AD-A956 434

LEE,VPA

(1)

DTIC
ELECTE
AUG 3 1 1993
S A D

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FINAL
ENVIRONMENTAL IMPACT STATEMENT

for

PALMDALE INTERNATIONAL AIRPORT
PALMDALE, CALIFORNIA
AIRPORT DEVELOPMENT PROGRAM

PURSUANT TO SECTION 102 (2) (c)
of the
NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
P. L. 91-190, AS AMENDED

JANUARY 1982

This document has been approved for public release and sale; its distribution is unlimited

93-20161

Best
Available
Copy

Air Force
Environmental Planning Division
(HQ USAF/CEVP)

Room 5B269
1260 Air Force Pentagon
Washington, DC 20330-1260

16 JUL 93

MEMORANDUM FOR DTIC (Acquisition)
(ATTN: Matt Mauby)

SUBJ: Distribution of USAF Planning Documents Forwarded on 1 JUL 93

ALL the Documents forwarded to your organization on the subject date should be considered Approved for Public Release, Distribution is unlimited (Distribution statement A).

Jack Bush, GM-14

Mr. Jack Bush
Special Projects and Plans
703-697-2928
DSN 227-2928

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: Decision Paper for Approval of Final EIS for a New Palmdale International Airport, California

Date: DEC 29 1981

From: Paul L. Galis, Director
Office of Airport Planning and Programming, APP-1

Reply to Attn of: Perrett:x63263

To: ARP-1

PROPOSED ACTION. The proposed Federal actions which are considered in this environmental impact statement (EIS) for the new Palmdale International Airport (PIA) are:

Reaffirmation of site location approval by the Secretary of Transportation on June 30, 1970;

Reaffirmation of airport layout plan (ALP) conditional approval by FAA on June 29, 1970;

Federal funding under the Federal Airport Act for initial land acquisition; and

Future Federal funding, in accordance with new airport legislation, of land and other airport development as more fully described below.

The airport is intended to serve a portion of the forecasted air transportation demand in the northern Los Angeles metropolitan area. The EIS has been prepared in response to a court order dated March 29, 1974, by the U.S. District Court for the District of Columbia, in Sierra Club v. Volpe, Civil Action No. 370-71. Approval of the EIS does not represent an authorization of the proposed Federal actions. However, it does indicate that these actions, with the conditions stated in this decision paper, would be environmentally acceptable. The approved EIS and all other relevant factors, including conditions established by the FAA in this EIS decision paper and by the Assistant Secretary for Policy and International Affairs in her letter of concurrence, will have a bearing on the final decision. A record of that decision will be prepared by the FAA at the appropriate time.

Federal funding would be considered for the first three phases of an ultimate five phase program as outlined on page 8 of the final EIS. Phase I is acquisition of approximately 17,700 acres of land east of Palmdale and directly adjacent to Air Force Plant 42, which presently handles a small number of commuter operations. This area would accommodate ultimate

DTIC QUALITY INSPECTED 3

UNANNOUNCED

Dist | Avail and/or Special
A-1

development of up to six parallel runways; four to accommodate air carrier operations and two shorter ones for general aviation activity. Phases II and III cover construction of the outer two parallel (14,000- by 150-foot) air carrier runways and related taxiways, aprons, terminal area, and access road. Phases IV and V include construction of a commuter general aviation complex and the remaining parallel runways. The latter two phases would not proceed without separate environmental approval.

If the above Federal actions are taken, the initial development (Phases II and III) is projected to begin in the mid-1980's and accommodate over 9 million annual passengers (MAP) by 1990, 12 MAP by 1995. The FAA forecast given in Table 5 on page 13 of the final EIS shows 55 MAP forecast for the Los Angeles hub by 1985 and 69 MAP by 1990 distributed among the five principal existing air carrier airports and Palmdale. More than half the 1985 and 1990 projections would be accommodated at Los Angeles International (LAX), with Ontario International (ONT) receiving the next largest amount. A total system projection to 85 MAP by 1995 reflects local forecasts beyond the period covered by FAA.

BACKGROUND. LAX has begun a major development program for which an EIS was approved on December 12, 1980. This program is intended to improve the overall efficiency of both aircraft and ground vehicle movement at LAX. An upper limit of 40 MAP has been established as a policy of the city of Los Angeles to reflect the desires of surrounding communities and minimize the adverse effects of noise, air pollution, and traffic congestion to a reasonable level commensurate with the highly urban environment and high air traffic demands of the Los Angeles area.

ONT is in a good position to absorb a rapidly increasing share of the total area demand and has taken initial steps in this direction with a runway improvement program environmentally approved in July 1978. A new parallel runway and runway extension will improve the capacity considerably. This development will also begin a program to relieve noise impacts over populated areas to the west. Ultimate development plans at ONT, which would further relieve noise impacts, will depend on resolution of possible airspace problems to the east in the direction of future runway extensions. As a further constraint, the California Air Resources Board has conditioned issuance of the required air quality certification on a limitation of 12 MAP or 125,000 annual air carrier operations at ONT. Any development which would accommodate growth beyond these levels would require concurrence by the Air Resources Board.

The other air carrier airports in the Los Angeles hub have physical and/or environmental constraints which limit their potential for handling air passengers to a combined total of less than 10 percent of total forecast demand.

Given the projections and limitations outlined above, it can be seen that an increasingly severe constraint would be imposed on meeting total area air transportation demands by the late 1980's or early 1990's without the development of a major new facility.

Section II of the final EIS, starting on page 10, gives the background for the proposed airport at Palmdale, including the fact that the site was approved and airspace clearance given by FAA in 1970. At the same time, a grant of $100,000 was given for initial land acquisition under the then existing Federal-aid Airport Program (FAAP). Construction of the airport was enjoined by State court action in 1972 and dispersal of the FAAP grant held up by mutual consent between FAA and the Los Angeles Department of Airports (DOA) in conjunction with the action of the U.S. District Court in 1974. Acquisition of the land for the proposed site by the DOA was not forbidden by either of these court actions and, in fact, DOA has acquired virtually all of the 17,700 acres identified as needed for ultimate development. Under the most recent airport grant legislation (the Airport and Airway Development Act of 1970, funding authorization now expired) reimbursement for land acquisition would be an allowable cost. New grant legislation has been proposed and is awaiting action by the Congress. It is reasonable to expect a similar provision will be included.

ALTERNATIVES. Section IV of the final EIS describes in detail the three alternative system concepts considered, as well as a brief examination of alternatives of remote terminals, diversion of general aviation, and other modes of transportation.

Concept A is described starting on page 199. This concept postulates that no major expansion would take place at the five existing major air carrier airports (LAX, ONT, Burbank-Glendale-Pasadena (BUR), John Wayne/Orange County (SNA), and Long Beach (LGB)), nor would a new facility be built. Only minor improvements would occur with the intent to maintain current levels of operational efficiency. Some increases in numbers of passengers and operations would be expected as a result of a shift in aircraft mix to larger capacities and improvements in air traffic control. However, a reasonable projection of total passenger capacity of this system of airports under these circumstances would be in the range of 45 MAP--significantly under the forecast demand of 69 MAP by 1990. Essentially, Concept A represents the "no action" alternative insofar as accommodating areawide demands. As indicated above, recent actions at both LAX and ONT have rendered this system concept academic.

Concept B, described starting on page 209, is basically a reflection of the current situation areawide with the now approved programs at LAX and ONT considered to be in place by 1985. These improvements would provide the system capacity to meet 1985 forecast demands. Thereafter, demand could only be met by increasing strains on the system in the form of worsening congestion and delays and accompanying environmental degradation at the existing airports, especially from noise and air pollution. Without some other facilities to relieve this pressure, there would likely be increased efforts to lift constraints imposed by physical limitations or environmental policy allowing for expansion or greater use of existing facilities beyond that presently contemplated.

Concept C explores various means to accommodate area demand beyond 1985. In the analysis starting on page 213, three categories of potential actions

are reviewed; i.e., use of military facilities, new airport facilities, and use of existing facilities beyond planned capacities. In summary, the potential solutions other than a major new facility would be either unavailable, impractical, or yield only a small increase in overall system capacity. Principal factors limiting use of military facilities in the area are availability for civil use and environmental factors. Development and use of existing civil airports beyond presently planned capacities could conceivably increase total passenger levels to about 70 MAP for the airport system if certain environmental constraints were lifted and increasing ground access congestion either tolerated or relieved. This level would meet forecast demands through 1990, but would not satisfy demands beyond that time.

Under Concept C, the remaining category of alternative means to provide for air transportation demand in excess of system capacity in the post-1985 period is a new major air carrier facility. Four possible sites were considered in the EIS. Construction of an offshore airport in the vicinity of Long Beach has been considered recently as a means to eliminate some of the noise problems and meet demands in the southern Los Angeles/Orange County area. Such a proposal, while technically possible, would create a different set of environmental problems and does not currently have the kind of political or institutional support which would be necessary for a major undertaking of this nature.

A land based site in Orange County, in the Chino Hills area, has been proposed. However, airspace conflicts limit its potential usefulness, and construction costs would be quite high because of mountainous terrain. The possibility of using a portion of the vast acreage around the Edwards AFB was dismissed for two principal reasons: the unlikelihood of the military either moving to a different location or allowing basically incompatible civil aviation usage of its area and the remoteness of the site from urban areas to be served.

The remaining alternative for a new airport to serve the needs is the site in Palmdale, described in detail in the EIS.

Alternative Technologies. Under this heading, starting on page 195, is a brief discussion of remote terminals, diversion of general aviation, and other modes of transportation. Collector terminals at central locations have the potential for handling upwards to 30 percent of the air passengers if tied in with a mass transit system. Such a system may be workable in the Nineties and would help relieve ground access congestion, but it does not deal with the problem of airport capacity. This problem can be addressed in some situations by considering diversion of general aviation. In the Los Angeles area, two factors mitigate against any significant contribution by this means of reducing demand at the major air carrier airports. First, the level of general aviation activity, especially at LAX, is already quite low with a trend toward reductions in this activity at LAX and the other major airports. Secondly, available sites to develop new reliever facilities in southern California are limited.

The use of various alternative modes of transportation has been explored briefly. The market area served through the Los Angeles region covers a wide spectrum of travel demands, from short-haul domestic to long-haul international. Given the limited current availability of viable alternate means to serve any major segment of this market with the time-distance advantages of air transportation, it is unlikely that any system could be developed in the timeframe of the proposed development which would realistically divert more than a small fraction of the forecast demand.

Position of California Department of Transportation (CALTRANS). CALTRANS has expressed opposition to the construction of a new airport at Palmdale and has indicated that future demand could be handled by greater civil use of U.S. Air Force Plant 42. The FAA has examined a copy of the California Aviation System Plan recently completed by CALTRANS under an FAA airport planning grant. This document provides comparisons between the State Plan and "Regional Plan Alternatives." The latter are based on adopted (or recommended) regional transportation plans for the three major urban areas in California. For the Los Angeles region, the State Plan has been compared with a 1980 recommendation by the Aviation Work Program Committee of the Southern California Association of Governments, although the State Plan notes that this Committee proposed (as of April 1981) a major update of the Regional Plan. The 1980 Regional Plan forecasted a total of 85 million annual passengers (MAP) for the Los Angeles region by 1995. (This projected number is still current as a local forecast.) In 1980, the Regional Plan recommended apportioning the 1995 demand as follows: 37.3 MAP at LAX, 24.6 MAP at a new Long Beach Harbor airport, 12.0 MAP at ONT, 2.7 MAP at a new Palmdale airport, and the remaining divided among five other area airports. (The Regional Plan update is expected to delete the Long Beach Harbor airport due to lack of support, thereby generating a greater demand to be accommodated at Palmdale and other airports.) The California Aviation System Plan notes that, for the Los Angeles Region, "The major difference between the 1995 Regional Alternative and the 1995 State Plan is the proposed Long Beach Harbor Airport and the new Palmdale facility. The State Plan suggests instead the expansion of Los Angeles International Airport to handle 55.3 MAP and the use of Plant #42 near Palmdale. All other elements for the region would be the same." In summary, this statement indicates that, while the 1995 projection of a demand of 85 MAP for the Los Angeles region as a whole is apparently not in dispute, the State projects a different apportionment of this demand with an 18 MAP increase at LAX over that projected by the Regional Plan, a deletion of 24.6 MAP from Long Beach Harbor, and the accommodation of the Regional Plan's Palmdale demand at Plant 42. In the absence of other adjustments, the logical conclusion is that the State Plan apportionment would result in a net deficiency of 6.6 MAP in accommodating the 85 MAP demand. The California Aviation System Plan does not address this deficiency. This Plan further contains various apparent internal inconsistencies which makes comparison difficult. The FAA notes problems with the State's assumption of being able to accommodate 55.3 MAP at LAX for reasons of congestion, environmental impacts, and conflict with the city's policy of an upper limit of 40 MAP for LAX. The FAA notes that the State Plan indicates more than a 40 percent increase in population around LAX exposed to noise levels

above 65 CNEL (Community Noise Equivalent Level) by 1995 using the State's projection as compared with the Regional Plan. The inability of LAX to accommodate the State's forecast would result in a greater overall net deficiency in meeting the 85 MAP demand in 1995.

The FAA does not agree with the State's assumption that future demand could be handled by greater civil use of Air Force Plant 42, especially when considering the magnitude of the demand which does not appear to be met elsewhere. Even if LAX does prove capable of accommodating 55.3 MAP, there is still an unaddressed and unaccommodated deficiency of 6.6 MAP in the State Plan. If this 6.6 MAP is not accommodated at existing civil airports and is added to the demand to be met by greater civil use of Plant 42, then Plant 42 would need to accommodate 9.3 MAP instead of 2.7 MAP. The Air Force has recently reconfirmed its position that any additional civil use of Plant 42 beyond the currently authorized level of 50 scheduled air carrier operations per day would not be acceptable. The current authorized level of civil use would not accommodate the demand projected by FAA and local forecasts or meet the otherwise unaccommodated demand in the State Plan.

CALTRANS advised the city of Los Angeles in August 1979 that it did not intend to reissue the State permit for a new Palmdale airport. DOA has challenged this position in a court action which is still pending. The FAA will require satisfactory resolution of this State permit issue prior to approving any Federal action, in accordance with Condition of Approval No. 2 in this decision paper.

NOISE AND LAND USE. The EIS describes the existing and anticipated noise environment and land use patterns at the proposed airport site in detail starting on page 33. As shown in Figure 2, page 12 of the EIS, the proposed airport is located immediately to the east of the existing Air Force Plant 42 with the principal urban areas to the south, west, and north (Palmdale, Quartz Hill, and Lancaster, respectively).

Activity at Plant 42 consists mostly of both civil and military aircraft production, flight testing, and touch-and-go practice with a total of about 130,000 annual operations. A small percentage (presently fewer than 10 operations a day) is by short-haul commuter airlines. While this number would be expected to increase somewhat if the new airport were not built, it would not affect total operations appreciably. This number and the noise levels associated with it (as shown in Figure 6, page 41) would remain fairly constant in the future without the new airport. If PIA is built, the east-west runway at Plant 42 would likely remain open for a reduced number of military operations. The crosswind runway would be closed and civil activity would move to the new facility, reducing the noise impact from military operations. The additive effect of operations at PIA could increase noise levels on Plant 42 itself and to the west by as much as 3 dB(A), but this level of increase would be over compatible land uses.

Projected noise contours in 1995 from activities at PIA are shown in Figure 9 on page 49. The contours show values in CNEL, in conformance with the methodology specified by the California Division of Aeronautics Noise Standards. CNEL is similar to the Day-Night Equivalent Noise Level (Ldn) except for a weighting of activity in the evening (7 p.m. to 10 p.m.). In application at PIA, it produces values within one unit of Ldn. These contours, based on normal operations without correction for possible noise abatement procedures, show that the 65 CNEL levels would be essentially contained within the property lines of Air Force Plant 42 and the proposed airport.

The 65 CNEL (and Ldn) level is considered by FAA as the level above which there are potential significant noise impacts over noise sensitive areas. It is also the level established by the California Noise Standards above which no incompatible land uses should exist after January 1, 1986. If they exist, the airport would be considered to have a noise problem. In order to continue to operate under the State law, such an airport would have to obtain an annual "variance." LAX and other major airports in California are in this category.

A principal advantage of the PIA site is that sufficient area would be under direct control of the owner/operator (city of Los Angeles) to prevent incompatible development within 65 CNEL. As indicated on page 2 of this paper, the DOA already owns most of this land. A scattering of residences has been acquired and either demolished or rented by short-term leases. A description of the relocation program and evidence of conformance with state and Federal relocation laws are given on pages 125 and 126 of the EIS. The evidence supports our conclusion that appropriate action has been and will be taken to the extent reasonable to restrict the use of land in the airport vicinity to purposes compatible with airport operations (now embodied in section 18(a)(4) of the Airport and Airway Development Act of 1970 (P.L. 91-258), as amended, and expected to be continued in similar form in future legislation).

The noise contour map and Table 11 on page 50 indicate the area and projected population within the 60 CNEL as well as 65 CNEL. The area within the 60 CNEL is protected under State of California Housing and Community Development Law and Noise Impact Management criteria to assure that noise sensitive uses (e.g., residences, schools, health facilities) are designed to limit internal noise levels to 45 CNEL. These criteria have been included in the draft North Los Angeles County (NLAC) General Plan, which has established goals and policies for land uses throughout the Antelope Valley area. The details of this plan are described in the EIS starting on page 63. A significant element of the plan is the proposed development of PIA and the influence it will have not only on development in the "buffer zone" around the airport but in determining the nature and intensity of land uses throughout the Valley. The pace of growth and urbanization in the North County area is projected to occur at a noticeably faster rate if the airport is built than it would otherwise, as briefly described on pages 61 and 62. One effect would be the conversion of some 43,000 acres (including the airport) of North County land from vacant or agricultural

land use categories to urban uses. However, because much of the land in North County is presently open, this conversion would represent only about a 5 percent reduction of vacant and agricultural land by 1995.

As indicated on page 64 of the EIS, the NLAC General Plan is still in draft form, and formal adoption is not expected until sometime in 1982. However, the Los Angeles County General Plan, of which the NLAC Plan is a component, was approved in November 1980.

AIR QUALITY. A detailed review and analysis of current and projected air quality impacts in the vicinity of the proposed airport and throughout the region are given in the final EIS starting on page 73. A number of comments on air quality were received on the draft EIS, especially from the Environmental Protection Agency (EPA). These comments and responses to them are given in Appendix A. Attachments to the appendix include updated emissions data from the draft EIS and background studies. Both California and Federal Ambient Air Quality Standards are given on page 74. Historical data from the Lancaster Air Monitoring Station (characteristic of ambient air quality in the Antelope Valley in which PIA would be located) indicates a high number of days a year exceeding standards for oxidants, hydrocarbon, and particulates in the period 1971 to 1974 (Table 13, page 77).

Projections of total pollutant emissions on a daily tonnage basis (Table 17 on page 85) include the immediate airport vicinity and the Antelope Valley and Santa Clarita Valley (depicted on Figure 2, page 12). The totals for Antelope Valley (which includes the airport) and Santa Clarita Valley (through which much of the airport related traffic would pass) include the effects of induced growth due to the airport. These amounts are 3 percent or less than the totals for the South Coast Air Basin. PIA would actually be located in the Southeast Desert Air Basin but, as indicated on the map on page 87, it is just on the edge of the South Coast Air Basin. The pollutant levels in the Antelope Valley are greatly influenced by this proximity and the prevailing weather patterns which bring in pollutants from downtown Los Angeles. A comparison with projected emission levels in the Southeast Desert Air Basin (Table 22, page 91), indicates that the total emissions from the airport and induced growth would account for a maximum of 11 percent of the pollutants listed.

For purposes of determining the extent to which the air quality standards would be affected by the new airport, it is necessary to examine the projected pollutant concentrations (weight per volume expressed in either parts per million or micrograms per cubic meter). This analysis is given in the EIS starting on page 92. Tables 23 and 24 (pages 93 and 94) indicate that violations of oxidant and suspended particulate standards would occur in 1995 whether or not the airport is built. Other data, not summarized in these tables, indicates that hydrocarbon standards will also be violated. The "build" case includes the effects of induced growth for each pollutant.

As indicated above, standards for these three pollutants are already exceeded in the area. As indicated in response to a question on air

quality (reference page A-7 of Appendix A in the EIS), a Nonattainment Plan for the area is not yet available. However, the State Implementation Plan required by the Clean Air Act does recognize PIA impacts which are expected to be included in the nonattainment plan. In any event, certification by the State as described below could not be given until they are satisfied that any increased emissions are within growth increments identified in the approved State Implementation Plan.

Particulate levels are due in large measure to natural causes with highest concentrations occurring during dust storms (the Antelope Valley has a relatively dry, warm climate and is in a portion of the Mojave Desert). A greater increase in particulate levels if the airport is built than otherwise is attributable in large measure to the effects of induced growth. However, this increase would represent a relatively small percentage of the total of this pollutant.

Violations in hydrocarbon and oxidant standards are interrelated by the chemistry involved. Hydrocarbons themselves are not a health hazard; they react with sunlight and oxides of nitrogen to form oxidants (or ozone) which can be harmful. The California Air Resources Board (ARB) focused on this situation in its letter dated October 10, 1978 (quoted on pages 97 and 98 of the EIS). In order to meet oxidant standards, ARB stated that 6 tons per day of hydrocarbons attributable to the airport must be offset by 1995. DOA has indicated by letter of February 19, 1981 (Appendix F of the EIS), that it intends to work with ARB toward developing a mitigation plan which will enable ARB to issue the required air quality certificate prior to any DOA request for Federal assistance for planned construction. At the present time, DOA, SCAG, and ARB have not reached an agreement on mitigation of air quality impacts.

Section 16(e) of the Airport and Airway Development Act of 1970 (P.L. 91-258), as amended, has required that no project application for a project involving airport location or runway location be approved unless the state certifies that there is reasonable assurance that the project will be located, designed, constructed, and operated so as to comply with applicable air quality standards. At this writing, it is expected that a similar provision will be included in new airport and airway legislation as proposed to the Congress in March 1981. In the case of Palmdale, airport location (or site) approval was given by the Secretary of Transportation prior to the effective date of legislation requiring air and water quality certification and has not been rescinded. Most of the land for the site has already been acquired by DOA. Therefore, the air and water quality certification is not required in conjunction with airport location or financial reimbursement of land acquisition but will be required prior to project application approval for any project involving runway location (i.e., construction of any runway or related work). However, a reasonable assurance from ARB that the air quality certification will be given, based upon development of an acceptable mitigation plan, will be required by the FAA prior to approving any proposed Federal action, including funding assistance, with respect to Palmdale as described herein. This requirement is delineated as the first Condition of Approval in this decision paper.

OTHER ENVIRONMENTAL CONSIDERATIONS. A number of other environmental impact areas are described in varying degrees of detail in the EIS (pages 99 to 194) commensurate with the nature and extent of such impact. It is clear that construction of a major airport in the Palmdale area would have a very noticeable effect on the rate of growth in the area. This will require that a number of decisions be made and funding be provided from several sources--local, State, and Federal--over the next decade or more to accommodate such change. The discussion under Noise and Land Use, above, describes the status of general land use planning for the area which recognizes the effect of the airport and sets guidelines and goals for integration of this major facility into the total community.

Many of the effects of more rapid urbanization than would otherwise occur can be quantified and plans made at this time. It must be pointed out, however, that this EIS cannot reflect complete assurance that all such plans will be carried out in the manner described or that all problems of urbanization associated with the induced effects of this major facility will be resolved. In this context, the following paragraphs summarize the more significant environmental effects of this proposal.

Flood Control. The site of the proposed airport lies across the drainage area of Little Rock Creek which begins in the Angeles National Forest to the south and fans out across the valley floor. Property damage in the past has resulted in limiting any recent development in the floodplain area. Some concern has been expressed about the extent of flooding which might occur if the Little Rock Dam should fail. The dam is part way up the mountain to the south and provides for excess runoff storage. Its unique structure of an arch made up of a number of smaller arches has been tested in recent years to verify its continued strength. Even if it should fail, however, the stored capacity would be insufficient to seriously affect the airport site.

The Little Rock Creek floodway and floodplain have been identified as a "Floodplain Management Area" in the NLAC General Plan referred to under Noise and Land Use, above. DOA has agreed to take necessary actions within its own resources and to cooperate with local agencies in carrying out the recommendations of this Plan, as listed on pages 105 and 106 of the EIS. The effect will be to limit development in the floodplain, facilitate groundwater recharge and protect its natural integrity. The U.S. Corps of Engineers has studied the streams flowing through the Antelope Valley and concluded that the construction of flood control structures by the Corps was not justified given the limited development in the floodplains and local plans for future controls.

Insofar as control of stormwater flow at the airport site itself is concerned, several alternative schemes have been proposed which would permit flow around or through the airport site across recharge areas. DOA will incorporate one of these schemes in the detailed master plan for the airport construction. It will also assure that provision is made to control increased runoff from impervious areas of the airport itself so as not to increase total discharge rates downstream (north of the site). This

will be done through use of spreading grounds, soft bottom channels, and retention ponds so as to retain groundwater recharge capability and protect flow rates across the dry lakes to the north which are critical to the mission of the Edwards Air Force Base.

Further discussion of flood control, drainage, and water supply is included on pages 102 through 110 of the EIS. Based on the description in the EIS and DOA's intention to cooperate in carrying out flood control measures indicated, the proposed airport development is not considered a "significant encroachment" as defined in DOT Order 5650.2, Floodplain Management and Protection.

Socioeconomic Effects. The construction of a major new air carrier airport in the Antelope Valley would stimulate an appreciable increase in the population growth rate as illustrated in Table 27 on page 116 of the EIS. A doubling of the population is forecast throughout the valley by 1995 over the current population of around 100,000 if the airport is built. This represents over twice the rate of population growth than would be expected without the airport. More than half this growth would be in Palmdale, the nearest urban center to the airport site.

An increase in the growth rate would initially be stimulated by an influx of construction workers with demands for both temporary and permanent housing and public services. This in turn would create opportunities for new businesses and diversification of employment. Along with the social and economic gains to be realized with such activity there is also the potential for social problems associated with increased urbanization. Issues ranging from employment to education, and poverty to public safety are discussed briefly on pages 117 to 122 of the EIS. As indicated in the discussion under Noise and Land Use above, goals and policies for the area set forth in the NLAC General Plan reflect the influences PIA would have on the character and timing of development. Decisions to implement specific provisions of the Plan would need to be made by local entities when the time was ripe. Environmental approval followed by actual construction of the proposed airport would be a major event in triggering the need for these decisions. It must be emphasized, however, that Federal approval of the airport proposal cannot guarantee the timely execution of a number of local decisions needed to assure the avoidance or minimization of adverse induced socioeconomic impacts.

Ground Access. The EIS, starting on page 127, contains detailed information on existing and proposed highway networks throughout the region and locally in the Antelope Valley area. The proposed airport site is about 61 miles north of the city of Los Angeles' central business district with access via various interstate highways to the Antelope Valley freeway (State Route 14) (see Figure 14 on page 128). The draft NLAC General Plan identifies a proposed limited access corridor from Route 14 to the airport about 10 miles long (see Figure 11, page 70 of the EIS). The exact route would be determined in conjunction with detailed master planning for the airport.

Regional and local ground traffic forecasts have been projected to compare volumes with and without PIA. Table 28 on page 134 shows a breakdown of airport generated traffic on the principal freeway segments by location of trip destination. Over 80 percent of airport generated traffic is projected to arrive from the southwest over Route 14 and the new access road. Most of this traffic would originate from locations south of the San Fernando Valley, but fully a third would come from the San Fernando Valley area--some 40 to 50 miles from PIA. The remainder would originate from the much less populated areas of North Los Angeles County (in the airport vicinity) and Ventura County to the west.

In addition to air passenger generated traffic, an approximately equal amount would be derived from growth in population induced by the airport. This is reflected in Table 29 on page 136. Route 14 south of the airport would experience the greatest increase in total traffic in 1995, from 79,900 to 123,400 average daily person trips. Person trips are converted to average daily vehicle trips by use of conversion factors explained at the bottom of page 135 and alternative modal splits ranging from 90 percent auto/10 percent bus to a 60/40 split. The number of lanes of highway needed to accommodate forecast traffic is then computed using a factor of 9 percent average daily vehicle trips for peak hour demand and up to 1,800 vehicles per hour adjusted for terrain and traffic mix.

The most affected segment is Route 14 (Antelope Valley Freeway) from I-5 to the new airport access road. If PIA were not built, four lanes would be sufficient for projected 1995 traffic. With PIA, two additional lanes would be required to handle airport generated and induced ground traffic in 1995. If the high percentage of bus usage is realized, one of these lanes could be converted for exclusive bus use. Portions of this 35 mile stretch of the Antelope Valley Freeway are already 6 lanes. Generally, the environmental impacts from widening the entire length to 6 lanes are expected to be relatively minor since expansion was contemplated when the highway was initially planned and built. Adding 2 lanes will essentially involve grading and paving along existing right-of-way. The specific timing and need for improvement of this principal access corridor will be determined by the actual schedule of PIA development and realization of projected usage. In any event, appropriate environmental assessments will be accomplished prior to highway construction. At worst, failure to provide additional highway capacity may ultimately constrain full projected usage of PIA.

Previous studies by DOA have examined alternative access routes or modes, including a more direct freeway route through the Angeles National Forest and mass transit options. In terms of overall costs and environmental factors, widening the Antelope Valley Freeway was identified as the preferred alternative, with use of buses the most feasible mass transit mode. As indicated above, alternative auto/bus modal splits have been considered in determining numbers of lanes required. DOA intends to encourage transit use by development of remote terminals in the San Fernando Valley and in Los Angeles.

Circulation of traffic in the immediate vicinity of Palmdale has been discussed at some length in the EIS. The principal roadway needs have been identified in the draft NLAC General Plan discussed above. Changes in land uses which will affect and be affected by transportation needs in the course of the next two decades in the Palmdale area will depend in large measure on the timing of PIA development and use. General policy, including encouraging a high level of transit use and developing a limited access corridor to the airport, is outlined in the EIS.

In addition to the discussion of the various aspects of ground transportation and access on pages 127 to 146 of the EIS, Appendix A, pages 20 to 26, contains responses to various comments made on this draft EIS on this subject.

Sewage Treatment and Solid Waste. These topics are discussed on pages 147 to 157 of the EIS. Projections of sewage load have been estimated through 1995 with and without the airport. Proposals by county sanitation districts to expand two of their existing plants and by DOA to provide a new facility on the airport should be sufficient to handle projected increases. Future plans by DOA include provision for pretreatment of industrial waste and separation of waste from maintenance and fuel spills. Separate storm and sanitary waste collection systems will be built as part of the overall systems to assure proper handling and treatment of the different categories of waste and the ability to meet water quality standards.

Disposal of solid wastes generated during construction will be carefully controlled to minimize effects on air and water quality. Long-term waste generation as a result of both the airport itself and induced development is projected to begin to exceed existing landfill capacity by the mid-Nineties. Proposals for solid waste disposal management for the Antelope Valley have been considered and are expected to be implemented when the airport is underway. A number of potential sites in the valley and in surrounding mountain canyons may be available, but care will be taken to locate the site so as to minimize adverse impacts and allow for reclamation and reuse. Another important factor is to prevent the location of sites near the airport which could attract birds and become hazards to air operations. DOA will use its influence in this regard.

The California Regional Water Quality Control Board was sent a copy of the draft EIS for review but had no response. Their only substantive comment, made in conjunction with DOA's earlier environmental study of the proposed airport, stated that the impacts of watershed development should be assessed. This has been done in conjunction with the study of flood control discussed above. EPA had a concern about wastewater treatment and asked that the Water Quality Control Board determine if any discharge requirements would be violated. (Reference EPA comments on page A-iii and response on page B-42 in Appendices A and B.) Based on evidence in the EIS, including mitigation measures, there is reasonable assurance that the water quality certificate required by section 16(e) of P.L. 91-258 will be obtained prior to any project involving runway location.

Flora and Fauna. A description of the ecology of the Antelope Valley and the effects of construction on flora and fauna are described on pages 158 through 165 of the EIS. DOA will develop as part of the detailed master planning for the airport a resource management plan to protect the fragile desert environment during construction and provide for revegetation where possible. It will also work with other groups in the valley to develop wildlife and wildflower sanctuaries. Review for endangered or threatened species has been conducted, with a statement from the U.S. Fish and Wildlife Service that there are no known listed species on the site (see Appendix E, page E-1).

Energy. Projections of energy consumption if PIA were built are included in the discussion of this impact category starting on page 175 of the EIS. Of the three principal categories of users (i.e., aircraft, dwellings, and ground vehicles), the latter represents the largest change in amount of consumption if the new airport were built. As indicated above under Ground Access, the distance most passengers would have to travel would exceed 40 miles.

A comparison has been made of total vehicular miles of travel and fuel consumption of the projected 12 MAP to PIA in 1995 over what it would be to LAX if PIA were not built. The difference in these figures when added to the difference resulting from both direct and indirect employee travel to work adds up to about 12 million gallons more fuel annually.

Another major source of energy use which would be affected considerably if PIA were built is that used in new homes projected as needed to house the increased population induced by the airport and related activities. Over 35,000 additional single-family dwellings are forecast as needed by 1995 in the Antelope Valley area with PIA. Energy usage has been estimated as the equivalent of nearly 47 million gallons of fuel annually. This is based on conversion from kilowatts of electricity to therms of gas per dwelling. If PIA were not built, most of the passenger demand forecast at PIA through 1990 (about 9 MAP) could be absorbed at existing airports in the Los Angeles area as indicated in the discussion of Alternative Concept C on page 3 of this paper. The amount of population increase and need for new homes resulting from such circumstance, however, is difficult to project. Presumably, the number of new jobs and other factors which would determine the level of induced growth would be less in an already densely urbanized area. Offsetting this to some extent is the fact that the average energy use for dwellings in the central Los Angeles area is about 15 percent higher than in Antelope Valley based on information from gas and electric companies serving the area.

Fuel consumed by aircraft in the landing and takeoff cycle has also been estimated for PIA, but overall aircraft fuel use would not vary appreciably because of the differences in location of the airport. If anything, one would expect to experience a lower total fuel use by aircraft using the airport with lower total operations assuming it is designed to handle the forecast traffic efficiently.

The following is presented to put projected energy use into perspective--that is, while the additional 12 million gallons for vehicular use is considerable, it represents only about one ten-thousandth of the over 110 billion gallons estimated for U.S. highway use in 1990. Highway fuel consumption accounts for four-fifths of all transportation petroleum use in the U.S., air travel only about 8.4 percent, according to the Aviation Energy Conservation Policy issued by OST and FAA in January 1981.

MITIGATION MEASURES. Noted throughout the discussion of environmental impacts in the EIS and summarized in Section V are a number of measures which would help to minimize the effects of construction and operation of the major new airport at Palmdale. Because of the number of agencies--local, State, and Federal--which would be involved and because construction of the airport would take place over a number of years, it is unreasonable or not possible to obtain firm commitments on a number of issues. The Los Angeles Department of Airports has pledged to work closely with all affected parties to minimize overall environmental effects. Measures directly under the control of DOA, such as controls during construction, will be a part of standard construction specifications and practices. Relocation, most all of which has already taken place, has and will conform to applicable State and Federal relocation laws and procedures. As indicated under the discussion of air quality, reasonable assurances regarding air quality certification will be required prior to approval of any proposed Federal action described in this paper.

Minimization of the adverse effects on land uses most directly impacted by the proposed airport has been assured by the fact that over 17,000 acres of land have already been acquired by DOA. It is the secondary impact of induced growth which will most significantly affect the future growth patterns of the entire Antelope Valley. Control of land use patterns affected by this growth will be much enhanced with passage of the proposed NLAC General Plan. This action is now expected sometime in 1982, well ahead of any major airport construction activity. The NLAC Plan, if approved, will provide a definitive master plan for growth of the whole area, but it cannot guarantee that every facet will be developed as proposed. If this Plan is not approved, then future FAA grants for airport construction must be preceded by a review of what other measures are proposed to absorb induced growth.

AIRSPACE UTILIZATION. An important issue raised by the Naval Weapons Center at China Lake and by the Department of the Air Force concerns the effects of the proposed PIA on military operations in an airspace complex identified as R-2508 and at Air Force installations in the area. Of special concern are Edwards AFB, 20 miles to the north; George AFB, 35 miles east; and Air Force Plant 42 adjoining PIA to the west. Letters from the Navy, dated April 16, 1979, and the Air Force, dated May 30, 1979, are included at the beginning of final EIS Appendix B.

The R-2508 complex is a vast area of controlled airspace extending from about midway between the PIA site and Edwards AFB northward over 160 miles

and averaging about 100 miles wide (east to west). This area encompasses both Edwards AFB and the China Lake Naval Weapons Center and includes a number of smaller restricted areas and military operating areas referenced in the Navy and Air Force letters.

Airspace utilization is described in general starting on page 24 of the EIS. Responses to the concerns of the military on the issue are contained in Appendix B starting on page B-37. FAA has been coordinating with the military for over a decade, culminating in the issuance by FAA of "Addendum No. 2" dated April 19, 1979, to a June 29, 1970, airspace determination (reference pages B-46 through B-48 of the EIS). Addendum No. 2 refers to a phased program called the R-2508 Enhancement Plan which is a joint Federal Aviation Administration/Department of Defense effort to upgrade air traffic control capabilities in the complex.

EIS Appendix B also contains copies of a report and letters preceding issuance of Addendum No. 2, the most significant being the "Report on the Palmdale International Airport Encroachment Issue" dated October 13, 1978, and signed by the Commanders of the four military installations most affected. This report indicates that the then-proposed FAA addendum had been concurred in by the R-2508 Joint Policy Planning Board and that it was "considered satisfactory and contains the protection of military airspace primacy desired." Concurrence by the Joint Logistics Commanders was recommended and subsequently obtained.

FAA Addendum No. 2 includes a key statement of policy:

> "The FAA recognizes the military's needs concerning airspace requirements within the Complex. Therefore, joint and shared use by civil and non-participating military aircraft will be on a non-interference basis."

This policy statement is referenced in both the Navy and Air Force letters of comment with the request that it be specifically recognized in the EIS. By virtue of its inclusion in the final EIS, it is so recognized.

The May 30, 1979, letter from the Air Force expresses serious concerns with respect to the potential for airspace conflicts between the proposed PIA and Edwards and George Air Force Bases. The letter also raises the question of possible eventual closure of Plant 42 due to airspace encroachment. FAA fully intends to continue to work with the military to implement a program of mutually acceptable airspace use in conjunction with authorizing operation of the proposed Palmdale International Airport.

PUBLIC INVOLVEMENT. Section VIII of the final EIS contains a brief summary of public hearings and meetings dating back to March 1969 on the subject of the proposed major new airport at Palmdale. In 1974 and again in 1976, hearings were held to provide formal opportunities to comment on the impacts of the proposed airport. The November 1974 hearings were preceded by the formation of a Citizens Information Committee to provide a forum for community input into the environmental review process. A primary function

of the Committee was to review and comment on eight environmental study task reports which became input into the 1974 DOA draft EIS. Comments received at the 1974 hearings were mostly favorable, with criticism principally from two sources--the Sierra Club and the Department of the Air Force. Changes were made to reflect these comments and a revised draft made available for the 1976 hearing. Further revisions were made by the DOA and a six-volume draft EIS report transmitted to the FAA in February 1978. This 1978 document is identified as a reference document for the FAA draft EIS circulated for Federal agency review by FAA in February 1979.

Throughout the environmental review process, numerous Federal, State, regional, and local agencies as well as private institutions and individuals provided input and comments. The 1978 DOA draft EIS includes a more extensive summary of comments made at the 1974 and 1976 hearings than subsequent documents. It contains evidence of proper notice of public hearing in local media and includes documents to support the fact that A-95 review by State and areawide clearinghouses was conducted. Substantial evidence exists to support the conclusion that fair consideration has been given to the interests of communities in the airport vicinity and that proposed development is reasonably consistent with plans for development of the area.

CONDITIONS OF APPROVAL. Approval of the EIS is subject to the understanding that the proponent Los Angeles Department of Airports will use its best efforts to influence actions by agencies not under its control to minimize adverse effects of the proposed airport and the growth it will induce and to take those actions under its control as indicated at various points in the EIS and summarized in Section V. As indicated in the discussion of mitigation measures, above, DOA's action will include controls during construction and conformance with applicable relocation laws. DOA must also obtain air and water quality certifications from the State of California, as discussed above, prior to requesting FAA approval of any project application involving runway location. DOA will incorporate energy conservation measures in the design and operation of the airport insofar as possible within its jurisdiction. The merits and safety of aircraft towing is under study by the FAA. Before undertaking any extensive towing program at PIA, the Los Angeles Department of Airports will obtain approval of FAA for such program.

Approval of the EIS is also subject to the following environmental conditions. These conditions are considered critical to any subsequent FAA decisions with respect to the proposed Federal actions. The first two conditions must be met before any Federal action described herein may be taken:

1. DOA shall continue to prepare a mitigation plan that will reduce emissions of pollutants which will exceed state and National Ambient Air Quality standards, with particular attention to hydrocarbons. The Plan must be acceptable to the State of California Air Resources Board, and evidence from that Board indicating a reasonable assurance that air quality

certification will be given for future runway construction at Palmdale must be submitted to FAA for review and concurrence prior to any Federal action, including funding assistance.

2. There must be evidence that the issue of a site permit from CALTRANS has been satisfactorily resolved through action by the State or the courts prior to any Federal action, including funding assistance.

In order to provide future Federal funding, the next four environmental commitments must be included in a grant agreement for land reimbursement. These commitments must be carried out by DOA whether or not future Federal funding for airport construction is requested.

3. DOA shall support the land use policies and plans set forth in the proposed North Los Angeles County General Plan. If this Plan is not adopted prior to airport construction, DOA shall prepare an analysis of other measures proposed to manage and mitigate the impacts of the expected induced growth and submit this analysis to FAA for review and concurrence before proceeding with construction.

4. DOA shall include in the design of the airport and implement the various measures described in the environmental impact statement concerning protection of water quality, establishment of a water distribution system, floodplain protection, and sewage treatment facilities and solid waste disposal.

5. DOA shall develop a resource management plan as described in the environmental impact statement during the master plan stage and implement it during the airport operational stage, with the objective of protecting and enhancing the endemic vegetation cover and animal habitats.

6. DOA shall employ controls on land within its jurisdiction to ensure land uses compatible with the airport's operations and shall recommend to FAA the establishment of noise abatement procedures needed to eliminate incompatible uses within the 65 CNEL noise contour in future years.

OPTIONS AVAILABLE. The environmental impact statement may be either approved or disapproved.

RECOMMENDATION. I recommend that you approve the EIS, subject to the conditions set forth above.

Attachment

CONCUR: _____ DATE: 4/11/

Assistant Secretary for Policy and
International Affairs, P-1

APPROVED: William J. Shea DATE: January 14, 1982

Associate Administrator for
Airports, ARP-1

DISAPPROVED: _____ DATE: _____

Associate Administrator for
Airports, ARP-1

SUMMARY SHEET

PALMDALE INTERNATIONAL AIRPORT - PALMDALE, CALIFORNIA
FINAL ENVIRONMENTAL IMPACT STATEMENT

Department of Transportation
Federal Aviation Administration

Gerald M. Dallas, Chief, Program Support Branch, AWE-602
Federal Aviation Administration
P. O. Box 92007, World Way Postal Center
Los Angeles, California 90009, (213) 536-6243

1. Name of Action - Administrative

2. Proposed Action - The proposed Federal Action is:

   a. Provision of Federal funds under the Federal Aid Airport Program (FAAP) and under the Airport and Airway Development Act (PL 91-258) as amended for land acquisition and the construction of airport facilities.

   b. Reaffirmation of Site and Airport Layout Plan Approval.

3. Summary of Environmental Impacts

   a. The Human Environment - There will be a modest population growth which will result in additional urbanization. Approximately 26,500 acres of vacant and agricultural land will be converted to urban and airport use. Relocation of residents located on the airport site has been completed. No public lands are involved.

   b. The Natural Environment - No archeological or historical features of major significance were found to exist on the site. Considering total emissions on a regional scale, differences in air quality with or without the project are small. All aircraft noise at or above the 65 CNEL noise level will be within the airport boundary in compliance with State of California Noise Regulations.

      The Airport will be able to provide its own source of water. A distribution system for imported water will be needed to support future non-airport activity. Airport development will impact

surface drainage and run-off patterns. The ecology of the airport site will change. Protected species of the Golden Eagle, Prairie Falcon, Desert Tortoise and rare Mojave Ground Squirrel inhabit the area. A large amount of the acreage purchased for airport purposes will remain available for agricultural use or be undisturbed.

4. Summary of Major Alternatives Considered

   a. No major airport expansion in the Los Angeles area.

   b. Expansion of existing airports in the Los Angeles area.

   c. Selection of new airport sites, including military bases.

5. List of Federal and State Agencies from which comments have been requested

   Federal

   Environmental Protection Agency
   Department of Agriculture
   Department of Commerce
   Department of Defense
   Department of Health, Education & Welfare
   Department of Housing and Urban Development
   Department of Interior
   Department of Transportation - Federal Highway Administration

   State

   Clearing House
   Department of Transportation
   Department of Conservation - Division of Mines and Geology
   Department of Fish and Game
   Department of Recreation
   Water Resources Control Board
   Air Resources Board

6. Date Draft Statement made Available to EPA and the Public

   February 5, 1979

7. Date of Public Hearings

   November 12 and 13, 1974 and December 9, 1976

8. Changes in this Final EIS from the February 1979 Draft EIS

In response to comments on the length of the February 1979 Draft EIS, the FAA has reduced the number of pages by referencing, combining tables, and eliminating excessive verbage. Cross references in the Final EIS are to other pages in the Final unless specifically stated otherwise.

TABLE OF CONTENTS

		Page No.
Table of Contents		i
List of Figures		iii
List of Tables		iv
Bibliography		vii
Reference Documents		viii
List of Abbreviations		ix
Section I:	Project Description	1
	Need for the Project	1
	Description of Proposed Action	8
	Project Purpose	8
Section II:	Project Setting and Background Information	10
	Existing Environmental Setting	19
Section III:	Probable Impacts	33
	Noise	33
	Existing and Planned Lard Uses	54
	Air Quality	73
	Water Quality and Flood Hazard	99
	Social Impacts	111
	Airport Access and Regional Ground Transportation	127
	Sanitary Wastes	147
	Sewage and Nonsolid Wastes	147
	Solid Wastes	152

Table of Contents - Cont'd

		Page No.
	Ecology.....	158
	Economy.....	166
	Energy.....	175
	Geology.....	182
	Archeological/Historical Sites.....	190
	Induced Socioeconomic Impacts.....	192
Section IV:	Alternatives to the Project.....	194
Section V:	Actions to Minimize Unavoidable..... Adverse Effects	221
Section VI:	Relationship Between Short-term..... Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity	232
Section VII:	Irreversible and Irretrievable..... Commitments of Resources	236
Section VIII:	Summary of Public Hearing..... Issues and Responses	239

Appendices

A.	Response to Comments on Air Quality.....	A-1
	(U.S. Environmental Protection Agency,....	A-1
	U.S. Department of the Navy),.....	A-12
	Energy and Airport Access.....	A-15
	(U.S. Department of Transportation)	
B.	Other Comments and Responses.....	B-1
C.	Circulation List for DEIS and FEIS.....	C-1
D.	Archaeology Survey.....	D-1
E.	Endangered Species and Historic Preservation Coordination.....	E-1
F.	Assurances.....	F-1

LIST OF FIGURES

Figure		Page
1	Location of Proposed Palmdale International Airport in Relation to Southern California Urban Areas	11
2	Location of Proposed Palmdale International Airport in Relation to the Antelope Valley and the Los Angeles Area	12
3	Proposed Palmdale International Airport General Airport Plan	16
4	Existing Air Traffic Flow	25
5	Proposed Arrival and Departure Patterns for Palmdale International Airport	27
6	Projected Noise Contours for U.S. Air Force Plant 42	41
7	Existing Land Use in the Vicinity of Palmdale, Lancaster, and the Proposed Airport	42
8	Flight Tracks	45
9	CNEL Noise Contour, Case 1, 1995 Normal Pattern	49
10	Existing Zoning in the Vicinity of Palmdale, Lancaster, and the Proposed Airport	58
11	Palmdale Land Use Plan	70
12	Location of Airports and the Air Basins	87
13	Alternative Structural Solutions for Flood Protection	109
14	District 7 Highway System	128
15	Diagrammatic Layout of Access Freeway Segments	132
16	Geologic Hazards	185

LIST OF TABLES

Table		Page
1	Levels of Air Carrier Activity at Selected Air Facilities in Southern California - 1977	1
2	Comparison of Origin of Passenger by County: SCRASS and State Department of Aeronautics	4
3	Comparison of Average Annual Growth Rates by County - 1970-1990	5
4	Six-county Comparison of Population and Average Annual Growth Rate - 1970-2000	5
5	Total Annual Passenger Forecasts, Greater Los Angeles Area - 1976-1990	13
6	MAP Demand Distribution by Length of Haul and County of Origin, 1995 - Palmdale International Airport	14
7	CNEL Regulatory Units	34
8	Estimated Trip Length Distribution of Average Daily Departures in 1995	43
9	Plant 42 Runway Operations if PIA Is Not Built	44
10	PIA Study Case Listing	46
11	Population and Off-airport Land Uses Impacted in 1995	50
12	Ambient Air Quality Standards for Pollutants Discussed in this Study	74
13	Number of Days Air Quality Did Not Meet Federal Standards at the LAAPCD-Lancaster Station	77
14	Annually Averaged Typical Total Emissions at the Palmdale Airport from the Various Sources With and Without PIA	80
15	Annually Averaged Emissions at PIA from Collateral Ground Sources	83

LIST OF TABLES (Continued)

Table		Page
16	Annually Averaged Emissions at PIA from Vehicles Entering and Leaving the Airport	84
17	Total Emissions Inventory for the Airport Area, the Antelope Valley (including airport), the Santa Clarita Valley, and South Coast Air Basin	85
18	Distribution of Air Passengers With and Without PIA	88
19	Distribution of PIA Generated Vehicle Trips With and Without PIA	88
20	Regional Emission Comparison With and Without PIA for 1995	90
21	Total Emissions for South Coast Air Basin	91
22	Total Emissions for Southeast Desert Air Basin	91
23	Predicted Ozone and CO Concentrations at Lancaster	93
24	Predicted NO_2 and Particulate Concentrations at Lancaster	94
25	Population Growth Characteristics - North Los Angeles County and Santa Clarita and Antelope Valleys, 1940-1973	113
26	Palmdale-Lancaster Population Characteristics - 1970	114
27	Estimated Population Growth in North Los Angeles County With and Without PIA - 1970-95	116
28	Average Annual and Daily Person-trips - 1985, 1990, 1995 - Palmdale International Airport	134
29	Total Average Daily Person-trips - 1995 - LARTS and Palmdale International Airport, Each Freeway Segment	136
30	Average Daily Vehicle-trips - Alternative Modal Allocations, Each Freeway Segment - 1995	138

LIST OF TABLES (Continued)

Table		Page
31	1995 Peak Hour Trips, Autos and Buses and Freeway Lane Requirements	139
32	Average Daily Vehicle-trips - Palmdale International Airport Access Road	140
33	Sewage Generation, Antelope Valley With and Without PIA - 1975-95	149
34	Annual Solid Waste Generated and Landfill Needs, Antelope Valley With and Without PIA - 1975-95	154
35	Construction Costs for Palmdale International Airport	169
36	Palmdale International Airport Derived Employment - 1985, 1990, and 1995	170
37	Estimated Costs for Public Service Improvement, Antelope Valley With and Without PIA - 1980-95	174
38	Cost Estimates - Selected Airports - 1975-90	218

LIST OF ABBREVIATIONS

SCAG	-	Southern California Association of Governments
SCRASS	-	Southern California Regional Aviation System Study
DOA	-	The City of Los Angeles, Department of Airports
MAP	-	Million Annual Passengers
NLAC	-	North Los Angeles County
CALTRANS	-	California Department of Transportation
RPC	-	Regional Planning Commission
PIA	-	Palmdale International Airport
PPO	-	Passengers Per Operation
CNEL	-	Community Noise Equivalent Level
L_{dn}	-	Day-Night Equivalent Noise Level
SENEL	-	Single Event Noise Exposure Level
NEF	-	Noise Exposure Forecast
DU/AC	-	Dwelling Units Per Acre
APCD	-	Air Pollution Control District
USGS	-	United States Geologic Survey
LARTS	-	Los Angeles Regional Transportation Survey
ADPT	-	Average Daily Person-Trips
LTO	-	Landing and Takeoff

BIBLIOGRAPHY

North Los Angeles County General Plan, Volume 1, "Plan Summary, EIR Guide," Preliminary Draft, November 1974.

North Los Angeles County General Plan, "Antelope Valley Areawide General Plan, Volume 1, Land Use, Environmental Impact Report," Cycle IV, 30 November 1975.

North Los Angeles County General Plan, "Antelope Valley Areawide General Plan, Volume 2, Housing Revitalization, Community Design, Human Resources," Cycle IV, 30 November 1975.

North Los Angeles County General Plan, "Palmdale Community General Plan," Cycle IV, 30 November 1975.

ITT Technical Services, Inc., "Air Installation Compatible Use Zone Study, Air Force Plant 42, Palmdale, California."

REFERENCE DOCUMENTS

The following is a list of documents used in the preparation of this Environmental Impact Statement (EIS). These documents are available at the FAA Airports Division Office. Agencies are requested to contact Mr. Gerald M. Dallas, Phone (213) 536-6243 if they wish to obtain copies of the listed documents, during early part of the coordination process so as to enable them to complete their review in due time.

Los Angeles Department of Airports (DOA) Draft EIS for Palmdale International Airport, Volume One, "Executive Summary," January 1978.

DOA Draft EIS for Palmdale International Airport, Volume Two, "Description of and Need for the Proposed Project," January 1978.

DOA Draft EIS for Palmdale International Airport, Volume Three, "The Human Environmental Impacts," January 1978.

DOA Draft EIS for Palmdale International Airport, Volume Four, "The Natural Environmental Impacts," January 1978.

DOA Draft EIS for Palmdale International Airport, Volume Five, "Alternatives to the Project, Adverse Impacts, Mitigating Actions, and Public Issues and Concerns," January 1978.

DOA Draft EIS for Palmdale International Airport, Volume Six, "Appendices," January 1978.

SECTION I: PROJECT DESCRIPTION

NEED FOR THE PROJECT

The Regional Air Transportation System in Southern California

The following examination of Southern California's air transportation system reviews the forecasts in a regional perspective.

Of the more than 200 airports in Southern California, 10 may be considered air carrier airports; however, six of these provide only short-haul service -- i.e., service 500 miles or less from the originating airport. These are Santa Barbara in Santa Barbara County, Meadows Field in Kern County, Burbank-Glendale-Pasadena and Long Beach in Los Angeles County, and Orange County and Imperial County airports. Of the four remaining airports, only one -- Los Angeles International -- provides the entire range of length of haul. Palm Springs, Ontario, and San Diego (Lindbergh Field) provide medium-haul service.

In addition to these air carrier airports, there are some scheduled air services provided by commuter and air taxi operators at other airports including Riverside, Oxnard, Inyokern, Santa Maria, and Palmdale. There are also 19 major military airfields in Southern California and 94 general aviation airports. Table 1 presents the actual 1977 level of activity for some of the major air carrier airports in Southern California.

TABLE 1

LEVELS OF AIR CARRIER ACTIVITY AT
SELECTED AIR FACILITIES IN SOUTHERN CALIFORNIA - 1977
(except San Diego County)

Airport	Air Carrier Operations	Air Carrier Passengers
Los Angeles International	427,000	27,514,000
Burbank-Glendale-Pasadena	46,000	1,772,000
Orange County	45,000	2,042,000
Ontario International	47,000	1,514,000
Long Beach	19,000	446,000
Total	584,000	33,288,000

Areas Served by the Los Angeles Region Air Carrier Airports

Spatial Distribution of Population and Economic Activity in the Greater Los Angeles Area

Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial counties had a combined estimated population in 1974 of 10,456,452[1], up 4.1% from the 1970 Census figure of 10,044,623. This compares with an increase by 1970 of 2,220,902 -- 28% -- over the April 1960 population of 7,823,721. On an average annual basis, the growth between 1960 and 1965 was 3.8%; between 1965 and 1970 it slowed to a rate of 1.6%. The latest figures indicate that for the six counties as a whole the average annual growth rate is about 1%.

On an individual county basis, Los Angeles County, while the most populous, has had a dramatic decline in growth rate -- from 2.4% per year between 1960 and 1965 to 0.8% annually between 1965 and 1970 -- and an actual decline in population between 1970 and 1974. However, the population is again steadily growing.

In the early 1960s, Orange County (followed closely by Ventura) exhibited the most dramatic percentage increases in population. Between 1965 and 1970, it continued to show the strongest growth, although the annual increase was only 4.8% compared to 12.5% between 1960 and 1965. Latest figures show that Orange County continues to lead in average annual growth rate.

In 1970, civilian employment for the five-county area stood at 4,131,000. This compares with civilian employment of 3.7 million in 1960. The average annual growth rate during this period was 3.2%.

Of the counties, Los Angeles leads in absolute numbers of employed, with Orange and Ventura counties showing the strongest annual growth rates.

While Los Angeles County currently accounts for approximately 77% of total employment in the five-county area, the increase in employment concentration has been in the outlying areas -- Orange, Riverside, San Bernardino, and Ventura.

Within Los Angeles County, the major employment concentrations are in the Los Angeles central area; the southeast area, including Downey, Montebello, Whittier, and La Mirada; the South Bay-Long Beach area, including Torrance, Long Beach, and San Pedro; and the San Fernando Valley.

---

1. Southern California Association of Governments estimates.

Characteristics of Air Transportation Demand in the Primary Market of Greater Los Angeles

Because of the nature of statistics on air travel, it is difficult to determine on an ongoing basis the origins within a region of the users of air transportation services. The Southern California Regional Aviation System Study (SCRASS) used the results of a 1967 origin/destination (OD) study made at Los Angeles International Airport as a basis for allocating demand to subareas of Southern California.

This study, combined with ongoing collections of statistics on passengers and flight operations, do give some idea of the distribution of passenger origin -- which is basic to examination of the link between demand for and supply of air transportation services.

The findings of the study were not unexpected. They showed that as distance from the airport increased the proportion of passengers decreased. According to the sector aggregations, which were developed with LAX as the point of origin and the sectors extending out in concentric circles, 41% in the sample had origin or destination in the first zone, which included the immediate area surrounding LAX -- i.e, Inglewood, Redondo Beach, downtown Los Angeles, Hollywood, and Beverly Hills. The next sector or ring, which went beyond into the San Fernando Valley northward and extended to the San Bernardino Freeway, contained 24.2% of the OD passengers. The next sector, including Van Nuys, Pasadena, Santa Ana, and Anaheim on the south, contained another 18%. Eleven percent were in the sector which ranges from Ventura County in the north to the limits of San Bernardino and Riverside counties in the east, and southward to the limits of Orange County.

As noted above, the 1967 OD study, along with an examination of population distribution in Southern California counties, was used by SCRASS as a basis for allocating demand in relation to origin, both for the base period of 1970 and for all forecasting. State aviation master planning made use of the 1970 survey and the 1967 OD study adjusted at LAX, for the same purposes. As can be seen in Table 2, there are some inconsistencies in terms of the origin during the base period. However, in either case the major portion of demand is coming from Los Angeles County, with less demand from Orange and the other counties.

The primary difference between the two studies in terms of base passenger figures is this: The State Department of Aeronautics attempted to estimate the proportion of passengers counted at an airport who were interlining -- that is, merely moving from one airplane or airline to another en route to their final destination. Thus, for example, a passenger from Bakersfield flying into LAX and transferring to a flight to Honolulu would be an interline passenger as opposed to a Bakersfield passenger destinated for some geographic subarea surrounding LAX. In the SCRASS study, the percent of interlining apparently was not estimated.

TABLE 2

COMPARISON OF ORIGIN OF PASSENGER BY COUNTY
SCRASS AND STATE DEPARTMENT OF AERONAUTICS

Origin of Air Travel Demand (county)	Percent Distribution	
	SCRASS Final Report	State Master Plan of Aviation
Los Angeles	77.1%	76.1%
Orange	12.5	14.1
Riverside	5.6	4.3
San Bernardino	3.2	3.7
Ventura	1.6	1.8
Total	100.0%	100.0%

The Future Market for Air Transportation Services in the Primary Market Area

In order to estimate the need for a new airport and the extent to which it will be used by people and goods in the Los Angeles area, extensive research has been done into existing forecasts, examining critical assumptions, implied growth rates, relationships established between key variables, and other relevant areas. Because of the difference in approach and time periods of the various air activity forecasts, different assumptions have been made regarding the growth in population and the distribution of that population.

Southern California is in a period of uncertainty regarding future population growth and its geographic distribution. The uncertainty results from the growing concern over the environmental holding capacity of the Southern California Region, and the slowing of economic expansion, as well as other more intangible factors. Compounding the uncertainty is the decline in the birth rate nationally, to below the replacement rate.

Comparison of Population Projections. In comparing the various population projections for each county, the measure deemed most appropriate for analysis was average annual growth rate. This was chosen because of the use of different base year figures by those agencies making projections. The average annual growth rate figure can provide a better understanding of what the projections would be if a standard base year figure had been used. Table 3 provides a comparison of figures from the three sources in order to determine their reasonableness.

TABLE 3

COMPARISON OF AVERAGE ANNUAL GROWTH RATES BY COUNTY - 1970-1990

County	SCRASS	State Department of Finance Series D-150	SCAG D/E 2a
Los Angeles	1.0%	1.1%	0.4%
Orange	3.0	2.4	2.3
Ventura	2.9	4.0	4.0
Riverside/San Bernardino	3.1	2.2	2.3
Imperial	0.7	1.4	1.4

While differences in average annual growth rates for the individual counties may not seem significant because of the size of the population base figure, on an aggregate basis their importance is more evident. For the six counties comprising the Southern California Association of Governments (Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial), SCRASS predicts an average annual growth rate of 1.7%, compared with the State Department of Finance Series D-150 rate of 1.6% and SCAG D/E 2a rate of 1.0% (see Table 4).

TABLE 4

SIX-COUNTY COMPARISON OF POPULATION AND AVERAGE ANNUAL GROWTH RATE - 1970-2000

	Population		Average Annual Growth Rate
	1970	2000	
SCRASS[a]	9,841,000	16,302,000	1.7%
California Department of Finance Series D-150[b]	10,000,200	16,062,500	1.6
SCAG D/E 2a[c]	10,044,623	13,973,926	1.0

a. SCRASS, "Projections of Economic Activity in California and Southern California to the Year 2000, "Working Paper B-3, October 1970.
b. California Department of Finance, Population Research Unit, "Provisional Projections of California Counties to 2000," Series D-150, September 1971.
c. Southern California Association of Governments, "Suggested Revision to SCAG Growth Forecast Policy," June 1975.

Review of Forecasts of Air Activity

Like population forecasts, air activity predictions typically are based on data published several years earlier, which precludes incorporation of more recent changes in underlying events. Also, different methodologies were used in developing these estimates. These range from simple straight-line extrapolation from historical activity to sophisticated mathematical formulations which develop relationships between air activity and independent variables considered important in determining travel demand -- e.g., income, population, and employment -- and then translate these data into air activity forecasts.

Greater Los Angeles Forecasts

Federal Aviation Administration. The FAA, in its 1975 Terminal Area Forecast based on a national forecast, forecasts 671,000 air carrier operations in the Los Angeles area by 1987. This implies an average annual growth of 3.4%, consistent with the same report's forecast of 3.5% growth per year for the entire Western Region.

The FAA has also developed forecasts of air carrier passenger activity. Passenger activity in the Los Angeles terminal area was predicted to increase 5.6% per year.

Air Transport Association of America. For the Los Angeles hub, the ATA forecast in 1975 an average annual growth rate of 6% between 1972 and 1993 for air passengers.

California Department of Aeronautics. Since the activity forecasts made in 1973 and adopted by SCAG in that year, the State Department of Aeronautics has used the forecast methodology to make additional projections. Preliminary forecast "E" made in 1975, based on lower regional population figures (SCAG D/E 2a population forecasts) shows estimated passenger levels significantly lower. Average annual growth rates for 1970-2000 have declined from about 6% in the 1973 forecasts to between 5% and 5.4% in the 1975 forecast.

There are several factors which will affect these forecasts that are not readily predictable as discussed below. For one, the effect of rising fuel costs on plane fares and hence on the demand for air travel. Fuel cost represented 19.3% of the total operating expenses of all certified route carriers in 1975. This is contrasted with a 13.2% share in 1969. While the increase is significant, these costs have not overwhelmed all other operating expenses. It is also highly improbable that they will do so in the future. The major price rise came during 1973 and early 1974. Future increases will most likely be instituted at regular intervals and will be designed to keep the real price of crude oil constant.

Furthermore, it is noted that one of the most basic tenets of economic theory is that a raise in the price of a product or service decreases demand for it. This is certainly true for plane fares and air travel demand as well as other goods. However, an absolute change in price is only one of a number of influences on demand. The price of other modes of transport have also increased with rising fuel costs. The relative prices of the major modes have not changed as drastically as the rise in fuel costs would suggest. In addition, the cost of the individual's time has risen, making the "time" cost of air travel increasingly less than that of other transport modes. This "price effect" has been one of the major causes of the high growth in total air transport expenditures.

Even assuming that future air fares would rise relative to all other prices, demand would not be affected dramatically. The price elasticity of demand for air travel is probably slightly elastic, but air travel, especially for business purposes, has few substitutes. Vacation travel by air might decline (or grow more slowly), but business travel historically appears to be little affected.

Another factor will be the recently enacted airline deregulation measure. It would tend to restrain increases in the price of air travel due to increased competition. The full effect is not known at this time. Propositions have been effected within the federally regulated air transport framework which has lowered the fares on established routes.

Characteristics of Regional Demand

The forecasts level of air activity for the greater Los Angeles Service area is approximately 42.7 million annual passengers (MAP) by 1980, 55.4 MAP by 1985, 69.4 MAP by 1990 and 85 MAP by the year 1995. These forecasts include originating and interlining passengers. The constrained capacity of the existing airports is estimated to be 58 MAP.

In developing the State Master Plan of Aviation, a distribution of trip lengths was determined for 1970, based on origin and destination studies done within the scope of that work. In addition, origin and destination studies were performed at San Francisco and Los Angeles International Airports. From this work it was observed that 53.5% of the total air traffic was short-haul (less than 600 miles), 22.1% was medium haul (600-1800 miles), 19.8% was long-haul, and 4.6% was international. Upon further analysis of the short-haul market as of 1970, it was found that the Los Angeles-Bay Area corridor accounted for 56.1% of the total short-haul demand, with traffic to the rest of California acounting for another 18.3%. Thus, the total intra-California market accounted for 74.4% of the short-haul enplanements and deplanements.

DESCRIPTION OF PROPOSED ACTION

The City of Los Angeles, Department of Airports (DOA) seeks approval for provision of Federal funds for land acquisition and construction of airport facilities at Palmdale to be known as Palmdale International Airport (PIA). Reaffirmation of the airport site and approval of the Airport Layout Plan (ALP) is also requested.

The proposed development program would be accomplished in five phases as follows:

- Phase I - Land Acquisition for Airport Development.
- Phase II - Site Preparation; Construct, Mark and Light the outboard southerly E/W Runway (14,000' x 150'), including taxiways, aprons, utilities, access roads, fencing and terminal area.
- Phase III - Site Preparation; Construct, Mark and Light the outboard northerly parallel E/W Runway (14,000' x 150'), taxiway and apron system, including terminal expansion and utilities.
- Phase IV - Construct Commuter General Aviation Runway Complex, including service facilities.
- Phase V - Construct additional parallel runways for those outlined in Phases II and III.

Phases I, and III are proposed initially. The two parallel runways would be e to handle approximately 12 MAP proposed to be served by this airport by 1995. This Environmental Impact Statement (EIS) encompasses the development of this airport for Phases I through III only. A new EIS will have to be prepared and approved for development of Phases IV and V, if required.

It is expected that construction for initial development phases would begin in the mid 1980s.

PROJECT PURPOSE

The planned purpose of this airport is to provide international and all stage-length haul services that would accommodate part of the future air transportation travel demand of the northern sectors of the greater Los Angeles Metropolitan area. Short-haul and air taxi services for interline connections would also be provided to population and activity centers of Kern, Ventura, Santa Barbara, Orange, San Bernadino, Riverside and Los Angeles counties. This proposed airport would become one of several airports making up the air transportation system serving the Southern California area.

The proposed airport is planned to serve approximately 12 MAP by 1995. This level of activity has been used as a guideline for planning and assessment purposes as agreed to by the DOA, North Los Angeles County (NLAC) General Plan Study Group, CALTRANS, Southern California Association of Governments (SCAG), and Regional Planning Commission (RPC). The DOT/FAA Aviation Forecast for Los Angeles area dated June, 1978, forecasts PIA to handle 9.3 MAP by 1990.

The purpose to be served by a major new international airport at the proposed site includes the following:

- To increase the future combined capacity of airports in the Los Angeles metropolitan area inasmuch as the existing airports providing commercial airline service are estimated to have a constrained capacity of approximately 58 MAP to accommodate a projected regional demand of approximately 85 MAP by 1995,

- To assure that all residents of the Los Angeles metropolitan area who desire to travel will continue to have the airport facilities necessary to do so,

- To provide optimum air transportation service in terms of safety, reliability, convenience, scheduling, comfort, and economy, and

- To provide environmental compatibility by avoiding conflict with urbanized areas through comprehensive and compatible land use planning, and by incorporating improved technology and management to control the quality of water supply, drainage, sewage treatment, solid waste disposal, noise, and emissions into the atmosphere.

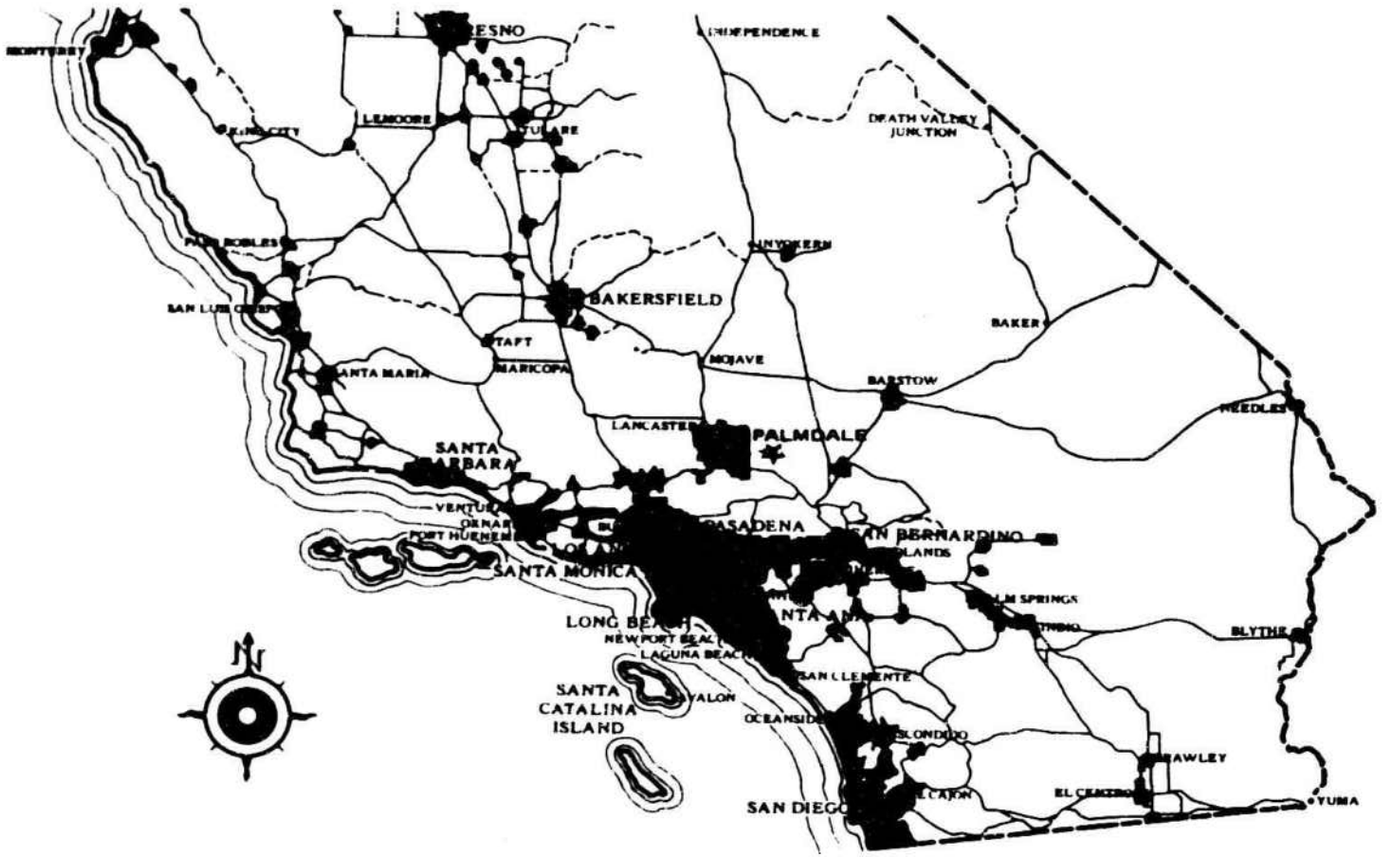
SECTION II: PROJECT SETTING AND BACKGROUND INFORMATION

The DOA proposes to construct a major commercial airport facility at Palmdale in the northern area of Los Angeles County known as the Antelope Valley. The DOA proposes to acquire approximately 17,700 acres for this airport, which will be situated adjacent to the City of Palmdale and an existing 5700-acre U.S. Air Force airfield known as Air Force Plant No. 42. The PIA location is shown in relation to the Southern California Region in Figure 1, and to the Antelope Valley in Figure 2.

The groundwork for the new airport was laid by the California State Legislature when it resolved to seek joint civil-military use of Air Force Plant No. 42. This was achieved in December 1967 with the execution of an enabling joint use agreement covering a 25 year period ending in 1992. Based on aviation demand forecasts which were far in excees of Plant No. 42's operational capacity, the Los Angeles Board of Airport Commissioners in August 1968 resolved to acquire 17,700 acres adjacent to Plant No. 42 for the development of a major civil airport and asked the Los Angeles City Council to authorize condemnation procedures. This authorization was given by an ordinance passed by the City Council, February 4, 1969. The County of Los Angeles passed a resolution of approval for the project earlier, on July 23, 1968. The Los Angeles City Council, by resolution in July, 1969, directed the DOA and the Los Angeles Administrative Offices to coordinate development of the airport and planning for the surrounding area. A joint powers agreement was made between the City of Los Angeles and the County of Los Angeles for regional planning of the Antelope Valley, including general land use and a study of the growth impacts of the proposed airport on the area.

The site was approved for the proposed airport by the Department of Aeronautics of the State of California August 4, 1969. An environmental impact statement (EIS) was prepared by the DOA. The Office of the Secretary, Department of Transportation made a finding and approved the EIS on June 2, 1970. The FAA approved an ALP conditionally on June 29, 1970. The airport site was approved on June 30, 1970 based on the aforementioned approval of the EIS. Airspace approval was given on July 1, 1970. A Request for Aid was received and a grant for $100,000 for initial land acquisition under the Federal-Aid Airport Program (FAAP) was given on June 29, 1970.

In April, 1972, the Sierra Club and the Palmdale Homeowners Association (et al) obtained an injunction in Los Angeles Superior Court (State) which halted any construction or improvement at the new site, pending compliance with the California Environmental Quality Act (CEQA). The DOA has completed an environmental report required under CEQA. The report was filed with the State Superior Court in May, 1978. The State court did allow the DOA to continue land acquisition subject to the condition they would not change the character of the land use nor the environment.



Source: Security Pacific National Bank, Economic Research Department, The Southern California Report, A Study of Growth and Economic Stature, March 1970.

FIGURE 1 LOCATION OF PROPOSED PALMDALE INTERNATIONAL AIRPORT IN RELATION TO SOUTHERN CALIFORNIA URBAN AREAS

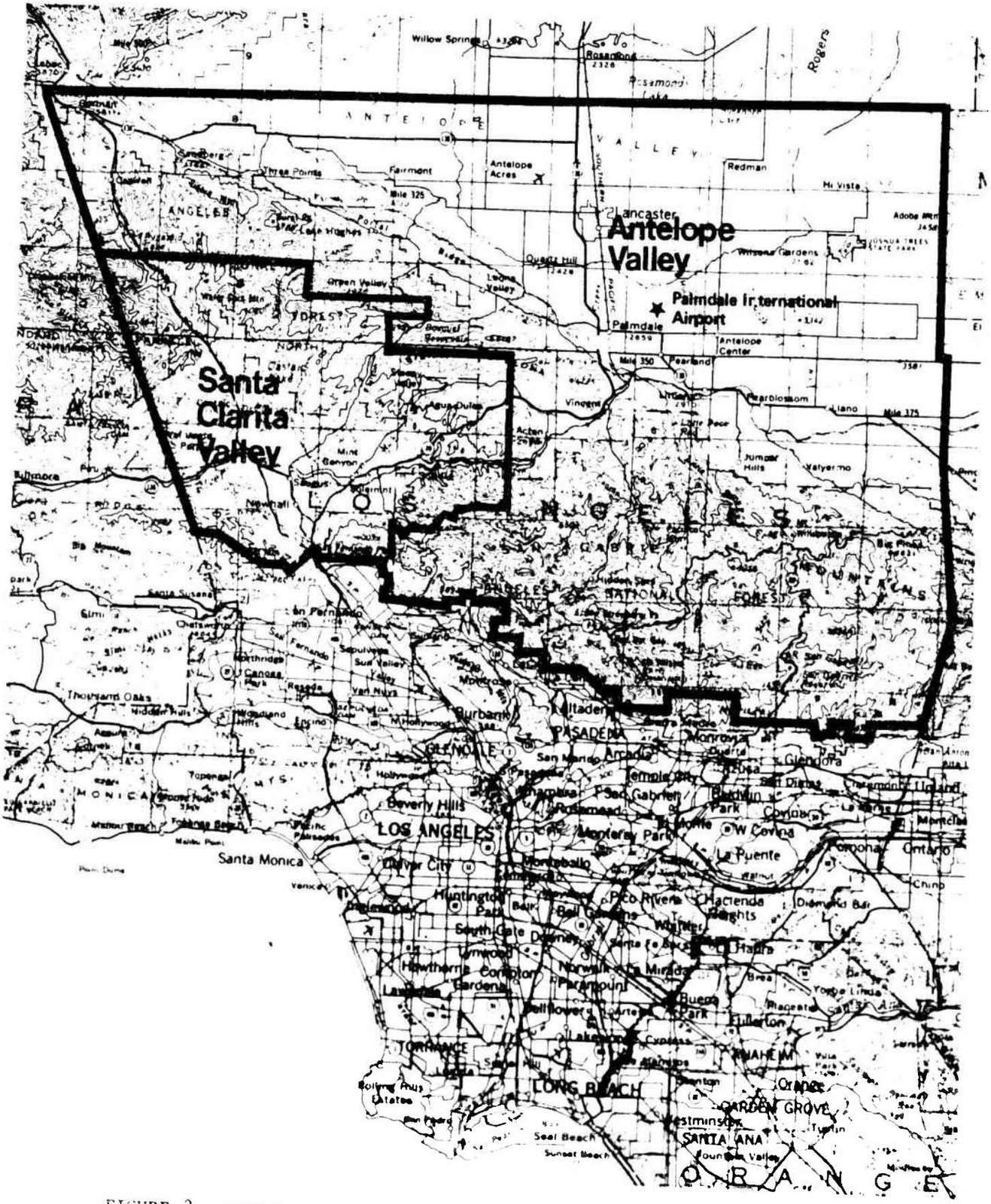


FIGURE 2 LOCATION OF PALMDALE INTERNATIONAL AIRPORT IN RELATION TO THE ANTELOPE VALLEY AND THE LOS ANGELES AREA

Source:

NORTH LOS ANGELES COUNTY
GENERAL PLAN

30 November 1975

QUINTON REDGATE Economics Research Associates Alan M. Voorhees & Associates
prepared for Los Angeles County Department of Regional Planning Southern California Association of Governments
U.S. Department of Housing and Urban Development City of Palmdale City of Los Angeles Department of Airports

In Sierra Club v. Volpe, Civil Case 370-71, U.S. District Court for the District of Columbia (Federal), the court issued an order dated March 29, 1974, requiring that a draft environmental impact statement be prepared and notice of its existence be published in the Federal Register. That was accomplished, and the notice can be found in Volume 44, No. 35, page 10425, of the Federal Register of February 20, 1979. The Grant Agreement was not withdrawn as a result of the Court Order even though dispersal of FAAP funds were held up by mutual agreement with the DOA. This litigation has prompted the FAA to use this final EIS to support a reaffirmation of the site location and the ALP approval which were the basis for the FAAP grant to provide initial funding for land acquistion.

Limited air carrier operations were initiated in June, 1971 at Plant No. 42 under the name of Palmdale Airport. PIA is expected to become operational in 1985, with Plant No. 42 continuing to serve as an interim facility. A modest terminal located on a 54-acre leased site was opened by DOA on June 29, 1971. It's purpose was to establish a pattern of commercial service into the Antelope Valley.

The need for additional aviation facilities to serve the Metropolitan Los Angeles area has been forecast in SCAG, State, and FAA studies. The regional demand as shown by the FAA forecasts is expected to increase from about 31 MAP in 1976 to 85 MAP by 1995. These forecast passenger levels are allocated as shown in Table 5. Palmdale International Airport is forecast to accommodate .04 MAP by 1985, 9.3 MAP by 1990, and 12 MAP by 1995.

TABLE 5

TOTAL ANNUAL PASSENGER FORECASTS, GREATER LOS ANGELES AREA - 1976 - 1990*
MILLION ANNUAL PASSENGERS (MAP)

Airport	1976	1980	1985	1990	1995
Los Angeles International	25.9	33.8	38.7	39.8	--
Burbank-Glendale-Pasadena	1.7	2.1	2.3	2.5	--
Orange County	1.8	2.3	2.5	2.7	--
Ontario International	1.4	4.0	11.4	14.5	--
Long Beach	.4	.5	.5	.6	--
Palmdale International	.01	.02	.04	9.3	12.0
Totals	31.21	42.72	55.44	69.4	85.0[1]

*Source - DOT/FAA Aviation Forecast for Los Angeles Area, June 1978.

1. Extension of forecast passenger demand to 1995 is estimated to be 85.0 MAP.

These allocations reflect physical or environmental capacity constraints. The length of haul and county origin distribution for PIA is shown in Table 6 for the year 1995.

TABLE 6

MAP DEMAND DISTRIBUTION BY LENGTH OF HAUL AND COUNTY ORIGIN
1995 - PALMDALE INTERNATIONAL AIRPORT

Length of Haul	TOTAL MAP*	North County		San Fernando		Other	
		Number	Percent	Number	Percent	Number	Percent
Short-haul	3.8	1.0	25%	2.5	65%	0.3	10%
Medium-haul	2.2	0.1	5	0.3	13	1.8	82
Long-haul	2.4	0.1	4	0.2	10	2.3	86
International	1.2	0.1	4	0.1	10	1.0	86
Total	9.6	1.1	11%	3.2	33%	5.4	56%

Note: Numbers may not add to totals due to rounding.

*Forecast demand less 20% for interlining

Source: Arthur D. Little, Inc., estimates.

The size and boundaries of the proposed 17,700-acre PIA site were designed to accommodate the aircraft operational requirements, aircraft and passenger terminal parking, aircraft maintenance facilities, support service areas, and air cargo terminal. Additional areas were determined by clear zone requirements, the need for noise buffer zones and environmental protection areas, and other factors which made airport control and ownership desirable.

The dominant factor remains the runway complex. Runway length and separation are determined by aircraft operations requirements for safety and capacity. Runway orientation is determined by wind patterns and air traffic control constraints. Restrictions are placed on surrounding areas by regulatory agencies for the safety of flights and ground activities.

The other airport components include the main passenger terminal, an air cargo facility, a fuel storage tank farm, an airline maintenance and hangar area, a general aviation area, and such commercial and industrial activities as appropriate.

Landing Area: Runways and Taxiways

The basic functional requirements of the airport have been identified and the primary facility -- the runways -- have been defined and located in respect to the proposed site and the surroundings. Two dual pairs of parallel runways aligned 250/070 degrees magnetic as shown in Figure 3 are planned for this airport. The initial development will consist of two outermost runways being constructed, 14,000 feet long by 150 feet wide and separated by 8,100 feet. The second set of runways will be built, when required, parallel to and 1,000 feet inboard of the initial set of runways. During the 1990s, the updating of forecasts and analysis of past trends may indicate the necessity of adding these other runways. Further, some commercial air travel is expected to be accommodated in STOL aircraft. In addition, general aviation use of the airport is expected to increase slowly over time, particularly that of corporate aircraft and business flights. The combined effect will necessitate an additional pair of 3,000-foot long runways at a distance of 4,250 feet from and parallel to the southern set of primary runways and a small terminal complex serving both short-haul and business-oriented general aviation. The runways would be separated by 750 feet.

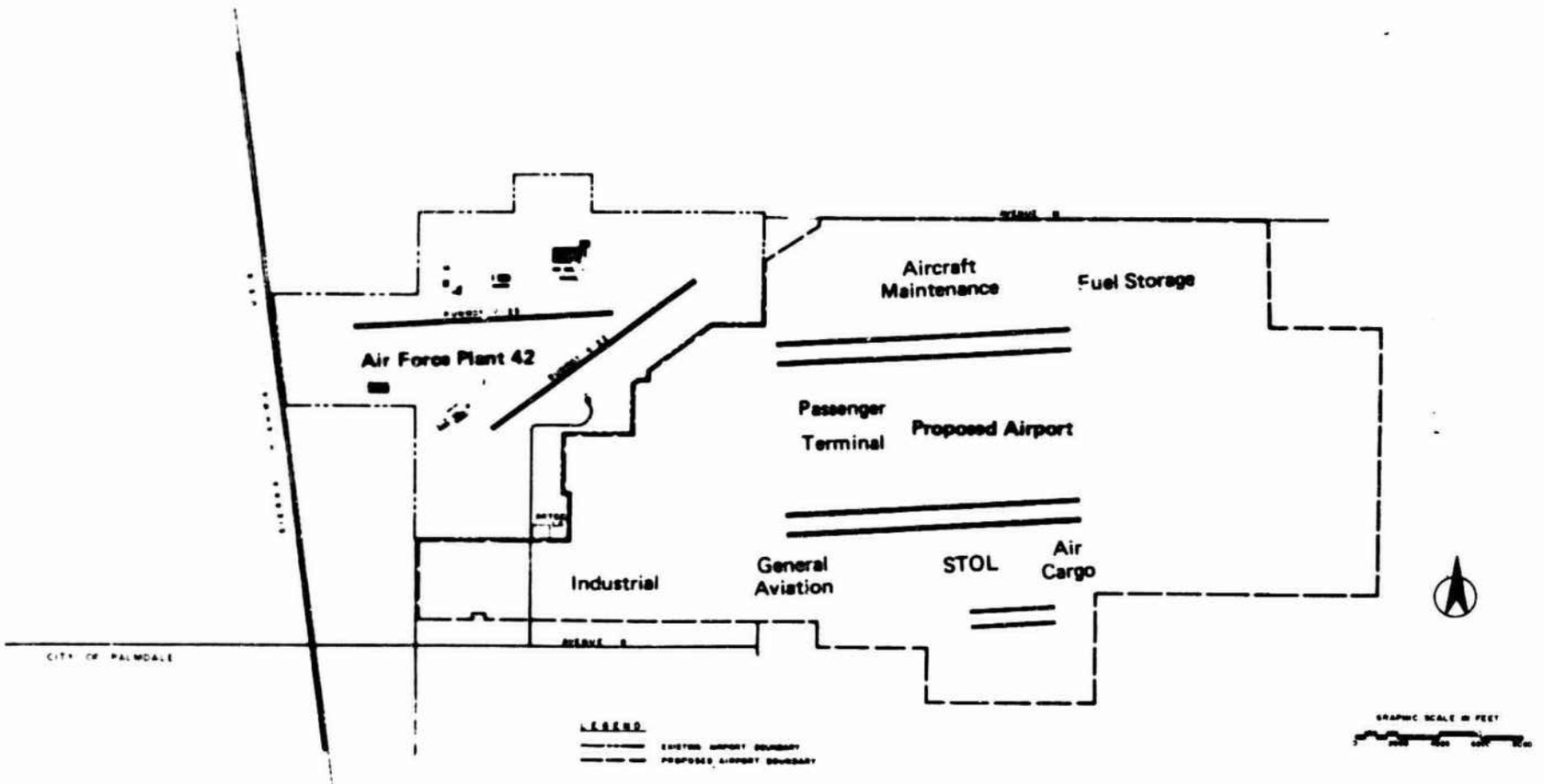
The proposed airfield design is based on the dimensional standards and clearances recommended for use of the largest jet transports anticipated in the next 20 years. Design of access and exit taxiways and terminal aprons, and final design of the runway have not yet been developed, but studies are continuing for the most efficient system giving maximum capacity from the runway complex.

Supporting the primary runways will be a dual parallel and exit taxiway system to provide traffic separation and capability for aircraft maneuvering between the terminal and runway. It is anticipated that the runway/taxiway complex will occupy approximately 3000 acres at ultimate airport development.

Passenger Terminal Area

The airport will contain the passenger terminal building(s) and the attendant facilities necessary for the proper transfer of people from aircraft to ground transportation (and vice versa). The passenger terminal itself will include gate areas, passenger processing, waiting rooms, customs facilities, baggage processing and claims, auto rental counters, food service, and shops. Associated airline offices and workroom areas are usually provided close to the passenger processing functions and aircraft service facilities located at the gates.

The design for the proposed airport will provide adequate aircraft gate/passenger lounge areas in a manner convenient for passenger access, circulation and handling, and function with minimal ground-side congestion. However, the actual character of the terminal facilities to be provided for this airport is not yet defined and will be decided in final design.



Source: Peat, Marwick, Livingston & Co., A Preliminary Analysis of the Proposed Palmdale Airport, June 1969.

FIGURE 3 PROPOSED PALMDALE INTERNATIONAL AIRPORT
GENERAL AIRPORT PLAN

The main terminal facilities are expected to be located between the parallel pairs of primary runways. A separate STOL passenger terminal and facility serving general aviation is expected to be located adjacent to the pair of short runways. Associated apron areas will be provided with utility and communications systems as necessary, and will be built into the pavement at the main terminal.

It is estimated that the passenger terminal and associated buildings will have a total floor area of roughly 585,000 gross square feet at 9 MAP and 780,000 gross sq. ft. at 12 MAP. This estimate is based on DOA data from experience at LAX and other airports which provide a guideline of 65,000 gross sq. ft. per million annual passengers. Total land area available for the terminal complex will be approximately 600-800 acres.

Airport Access Facilities

Access to the new airport site will be provided by the regional surface transportation system as implemented by those agencies responsible. The Antelope Valley Freeway is at present the primary regional access route, and passes approximately 1.5 miles west of the land proposed for acquisition. A major traffic corridor is expected to connect the existing and future freeways with the airport, leading directly to the passenger terminal area.

The airport complex will also have a complete road system linking all of the various operating elements and the main access corridor in a manner that facilitates both passenger and service flows. An intra-airport people mover system may be provided as necessary. Major peripheral parking facilities will be provided convenient to the freeways and access roads at the ratio of approximately 750 spaces to 1 MAP. The access and circulation roads and parking lots will be located so as to avoid vehicle concentration and concentrated sources of pollution. It is anticipated that separate passenger vehicle roads and service roads will be developed. The objective will be to achieve efficiency of traffic flow and clear division of passenger and service vehicles.

Cargo Terminal

Adequate cargo facilities will be provided at the airport. The space requirements of a cargo terminal are dictated by the volume to be processed, the type of freight (domestic or international), the size (cargo capacity) of the aircraft serving the airport, the frequency of aircraft schedules, the efficiency of the procedures, the materials handling equipment utilized, and the number of airlines using the facility. Large-scale cargo developments are not expected to occur until the 1990s.

Navigational Aids

The 17,700-acre site will be capable of housing all of the necessary and up-to-date on-airport navigational aids (Navaids) and Air Traffic Control (ATC) facilities.

The ground system of navigational aids to be installed at the new major air carrier facility is expected to provide for Category II landing minimums as specified in the FAA AC No. 120-29. These Navaids include the following:

- Electronic Guidance System
  - (1) Localizer
  - (2) Glide Slope
  - (3) VHF Marker Beacons
- Visual Guidance System
  - (1) Approach Lighting System
  - (2) Touchdown Zone Lighting System
  - (3) Centerline Lighting System
  - (4) High-intensity Runway Edge Lighting
  - (5) Taxiway Turnoff Lighting Systems
  - (6) All-weather Runway Markings
- Other Requirements
  - (1) Runway Visual Range
  - (2) Radar Altimeter Setting Heights
  - (3) Remote Monitoring

Airport Maintenance and Emergency Facilities

The facilities for these important airport functions are not major land consumers. However, in view of the very large land area of the airport and the need for maintenance in the far reaches of the property, and for the ability to respond to emergencies in remote areas, maintenance and emergency facilities may be decentralized. Sufficient land at strategic locations within the airport will be reserved for these vital functions.

Attendant Facilities

The balance of the airport land will be reserved for aviation and aviation-oriented development. This category covers bulk aviation fuel storage, central utilities complex, sewage treatment plant, airline maintenance and overhaul facilities, in-flight kitchens, rental car maintenance facilities, general aviation servicing (minimal), and commercial development (hotel, bank, gas station, etc.) Approximately 3000 acres would be available for such activities.

The aviation facilities and airport-related support facilities are expected to affect about 10,000 acres and cover approximately 10 - 15% of the total area. The rest of the site will remain as open space with 4,800 acres being undisturbed.

EXISTING ENVIRONMENTAL SETTING

General Description of the Antelope Valley Region and Project Site

The Antelope Valley is a triangle-shaped high desert plain of approximately 2500 square miles, portions of which are in both North Los Angeles County and East Kern County. The Tehachapi Mountains define the northwestern boundary, while the San Gabriel Mountains define the south and southwest edge, separating the Valley from the Los Angeles basin. The Antelope Valley is the western extension of the Mojave Desert, with isolated buttes in the desert loosely defining the eastern edge of the Valley (which is also the line between Los Angeles and San Bernardino counties). The project site is located at the southern edge of the Antelope Valley on the desert floor near the San Gabriel foothills. The principal environmental characteristics of the area in the vicinity of the airport are briefly discussed below.

Physiography

The Valley plain at the site is approximately 2550 feet above mean sea level, with the mountains rising to 5000 and 8000 feet to the south and west of the site. The sedimentary desert plain slopes gently down to the north away from the mountains.

The basement rock of the Antelope Valley portion of the Mojave Desert was tilted westward and erosion of planes from the mountains created deep alluvial fill across this basement rock. In conjunction with a basement block uplift along the Rosamond Fault to the east, these erosional deposits from the surrounding hills created a basin of unconsolidated materials important to the hydrologic cycle in the Valley today. The process of erosion is still taking place with the drainage of waters of the northern and eastern slopes of the San Gabriels and Tehachapis. This creates a system of natural recharge to the Valley basin with accompanying erosion, sedimentation, and flood hazards to the Valley and the proposed Palmdale International Airport site.

The fault system in the immediate vicinity of the PIA site is the San Andreas Rift Zone. The fault in the Palmdale area stretches from the juncture with the Garloch Fault and associated Tehachapi Mountains to the north, at Cajon Pass, to San Gorgonio Pass, and eventually to the Gulf of California to the southeast.

Agriculture

Agriculture areas currently under cultivation are generally located in the north and northeast sections of Palmdale, and near the community of Little Rock. The major Valley crops are: 1393 acres of nuts and fruits, mostly almonds and nectarines; 42,800 acres of field crops, mainly alfalfa, hay and wheat; 900 acres of vegetables, mostly onions; and 20 acres of nursery stock and 50 acres of cut flowers. There are some abandoned fields, in some cases quite large, located in the northwest. Vegetation on these fields is limited to introduced grasses: it is difficult for native vegetation to reestablish, mainly because of increased soil alkalinity.

Hydrology

Surface Waters. The average annual rainfall is about 4-6 inches on the Valley floor. In the mountains surrounding the Valley there is an average of more than 19 inches per year and in some places, particularly in the high peaks, there are recorded rainfalls of up to 40 inches. However, only on occasion is the rainfall of such intensity or duration that the flows continue down major stream courses to the dry land where waters pond and eventually evaporate. One of these courses, Little Rock Creek, drains directly across the PIA site from south to north between Plant 42 and 110th Street. If runoff is sufficient, this flow drains finally into Rosamond Dry Lake to the north. The drainage area for Little Rock Creek is approximately 124,000 acres. Most of this drainage is funneled into a basin area approximately 3000 feet up the side of the San Gabriel Mountains, behind Little Rock Dam. Waters from this basin area help supply the Palmdale and Little Rock Irrigation District municipal area.

Groundwater. In the Antelope Valley there is a natural groundwater formation present because of the unconsolidated material formation in the Valley and the natural recharge from the mountain streams. However, with increasing drawdown from agricultural and urban uses in the Palmdale-Lancaster area, there has been an overdraft of this groundwater formation and many pumping depressions exist in the Valley. In some places the water level has fallen as much as 400 feet over the past 10 years. With these decreasing levels of groundwater, accompanying subsidence, and large centers of pumping depressions, a drawdown level of 300 feet maximum has been set for safe and economic yields from wells in the Valley. Many wells, however, are approaching this limit.

During wet periods, when annual rainfall in the mountains approaches 20-40 inches, recharge levels are the highest in the Valley. However, during these periods the water runs off at excessive rates across the Valley plain and is lost to the dry lakes to the north of the site. Some of this water is lost to evaporation. Thus, much of the water accompanying high discharge rates is lost and not, in fact, recharged into the groundwater system.

To date, use of imported water from the California Aqueduct Project has been minimal and thus a water deficit exists relative to agricultural and urban water consumption, particularly in the Palmdale-Lancaster area. There are presently only limited distribution facilities for this imported water.

Vegetation and Wildlife

A wide variety of plant communities exists throughout the study area. The dominant forms are the Joshua tree, creosote bush, and California juniper. In general, these forms are intermixed, with only a few locations being dominated by one or a few species. The Joshua tree occurs primarily in two dense stands, one northwest of Palmdale and the other east of the city and west of Little Rock Creek. This is considered to be the most significant plant in the study area, primarily because of its size and uniqueness to the southwestern Mojave Desert Region.

Approximately 85 species of wildlife can be found on or near the site. There are no rare or endangered species on site. Such species are found in the foothills and mountains at some distance from the site. The more sensitive species have already moved to the east of Little Rock Creek, north of Lancaster and south into the mountains.

Climate

The area has the warm dry climate typical of the high desert. Mean daytime temperatures are between 80 to 90 degrees in summer and between 46 and 50 degrees in winter. Relative humidity is low, averaging 29% during the day and 40% at night. Prevailing winds are westerly, usually moderate but occasionally increasing across the desert and resulting in sand storms. Air quality is normally good but beginning to deteriorate, because of drift from the Los Angeles basin.

Socioeconomic Conditions

The airport project site is adjacent to the City of Palmdale, an incorporated city with a population of 30,200 in 1975. The community of Lancaster is eight miles northwest of the site and is the largest community and the major trade and administrative center in the Valley. In 1970, the Palmdale Regional Statistical Area (RSA) had a population of 31,429 and the Lancaster RSA had a population of 51,446. Other population centers in the Los Angeles County area of the Valley are the small communities of Quartz Hill, Pearblossom, and Little Rock located along the foothills. Population has increased dramatically in the last two decades from a Valley total of approximately 18,000 in 1950 to 94,540 in 1975, due to growth of the aviation industry there.

The major economic support of the Valley is agriculture, mining, military installations and the aviation industry. Lately, with speculative land prices and increasing taxes, farming has declined. The world's largest open pit mine is located in the northeastern part of the Valley, producing 75% of the free world's supply of boron. The alluvial fans of the creeks running into the Valley provide the sites for active sand and gravel operations.

Institutional Characteristics

Aside from Palmdale, Los Angeles County is responsible for providing governmental services for the North County area. There are various special districts in the area to provide such services as power, sanitation, education, and irrigation. Planning responsibilities in North Los Angeles County are borne primarily by the Los Angeles Regional Planning Commission, which has established a special group known as the North County Study Team to guide development of a general plan for the area. The City of Palmdale and the DOA are jointly responsible for appropriate planning for the area surrounding the proposed airport.

Transportation Facilities

Edwards Air Force Base is the only Air Force flight test center of its kind in the United States and also houses other exploratory aerospace activities. It has the world's longest runway, and its 301,209 acres make it the Air Force's second largest installation. Edwards is located in the northeastern part of the Valley, but its flight patterns and the flight patterns of the more distant George AFB to the east are important factors in the design of the proposed new airport.

Adjacent to the proposed airport site, and between Palmdale and Lancaster, is Air Force Plant No. 42, a unique facility for production flight testing of military and civilian aircraft. Contractors are leased space by the Federal Government for military aircraft development. Lockheed-California has also built a new 533-acre, $30 million plant adjacent to Plant 42 to assemble and flight test the L-1011 jet aircraft. Use of the Plant 42 runways is permitted through lease agreements.

Two general aviation airports are located in Antelope Valley near the proposed PIA site: The General William J. Fox airfield, a county airport with a 5000-foot runway located seven miles northwest of Lancaster, and an airfield at Quartz Hill. Several other small unpaved airstrips, characterized by irregular activity, are located throughout the region. The Valley also has a number of airstrips that are utilized for soaring and gliding purposes.

The Antelope Valley, San Diego, and Golden State Freeways link Palmdale and the project site with central Los Angeles via the San Fernando Valley. A 73-mile, two-lane highway, California 138, connects Palmdale to San Bernardino.

The Southern Pacific Railroad lines also connect Palmdale with Los Angeles and San Bernardino and extend north to the San Joaquin Valley and eventually to the San Francisco Bay Area. This regional network of rail lines is proximate to most of the major airports and activity areas of Southern California.

Land Use, Open Space, and Recreational Areas

Three significant public recreational areas lie 10-18 miles from the proposed airport site. Saddle Butte State Park (formerly named Joshua Tree State Park) is a 2700-acre state park northeast of the airport site which features hiking trails and picnic areas. Devil's Punch Bowl is a 1310-acre county facility southeast of the airport site, near the community of Valyermo. It offers picnicking and hiking and the scenic attractions of rock formations along the San Andreas Fault. The Little Rock Reservoir Recreation Area, with camping, picnicking, boating, and fishing facilities, is directly south of the proposed site.

Within a 20-mile radius of the site, there are 10 other developed park facilities maintained by Los Angeles County and the City of Palmdale. Within the same 20-mile radius, there are roughly 380 acres of undeveloped park areas and 3950 acres reserved as wildlife/wild flower sanctuaries.

The City of Palmdale has zoned as industrial a buffer strip around Plant 42, and has also similarly zoned most of the surrounding area of the proposed PIA site.

Utilities

Several electric power lines of the Southern California Edison Company either traverse or border the airport site. Gas service is supplied by the Southern California Gas Company; no known lines are located on the site. Telephone service is provided by the Pacific Telephone Company which has several lines, both above and below ground, crossing the site.

Water service is provided by several jurisdictions. The airport site is within two water company service areas, the Palmdale Irrigation District and the Little Rock Irrigation District. The Los Angeles County Waterworks also supplies some of the small communities south of the site.

The Los Angeles County Sanitation District maintains 20 sewer lines which cross the southwest portion of the proposed site. The site lies completely within the District's boundaries. The District presently has primary and secondary treatment facilities serving 13,000 people. Two small sewage disposal plants lie within the proposed airport site.

Airspace Utilization

Airspace

A principal positive factor in selection of Palmdale for a major regional airport was the physical distance and isolation of Antelope Valley from the congested airspace of the Los Angeles basin. However, the airspace of the Antelope Valley and the Mojave Desert is itself not empty. Although the site is in a relatively sparsely populated area, the airspace is limited by both surrounding terrain and military activities.

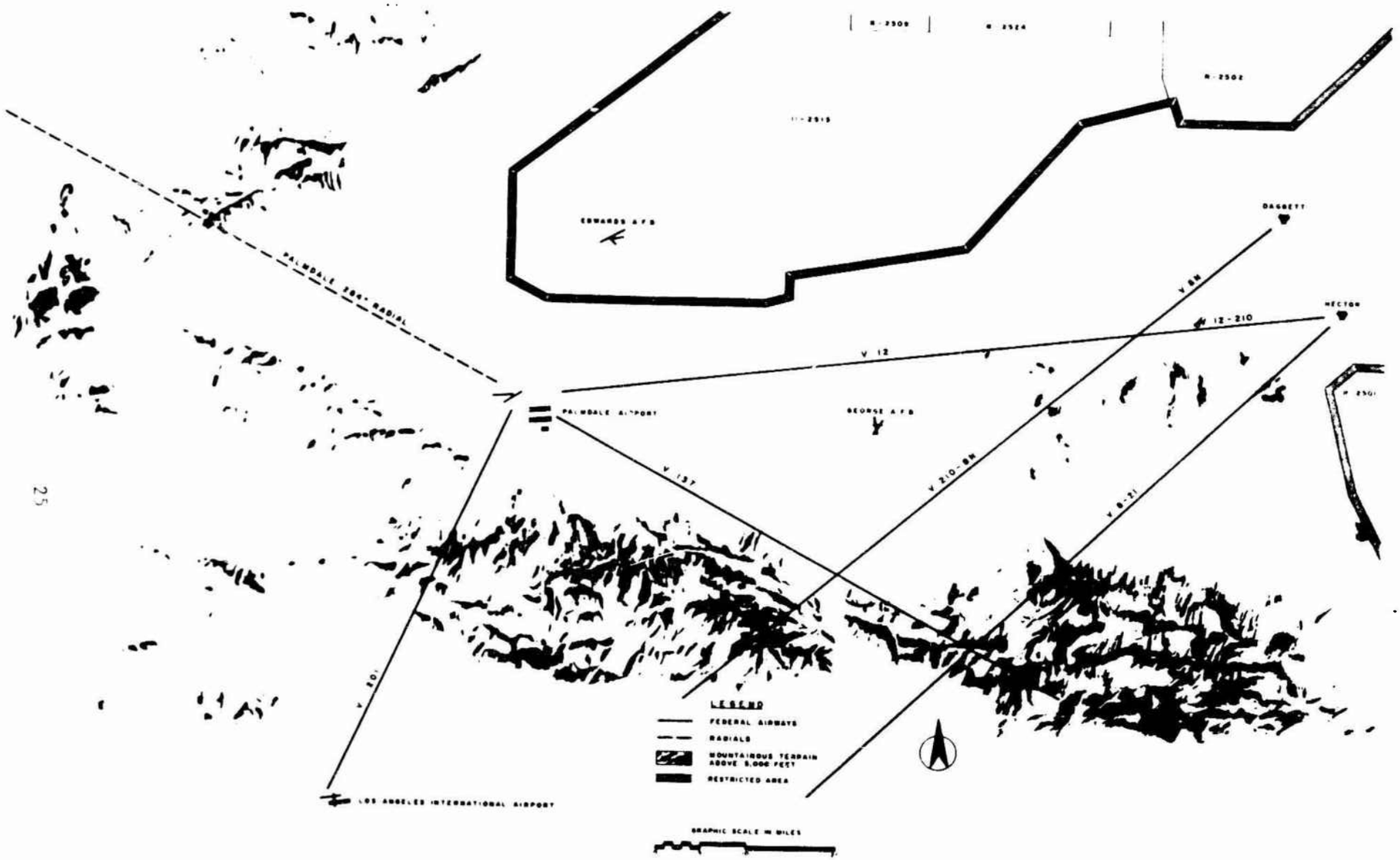
Mountainous terrain to the south and west reaches elevations in excess of 5000 feet within about 10 miles of the proposed airport site. Air Force Plant 42, with aircraft test operations, is adjacent to the west side of the site and Fox Field, a county airport, is 11 miles northwest. Immediately to the north is a series of four military restricted airspace areas over Edwards Air Force Base and extending to the northeast, and also over China Lake and to the north. To the east are the Hector/Daggett VORTACs defining the east-west traffic airways for the Los Angeles region. Additional military restricted areas on either side of these VORTACs create a narrow portal that constrains the air traffic capacity of this corridor. George Air Force Base lies south of Victor Airway 12 on the segment between the Palmdale and Hector VORTACs. Airways toward the ocean and LAX are relatively unconstrained, and airways northwest to Northern California have some conflicts, but are not expected by the FAA to present major problems. The situation is illustrated in Figure 4.

The Southern California Airspace Utilization Committee (SCAUC) and the FAA reviewed the airport traffic allocations and the air traffic routes serving Palmdale, and recommended particular changes to meet these allocations. SCAUC noted that optimum utilization of the limited airspace in the area is a prerequisite of Palmdale's handling the anticipated traffic. SCAUC further recommended that any master plan concept for the Southern California aviation system continue to ensure that priority treatment is given to the new Palmdale and the Los Angeles facilities, allowing them to grow to their maximum capacity.[1] Their Task 9 report presenting the detailed review and recommendations concerning airways serving Palmdale (as affected by Edwards AFB and military restricted airspace) is as follows:

---

1. Southern California Airspace Utilization Committee, Task 2, Final Report, July 1972.

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



Source: Peat, Marwick, Livingston & Co., A Preliminary Analysis of the Proposed Palmdale Airport, June 1969.

FIGURE 4 EXISTING AIR TRAFFIC FLOW

SOUTHERN CALIFORNIA AIRSPACE UTILIZATION COMMITTEE
TASK 9 REPORT
BLUEPRINT OF A MASTER PLAN FOR
SOUTHERN CALIFORNIA IFR TRAFFIC FLOWS INTO 1980

"PHASE I - Palmdale Intercontinental Airport/Edwards Restricted Area Complex" - Figure 5"

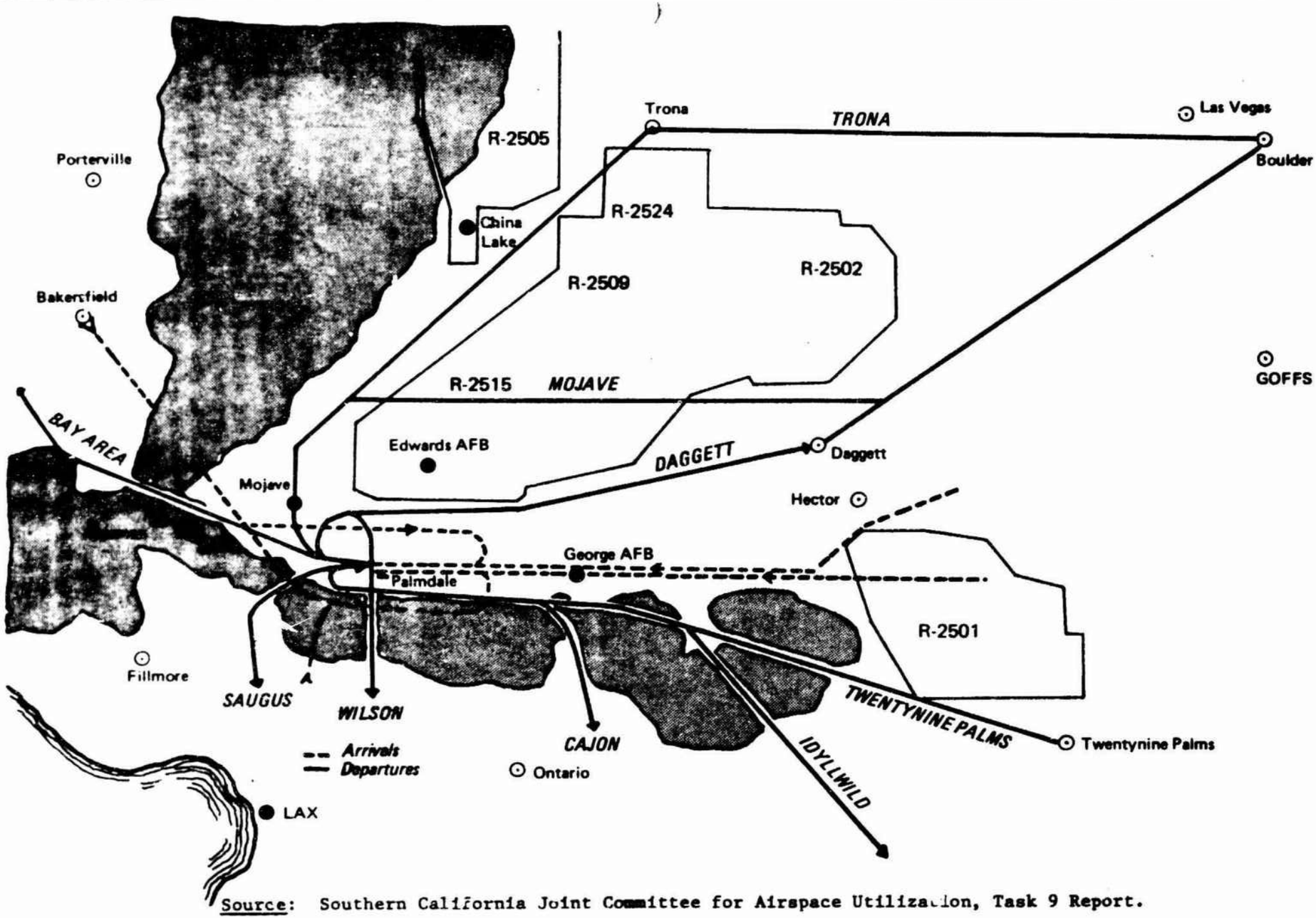
"The departure and arrival patterns depicted are the approximate routes that we believe are required to effectively accommodate traffic to and from the Palmdale Intercontinental Airport. The routes are drawn to the specifications of today's TERPS criteria, are primarily Area Navigation (RNAV) routes with VOR redundancy, and take into consideration noise abatement, aircraft performance, and Restricted Area availability. Although the en-route portion of the report addresses itself to the possibility of better utilization of joint use restricted airspace, it is our thinking that the less incursion on this airspace, the better. These proposed routings represent an absolute minimum use of Restricted Area airspace. We might add that we relied heavily on advice from the air traffic controllers at Edwards RAPCON as to what accommodation to Palmdale Airport traffic could be made without derogating the critical existing operations in the Edwards Area complex."

OUTBOUNDS

"We believe that the amount of commuter traffic operating between the San Francisco Bay Area and PIA will be minimal. This is based on the assumption that most commuters to the Bay Area would not buy tickets for a 40-minute plane ride that was preceded by an hour and a half bus ride or a short-haul ride from the basin versus driving to LAX, where we anticipate most of the short-haul business would continue. Air carriers logically fly where the demand is. This same logic is true of traffic to and from Las Vegas, San Diego, Phoenix, and other short-haul points."

INBOUNDS

"Our plan will utilize dual ILS capability on the two arrival runways, which must be separated by a minimum 5000 feet to accommodate simultaneous parallel ILS



Source: Southern California Joint Committee for Airspace Utilization, Task 9 Report.

FIGURE 5 PROPOSED ARRIVAL AND DEPARTURE PATTERNS FOR PALMDALE INTERNATIONAL AIRPORT

approaches. Rather than specify which runway will be used for traffic from a particular destination, we believe runway use should be flexible so that either arrival runway may be used for traffic from any direction as the occasion demands. Experience with arrival flows will indicate if one runway will be used for a flow from a particular direction."

"PROVISION FOR VFR TRAFFIC: Provisions must be made for low altitude VFR traffic to arrive, depart, and transit the area on routings that will be comparable with the IFR traffic flows being presented. Appropriate VFR routes should be studied and recommendations made at the time the IFR procedures are reasonably firm."

NAVAIDS

"The plan, although utilizing RNAV extensively, is still designed to be compatible with a matching VORTAC system. For this reason, two new VORTACs, or second generation equivalents, will be required for PIA -- one located near Mojave, and one near Trona. Both will be used for course guidance for departing aircraft until they are in the en route structure."

"A Palmdale terminal radar control facility (TRACON) should be considered incorporating the existing air traffic facilities in the area. The type of facility that is established and the airspace jurisdiction to be served is within the purview of FAA and recommendations and actions on these subjects should come from that agency."

"The need for automated communications between the restricted area using and controlling agencies is covered in the en route portion of this report. Optimum utilization of the limited airspace in the area is a prerequisite in order for Palmdale Intercontinental Airport to handle the anticipated traffic."

The FAA has studied, and will continue to study, the situation relative to the proposed action. Based on their analysis, it is believed that there will be no major airspace conflict. Department of Defense and FAA concerns and views are discussed in more detail on pages B37-B39 of Appendix B. Pages B-46 to B-52 of the Appendix contain an April 19, 1979 addendum to a Department of Defense-FAA agreed to Letter of Determination stating that "the military could within reasonable parameters accept shared use airspace".

Meteorological Conditions

Meteorological conditions at Palmdale are generally considered excellent for airport operations. A preliminary analysis indicates that conditions permitting use of visual flight rule operations exist 99.5% of the year. The weather summaries indicate that more than 97% of the time, visibility is 10 miles or greater, and the ceiling is reported at 10,000 feet or greater about 93% of the time. Precipitation is minimal, approximately five inches annually and usually falling as a light rain.

Temperatures at Palmdale range from mild in the winter to hot in the summer. The maximum daily temperature is at least 80°F about 44% of the time, at least 90°F about 28% of the time, and at least 100°F about 9% of the time.

Prevailing winds at Palmdale are from the southwest. Wind is an important factor in airfield planning because it is desirable to minimize crosswind on runways. The analysis determined that runways oriented either in the 7-25 or 4-22 direction (the orientation of the two Plant 42 runways) are the most favorable with respect to minimizing crosswind. It was found that, because of the relatively good crosswind coverage for either 4-22 or 7-25 combined with the good visibility characteristics and relatively light precipitation, runways need be provided in only one direction, and that they should be oriented in the 7-25 direction as it is the most desirable from a standpoint of airspace traffic control. Most aircraft operations are expected to take place in a westerly direction because of the prevailing winds. Easterly operations would occur only about 5% of the time if 5-knot tail winds were acceptable.

Flight Obstructions

Obstruction clearance standards for navigable airspace are defined by the Federal Aviation Regulations Part 77. An examination of the proposed site and its surroundings indicates that no obstructions to air navigation appear to exist.

The FAA site evaluation report notes that all terrain criteria of FAR Part 77 are met, except that the Alpine Butte projects 70 feet into the criteria approach slope for the two northerly runways at a distance of 28,000 feet east of the runway ends. An operational evaluation indicates that this will not be a hazard. The report further notes that the mountains to the west rise above the criteria 40:1 slope at a distance of 62,000 feet from the runway ends, 12,000 feet beyond the criteria limits. This may have an effect on operational load limits for second segment climb during high temperatures.

Factors Affecting the Development of the Project

Airport Capacity

The extent to which aviation demand will be satisfied in the Los Angeles area will be determined primarily by the facilities of the existing major airports and the actions taken to add to those facilities. Moreover, continuing change and development expected in the transportation field will affect the practical capacity of the Los Angeles area airports. Such changes include the introduction of new generations of aircraft, improved navigational aids, modification of institutional and operational policies as promulgated by the FAA, CAB, or others, the availability of alternate transportation modes, and the market behavior of passengers (demand).

Aircraft. The domestic civil air carrier fleet has changed dramatically in the past 20 years as the propeller-driven aircraft of the 1950s were replaced by the turbine-driven aircraft of the 1960s and 1970s. By the end of 1972, turbine-driven aircraft comprised 86.4% of the air carrier fleet, according to the FAA census of U.S. civil aircraft. The makeup of this fleet was 28.2% of B-727s, 14.3% of B-707s, 14% of DC-9s, 9.7% of DC-8s, and 7.8% of B-747s and other widebody jets.

The introduction of the B-747, the DC-10, and the L-1011 aircraft with greatly increased passenger capacity represented another major step in aircraft development. Although cruising speeds remain in the 550-plus mile per hour range, their greater weight requires up to 10,000 or 12,000 feet of runway when fully loaded. A number of versions of these aircraft are now available for the short-, medium-, and long-haul markets, in a variety of passenger and cargo configurations.

The next generation of aircraft will have more power, less noise, and lower fuel consumption per passenger-mile. These aircraft are likely to be both derivatives of existing aircraft (stretch 737s or smaller DC-10s and L-1011s, for example) with 140-160 seats and a new 200-seat (Boeing 767 or DC-X-200) plane for short-to-medium-haul operations. The prototype STOL aircraft now being developed for the military, the Boeing YC-14 and McDonnell Douglas YC-15, are estimated to be operational with a 150-seat capacity by the mid-1980s.

Aircraft Load Factors. The average number of passengers enplaning or deplaning at an airport each time an air carrier aircraft takes off or lands is an important factor in airport capacity analysis. The number is referred to as the "PPO factor," for "passengers per operation." It is a product of a complex number of variables, including seats available as dictated by the mix of aircraft, the number and frequency of flights ("levels of service"), the nature of through flights (resulting in seats occupied by passengers who remain on the aircraft), stage length of haul, and role of the airport.

The economic downturn of 1970-71 and the 1973-74 fuel allocation restrictions encouraged the airlines to schedule fewer flights to concentrate loads. These cutbacks have not been replaced in most cases and increased passenger demand of late is being absorbed by the larger newer aircraft, particularly at the high-density airports.

An analysis made earlier for the SCRASS study of these and other variables resulted in a 1985 PPO factor for each of the major airports of the Southern California aviation system. For example, the PPO factor at LAX in 1972 was 52.3, and was projected by SCRASS to be 72.3 by 1985.

Airport Capacity. The capacity of the airport is the capacity of a system which comprises functional elements both inside and outside the airport. Runway capacity is an important ingredient, and this is most commonly expressed as the number of aircraft movements which a runway can handle during a given period of time with specified procedures and with a small but acceptable level of delay.

It is necessary to recognize that it is almost impossible to achieve perfection in the design of an airport, as there are many conflicting interests and the pattern of air traffic is continually changing. Many factors affect the capacity of an airport, any one of which at any time could be the limting factor. The main ones are:

* The passenger handling capability
* The runway capacity
* The capacity of the ground movement guidance and control system
* The terminal area capacity
* The apron capacity -- i.e., the number of stands available
* The method of air traffic control operation
* The ground access
* The aircraft mix
* The weather

If the airport is to operate in the most efficient manner, all of these elements must be kept in balance, and all bottlenecks must be eliminated to the extent possible. Thus, improvements in air traffic control procedures and techniques which result in an increase in runway capacity must be matched by adequate terminal and access system capacity.

Effects of Meteorological Conditions and Altitude

An noted above, temperatures at Palmdale range from mild in the winter to hot in the summer. High temperatures and elevation both affect aircraft performance, reducing thrust and thus takeoff and climb capability. A load reduction or longer runway is required in compensation. Furthermore, aircraft climb profile angles decrease with increasing temperature and altitude.

An analysis made by the DOA in 1969 indicated that the temperatures experienced at Palmdale and its elevation of 2500 feet above mean sea level will have a significant, but not major, effect on aircraft operations. It was found that only a limited number of flight would be affected, mostly long-range international operations where the aircraft utilized often operate at or near their maximum structural takeoff weights. Transcontinental passenger flights and those to Hawaii will be affeted only if the scheduled departure occurs when the temperature is greater than approimately 95°F to 100°F. Since the off-loading is based on being able to execute lift-off at minimum climb rates and one engine out, a significant number of aircraft potentially would be restricted from maximum climb angles. Based on this investigation, no aircraft would be permitted a nonstop condition over 4000 miles.

Landing profiles generally are not affected by the altitude and temperature, although specific aircraft flight parameters will be affected compared to cooler climates at seal level.

SECTION III: PROBABLE IMPACT ON THE ENVIRONMENT

NOISE[1]

Description of Analytical Methods and Their Limitations

Since each airport has its own unique noise problem, several procedures have been developed which permit a detailed, quantitative analysis of noise exposure at any airport. This noise analysis for PIA was performed in compliance with the methodology described in the California Noise Standards for Airports to provide the Community Noise Equivalent Levels (CNEL). This index is the method of airport noise description accept by the Southern California Association of Governments and the California Division of Aeronautics for Environmental Impact Reports.

The Environmental Protection Agency recommends a description index entitled "Day-Night Equivalent Noise Level" (L_{dn}). The L_{dn} index, when applied at PIA, produces values within one unit of CNEL values. Therefore, CNEL and L_{dn} noise contours will be used interchangeably since one unit is within the absolute accuracy of the CNEL prediction.

Community Noise Equivalent Level

The CNEL was established in 1970 to provide a translation of unit measures of sound (noise) into an index of annoyance for planning purposes. This index incorporates several factors: amplitude and spectral distribution of the noise, sensitivity of the human ear, duration of noise events, frequency of occurrence of noise events, and time of day weighting factors.

The CNEL is a method of representing in a single number the combined effect of daily noise exposure from aircraft. It is based on Single Event Noise Exposure Level (SENEL) measurments for each aircraft operation at an airport, and is averaged over 24 hours. The SENEL value is a mathematical combination of noise levels in A-weighted decibels and duration of the aircraft event. Mathematically, the CNEL value is computed by the following equation:

$$CNEL = \overline{SENEL} + 10 \log_{10} W_t - 49.4$$

where

$\overline{SENEL}$ = Average SENEL value in 24-hour period of all aircraft

---

1. The noise analysis of the proposed PIA was performed by Olson Laboratories, Inc.

$W_t = N_D + 3 N_E + 10 N_N$

W_t = The weighted total of daily flights with penalties applied for evening and night flights

N_D = The number of aircraft events from 7 a.m. to 7 p.m.

N_E = The number of aircraft events from 7 p.m. to 10 p.m.

N_N = The number of aircraft events from 10 p.m. to 7 a.m.

The CNEL index was derived in the framework of a regulatory standard for two classes of airports. Each class of airport is required to have a 5 CNEL reduction every five years until 1986, when the level is required to be 65. Table 7 lists the CNEL regulatory values which apply to incompatible land uses. Designated incompatible land uses include single-family and multi-family dwellings, trailer parks, and schools with standard construction.

TABLE 7

CNEL REGULATORY UNITS

Year	Class 1 Airports*	Class 2 Airports**	New Airports
1976	75	70	65
1981	70	70	65
1986	65	65	65

*Class 1 airports have more than 25,000 annual operations and operate 4-engine turbojet or turbo fan aircraft.

**Class 2 airports are all other existing airports with less than 25,000 annual operations or without 4-engine turbojet or turbofan aircraft.

PIA would be required to have compatible land uses, as defined in the standard, within the 65 CNEL noise contour when operations commence.

The CNEL values for a particular combination of aircraft parameters and airport operations are determined using a computer program. This program permits the mapping of lines of constant CNEL levels over the terrain about the airport.

Day-Night Equivalent Noise Level

The L_{dn} system of description and evaluation was developed in 1973-1974 for the Environmental Protection Agency. It is receiving wide use for estimating noise impacts at both civil and military airports and is based upon an Equivalent Sound Level (L_{eq}). The 65 CNEL (64 L_{dn}) falls below the 70 L_{dn} criterion which has been used by the EPA as a noise level requisite to insure minimum risk of hearing damage.

Interpretive Techniques

The description of noise using CNEL contours is the first step in assessing impact. The true measure lies in how much property and how many people are exposed to unacceptable conditions. The California Noise Standards established that at PIA the area within the 65 CNEL contour must have an impact area of zero. The impact area is the total area within the 65 CNEL noise contour less the area in compatible land use as defined by the standard. Because an area measure is not necessarily the most useful measure, the estimated resident population included within the 65 CNEL contour and the amount of area in certain specific land uses were also identified.

Considering that the California Noise Standards were established after weighing economic and technological feasibility, they represent the most thoroughly considered public policy to date and are used as the basis of evaluation.

Noise Standards

In view of the fact that moderate and excessive noise levels have adverse effects on some people, federal, state, and local governments have established noise-limiting regulations to protect citizens from potential physiological (such as hearing damage) and physchological effects.

Federal

The Noise Control Act of 1972 provides for the establishment of federal noise emission standards for new products. The Act also authorizes the EPA to recommend regulations to the FAA which the EPA believes are necessary to regulate aircraft noise, and to coordinate federal research activity in noise control. The Act prohibits state and local governments from setting noise emission levels different from those established by the EPA for noise sources covered under the Noise Control Act.

The authority and responsibility of the FAA, in the area of aircraft noise control, are mandated by the Federal Aviation Act of 1958, as amended, and the Noise Control Act. Under Section 611 (PL 90-411, modified by PL 92-574, Section 7), the FAA Administrator, after consultation with the Secretary of Transportation, is authorized to issue "standards for the measurement of aircraft noise" and the "prescription of such rules and regulations as he may find necessary to provide for the control and abatement of aircraft noise...."

Pursuant to this authority, the FAA published Federal Aviation Regulation (FAR) Part 36, in November 1969, in an effort to halt the escalation of aircraft noise. This regulation deals only with standards for noise emission for new aircraft certified after the date of promulgation. Aircraft which have been issued certificates based on noise standards in this regulation include the DC-10, L-1011, B-747, F-28, Cessna Citation, and the Dassault Falcon 10. Subsequently, in October 1973, the FAA published a regulation concerning the subject of the noise levels of aircraft produced before the effective date of FAR Part 36. The FAA reviewed the noise problems associated with in-service commercial aircraft in March 1974. The proposed "Fleet Noise Rule" would set permissible totals.

The FAA considers the utilization of operational procedures to be an effective device for controlling aircraft noise. In 1972, a procedure -- developed jointly by the FAA and the Air Transport Association -- defined climb speed and altitudes for various configurations and power changes. This procedure was slightly modified in 1973 and subsequently issued in January 1974, as FAA Advisory Circular 91-39, as a recommended noise abatement takeoff and departure procedure for civil turbojet aircraft. In 1974, the FAA published Order 7110.22 and Advisory Circular 90-59 concerning the arrival and departure procedures for high-performance aircraft. The sense of these directives is to maintain aircraft at as high an altitude as practical in the terminal control area.

In March 1974, in response to the Congressional requirement in the Noise Control Act of 1972, the EPA published information on the levels of noise "requisite to protect the public health and welfare with an adequate margin of safety." The EPA has concluded that a level which protects the 96th percentile of the population should be considered to be protective of the entire society. The level for hearing conservation has been calculated to be an L_{eq} of 70 dB[1] over a 24-hour day.

---

1. dB = decible which is a unit measure of sound level. Defined mathematically as 10 times the logarithm of the ratio of a given sound pressure level squared, to a reference sound pressure level squared. dBA is a decible modification that approximates the response of the human ear to sound.

Another agency of the Federal Government, the Department of Housing and Urban Development (HUD), issued Circular 1390.2 in August 1971, establishing minimum standards and guidelines with respect to noise abatement and control. The circular states: "HUD discourages the construction of new dwelling units on sites which have, or are projected to have, unacceptable noise exposures, by withholding all forms of HUD assistance for such dwelling units."

The current HUD definition of unacceptable noise levels is Noise Exposure Forecast (NEF) 40 which is approximately equal to 75 CNEL and above. Those areas with noise levels between 30 NEF and 40 NEF (65-75 CNEL) are considered by HUD to have normally unacceptable noise levels, but can be judged on a discretionary basis.

State of California

In December 1971, the California Division of Aeronautics established regulations (see Table 7) to provide noise standards applicable to all existing and future airports in the state required to operate under a valid permit issued by the Division, and to all operations of aircraft and aircraft engines which produce noise.

These regulations define the conditions which must exist for an airport to be specified as one with a noise problem. As a new airport, PIA would be in violation of the state law if any incompatible land uses fall within the 65 CNEL contour.

The State Noise Insulation Standards state that residential structures located in noise-critical areas, such as proximity to airports, shall be designed to prevent the intrusion of exterior noises beyond a CNEL of 45 dB in any habitable room with all exterior doors and windows in the closed position. Residental structures to be located within an annual CNEL contour of 60 dB generated by an existing or a new airport are required to be soundproofed to limit intruding noise (interior) to an annual CNEL of 45 dB.

The Effects of Noise

The hearing mechanism of humans allows reception of acoustical pressure, amplification of faint signals, attenuation of loud sounds, and conversion to impulses that are transmitted to the brain for interpretation. Studies have revealed the tremendous range of acoustical pressures that can be perceived as sound by man. Pressure fluctuations which are as small as 29×10^{-10} pounds per square inch (0 dB) can be detected as faint sound by most young healthy persons; and pressures as high as 0.0029 pounds per square inch (120 dB) are often perceived by people without causing serious hearing damage.

However, phenomenal as human hearing can be, there are certain limits beyond which damage will occur to the delicate hearing mechanism. It is

an accep'ed fact that most people will experience permanent hearing damage if exposed to sound pressure levels exceeding 160 decibels, or 0.29 pounds per square inch (psi), for only a few seconds. More recent studies have shown that, although most people can endure moderately high sound pressure levels for varying durations, the hearing ability of people will deteriorate at a rate depending on level and duration of exposure.

Studies have revealed that many factors, including social, psychological, economic, and political, contribute to protest activity relative to noise. At airports, the primary cause for complaints is noise. However, community response to PIA will vary depending on community acceptance and airport function.

The amount of attenuation produced by a structure depends on its design and on the frequency spectrum of the source. Typical frame construction, with windows closed, produces about a 20 dBA reduction of jet aircraft sound.

In the vicinity of PIA, most structures are single-family units of frame construction with various stucco, masonry, and wood veneers. Therefore, these generally will have an attenuation capability of 20-25 dBA if windows and doors are closed. A survey of the homes in the area surrounding the proposed airport showed that a majority of the residences are air conditioned. In terms of aircraft sounds, then, aircraft noise at 85-90 dBA would be attenuated to about 65-70 dBA.

Description of Existing Condition

Existing Noise Levels

The existing environment in the vicinity of the proposed PIA has ambient noise levels in the 35-45 dBA range. The ambient noise level in the Palmdale region is strongly influenced by natural factors, predominantly wind.

The results of a 1976 noise survey show a pattern of higher noise levels in the more developed areas to the west of the proposed airport. The area west of 15th Street East is generally characterized by urban uses and had the highest average L_{dn} value. The two highest L_{dn} values, 61 and 60 were to the west of Plant 42 adjacent to the Antelope Valley Freeway. During the daytime, a susbstantial number of aircraft flyovers from Plant 42 were recorded, consisting predominantly of U.S. Air Force four-engine turboprops and commercial airline 747s and L-1011s. The area to the south of the proposed airport is in the City of Palmdale and is characterized by urban sources of noise. The average ambient noise level in both these areas was 47 dBA.

The average ambient noise level to the north of the PIA site was 45 dBA. The area to the east of the proposed airport and 90th Street East

is largely vacant. This area had the lowest average ambient noise level, 31 dBA. The L_{dn} values were also low.

The existing noise environment is dominated by aircraft operations during the day and noise generated by freeway traffic at night. During the daytime measurements, aircraft touch-and-go operations, both military and civilian, were recorded. Most of these flights had peak levels between 65 dBA and 73 dBA at the measurement sites adjacent to the Antelope Valley Freeway. Airport operations at Plant 42 essentially dropped to zero during the nighttime noise measurement. Traffic-generated noise from the Antelope Valley Freeway and Highway 138 was pervasive during the nighttime noise measurements. Noise from these two major transportation routes was evident during the night in areas both north and east of the proposed airport boundaries. Because of the lack of development in the region surrounding the proposed airport, few barriers exist to impede the radiation of noise.

Wind produces a significant change in the area noise. The wind rose for Plant 42 indicates that calm conditions (0-6 knots) occur only 5.5% of the year; the wind exceeds 10 knots 31.5% of the year. At LAX, which is near the ocean, clam prevails 61.9% of the year. Above 10 knots, wind begins to cause a significant increase in the ambient noise level.

Air Force Plant 42 Operations

As presented in a recent study,[1] the following describes Plant 42:

> "The primary aircraft activity at Air Force Plant 42 is production and initial flight testing. However, the installation is also utilized to perform touch-and-go practice operations by various military aircraft. In addition, the airfield is utilized for touch-and-go training operations by commercial airlines. The majority of flight operations occur during the hours of 7 a.m. to 10 p.m.
>
> "Air Force Plant 42 has two active runways. Runway 07/25 is the primary runway for larger aircraft such as the L-1011, P-3, C-130, etc. Runway 04/22 is used primarily by attack/fighter aircraft. Takeoffs on these runways entail a turn to the northwest. Flights over the City of Lancaster are avoided.
>
> "Touch-and-go patterns (closed loop) for the larger aircraft are flown north of the base, avoiding the City of Lancaster. Fighter aircraft are flown strictly using left-hand patterns both for closed and overhead patterns."

---

1. "Air Installation Compatible Use Zone Study, Air Force Plant 42," U. S. Air Force, April 1978 as amended.

Based on the daily aircraft operations for both runways, the Air Force study projected noise contours using the L_{dn} methodology as shown in Figure 6. These operations result in some land use conflicts to the west of Runway 07/25 toward Quartz Hill. To date, however, complaints about noise from the 128,500 total annual operations of Plant 42 have been negligible.

Existing Land Use

The location of an airport has a decided effect on surrounding land uses, especially in an area that is sparsely populated and developed. The proposed PIA will be an important determinant of land use patterns that evolve in the vicinity of the airport site. The area most directly impacted by aircraft operations usually is assumed to be within a five-mile radius of an airport. However, much of the area impacted by noise is planned to be devoted to future nonresidential land use.

The area generally surveyed for noise impacts covered 154 square miles, or 98,560 acres. This area is bounded on the north by Avenue K, on the south by Avenue R, on the east by 170th Street East, and on the west by 50th Street West. The urbanized sections in the area include northern Palmdale, southern Lancaster, and Quartz Hill.

Most of the land in the study area, approximately 80% is nonurbanized. The nonurbanized land uses included rural, agricultural, vacant, and nonrecreational open space land. The least developed area is to the east of the airport site. (See Figure 7 for map of existing land uses.)

The nonurbanized character of the study area has resulted in relatively few incompatible land uses near PIA. Most of the land close to the proposed airport is designated for future industrial use or public open space.

The highest incidence of commercial land use is strip development to the west and south of the airport site along two transportation arteries, Sierra Highway (State Route 14) and Palmdale Boulevard (State Route 138).

The highest concentration of residential use is found south of PIA in northern Palmdale. Density in this area ranges from 1.1-15 dwelling units per acre (DU/AC).

The second highest concentration of residential use exists in southern Lancaster and Quartz Hill. Density in this area ranges from 0.25-6.6 DU/AC. Other scattered residential uses exist throughout the study area with densities of 0.25-1.0 DU/AC.

The total 1970 population of the defined study area was 24,407. The greatest population concentration is south of the airport site along Palmdale Boulevard with approximately 12,200. The second population

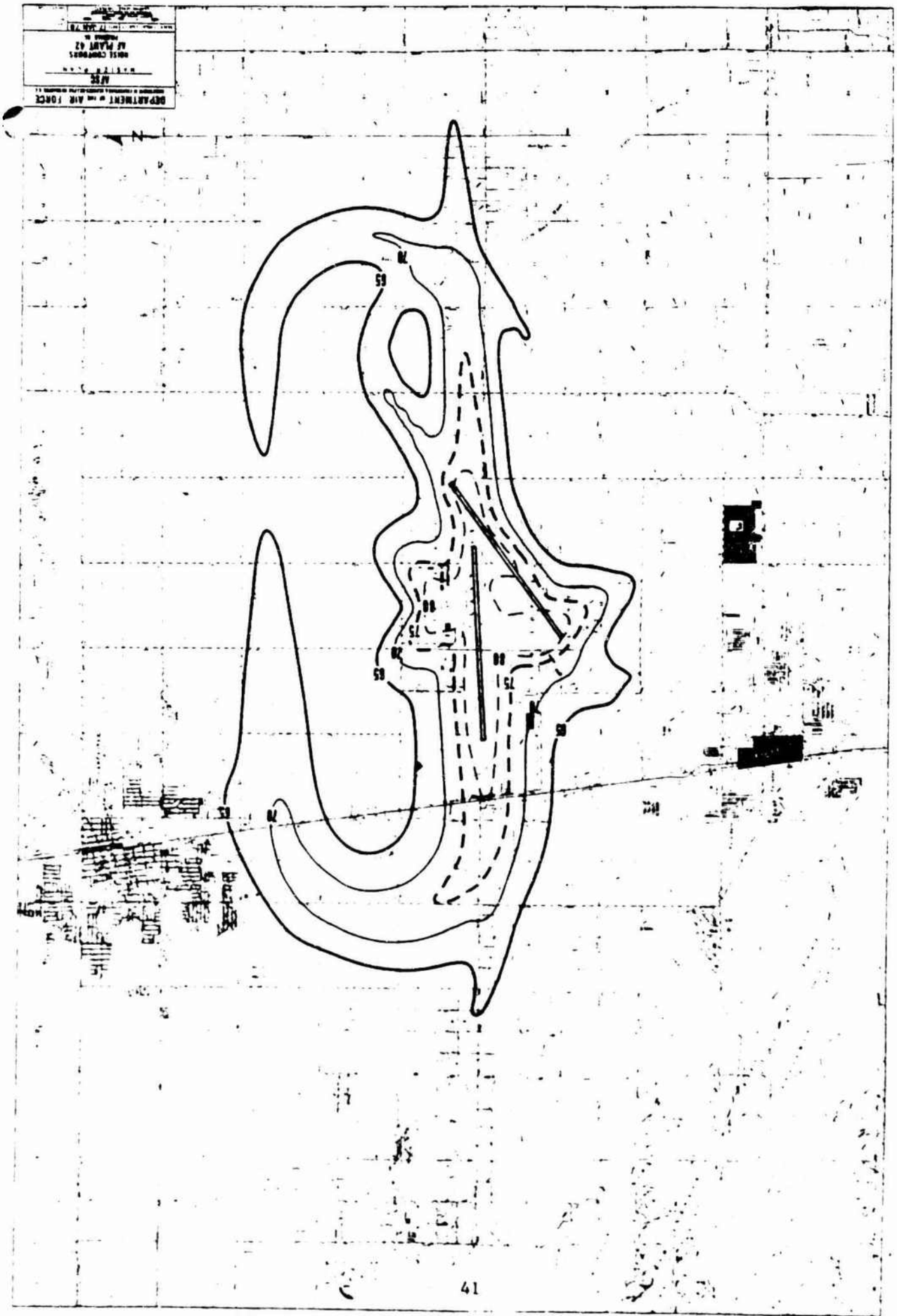


Figure 6 Projected Noise Contours for U. S. Air Force Plant 42

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

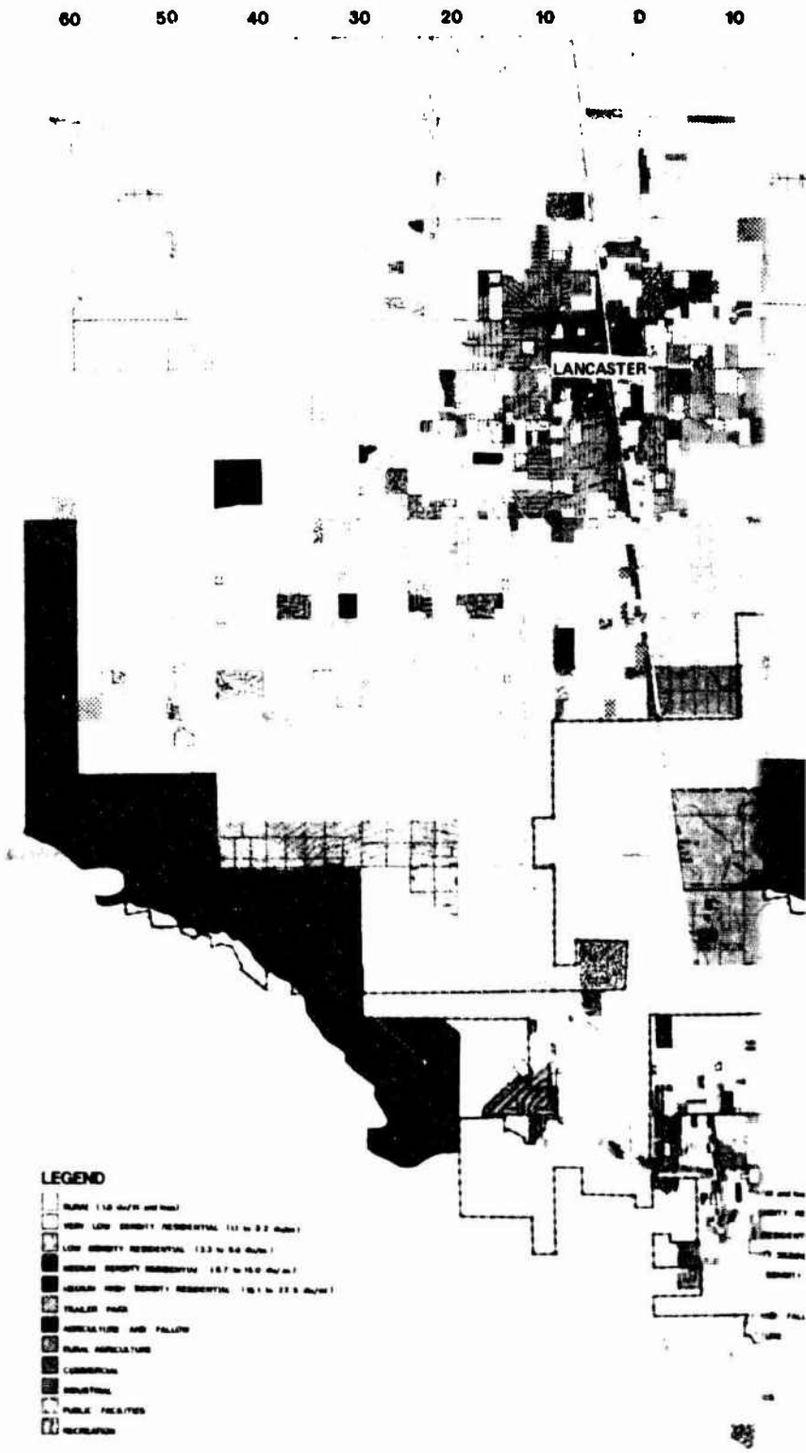


Figure 7 EXISTING LAND USE IN THE VI(
LANCASTER, AND THE PROPOSE

VIL

PALMDALE COMMUNITY
GENERAL PLAN

QUINTON·REDGATE·Economics Research Associates·Alan M. Voorhees & Associates
prepared for: Los Angeles County Department of Regional Planning·Southern California As
U.S. Department of Housing and Urban Development·City of Palmdale·City of Los Angele

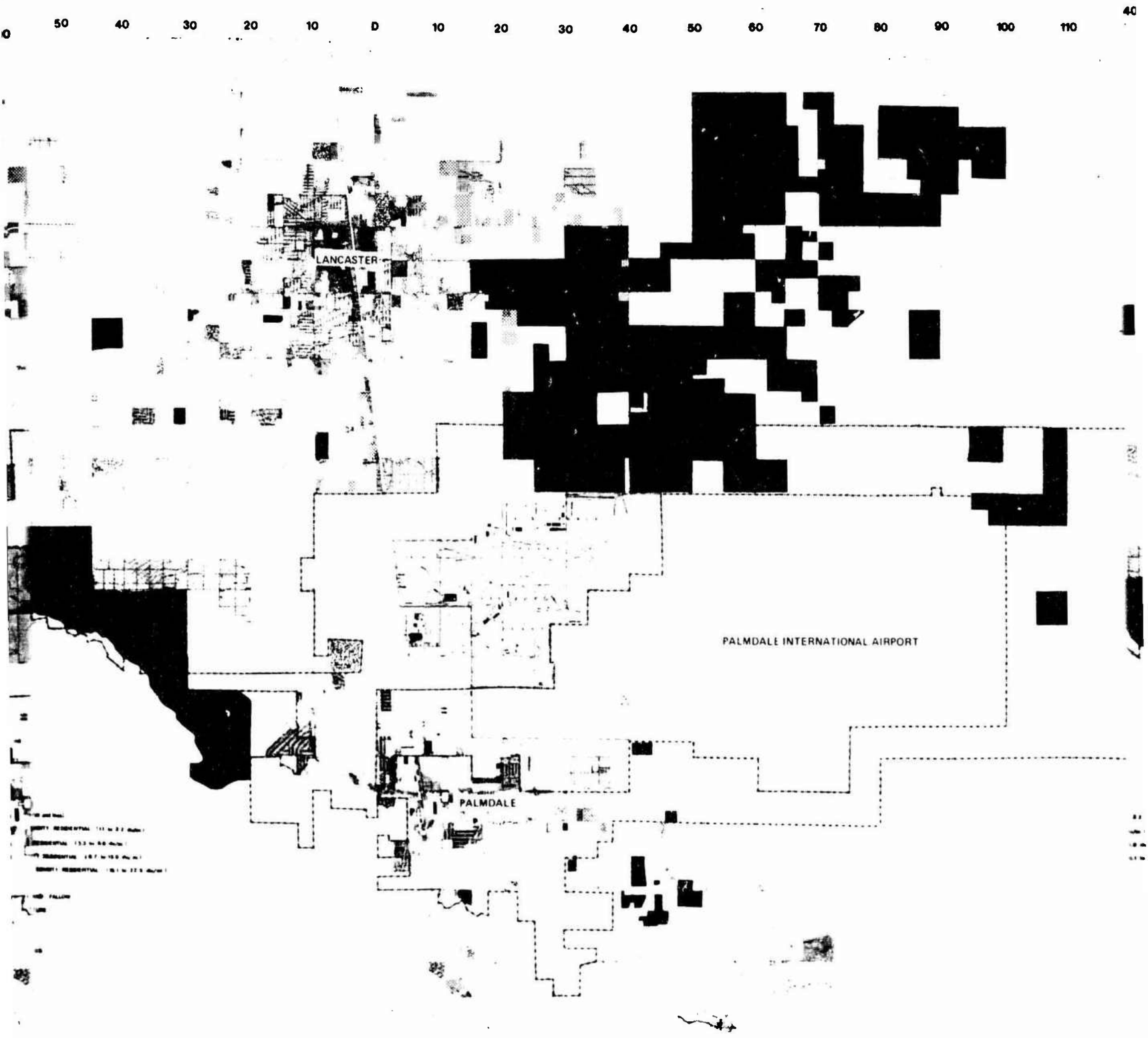
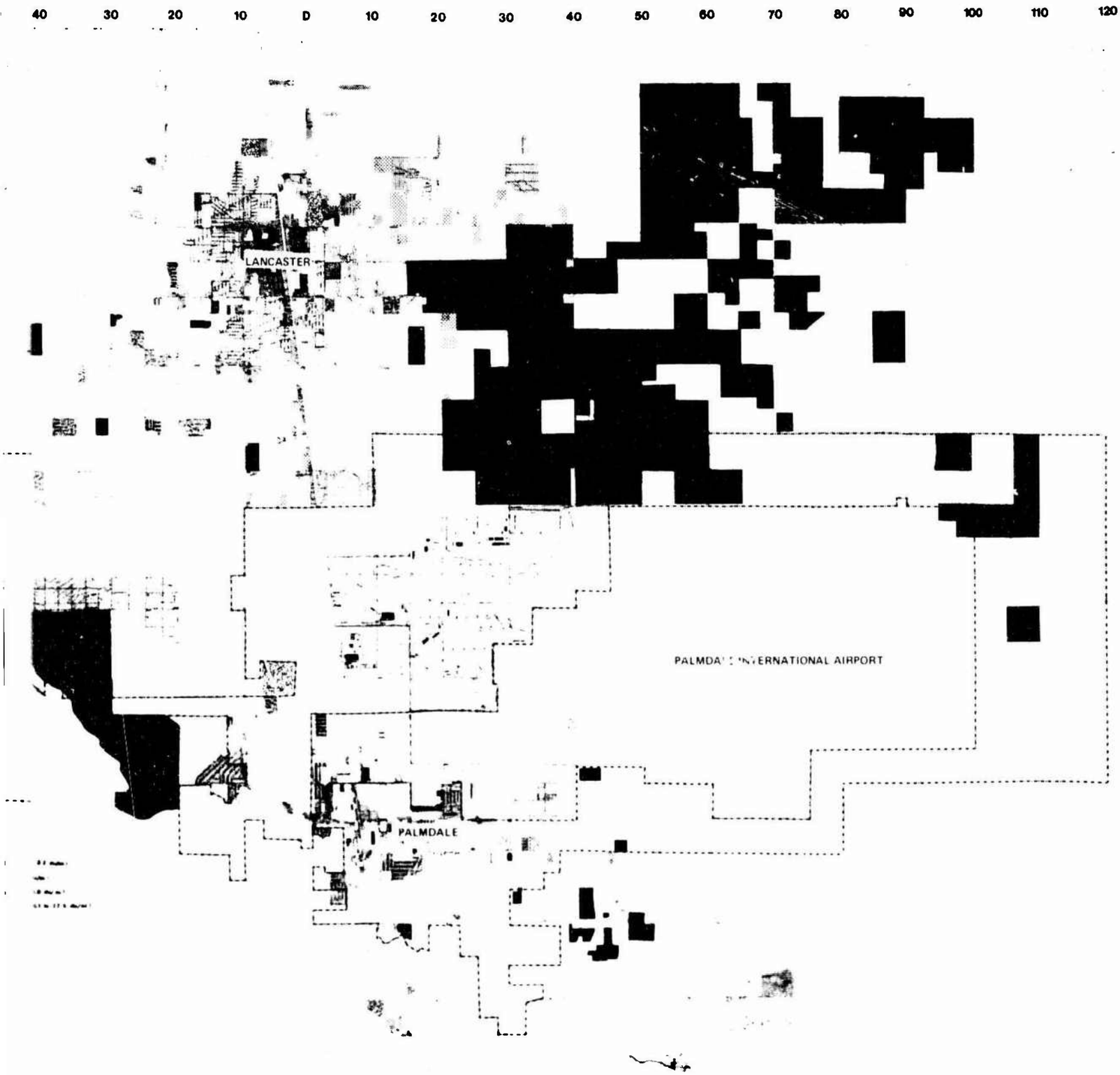
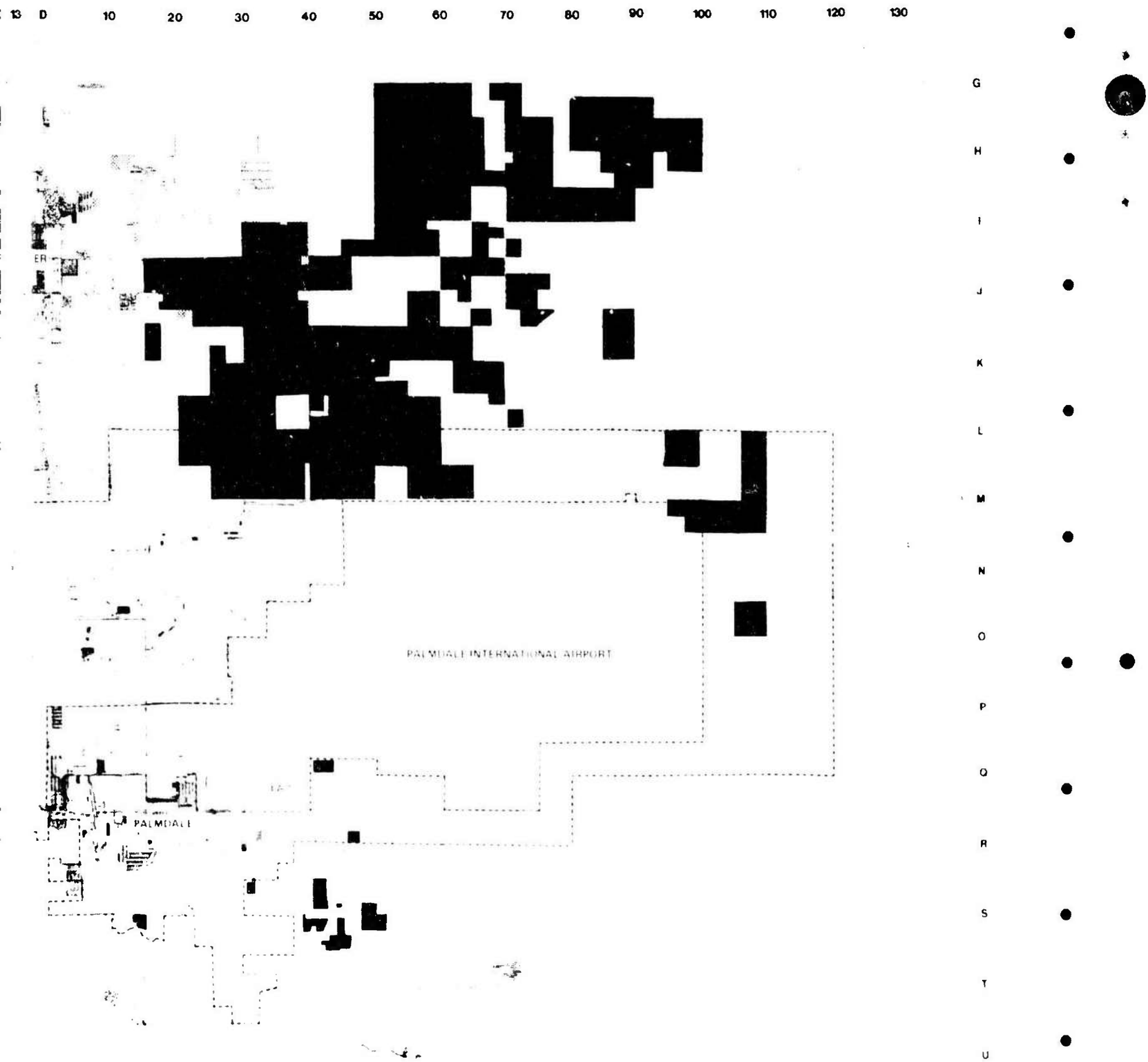


Figure 7 EXISTING LAND USE IN THE VICINITY OF PALMDALE, LANCASTER, AND THE PROPOSED AIRPORT

lesearch Associates · Alan M. Voorhees & Associates
Department of Regional Planning · Southern California Association of Governments
rban Development · City of Palmdale · City of Los Angeles Department of Airports



ure 7 EXISTING LAND USE IN THE VICINITY OF PALMDALE, LANCASTER, AND THE PROPOSED AIRPORT



IN THE VICINITY OF PALMDALE,
E PROPOSED AIRPORT

30 November 1975

ociates
alifornia Association of Governments
os Angeles Department of Airports

concentration is west-northwest of PIA in Quartz Hill and southern Lancaster with approximately 6,500. The population near the northern and eastern boundaries of the airport is very sparse. The lowest population density is east of PIA.

Noise Analysis Factors

Volume of Operations

The average daily operations at the proposed airport are shown in Table 8 by aircraft type for the study year 1995.

The average annual commercial operations at the existing Plant 42 runways are shown in Table 9 for the study years 1980, 1990, and 2000. These operations are predicated on the assumption that the proposed new airport would not be constructed and only a limited number of commercial operations would occur.

TABLE 8

ESTIMATED TRIP LENGTH DISTRIBUTION OF AVERAGE DAILY DEPARTURES IN 1995

Trip Length (miles)	3-engine Widebody	2-engine Fan	4-engine Widebody	3-engine Fan	2-engine Turboprop	4-engine Turboprop	Total
0- 500	11	43	-	6	2	10	72
501-1,500	21	-	-	9	-	-	30
1,501-2,500	19	-	11	-	-	-	30
2,501-3,500	4	-	18	-	-	-	22
3,501-4,500	-	-	5	-	-	-	5
More than 4,500	-	-	3	-	-	-	3
Total	55	43	37	15	2	10	162

TABLE 9

PLANT 42 RUNWAY OPERATIONS IF PIA IS NOT BUILT

Year	Passengers	Annual Operations	Load Factor	PPO
1980	330,000	3,000	0.55	55
1990	660,000	6,470	0.55	102
2000	820,000	7,455	0.70	110

Flight Paths and Utilization

This study is based on using the two outboard runways separated by about 8,100 feet and designated 7R-25L and 6L-24R. Only these two are expected to be built by the year 1995. The runways are shown in Figure 8 together with their associated flight tracks.

The landing approaches to PIA will be evenly split between the two runways. The straight-in approach patterns 7A for the southern Runway 7R-25L, and 6A for the northern Runway 6L-24R will each account for 50% of the incoming aircraft. The takeoff allocation is, however, not evenly split. Runway 6L-24R will account for 68% of the takeoffs, with a split of 36% on takeoff to 24B and 32% to 24C. The remaining 32% of the takeoffs will depart on the south Runway 7R-25L, with all of these flights departing along flight track 25C.

It should be noted that safety constraints required the uneven split on takeoffs from the two runways to prevent flight track crossover. The selection of path and runway utilization values was based on a review of the original PIA site studies and existing designated federal airways and controlled airspace.

In the CNEL description system, account must be taken of the time of day of operations. An extensive survey of daily record at LAX serves as the basis for development of the daily splits. A daily allocation of 71.8% from 7 a.m. to 7 p.m., 14.8% from 7 p.m. to 10 p.m., and 13.4% from 10 p.m. to 7 a.m. was used for all PIA calculations.

Projected Land Use

Substantial demands for residential acreage as well as commercial use are projected by 1995. New residential development will occur at substantial distances from the airport, leaving the areas closer to PIA for industrial or commercial purposes. The Draft Land Use Element from the Palmdale Community General Plan was used as a guide for projected 1995 land uses which might be impacted by PIA.

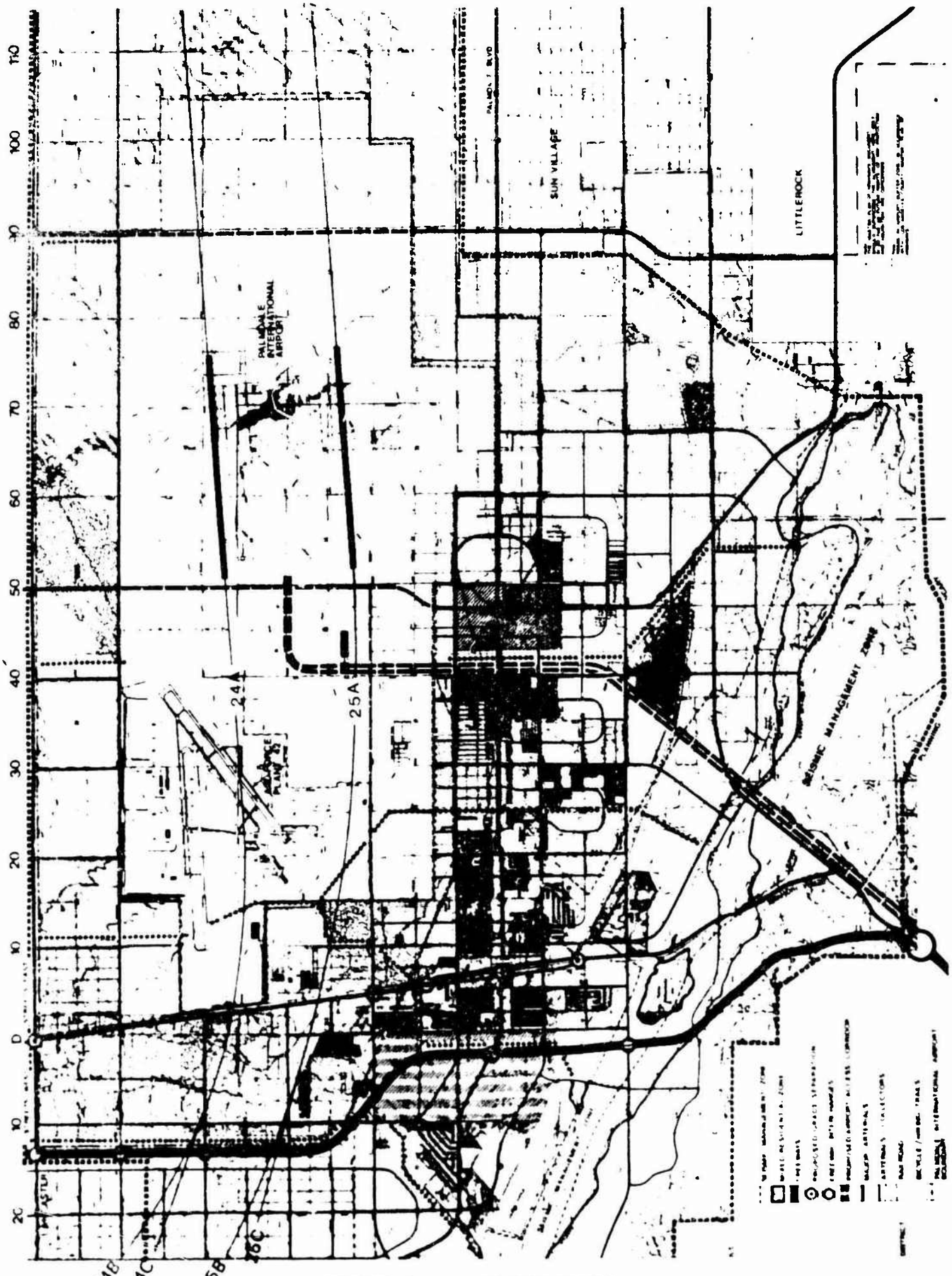


FIGURE 8 FLIGHT TRACKS

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE

Effects of Meteorological Conditions and Altitude

Aircraft climb profile angles decrease with increasing temperature and altitude. Thus, an aircraft departing PIA will always fly a lower climb profile than at LAX for the same gross weight because of the 2,500-foot elevation difference between the two locations. In addition, aircraft generally will fly lower climb profiles at PIA because the average temperatures are higher than at LAX, which is located next to the ocean.

Several studies were conducted on both the aircraft parameters and sound transmission effects. From these studies it was indicated that as much as 10% of total summer passenger volume could be affected, involving up to 50% of long-haul passenger volume during daylight hours. On the assumption that extra flights would have to be added to compensate for the problem during the summer, it was concluded that the noise levels would be increased by less than 0.5 dBA on the CNEL contours under worst conditions.

Case Studies

The computer programs for the CNEL index utilize the data in the library that includes noise levels, climb profiles, and power scheduling for each aircraft type forecast at each nonstop destination range. Noise and performance parameters were adjusted for 2,500 feet above mean sea level, 80°F mean annual temperature, and 44% mean relative humidity for most computer runs. Aircraft operations data were developed in terms of average daily aircraft volumes based on levels of air activity allocated to PIA. These data were used in the majority of runs.

Case numbers were assigned to the components of the proposed airport -- i.e., to normal operations, possible noise mitigation measures, weather-limited conditions, and maximum/minimum operations. The study year considered for each case was 1995 to correspond with the North Los Angeles County General Plan. These cases are listed in Table 10

TABLE 10

PIA STUDY CASE LISTING

Case	Identification
(1)	1995 Normal Pattern
(2)	1995 Noise Abatement Takeoff and Landing
(3)	1995 Temperature-limited Operations (off-loading and/or fuel stops and extra flights)
(4)	1995 Maximum/Minimum Operations per Day
(5)	1980, 1990, and 1995 - Plant 42 Limited Operations

(1) Normal Pattern. The standard conditions refer to the direction in which aircraft land and takeoff, the climb profiles, temperature conditions, and flight distribution. The air traffic flow is determined by air traffic control restraints and prevailing winds, with the aircraft being flown into the wind. The air traffic flow for PIA would be in a northeasterly to southwesterly direction, aligned 250/070 degrees magnetic. Departure climb profiles are at full power settings. Flights were distributed according to the 1972 average daily operations at LAX.

(2) Noise Abatement for Takeoff. The noise abatement takeoff cases consist of noise mitigation flight maneuvers executed by the pilots to reduce noise exposure times at locations in the vicinity of PIA. Departure climb profiles are according to current Air Line Pilots Association approved procedures. This involves a first-segment climb at full power to 1,500 feet, with a power reduction at 1,500 feet, and an adjusted climb gradient to maintain constant velocity.

(3) Temperature-limited Operations. A set of three curves considers temperature in Palmdale which often hovers in the middle to high nineties (°F). During these hot days, aircraft engine performance is degraded, aircraft climb profiles are shallower, and noise levels are reduced. The mean July day of 90°F and 16% relative humidity was used for computational purposes.

(4) Maximum/Minimum Operations Per Day. Statistically, the number of operations per day varies about some mean value. The maximum and minimum cases represent, in effect, an examination of the worst and best days on a noise exposure basis. One case was run using the 1972 maximum and minimum daily operations ratios of LAX. In 1972, the highest operational day was 124% of the mean daily volume, and the lowest operational day was 69% of that volume.

(5) Plant 42 Limited Operations. In the case of limited operations at Plant 42, the noise impact of the use of these runways is considered. For purposes of this study, assumptions regarding the future of Plant 42 were necessary. While the future of this facility is unclear, it can continue operations on the east-west runway without undue airspace conflict. For the purposes of this study, the east-west runway at Plant 42 was assumed to be operational as long as needed. The proposed two pairs of parallel runways of PIA were aligned such that their ILS systems would not interfere with the east-west runway at Plant 42. The cross wind runway at Plant 42 would have to be phased out.

Aircraft Noise Impact

Construction Phase

The construction of a new airport at Palmdale is a major project. A large variety of types and sizes of equipment may be expected to be used during the construction phase. As a result, a great deal of noise will be generated from construction activities.

The major characteristic of noise (i.e., the average noise annoyance potential) will vary during each phase of construction. The major phases will consist of ground clearing, excavation, foundations, erection, and finishing. During these phases, a number of projects will be undertaken including runway and taxiway construction, maintenance, departure and arrival aircraft parking area construction, passenger and freight terminal facilities, and public access projects consisting of public parking facilities and road construction internal to the site.

The majority of heavy construction activity will occur well within the confines of the airport site, which already encompasses a large noise buffer zone to mitigate jet aircraft noise. The semirural character of the area external to the site supports studies which indicate that few people will be disturbed by construction noise.

Construction activity will be required to comply with both proposed and future noise ordinances of the City of Palmdale and the North Los Angeles County General Plan. Both of the main state highways and arterial connectors will experience higher noise levels due to increased traffic from hauling construction materials and additional construction worker traffic.

Operational Phase, CNEL Methodology

CNEL contours were developed for most of the cases presented in Table 10. Contours for the case with the greatest noise impact (normal pattern) are shown in Figure 9.

Population and Land Use Impacts

The off-airport areas enclosed within each of the noise contours provide the broadest comparison of the study cases. These areas can be seen in Figure 9. Subsequent comparison of impacts on people and land use is limited by the available population and land use projections.

The land uses enclosed by the 60 and 65 CNEL contours for the various cases are presented in Table 11. The 70 and 75 CNEL contours are confined to PIA property for all cases. Noise contours were computed for Case 5, Plant 42 Limited Operations, but are not shown. Computer analysis and preliminary plotting indicated that Plant 42 commercial operations would not be of sufficient volume to generate 65 CNEL contours with off-airport areas impacted.

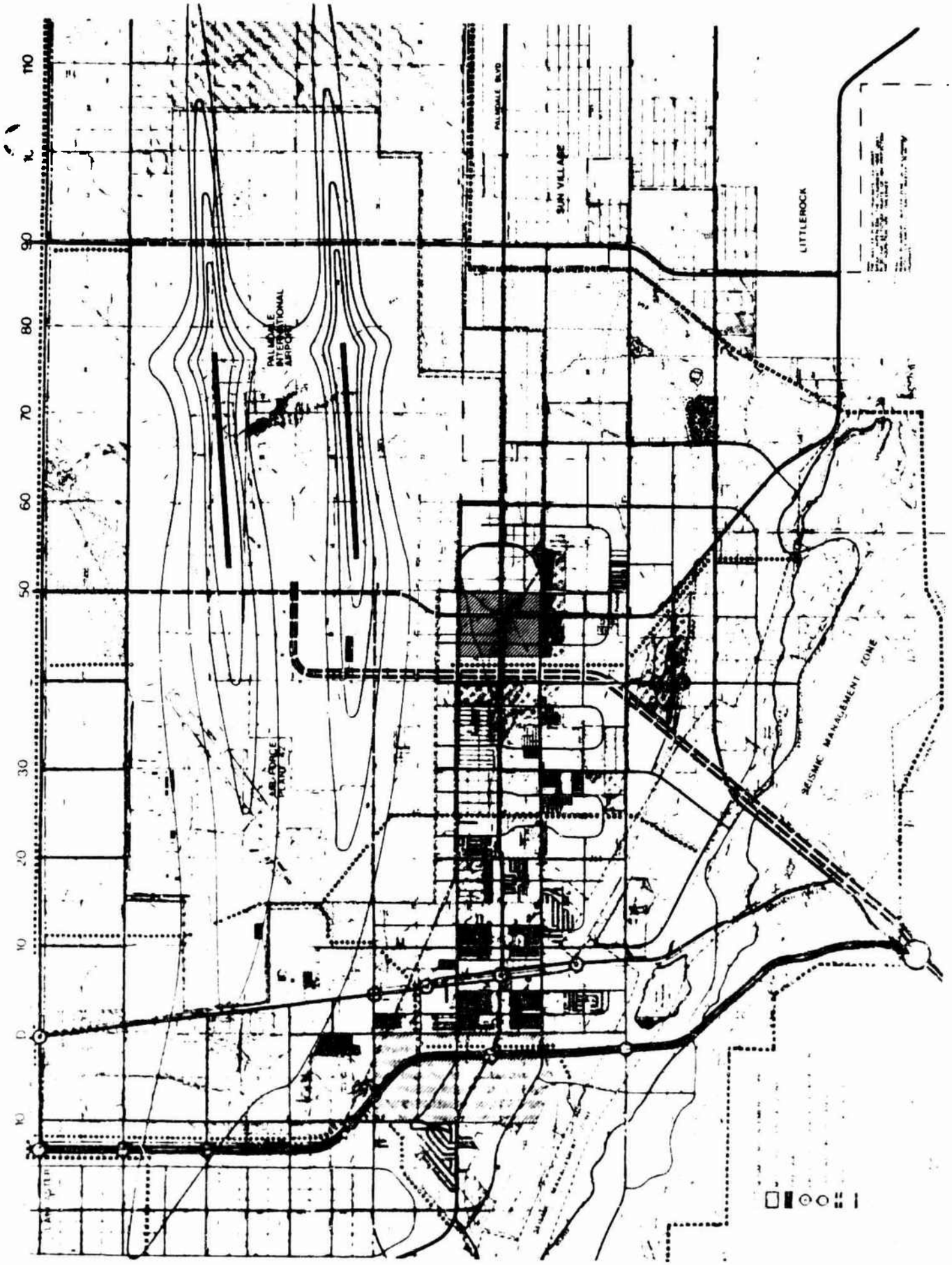


FIGURE 9 CNEL NOISE CONTOUR, CASE 1, 1995 NORMAL PATTERN

TABLE 11

POPULATION AND OFF-AIRPORT LAND USES IMPACTED IN 1995

Case	60 CNEL					65 CNEL		
		Acres*					Acres*	
	Population**	Nonurban 1 (residential)	Open Space (public)	Industry	Airport Buffer Zone	Population**	Open Space (public)	Airport Buffer Zone
1. Normal Pattern	680	410	925	1,310	445	0	0	60
2. Noise Abatement	0	0	470	420	210	0	0	45
3. Temperature Limited	0	0	80	0	40	0	0	0
4. Maximum Operations 65 CNEL						0	80	110
5. Minimum Operations 65 CNEL						0	0	0

*The land use designations were based upon those utilized in the Palmdale General Plan, November 1975.
**Population estimates were based upon planning factors of 0.5 dwelling units per acre or less, and 3.3 persons per dwelling unit for Nonurban 1 areas found in the Land Use Element of the North Los Angeles County General Plan, Palmdale Community General Plan, Draft for Citizen Review.

The area of land which is within the noise impact boundary and which has incompatible land use is utilized as a measure of the magnitude of the noise problem at an airport by the State of California under the California Division of Aeronautics Noise Standards. Incompatible land use will not occur at PIA for any of the cases studied.

The normal pattern (Case 1) and Maximum/Minimum Operation (Case 4) can be compared in Table 11. The 65 CNEL contour generated by the maximum day operation case will extend onto 80 acres of public open space just west of Plant 42. In addition, almost twice as many acres in the airport buffer zone to the east will be impacted. On a minimum day of operation no off-site acres will be impacted by 65 CNEL.

The population and off-airport land use impacted by 60 CNEL are also shown in Table 11. The normal pattern impacts 410 acres of residential area. This area is between Avenue M and Avenue N and immediately west of Antelope Valley Freeway. Approximately 680 people will be impacted.

The Noise Impact Management Area-Buffer criteria supplements the State of California Housing and Community Development Law standards. The state standard mandates that: "Residential structures to be located within an annual CNEL contour of 60 dB require an acoustical analysis showing that the structure has been designed to limit intruding noise to the prescribed allowable levels. Interior community noise equivalent levels with windows closed, attributable to exterior sources, shall not exceed an annual CNEL of 45 dB in any habitable room." The Noise Impact Management Area defined in the Palmdale Community General Plan extends this standard to all single-family dwellings, schools, libraries, health facilities, nursing homes, and public meeting places. The Nonurban 1 land use impacted by 60 CNEL for the normal pattern falls within this category, involving a total of 410 acres, as noted above. An acoustical analysis showing that the structure has been designed to limit intruding noise to the prescribed allowable levels would be required in this area.

Plant 42 Impact. The effect of 128,500 annual operations at Plant 42 in the future is difficult to ascertain as a forecast of activities is not available. Assuming, however, a constant level of activities, and that PIA was not constructed, the contours as shown previously in Figure 6 would probably be about the same. This is because the civilian training activities (21,800 annual operations) would most likely be discontinued and replaced by about 7,500 annual commercial flights. The remaining 106,700 military operations, of which 46% are jet, 29% are four-engine piston aircraft, and the rest two-engine piston aircraft, are assumed to continue.

If PIA is built, it is probable that the civilian jet training activities and the smaller twin-engine aircraft would not continue at Plant 42, thus reducing operations to about 80,000 annually. Further,

as Runway 04/22 would not be operational, another 9,000 annual operations of jet fighter aircraft using this runway probably would not occur. Of the remaining 71,000 operations, only 57% would be jet engine aircraft. These lowered and changed levels of activity would most likely result in a noise impact lower than that for current conditions which has elicited a negligible reaction from the surrounding communities. PIA activities and noise levels, however, will add slightly to the noise levels of Plant 42 military operations west of the existing property lines of Plant 42 only. These increases of 3 dBA at the worst will occur within areas designated as public open space and industrial use. Impacts on residences south of Plant 42 will cease with the discontinuance of Runway 04/22.

Activities at PIA will subject Plant 42 to aircraft noise ranging from 75 CNEL at the edges of the eastern property line to 65 CNEL at the western property line. Most of this noise will occur over the runway complex or south of it over vacant land. There are also four production facilities and a warehouse exposed. All are currently within the 70-75 CNEL contour. With the reduced Plant 42 operations combined with PIA operations, these facilities will be subjected to slightly higher noise levels than now.

The FAA regional Air Route Traffic Control Center at Avenue P and 25th Street East will be within the 60-65 CNEL contour. The existing sewage disposal plant at Avenue P-8 and 30th Street East is located just beyond the 60 CNEL contour. The Lockheed production facility on Sierra Highway at Avenue O-8 will be subjected to approximately the same noise level as at present.

Schools. One of the requirements for a good learning situation appears to be one without too intensive background or interfering noise. Various studies have determined a maximum classroom level of 45 dBA. The Noise Element of the Palmdale Community General Plan sets a maximum interior exposure of 45 CNEL for school classrooms.

In Palmdale, there are no schools within the 65 or 60 CNEL contours. The closest school to the 60 CNEL contour is Manzanita School which is approximately 4,000 feet south of the 60 CNEL contour line. An outside noise level between 50 and 55 CNEL from the operation of PIA is projected for this school. Manzanita School was selected as one of the noise measurement sites, Site 20, in the February 1976 noise survey. During the day, measurement of a jet flight taking off from Plant 42 reached a peak noise level of 55 dBA outside on school grounds.

Three other school locations were also measured during the latest noise survey. These schools were Site 10, Tamarisk School -- 50 L_{dn}, Site 4, Paraclete High School -- 57 L_{dn}, and Site 1, Antelope Valley College -- 56 L_{dn}.

Proposed Methods for Controlling the Effects of Noise

There are a number of measures available to aid in alleviating the adverse noise impact from operations at the proposed PIA. It should be remembered that some measures are directly under the control of the Los Angeles Department of Airports, and others are under the control of various other government entities.

Land Use Controls in the Vicinity of PIA

Noise impacts on surrounding land uses can be minimized by land use control strategies. These strategies provide the most important aspect of Palmdale noise abatement efforts. Three strategies available are zoning and building code restrictions, acquisition of vacant land, and redevelopment of incompatible land.

Incompatible land uses can be prevented by the enactment and protection of zoning to limit development to compatible land uses. The City of Palmdale, County of Los Angeles, and U.S. Air Force have attempted to reserve an airport buffer zone around the existing Air Force Plant 42 and proposed facilities. In general, the land surrounding Plant 42 has been zoned for industrial utilization. Clear zones have been reserved at the runway ends of Plant 42 for further protection. A substantial area to the north and east of the proposed airport has also been designated as an airport buffer zone to reduce incompatible land use. The area to the west of Plant 42 and bounded on the north by Avenue M, on the east by the Antelope Valley Freeway, and on the south by Avenue P, is generally planned for industrial or public open space use to mitigate impacts.

Implementation of the zoning restrictions cited in the Draft Palmdale Community General Plan will be a major step toward controlling aircraft noise impacts. A small triangular area northwest of the airport is currently designated as Nonurban 1 with 0.5 dwelling units per acre and less. Part of this area lies within the 60 CNEL contour and should, therefore, be designated for nonresidential uses.

Acquistion of land as a noise buffer has already occurred by designating a large site area. Acquistion of additional land would guarantee land use control of the impacted areas.

Alteration to Impacted Structures

Many individual modifications can be made to existing residential structures to provide acoustical shelter for people from high noise level environments. Areas on the 60 CNEL contour will be impacted by average maximum dBA values around 67. Generally, a 10 dBA reduction is gained for most homes in the area with open windows. This allows normal conversation at 5-7 feet indoors.

The addition of a forced-air ventilation system to dwellings results in a 20 dBA reduction from outside noise. It should be noted that most structures in the study area are presently equipped with air conditioning.

EXISTING AND PLANNED LAND USES

The following description of existing land uses and zoning is excerpted from the Palmdale and Lancaster Community General Plans and the Areawide General Plan for Antelope Valley of the Draft North Los Angeles County General Plan, November 1975.

Existing Land Use Patterns

The Antelope Valley study area has two basic characters. The mountains and valleys of the Sierra Pelona and San Gabriel ranges limit urban growth and the supply of land for expansion. Extending northward from these ranges is the broad, flat plain of the western Mojave Desert, characterized by a more dispersed residential pattern with a grid road network.

Land Ownership

The Antelope Valley study area is approximately 1950 square miles in extent. The following breakdown classifies land in this area in terms of public versus private ownership:

Ownership	Approximate Gross Acreage
Public	
National Forest	
Angeles	512,000
Los Padres	4,400
Subtotal	516,400
Bureau of Land Management	12,000
Military	47,500
Institutions	200
Total Public	576,100
Private	670,000
Total	1,246,100

A vast majority of private holdings is in or adjacent to the urban areas.

Pattern of Land Use - Antelope Valley[1]

The main residential concentrations, located in the central and southern part of this Valley, are the communities of Lancaster, Quartz Hill, and Palmdale. The City of Palmdale was originally developed as a residential community near the junction of Sierra Highway and State Highway 138 (Palmdale Boulevard). Retail commercial businesses were located along these two arteries since the Sierra Highway was at one time a major thoroughfare. After construction of the Antelope Valley Freeway, however, commercial facilities serving the traveling public began to be established nearer the freeway on Palmdale Boulevard. In the residential zone nearest the highway junction, housing units are scattered throughout the area at a low density. Away from this junction, mostly to the east, scattered tracts are separated by vacant land, with the most recent building activity to the southeast. The Antelope Valley's most significant manufacturing land users, including the Lockheed assembly plant and Air Force Plant 42, are located north of Palmdale, between this community and Lancaster.

Most of the growth in the area has occurred in the Valley's central trade and administrative center, Lancaster. West of this community is the only college in the Valley, Antelope Valley Junior College, and the community itself contains the county multipurpose Civic Center, as well as major commercial uses.

Residential development in Lancaster occurs both east and west of Sierra Highway, and it extends to the southwest, toward the rural community of Quartz Hill. Apart from a concentration of mobile home parks along Avenue I, development is in low-density tracts that become more scattered west of the freeway and south of Avenue J. Present growth seems to be focused on an area near Antelope Valley Junior College, halfway between Lancaster and Quartz Hill. The Lancaster area began as a trade community, primarily for the Antelope Valley's agriculture lands.

Agricultural land in the Antelope Valley today tends to be located away from the communities. The farm land is used increasingly for irrigated alfalfa crops. This pattern becomes more diffused as it moves east, and agriculture disappears altogether near Lancaster (from 60th Street West to 30th Street East).

Most of Antelope Valley's smaller communities, which began as agricultural settlements or local farm trade centers, still maintain a very low or rural density of residential development. These small residential

---

1. See Figure 7 for existing land use map.

areas are primarily located southeast of Palmdale, along the Pearblossom Highway. Littlerock, just east of the creek's wash with its sand and gravel operations, is located among fruit orchards. North of Littlerock is Sun Village, a large area of widely dispersed homes and poultry ranches, and four miles east of Littlerock is Pearblossom, a residential concentration, south of Pearblossom Highway. Another rural residential area spread out in the vicinity of Pearblossom, against the mountains, is Juniper Hills. Generally, the east Antelope Valley has the most dispersed pattern of residences in the study area. The west Valley has only one rural community, Antelope Acres, formerly a poultry-raising community that is five miles northwest of Lancaster.

Existing Land Use - Palmdale, Lancaster, and Vicinity

A 'checkerboard' scattering best describes the existing land use pattern of the Palmdale planning area. Unlike the Lancaster community, with its concentrated pattern of uses near Sierra Highway, Palmdale is characterized by residential and commercial tracts scattered on either side of Palmdale Boulevard. If there is any unifying element, it is Palmdale Boulevard. Most of the developed uses tend to be located within one mile of either side of this major arterial. On the other hand, these uses extend over eight miles in the east-west direction.

Principal commercial concentrations are located along Palmdale Boulevard; along Sierra Highway, north and south of Palmdale Boulevard; and west of the intersection of the Antelope Valley Freeway and Palmdale Boulevard. Other smaller commercial centers are scattered throughout the community, adjacent to residential tracts.

Older, low-density residential units are scattered in an area surrounding the Palmdale Boulevard-Sierra Highway intersection. Newer single-family residential tracts are located outward from this older section. Most of these tracts have been constructed south of Palmdale Boulevard. Recent high-quality developments have been located at 10th Street West and Amargosa Creek (Desert View Highlands) and adjacent to the Antelope Valley Country Club. Scattered throughout the foothills are high-priced single-family dwellings. Apartments and condominiums have been developed in a very scattered pattern, located adjacent to and intermingled with single-family detached units. No single area of the Palmdale area is dominated by multiple-unit dwellings. Trailer parks have been developed in the eastern section of the planning area. Again, these are randomly scattered. Most, however, are located on Avenue R or Pearblossom Highway.

Industry, as would be expected, has developed along the railroad and Sierra Highway, south of Palmdale Boulevard, and adjacent to Air Force Plant 42. Generally, industry south of Palmdale Boulevard is small in scale and dependent upon the railroad. Uses adjacent to the Air Force

plant are aerospace-oriented, including Lockheed and North American-Rockwell. In the southeast, in the Little Rock Creek floodplain, quarrying and related uses are located. Rural agricultural uses are located in pockets adjacent to the California Aqueduct and in an area south of Avenue N and west of 20th Street West.

Public facilities (schools, civic structures, etc.) are scattered throughout the community to serve the needs of the population. Palmdale Hospital is located northeast of Lake Palmdale.

Agricultural lands in production or fallow are located in the western portion of the planning area. Generally, these extend in a belt along the base of the foothills, northwesterly from 20th Street West. Small agricultural parcels are scattered in the 40th and 50th Street East area, south of Avenue Q, north of Avenue S-8.

Lancaster has until recently developed its residential, industrial, and commercial uses in a relatively compact, cohesive manner reflecting the location of the major transportation corridors. Older residential areas with their grid street pattern reflect the alignment of Sierra Highway. The prime east-west and north-south highways have played a key role in establishing the development and character of Lancaster. The most northern thoroughfare, Avenue I, has been recently developed with uses similar to those along Sierra Highway. It is characterized by its abundance of highway-oriented establishments and miscellaneous industrial uses. The principal southern roadway, Avenue K, is fast emerging as the prime commercial street. Between these commercial streets, Avenue J has developed a strong 'civil' image with county government offices, a public library, and the Antelope Valley Medical Center. Tenth Street West connects with Avenue I, Avenue J, Avenue K, and the historic shopping street of Lancaster Boulevard, and in like manner, many commercial uses are developing along its length.

Sierra Highway, which parallels the Southern Pacific line, was once the basic north-south route through the Antelope Valley. Uses catering to the motorist and those dependent on access to other markets developed along its length, including commercial enterprises, real estate businessses, and distributive industries. As a result of the Antelope Valley Freeway, Sierra Highway is losing much of its commrcial importance.

Existing Zoning - Palmdale and Lancaster

Palmdale. Current zoning (as shown in Figure 10) in the Palmdale planning area approximates the existing land use development, in its rather 'hop-scotch' pattern of uses and densities. Other than a commercial spine running along the length of Palmdale Boulevard, terminating in a large center at the intersection of the Antelope Valley Freeway, there are no strong organizational elements in the current zoning patterns.

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

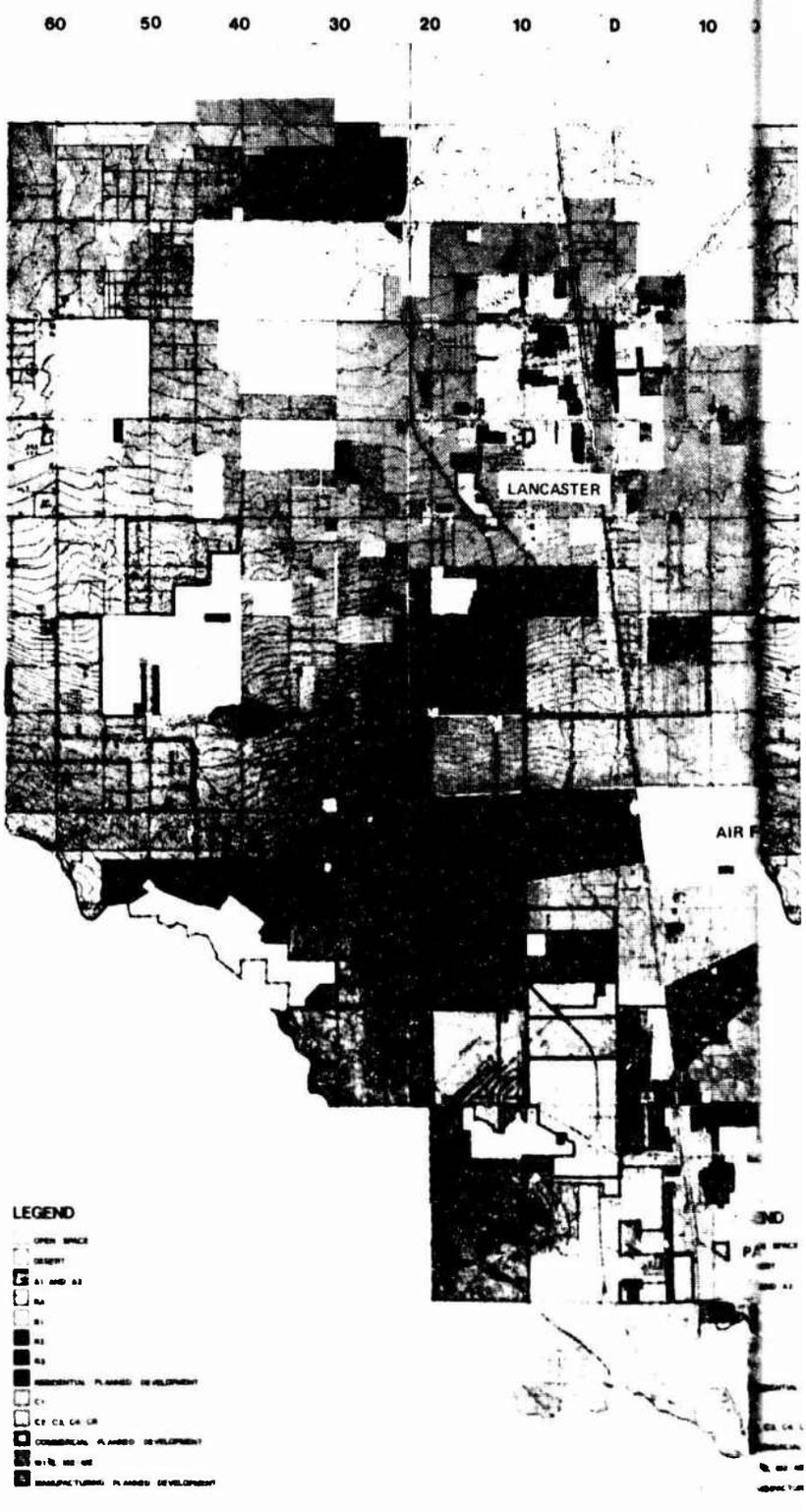


Figure 10 EXISTING ZONING IN THE VICINI
LANCASTER, AND THE PROPOSED

QUINTON·REDGATE·Economics Research Associates Alan M. Voorhees & Associates
prepared for: Los Angeles County Department of Regional Planning·Southern California Assoc
U.S. Department of Housing and Urban Development·City of Palmdale·City of Los Angeles De

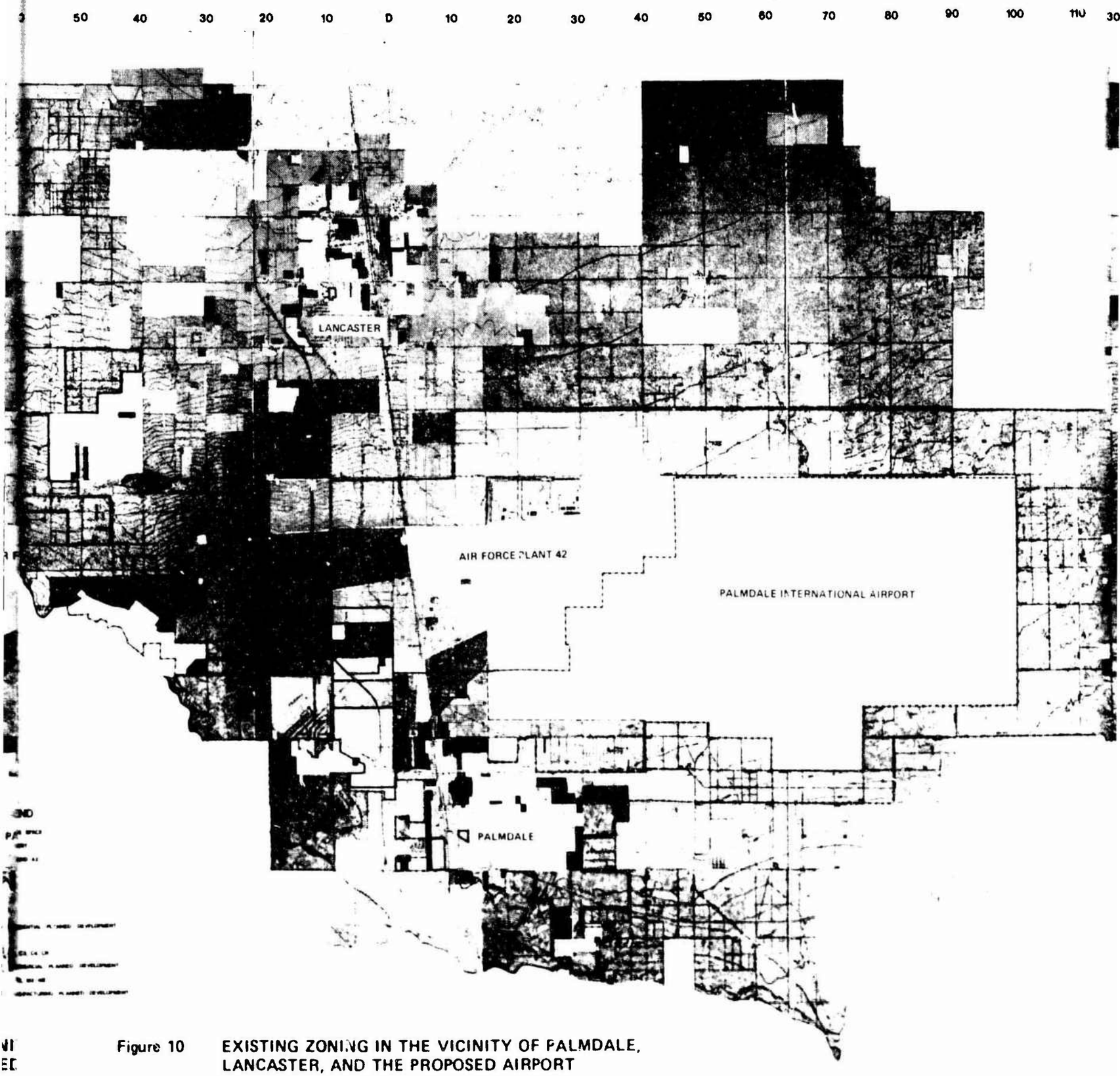
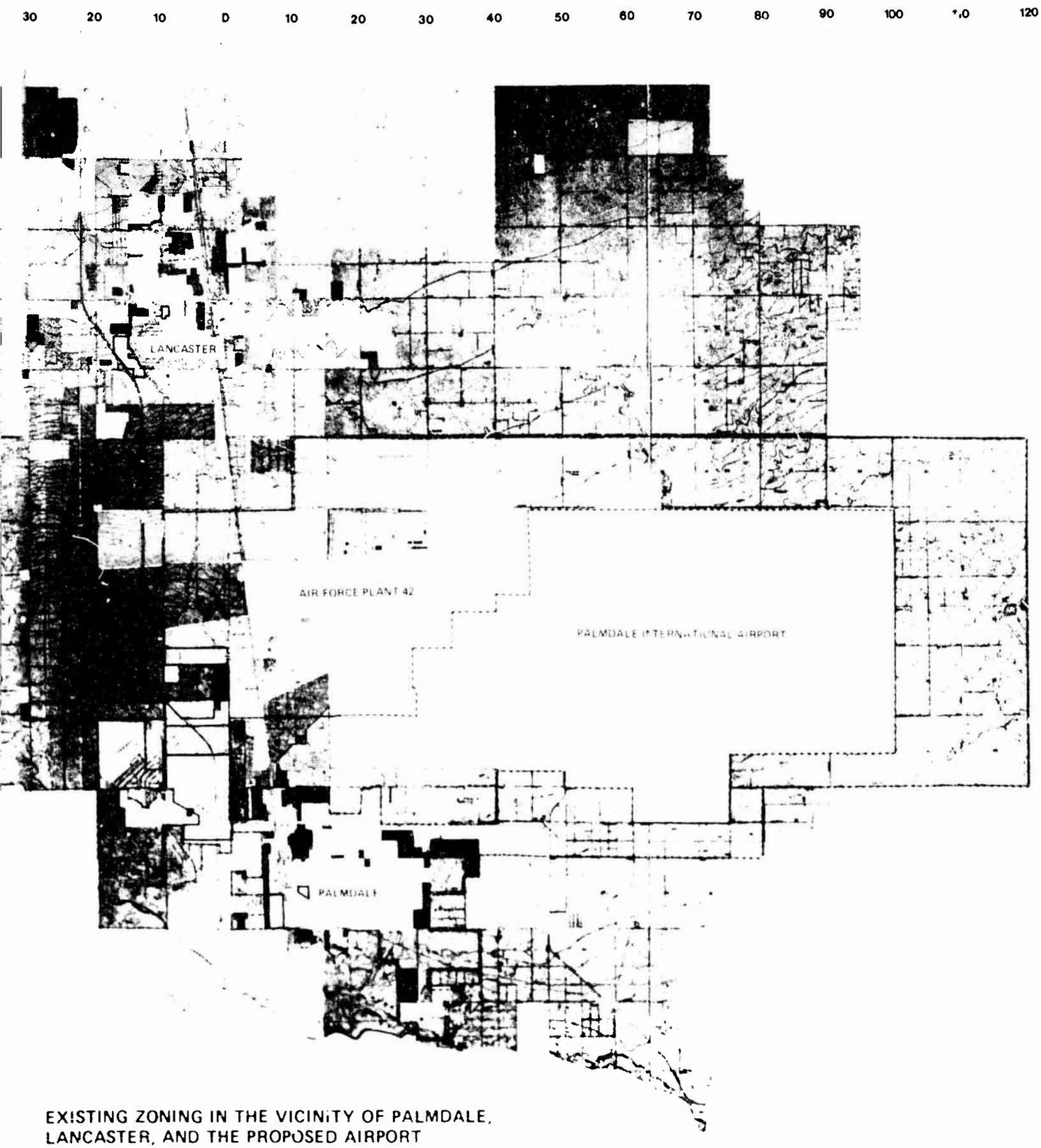


Figure 10 EXISTING ZONING IN THE VICINITY OF PALMDALE, LANCASTER, AND THE PROPOSED AIRPORT

mics Research Associates · Alan M. Voorhees & Associates
County Department of Regional Planning · Southern California Association of Governments
and Urban Development · City of Palmdale · City of Los Angeles Department of Airports

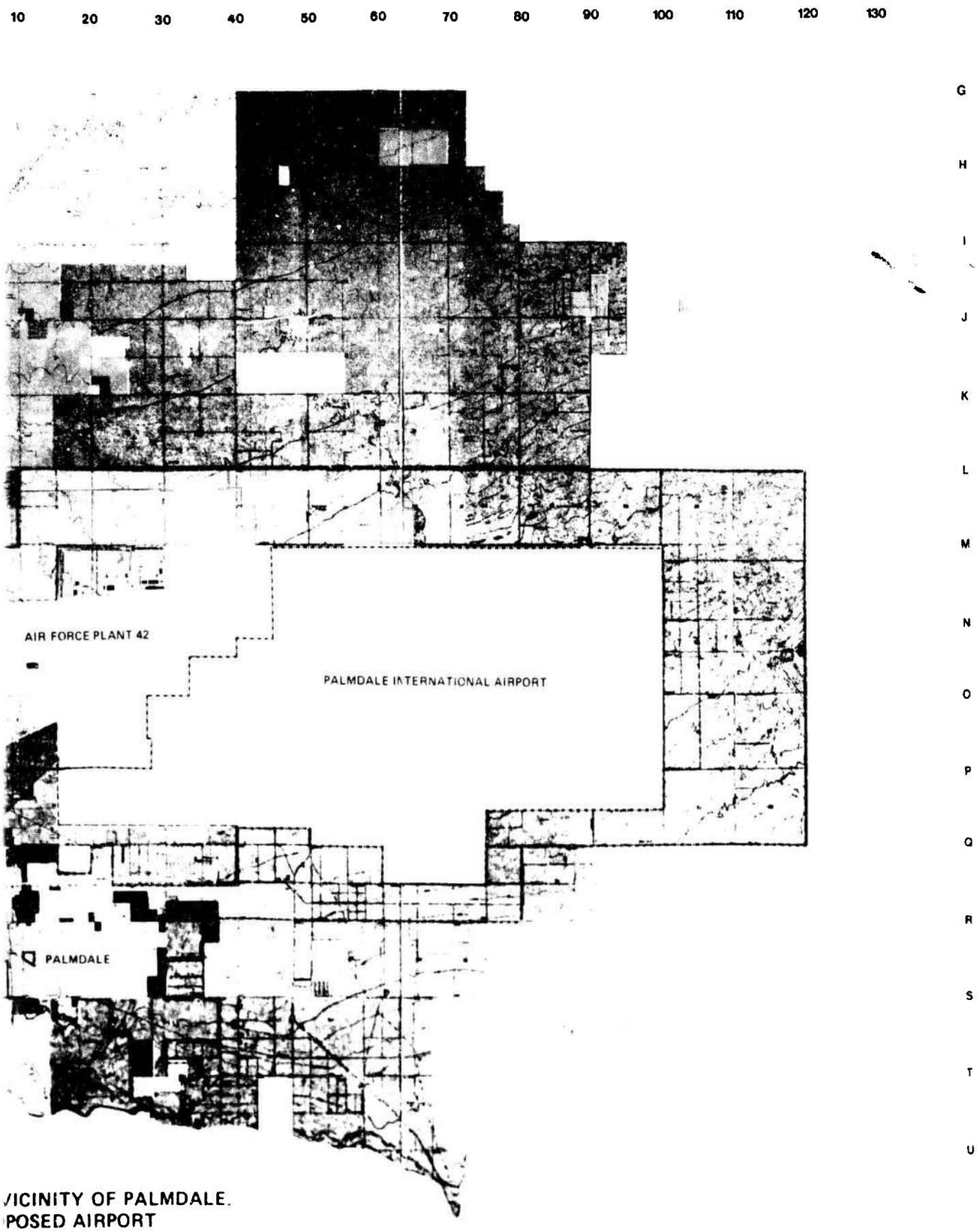


EXISTING ZONING IN THE VICINITY OF PALMDALE, LANCASTER, AND THE PROPOSED AIRPORT

AN

30 November 1975

s·Alan M. Voorhees & Associates
onal Planning·Southern California Association of Governments
City of Palmdale·City of Los Angeles Department of Airports



/ICINITY OF PALMDALE.
POSED AIRPORT

30 November 1975

Association of Governments
les Department of Airports

Air Force Plant 42 is surrounded by an industrial buffer. However, other industry, along Sierra Highway is haphazardly located and relates poorly to most of the adjacent land uses.

Residential Planned Developments (RPDs) are scattered irregularly throughout the community. Generally, these parcels are of sufficient size and appropriate shape to accommodate such development.

Multiple-unit residential zones have been clustered in the older sections of the community. Often they are located as buffers between lower-density residential, commercial, and industrial uses. Apart from this centralized concentration, there are a number of 'spot' multiple-unit zones throughout the community.

At the westernmost edge of the City of Palmdale, zoning has been established for a residential planned community, Rancho Vista. Its interweaving of land use type and density has been accomplished with a sense of logic and order, and the goal of creating a unique community.

Lancaster. Current zoning in the Lancaster area (see Figure 10) is characterized by a concentration of urban development, surrounded by decreasing densities within which are scattered pockets of high-intensity uses. To a large extent, the latter correspond to the location of the most recent development, reflecting the emerging tendency to 'leapfrog' vacant parcels.

The most intensive zoning is focused on both sides of Lancaster Boulevard, between Sierra Highway and 10th Street West. Other than this strongly defined nucleus of residential and commercial uses, there are no strong organizational elements in the current zoning pattern. Particularly evident is the lack of consideration of the impacts of the location of the Antelope Valley Freeway upon the land use pattern. The only response to its presence, to date, has been as a piecemeal basis. A large area adjacent to the freeway, between Avenue J-8 and Avenue K-2, has been designated as a 'commercial planned development,' to take advantage of the freeway visibility.

The area adjacent to Sierra Highway and the Southern Pacific Railroad is designated for industrial uses. It is a corridor which is characterized by its high levels of noise, odor, and vibration due to the frequent railroad utilization and high traffic volume of the highway. Consequently, it exhibits attraction for those uses dependent upon the railroad, such as distributive industries.

Other than the Lancaster Boulevard core, higher residential densities and 'residential planned developments' are scattered rather haphazardly throughout the planning area. Many of these pockets occur to the east and southwest of the present concentration of land uses.

Historical Land Use Trends

The change in land use acreages between 1960 and 1972 reveals developments which occurred during the decade. Because of changes in land use classifications, comparisons between the two periods are difficult. Residential acreage tripled during the decade although population increased by only half. Part of the explanation for this lies in the different classification systems used. In 1960, street acreage was recorded as a separate item; in 1972 streets were included as part of the surrounding land use -- i.e., residential, commercial, or other uses. Commercial land use, which increased from 365 acres to 1635 acres in the 12-year period, also reflects this classification difference.

Industrial land shows an increase of 50% over the 12 years. A great deal of mining is done in the Antelope Valley, much of which is for building industry materials. This extractive industry land is included in the industrial category. Since 1960, the areospace industry in and around Palmdale has expanded greatly, covering large sections of land near Plant 42 for its testing facilities. Both general and extractive industry have grown considerably since 1960.

The California Water Project crosses the Antelope Valley and maintains a large pump station at the base of the San Gabriel Mountains. The amount of land devoted to this project accounts for a good portion of land use in transportation and utilities category in 1972.

The amount of land designated for agriculture decreased by more than half, probably because of the use of less land for grazing since employment in agriculture has not fallen off markedly. North Los Angeles County currently contains more than 80% of the county's agricultural land.

Open space was not separated from vacant land in 1960, but even aggregating these two categories in 1972 gives a higher figure (1,420,600 acres) than total vacant land in 1960.

In spite of the differences in recording land acreages in the two years compared, it is apparent that the growth of residential, commercial, and industrial land was considerable. All three have grown much faster than the population.

Land Use Projections and Impacts

The changes that will take place in the type and density of land use in North Los Angeles County in the next 30 years depend greatly on the existence or nonexistence of the proposed Palmdale International Airport. Its size will also be an important determinant; for this analysis it is assumed that the growth of the airport will follow the pattern of the most probable level, 12 million annual passengers by year 1995.

Growth in the North County will be evidenced by an increase in land use for residential, commercial, industrial, and recreational land purposes as well as for transportation and utilities and institutions. Military land and open space are expected to remain unchanged. The increase in urban land uses will be accommodated by a decrease in vacant and agricultural land acreage.

Growth Without PIA

Residential land densities vary considerably with the terrain and urbanization of an area. There is a striking contrast between densities in different parts of North Los Angeles County and in the county as a whole. The range is from 6.5 persons per acre in the Antelope Valley as a whole, to almost 17 persons per acre for all of Los Angeles County.

If the airport is not built, the North County region will continue to grow at a moderate rate. There will be a modest expansion in industrial activity in and around Palmdale and overflow from the presently urbanized area of Los Angeles, both bringing about population increases.

The projection of residential land use was based on the assumption that new development will become increasingly dense. For purposes of projecting residential requirements a density factor was applied to the projected increase in population between now and 1995. The resulting residential acreage in 1995 is about 46% greater than for the present although population will grow by 81%. This gives a total gross residential acreage of 26,327 acres by the year 1995.

Open space acreage will remain constant since it is the county's policy not to develop this land. As growth occurs, vacant land and some agricultural land will be converted to urban uses.

Growth with PIA

If the Palmdale International Airport is built, the growth trends in North County will be quite different. With the more rapid increase in population will come the same general trends of urbanization and higher densities, but they will occur sooner. This growth is further complicated by the effect of the airport on the commercial and industrial segments of the economy.

The conversion of land into residential use is again determined on the basis of population except that different density factors reflecting a more rapid urbanization process are used. New subdivisions will be built with a much higher density and occupancy rate than has previously been the case. There will probably be little residential construction near the airport since the highest and best use of the land will be for industrial or commercial establishments.

The main difference resulting from the airport is that through the 1980s and 1990s, when growth will be the greatest, new residential land will be built up and occupied at a somewhat greater rate than under the 'without-PIA' scenario.

Although North County population will grow from 132,000 in 1970 to 317,000 in 1995 -- an increase of 140% -- residential acreage will only increase 75% over the same period -- an intensification of residential land use reflecting the rapid urbanization that will result from airport construction and operation.

The main difference in growth patterns between the assumptions of building or not building the airport is the rate of growth between 1985 and 1995. If the airport is not built, growth of urban land will continue at a moderate rate. If the airport is built, however, there will be very rapid growth until 1995. By 1990, trends in urbanized living will produce densities for new development as high as present densities in Los Angeles.

Recreational land is projected on the basis of population at 0.03 acres per person in 1980, decreasing to 0.01 acres/person in 1995. There is currently a shortage of recreational land in Los Angeles County, which accounts for the countywide factor of 0.005 acres/person. As urbanization continues, recreational land tends to be de-emphasized. North County contains much of the recreational land for the entire county, not just for its own population, and probably will continue to accommodate this demand; however, it will assume less responsibility for the county's recreational land as growth becomes more rapid.

The airport will cover an area of some 17,700 acres, adjacent to the existing Air Force Plant 42. This land will belong to the Los Angeles Department of Airports and will be maintained and operated by the DOA.

In spite of these changes, the region's supply of vacant and agricultural land would be decreased by only 5% by 1995. This is because North County contains 61% of the total acreage of Los Angeles County, and currently only 2% of its population. The impact of the airport on areas near the major communities of Lancaster, Newhall, and Palmdale and, in particular, around the Palmdale airport, will be most significant.

Probable Impacts

An effect of the airport is the direct and indirect demand for urban uses of the land which it will create. By the year 1995, some 8,800 acres (besides the 17,700 acres required at the airport) will be needed beyond

the amount of land that would come into urban use without development of the airport. This impact, while not necessarily adverse, does put currently vacant or agricultural land to more intensive urban use. Approximately 43,000 acres of North County land will be removed from the present vacant and agricultural land use category.

Over time, the airport and its associated direct and indirect population increase, increase of economic activity, and land use changes will result in significant commitments of resources -- for example, public capital investment.

It is important to note that extensive urbanization will occur even without the proposed PIA. However, growth and its dimensions will be much greater with the establishment of a major airport facility. More than anything else, such urbanization will accelerate the need for public capital investment in the North County area.

Possible Actions to Lessen Impacts[1]

The following discussions are based upon draft documents developed for the North Los Angeles County (NLAC) General Plan.[2] The general plan developed for the North Los Angeles County area assumes a level of 12 MAP at PIA in 1995 and thus the land use goals and policies designed to implement these goals reflect the impact of PIA. The plans take into consideration existing conditions, natural and man-made physical constraints, land use suitability, the potential for growth, and the possible actions for mitigating impacts.

Land use policies were developed at the areawide level (Antelope Valley and Santa Clarita Valley) and the community level (e.g., Palmdale). These land use policies were designed to accommodate and ameliorate the direct and indirect impacts of PIA. Land use immediately around the airport is under the jurisdiction of the City of Palmdale; all other land is under the County of Los Angeles except for federal lands.

Recommended Areawide Land Use Policies - Antelope Valley

A comprehensive general plan is basically a "policy document" to guide an area's future. Land use policies recommended by the NLAC General Plan were based on two main issues:

---

1. The DOA will support land use policies and programs indicated in the draft NLAC General Plan.
2. Quinton-Redgate et al., North Los Angeles County General Plan - Summary of the Areawide General Plan, the Antelope Valley Areawide General Plan, and the Palmdale Community General Plan, November 1975.

- Should population and land use growth be accommodated?

- What should be the pattern of such growth?

The draft NLAC General Plan is a component of the Los Angeles County General Plan prepared under the direction of Los Angeles County Department of Regional Planning. The Los Angeles County Supervisors approved the County General Plan on November 20, 1980 which recommends continued support for development of Palmdale. The NLAC General Plan is then to be formally adopted sometime in 1982. The final NLAC General Plan is expected to be similar to the draft with few or no revisions.

The following identifies some of the issues, as developed by the NLAC General Plan, and the general policies related to them:

Population and Land Use Growth

Projected 1995 population and land use demand in North County should be accommodated.

Population and Land Use Distribution

Priorities should be assigned for future land use growth in North County considering the following criteria: presence of sanitation and water district or service area; minimization of noise impacts from freeways, highways, airports, and railroads.

Land use growth should be concentrated in and adjacent to existing urban, suburban, and rural communities.

Development of 'new communities' should be facilitated in or outside of existing communities, with proper consideration of environmental sensitivities and hazards.

Costs of Population and Land Use Growth

Costs of population and land use growth should be borne by those who benefit.

Costs associated with the development of Palmdale International Airport should be assumed principally by those who benefit (e.g., airlines and users).

Environmental Sensitivities

Future growth should be directed away from areas exhibiting high environmental sensitivity to land use development unless appropriate mitigating measures can be implemented.

Disruption and degradation of the environment should be minimized as land use development occurs. Land uses should be integrated so that they are compatible with natural environmental systems.

Expansion of urban uses into areas of rare and endangered species should be prohibited.

Environmental degradation should be minimized by enforcing controls on sources of pollutants and noise.

Land Use Compatibility

Adjacencies of incompatible land uses and functions should be prevented. Interface techniques, such as buffers and green space, should be utilized where appropriate.

Conflicts between the proposed Palmdale International Airport and surrounding land uses and functions should be prevented. An area surrounding Palmdale International Airport should be designated as an 'Airport Buffer' restricted from uses sensitive to high levels of noise and vibration, physical operations of the airport, or intense activity functions.

Any area within a CNEL contour at 60 to 65 dB for existing and proposed airports, highways, freeways, railroads, and rapid transit lines shall be designated as a 'Noise Impact Management Area.'

Within the 'Noise Impact Management Area,' State of California Housing and Community Development Law standards regarding noise and its abatement shall be followed and extended to all single-family dwellings, schools, libraries, health facilities, nursing homes, and public meeting places.

Any area exceeding an annual CNEL of 65 dB due to existing and proposed airports, highways, freeways, railroads, and rapid transit lines shall be designated as a 'Noise Impact Management Area-Buffer.' Special restrictions regarding the types of uses will be applied to this area. These standards should not be retroactive, retaining existing such facilities until demolition.

Resource Conservation

Conservation of natural resources should be ensured by public programs to encourage continued agricultural production and to control energy consumption, mineral extraction, construction, and other public and private activities which impinge upon the future availability and quality of such resources.

Efficient utilization of resources should be encouraged in the allocation of land to various uses and incorporated in the design and implementation of public and private projects.

Plan Implementation and Enforcement

Growth in an orderly cohesive manner should be encouraged. An undue burden should not be placed on social, economic, environmental, or community service systems.

Adherence to the policies and programs of the General Plan Elements should be required. Proposed amendments which deviate from the plan's intent should be carefully weighed for appropriateness and impact. Plan flexibility should be encouraged as a means of accommodating changing demands and life-styles and inducing innovation for the benefit of the community. However, the plan should not be flexible to the point that it has no real significance or control. It should be utilized as an active and persuasive tool in guiding the community's future.

In the NLAC General Plan, five general components contributed to the structure of the land use plan, including:

- Basic conceptional framework
- Community classifications and policies for their development
- Land use classifications and special conditions for their development
- Land use classifications - standards of flexibility
- Conversion to more intensive development

Basic Conceptual Framework

At its most general level, the land use concept for North Los Angeles County proposes a number of centers of varying use, density, and life-style, linked to one another, the proposed airport, and the Los Angeles basin. These include residential, commercial, employment, civic-cultural, and recreational centers.

Community Classifications and Policies for Their Development

It was recommended that future growth in North Los Angeles County be allocated to communities on the basis of their ability to accommodate growth within economic and environmental considerations. The planning team recommended development of three centralized community types: Primary Urban Development Areas, Rural Communities, and Rural Villages. The area remaining characterized by its dispersed pattern of uses should be classified as the General Rural Area.

Primary Urban Development Area

These areas are defined by the following criteria:

- Existing major development with a significant population base
- Presence of sanitation and water districts
- Minimization of or capability to mitigate environmental hazards and/or sensitivities (least conflicts)

Based upon these criteria, four communities have been designated as Primary Urban Development Areas: Lancaster, Palmdale, Santa Clarita Valley (Valencia, Newhall, Saugus, Canyon Country, Val Verde, and Castaic), and Quartz Hill.

Rural Communities

These communities are defined by the following criteria:

- A minimum of 300 permanent residents in relatively close proximity to one another
- Presence of local commercial activity
- A definable "community pattern," including paved streets, improved parks, public facilities, and other such improvements

Rural Villages

Rural villages are defined by the following criteria:

- Areas wherein the total permanent resident population is less than 300 located relatively close to one another
- A definable pattern of land uses which distinguishes the area from the general character of all other non-urban areas

General Rural Area

This area includes all developable lands outside the Primary Urban Development Area, Rural Communities, and Rural Villages. Growth should be encouraged in the General Rural Area at very low densities. Residential, agriculture, and other low-density uses should be facilitated.

Land Use Classifications

In the NLAC General Plan, classifications were developed relative to the type, intensity, and special conditions of the use of land in North County, as follows:

Residential

(1) Non-urban: 0.5 to 1.0 dwelling units per acre

(2) Urban: 1.1 to 15.1 dwelling units per acre and greater

(3) Mixed Residential Areas: self-contained communities of between 2000 and 4000 residents in a variety of dwelling types.

Commercial

(1) Neighborhood, community and regional commercial.

(2) Palmdale International multi-use center.

Other Uses

(1) Industry: Land that has been designated for light, medium, and heavy industrial uses. Emphasis is placed on developing designated sites to industrial park standards. In general, heavier industry in the Antelope Valley should be located immediately adjacent to, or within, the airport complex.

(2) Public Service Facilities and Special Study Areas.

(3) Palmdale International Airport Buffer Zone: To preserve and protect the "integrity" of airport operations and compatibility with adjacent land uses, the plan proposes encircling Palmdale International Airport with a buffer zone. Uses that may be facilitated include agriculture, industry, recreation, treatment plants, energy substations, and non-sensitive commercial. All residential, civic, cultural, educational, and other sensitive uses would be excluded.

Open Space

Open space areas are considered to be lands under public or private ownership that are essentially free of structures and roads, and maintained in an open or natural state. Open space is separated into two major categories, public and private.

General Plan Land Use Designations - Standards of Flexibility

Since a general plan is intended to serve as a guide for the general allocations of uses by type and intensity, the NLAC General Plan incorporated flexibility in its suggested allocation of land uses.

Conversion of Rural Areas for More Intensive Development

To deal with the problem of development pressures forcing conversion of rural areas to more development, the NLAC General Plan has developed criteria for expanding the boundaries for urban expansion.

Within Antelope Valley the NLAC General Plan proposes three major activity centers -- Lancaster, Palmdale, and Quartz Hill. Since these three areas will feel the primary effects of development at PIA, detailed plans framed by appropriate policies and implementation programs were developed by the NLAC General Plan team. Figure 11 shows the land use plan for Palmdale. The recommended land use plan illustrating the suggested spatial distribution of the various urban land uses throughout the Valley is based upon an activity level of 12 MAP at PIA and thus incorporates the direct and indirect land use effects of this major transportation mode. The following summarizes the proposed land use plan particularly as it relates to PIA and surrounding areas.

The principal elements which shape the pattern and intensity of land uses in the Antelope Valley are the major transportation corridors, the proposed PIA access corridor, Palmdale International Airport, Air Force Plant 42, and Fox Field.

It is proposed that major industrial uses will be located along the transportation corridors and at the proposed airport. An industrial "belt" is proposed to extend roughly from Fox Field in the northwest, along Sierra Highway to Avenue Q, and easterly along the south edge of the PIA property to 50th Street East. Other lands are designated for industry in the Antelope Valley, but this "belt" constitutes the major concentration and serves as a dominant element around which other land uses group.

Along the proposed access corridor to PIA, a commercial center oriented to the unique needs of the airport is proposed. Included in the center would be office headquarters buildings, airline offices, hotels, motels, restaurants, and specialized retail and recreation catering to the needs of the air traveler.

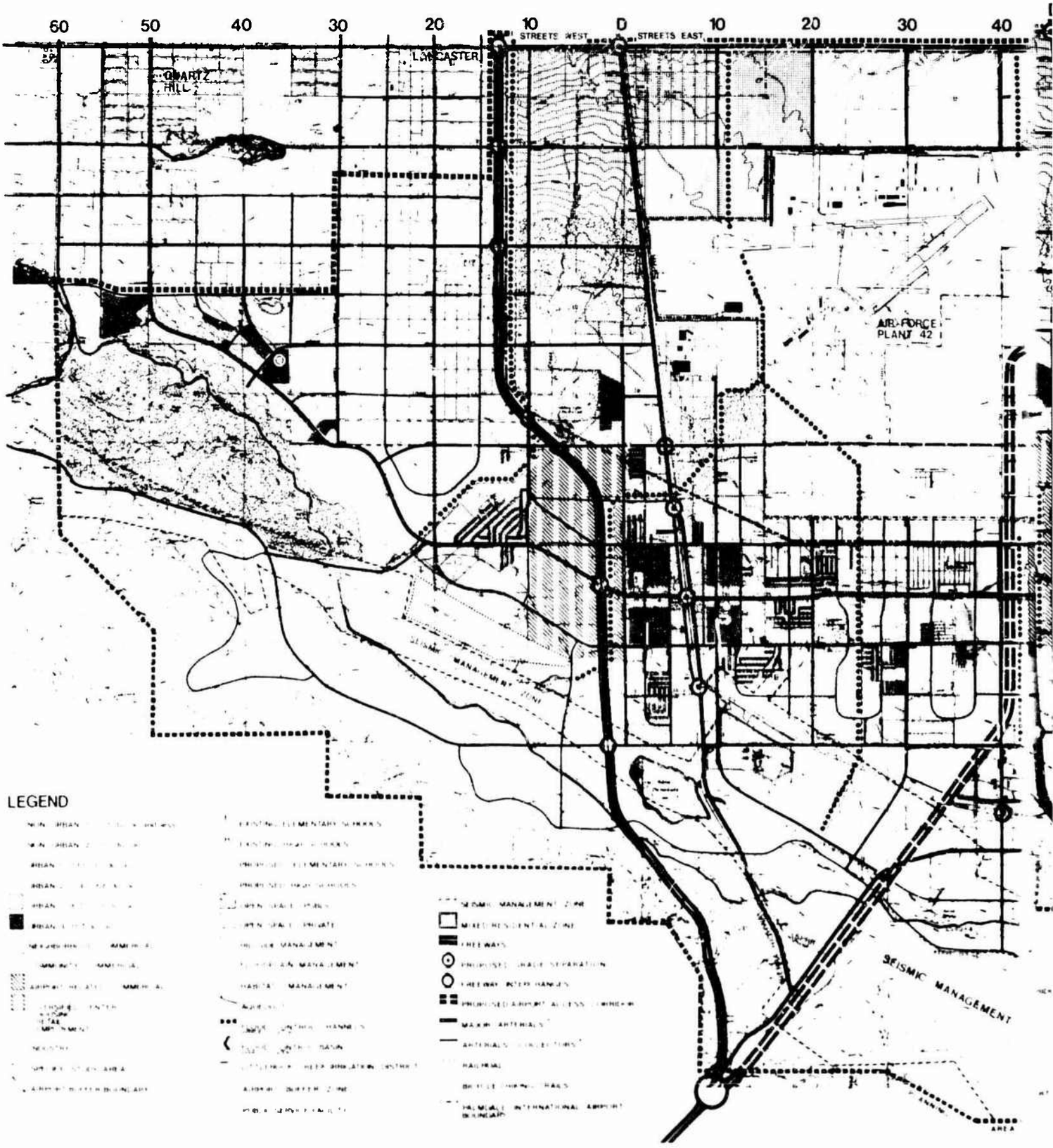
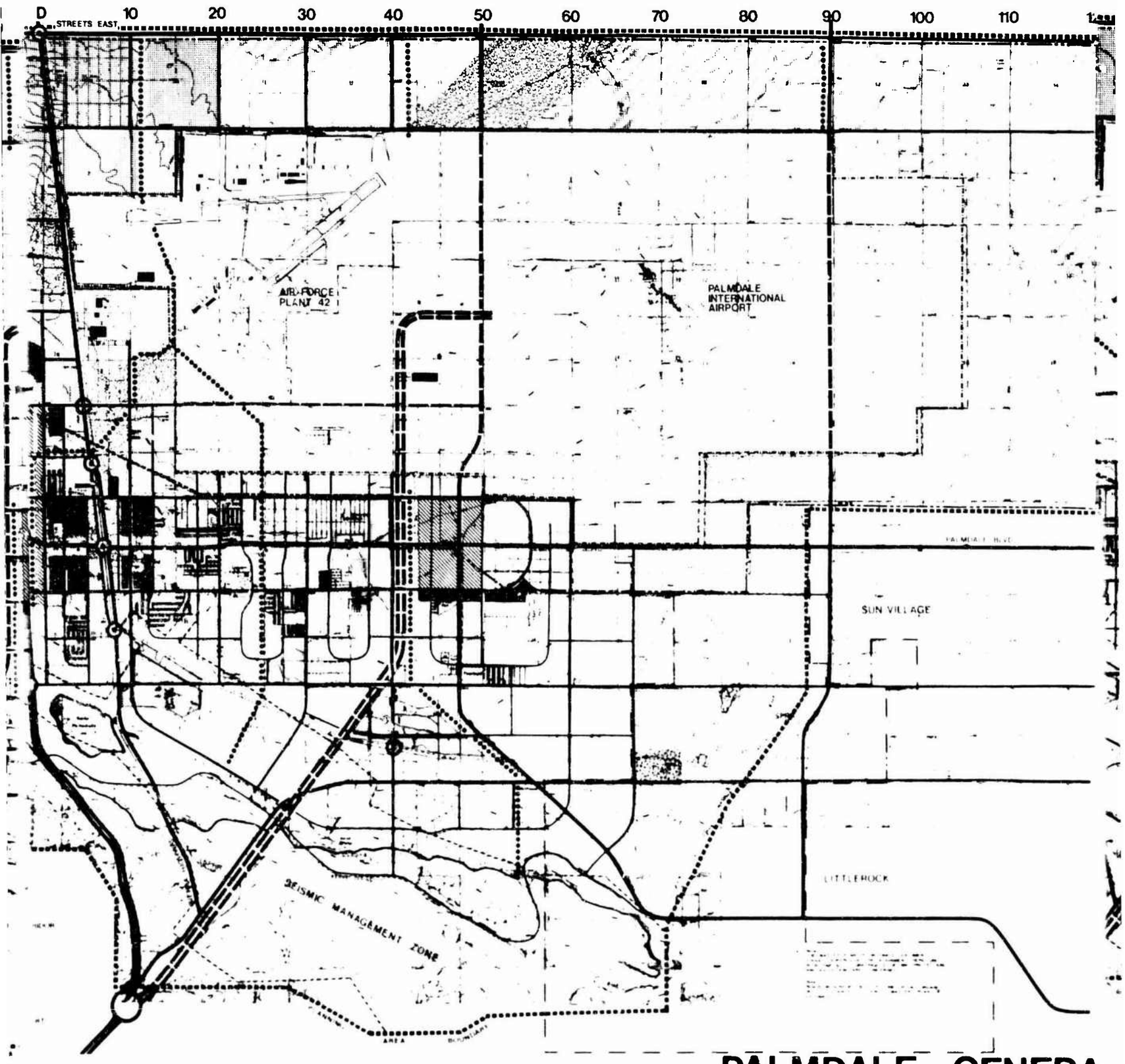
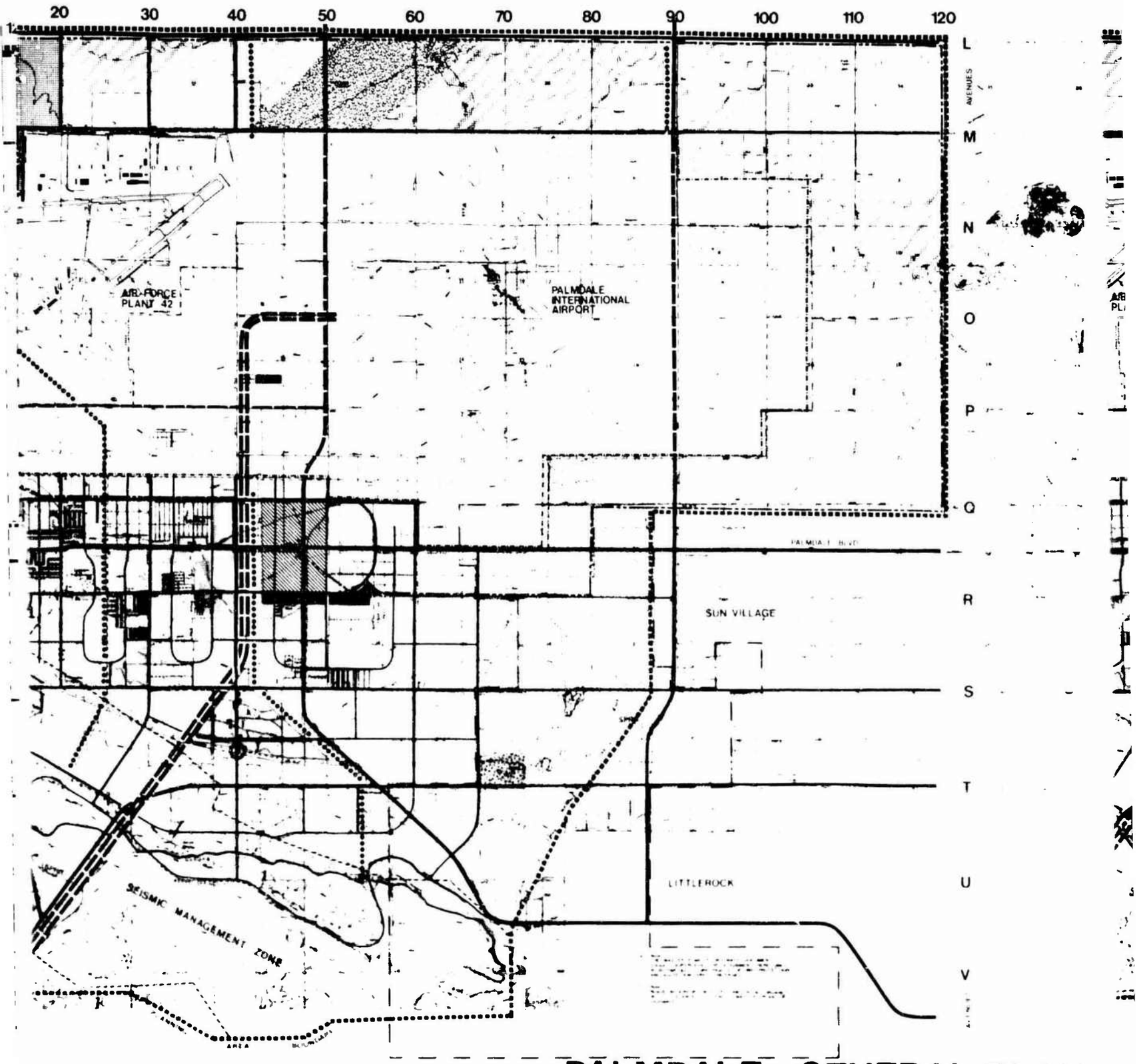


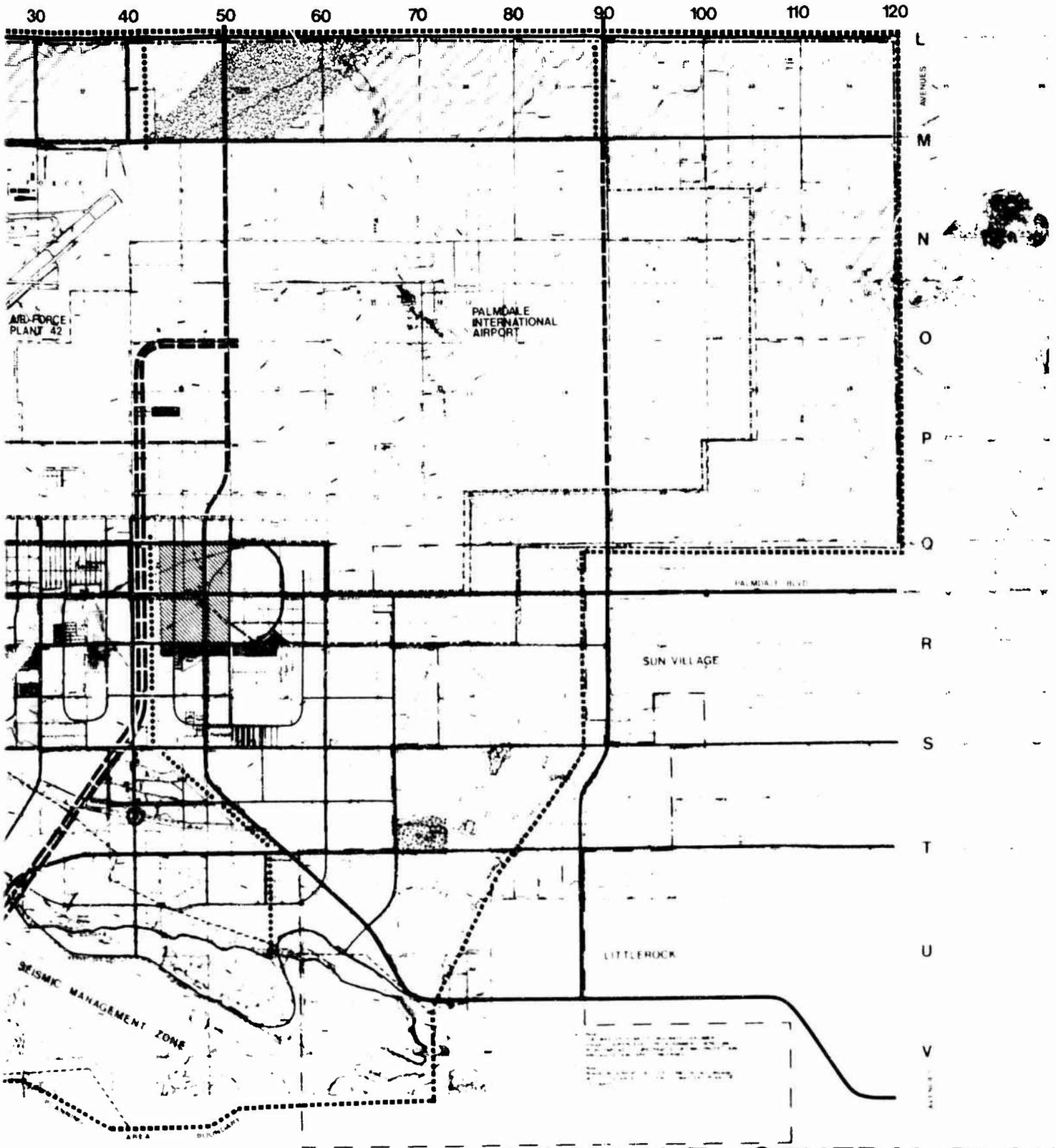
Figure 11 PALMDALE LAND USE PLAN



PALMDALE GENERA
30 November 1975



PALMDALE GENERAL PLAN
30 November 1975



PALMDALE GENERAL PLAN
30 November 1975

In those areas surrounding the proposed airport not designated for industrial use, it is recommended that a buffer land use classification be applied. It is recommended that the buffer extend one mile to the north, two miles to the east and west, one mile to the south from 40th Street East to 120th Street East, and to Avenue Q west of 40th Street East.

Public Lands and Other Areas of Unique Interest or Scenic Beauty

Description of Public Lands and Other Areas

While there are no public recreational areas or designated areas of unique interest or scenic beauty within the 17,7000 acres of the proposed PIA site, the northern parts of Los Angeles County and the Antelope Valley have many points of interest.

The major landscapes in the North County area, as identified in the NLAC General Plan, are:

- The mountain areas (or high country)
- The desert slope
- The desert plains and buttes

Antelope Valley has many public recreational areas. Within the 20-mile radius of the proposed airport site, there are 4 large public parks, 9 smaller developed parks, 11 undeveloped areas assigned as recreational areas, and 8 areas preserved as wildlife/wild flower sanctuaries. In addition, the Angeles National Forest (512,000 acres) is six miles south of the airport at its closest point.

The nine smaller urban recreational facilities developed in the Antelope Valley are maintained by either the County of Los Angeles or the City of Palmdale. The two closest parks are about three miles from the nearest runways.

The Antelope Valley is also well known internationally for its excellent conditions for soaring. Flights occur over the San Gabriel and Tehachapi mountains and up the Owens Valley to the north along the eastern slope of the Sierras. Very little activity occurs over the Valley floor.

Short-term Effects and Longer-term Uses

The acquisition of airport property will have no direct effect on public lands and parks or other areas of scenic beauty as they are all located outside the airport boundaries. The lands of the Sanitation District and Palmdale Water District will remain in present ownership even though surrounded by airport property. Due to the distance of most parks, public lands, and recreational areas from the site, no adverse impacts on their function or beauty are expected during construction.

Probable Effects on Public Lands and Recreational Activities

The airport is not expected to have any significant adverse impacts on public lands in its vicinity. Future growth will tax existing local facilities and result in the development of the 381 acres of parkland. The undeveloped regional park acreage (3,949) may also be needed for nature preserves and sanctuaries. While this may require additional expenditures of funds and public maintenance, the long-term effect is expected to be beneficial to the public.

Use of Resources

The only commitment of resources foreseen is for land that may be needed for future parks beyond that already designated. Such planning and acquisition will occur over a long period of time in response to demand and at this point cannot be considered irreversible. Moreover, the parks or sanctuaries will serve a public need for outdoor activity and preserve indigenous features.

AIR QUALITY

Introduction

The overall objective of the air quality study was to assess the impact of Palmdale International Airport on air quality for the period 1980-95. Forecasts were made assuming airport construction and assuming no airport construction. Pollutants considered were carbon monoxide (CO), oxidant (O_3), nitrogen oxides (NO_x), methane-reduced hydrocarbons (HC), and particulates.

To aid in the characterization of the climatology and air quality of the study area, the historical meterological and air quality data were supplemented by field programs of winter-early spring and summer-early fall measurements. The field program measurements included both meteorology at fixed sites and air quality measurements using a mobile lab.

Study Approach

Current and future ambient air quality was defined for the airport complex as well as for the Antelope Valley and Santa Clarita Valley.

Existing ambient air quality was defined on the basis of analysis of existing air quality data at Lancaster and of data taken during the field program.

The historical air quality data used to characterize the ambient pollution situation in the Antelope Valley were taken from the Los Angeles Air Pollution Control District (LAAPCD). The historical inversion climatology was based on radiosonde measurements at Edwards Air Force Base. Hourly wind speed and direction taken historically at Palmdale Airport completed the meteorological data set used in this study.

Several approaches were taken to define future ambient air quality for CO, HC, NO_x, and particulates treated as non-reacting pollutants. The AVQUAL model was used to evaluate the inert pollutant, CO, and the other pollutants scaled accordingly, after consideration of background values.

Basic Assumptions

It was assumed for purposes of air quality analysis that PIA (if built) would be operative after 1980. It was further assumed that military aircraft activity would be constant at the 1970 level through the year 1995.

The basis for aircraft mix assumed at PIA was based on characteristics of the Los Angeles International Airport mix with adjustments for phasing in and phasing out of various engine types over the years. Demographic data and airport-related activity estimates for the years 1985, 1990, and 1995 were based on factors discussed elsewhere in this statement. Aircraft and stationary source emission factors were obtained from the

Environmental Protection Agency; automobile emission factors were computed using supplement No. 5 (to AP-42) for Compilation of Air Pollutant Emission Factors by EPA.

For aircraft emission during landing and takeoff (LTO), the LTO cycle was used as the relevant emissions unit and was used to represent ground level emissions.

Forecasts

With examination of the existing air quality and meteorological conditions combined with estimates of future activity in and around the study area, both under the assumption of PIA being built and the assumption of no significant airport activity, forecasts were made of CO, NO_x, non-methane HC, O_3, and particulates. These air quality forecasts or projections were then examined against state and federal air quality standards (Table 12) to determine the anticipated impact on air quality at the proposed PIA and the unavoidable adverse effects on air quality of the location of PIA at Palmdale.

Throughout this study emission estimates and forecasts were made on the conservative side -- that is, on the side favoring greater values.

TABLE 12

AMBIENT AIR QUALITY STANDARDS
FOR POLLUTANTS DISCUSSED IN THIS STUDY

Pollutant	Averaging Time (hours)	California Standard	Federal Standard
O_3	1	0.10 ppm	0.08 ppm
CO	12	10 ppm	-
	8	-	9 ppm
	1	40 ppm	35 ppm
NO_2	1	0.25 ppm	-
	Annual Average	-	0.05 ppm
Non-methane HC	3 (6-9 a.m.)	-	0.24 ppm
Suspended Particulates	24	$100ug/m^3$	$260ug/m^3$
	Annual Geometric Mean	$60ug/m^3$	$75ug/m^3$
Visibility	1 Observation	<10 Miles with RH <70%	-

Review of Meteorology of the Study Area

Southern California. The synoptic scale methodology in Southern California is, to a large extent, dictated by a persistent broad, high-pressure cell located in the Pacific some distance from the continental West Coast. This pressure system sets up an onshore flow which, at lower levels, is frequently intensified by the diurnal sea breeze and Valley wind circulation set up by differential heating over water (and costal plains) and higher inland regions. The diurnal flows from the coastal regions inland are intimately related to pollution transport in Southern California.

Lancaster-Palmdale-PIA Area. The historical meteorological data in the study area come from three sources: Palmdale Airport, Edwards Air Force Base, and the LAAPCD (also here referred to as APCD) Lancaster Air Monitoring Station.

A review of the historical meteorological data taken by the National Weather Service (NWS) from 1934-1952 shows the prevailing wind direction to be from the southwest throughout the year, but speeds are generally light. Speeds of 16 mph or less are found more than three-quarters of the time. Calm occurs about 15.5% of the time. During the summer and early fall months the meteorology is generally similar from one day to the next. The winter and early spring months show inhomogeneities in the meteorology with greater frequencies of storms passing through and subsequent fresh air mass advection.

At Palmdale the weather is generally dry, rather warm in the summer, and with moderate temperatures during the winter. Sunshine is abundant; these historical data suggest 287 days of the year to be clear, 44 to be partly cloudy, and only 34 days to be classified as cloudy. Afternoon temperatures during July and August average in the upper 90s (° F). There are about 100 days of the year with maximum temperatures of 90° or higher, and 33 days per year with readings of 100° or more. In contrast, nighttime temperatures are relatively low, dropping to the middle or lower 60s, on the average, even during the warmest months.

Rainfall is light, totaling about 8.87 inches per year with almost 90% of this occurring during the six-month period from November through April. Thunderstorms rarely occur.

Three local flows need special attention here because of their importance in the air pollution picture: nighttime drainage flows, which often determine flow and mixing for local sources in the early morning hours; the "smog fronts" which are identified with the importation of polluted air from urbanized regions nearer the coast; and Santa Ana circulations which tend to move air toward coastal regions and which, during weak portions of the growth or decay stages, can "stall" the smog front flows and cause stagnation conditions which might amplify pollution effects from local flows.

The drainage flows are strongest in the winter and early spring months, on clear nights when radiational ground cooling is at a maximum. Air next to the ground becomes colder than the overlying layers; such air on the north slopes of the San Gabriel Mountains will, under gravitational acceleration, move downslope -- in this case toward Palmdale and Lancaster. Wind speeds at the surface will be light, and in some local areas even zero, but there can be significant turbulence aloft from shears related to the drainage flows. The thickness of the drainage layer is typically at a maximum just before dawn. Later, as solar heating takes effect, the ground-based inversion is soon removed and the drainage flow regime disappears.

The second type of flow is the transport of air from coastal regions into the desert which dominates the photochemical pollution in the Antelope Valley. The problem is especially severe because the coastal area represents a large source of the pollutants from which photochemical pollution evolves, because the air mass which is transported does not mix much in the vertical and hence dilution is inhibited, and because the travel time happens to coincide with the periods for strong photochemical reactions.

The third type of local flow is the Santa Ana circulation resulting from high pressure in the area between the Rockies and the Sierra-Cascade Mountain ranges encompassing southeastern Oregon, southern Idaho, western Utah, and all of Nevada. The principal characteristic of this high is a great mass of dry, relatively cool high-pressure air that diverges southward. When this diverging flow just counterbalances coastal inflow to the Antelope Valley, as during portions of decaying and growing stages of this high, stagnant conditions can arise. Santa Anas are primarily a late autumn phenomenon; they occur on at least a few days in October through March, being most frequent in December and January.

The Importation of Pollution. The photochemical pollution problem in the Antelope valley is dominated by distant upwind pollution sources -- the second type of local flow phenomenon cited above.

The coastal-urban air mass, initially limited in height by the marine inversion, tends to be drawn to the Antelope Valley through canyons to the west and southwest as the solar heating creates a low pressure on the desert-mountain regions. It typically reaches Palmdale around noon, being modified along the way, with moderate to strong southwest winds, and then throughout the afternoon causes a lowering of visibility, keeps the temperature from rising as it would in normal deserts, and puts a "lid" of the order of 1300 feet on the mixing depth. The smog front reaches other locations to the north or east later in the day. The flows contaminate the desert most in the summer and early fall, and least in the winter.

Review of Air Quality of Airport Area

The historical air quality data in the study area comes from the APCD station at Lancaster which began taking data in 1970. Table 13 summarizes the air quality data taken at the Lancaster station from 1971 through 1974.

From the table it is obvious that, of the parameters tabulated, oxidants, non-methane hydrocarbons, and particulates currently pose a problem in the study area. The high oxidant season extends from May to September with federal air quality standard exceedances over the years shown occurring about 25% of the time. Oxidants were particularly bad in 1973, both in days of exceedances and in the peak values. Most of the oxidant in the Antelope Valley is advected in from the Los Angeles basin via the Soledad and Mint canyons to the southwest and west of Palmdale, and from the Cajon Pass to the southeast; this is borne out from observations of shear lines, convergence zones, and smog fronts in the Antelope Valley. Federal standards for non-methane hydrocarbons were set primarily to control ozone formation and not because of direct health-related effects. High particulate readings are usually associated with wind-blown dust and are thus attributed to natural rather than anthropogenic sources.

TABLE 13

NUMBER OF DAYS AIR QUALITY DID NOT MEET
FEDERAL STANDARDS AT THE LAAPCD-LANCASTER STATION
(particulates are percent of observation)

Parameter	1971	1972	1973	1974	Average
Oxidant (1-hour)	83	92	134	75	96
CO (8-hour)	0	1	0	0	<1
NO_2 (1 hour)	0	0	0	0	0
Non-methane HC	128	169	149	170	154
Particulates (24-hour)	-	-	56%	44%	50%

Meteorological and Air Quailty Regime Classification

Typical Meteorological Regime. An analysis of four years of historical meteorological data taken at Lancaster and at the Palmdale Airport showed that typically at Palmdale the winds are moderate southwesterlies in the morning, becoming stronger in the afternoon. At Lancaster the winds are only half as strong; they are more variable in direction.

The analysis also showed that the meteorology for the month of March most closely typifies the year-round meteorology. The air quality data at Lancaster for the period 1970-1974 showed no anomalous extrema for the month of March, suggesting that air quality projections based on this type of weather would reasonably represent typical air pollution. Therefore, meteorological conditions observed in March 1973, averaged over the month for each hour of the day, were used to represent typical meteorology for modeling purposes.

Severe Meteorological-Air Quality Regime. The duality in the adverse pollutant season is recognized in this study from the discussions in above. This comprises an adverse season for the primary pollutants (CO, methane-reduced HC, NO_x, and particulates), referred to hereafter as the inert season, and one for the secondary pollutant (O_3), referred to hereafter as the photochemical season. The meteorological elements considered in the definition are surface winds, atmospheric stability, and inversion base heights, and considerations are also given to the historical air quality data. Severe CO (inert) days have generally light winds throughout the day, whereas high oxidant days show wind speeds of up to 19 mph. At the surface, periods of calm occurred in all severe inert days.

At the airport itself the severe meteorology-air quality regime comprises calm conditions with a ground-based inversion at 6 a.m., which is gradually pushed upwards, attaining a maximum of 200 feet at 9 a.m. The probability of occurrence of such conditions is 7% based on the historical data at the Palmdale Airport.

Emissions Estimates

This subsection discusses the methodology used in calculating the emissions and the resultant emissions estimates for the Palmdale-Lancaster study area and specifically for PIA if built and if not built. Estimates are made for 1980 through 1995 for CO, HC, NO_x, and particulates. Typical case emissions are estimated at PIA if built and if not; severe case emissions are computed at PIA for both the inert and photochemical seasons. Total emissions are estimated in the study area for the case where PIA is built and where not built.

Characteristics of Pollutants

The EPA has adopted ambient air quality standards for a number of pollutants, including particulate matter, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen oxides.

These five major air pollutants are of significance to airport operations. Their characteristics are as follows:

- Particulate matter is generally any matter, whether solid or liquid, which is dispersed in the air and which is within a certain size range (less than 500 microns). Studies indicate an association between particulate matter and certain health effects, especially injury to the surfaces of the respiratory system. Other problems associated with high concentrations of particulate matter are impaired visibility, increased corrosion of some metals, and damage to plants and vegetation.

- Carbon Monoxide (CO) emissions arise primarily from incomplete combustion of carbonaceous fuels. CO is absorbed through the lungs and reacts primarily with the hemoglobin in red blood cells, thus decreasing the oxygen-carrying capacity of the blood and reducing the amount of oxygen transported to vital tissues by the blood. The amount of CO emitted by a jet engine is relatively small compared to a piston engine, but still a significant amount can be discharged during ground operations.

- Photochemical oxidants are produced in the atmosphere when reactive organic substances (mainly hydrocarbons) and nitrogen oxides are exposed to sunlight. Ozone is the major reaction product of these oxidants. Photochemical oxidants at certain concentrations can cause irritation of the mucous membranes, damage to vegetation, and deterioration of materials. They affect the clearance mechanism of the lungs and alter resistance to respiratory bacterial infection.

- Hydrocarbons are primarily associated with the processing and use of petroleum products. They constitute the major portion of the reactive organic substances which eventually cause photochemical smog. Hydrocarbon emissions from aircraft engines may consist of products formed during combustion, as well as unburned fuel components. Exhaust concentrations are highest during ground operations. The only direct effect attributable to ambient levels of hydrocarbons is vegetation damage from ethylene.

- Nitrogen oxides (NO_x), namely nitrogen dioxide (NO_2) and nitric oxide (NO), are formed during all atmospheric combustion processes in a spontaneous chemical reaction. Fuel-rich combustion (i.e., piston engine) favors the production of NO, whereas oxygen-rich combustion produces substantial NO_2. Nitric oxide has not been shown to have any adverse effects on health or welfare. However, there are several atmospheric reactions which can lead to the oxidation of nitric oxide to nitrogen dioxide, NO_2, which has been associated with a variety of respiratory diseases, and is also essential to the production of photochemical smog. Corrosion of electrical components and vegetation damage have been linked to NO_2 at higher concentrations.

- Sulfur dioxide (SO_2) is a minor product of the combustion of fuel in jet engines as well as in automobiles. SO_2 is not measured in the Antelope Valley and is not included in the discussions as the emissions are negligible and well below federal standards.

Typical Case Emissions at Airport Source

The emissions of CO, HC, NO_x, and particulates at the Palmdale Airport are summarized in Table 14 for the years 1980 and 1995 for the case where PIA is built and where not built. For CO, the impact of PIA increases the total CO emissions by about one-third in 1995 due to increased activity even with the offsetting effects of emissions controls over increasing activity.

The above trends are explainable in the context of the aircraft and automobile (largest contributor to the collateral ground source in 1995) emissions standards schedule. Automobile CO emissions control in California began with the 1966-67 models and is scheduled to be progressively more stringent through 1980; on the other hand, aircraft CO emission controls are scheduled to be in effect after 1981 when newly manufactured engines must meet the 1981 standards and in-use engines must emit no more than they did when new. However, even with emissions controls, the airport activity by 1995 shows an increase over 1980 values.

TABLE 14

ANNUALLY AVERAGED TYPICAL TOTAL EMISSIONS
AT THE PALMDALE AIRPORT FROM THE VARIOUS SOURCES
WITH AND WITHOUT PIA
(tons per year)

Pollutant/Source	1980 Existing Airport	1995 Without PIA	1995 With PIA
CO			
Aircraft Sources	2,178	1,206	1,493
Collateral Ground Sources	1,661	1,046	4,674
Total	3,839	2,252	6,167
HC			
Aircraft Sources	598	451	565
Collateral Ground Sources	532	301	722
Total	1,130	752	1,287
NO_x			
Aircraft Sources	172	210	760
Collateral Ground Sources	120	73	283
Total	292	283	1,043
Particulates			
Aircraft Sources	17	17	62
Collateral Ground Sources	41	26	72
Total	58	43	134

The total HC emissions show a small rise in 1995; on the other hand, NO_x shows considerable increasing emissions in 1995, emphasizing the need for new aircraft engines to make NO_x reduction possible. Particulates show a small rise in 1995. These are, however, overestimates when the increasing trend toward low-lead fuel usage is taken into account.

Method of Estimating Emissions. Estimating emissions from a given source is, in general, a difficult problem; when the sources are aircraft and collateral ground-based ones, the problem is even more difficult. Each engine type has its own emissions rate, and variations are further enhanced by the present latitude afforded each aircraft at individual airports -- e.g., taxi-idle time and power setting still remain up to the individual airport and pilot. The collateral ground source emissions are equally difficult to specify. For some pollutants (e.g., CO), most of the emissions are automobile-derived. These emissions are mix- and speed-dependent; speed remains a difficult quantity to specify at airports, especially during peak emissions when traffic is generally stop-and-go. The other contributors to ground emissions -- e.g., operation of service vehicles, aircraft fueling systems, aircraft engine run-up during maintenance and ground check, etc. -- are even more difficult because both emission factors and operational models are not well defined.

In view of the uncertainty inherent in such estimates the philosophy in these calculations has been to overestimate emissions rather than underestimate whenever a choice was presented.

With PIA Built. For an aircraft the emissions of interest are those made during an LTO cycle. An LTO cycle is defined (by EPA) as that which includes all normal operation modes performed by an aircraft between the time it descends through an altitude of 3500 feet (1100 meters) on its approach and the time it subsequently reaches the 3500-foot (1100 meter) altitude after takeoff. Each class of aircraft has its own LTO cycle. In order to determine emissions, the LTO cycle is separated into five distinct modes: (a) taxi, (b) takeoff, (c) climb-out, (4) approach and landing, and (e) taxi.

The emission factors per LTO cycle for various engine types and for different emissions standards were supplied by the EPA; some were estimated with appropriate assumptions.

The collateral ground sources assumed were comprised of:

- Aircraft fueling systems
- Operation of service vehicles
- Aircraft engine run-up during maintenance
- Miscellaneous sources at the airport (boilers, incinerators, paint spray booths, underground storage tanks, etc.)
- Vehicles entering and leaving the airport.

Four of the five sources (final results shown in Table 15) were handled by the same scaling technique employed for aircraft (the implicit assumption here being that ground operations bear a direct correlation with aircraft volume). The volumes of automobiles entering and leaving the airport were estimated from scaling arguments, but the 1980 and 1995 emissions factors (ARB EMFAC - CO emission factors, 1980) corrected for speed and mix were used in computing the total emissions (see Table 16).

With PIA Not Built (i.e., assuming existing airport). The growth rate of the airport was estimated using the population estimates for the total Antelope Valley without PIA. Aircraft movement for future years was estimated in the same manner using the appropriate scaling parameters.

Beginning with the 1980 collateral ground emissions (shown in Table 15), future emissions were obtained by the same scaling techniques applied for aircraft in this subsection. The results are shown in Table 14.

Total Emissions in the Antelope Valley and Santa Clarita Valley Study Area

Total emissions, those comprising the Antelope Valley as well as those from the Santa Clarita Valley, are shown in Table 17. Both cases (with PIA built and not built) are shown in the table, as well as the emissions from the South Coast Air Basin.

All the pollutants studied show a decline, except particulates. These trends come about because the largest contribution comes from automobiles which will emit progressively less through 1990 as present and future emissions standards take effect; after that, however, emissions are expected to increase because of population increases and hence more automobiles.

Base year (1973) emissions, emission projections, and traffic data for the Los Angeles County portion of the Southeast Desert Air Basin and base year (1973) emissions for the South Coast Air Basin were provided by the California Air Resources Board.

Comparison of Emissions From Automobiles and Aircraft Using PIA or Using LAX and ONT

In January 1978, a report[1] was prepared for DOA on an air pollutant emission comparison with and without PIA.

---

[1] Air Pollutant Emission Comparison With/Without Palmdale International Airport, Aerovironment Inc., January 1978.

TABLE 15

ANNUALLY AVERAGED EMISSIONS AT PIA FROM COLLATERAL GROUND SOURCES
(tons per year)

Ground Operation Source	1980 CO	1980 HC	1980 NO_x	1980 Particulates	1995 CO	1995 HC	1995 NO_x	1995 Particulates
Aircraft Fueling Systems	0	12	0	0	0	9	0	0
Operation of Service Vehicles	908	193	43	5	679	145	32	3
Aircraft Engines Run-up During Maintenance	109	131	7	23	82	98	5	18
Vehicles Leaving and Entering Airport*	644	67	37	5	3,913	373	222	44
Miscellaneous Sources at the Airport	0	129	33	8	0	97	24	7
Total	1,661	532	120	41	4,674	722	283	72

*Obtained from Table 16

TABLE 16

ANNUALLY AVERAGED EMISSIONS AT PIA FROM VEHICLES ENTERING AND LEAVING THE AIRPORT
(tons per year)

Year	Number of Vehicles	Average Speed (mph)	Distance (miles)	Emissions Factor (lbs/mi)				Total Emissions (tons/year)			
				CO	HC	NO_x	Particulates	CO	HC	NO_x	Particulates
1980*	1,280,172	20	10	0.1006	0.0105	0.0058	0.00084	643.9	67.5	37.1	5.4
1995	14,767,213	15	10	0.0530	0.0050	0.0030	0.00060	3,913.3	373.4	221.5	44.3

*Applies for existing airport since PIA (if built) will become operative after 1980.

Source: AeroVironment Inc. computation based on California Air Resources Board: Procedure and Basis for Estimating On-Road Motor Vehicle Emissions (EMFAC-6) 1980.

A Vehicle Mix of LDV=95.4%, LDT=1.4%, HDG=2.4% and HDD=0.8% was used.

TABLE 17

TOTAL EMISSIONS INVENTORY FOR THE AIRPORT AREA,
THE ANTELOPE VALLEY (INCLUDING AIRPORT),
THE SANTA CLARITA VALLEY, AND SOUTH COAST AIR BASIN
(tons per day)

Pollutant/Area	1973	1980	1995 Without PIA	1995 With PIA
CO				
Airport	-	10.1	5.8	13.8
Antelope Valley	71.7	39.6	37.1	49.0
Santa Clarita Valley	82.8	39.7	31.7	39.5
Total	154.5	79.3	68.8	88.5
South Coast Air Basin	8,130.0	5,005.3	3,542.6	3,550.4
HC				
Airport	-	3.1	2.0	3.2
Antelope Valley	12.2	8.0	8.0	11.2
Santa Clarita Valley	12.3	6.6	5.7	7.0
Total	24.5	14.6	13.7	18.2
South Coast Air Basin	1,620.0	1,074.4	1,112.2	1,113.5
NO_x				
Airport	-	0.8	0.8	2.8
Antelope Valley	12.7	9.1	8.1	11.6
Santa Clarita Valley	13.3	8.4	6.4	7.7
Total	26.0	17.5	14.5	19.3
South Coast Air Basin	1,310.0	1,154.1	965.0	966.3
Particulates				
Airport	-	0.2	0.1	0.4
Antelope Valley	5.4	5.2	5.7	8.0
Santa Clarita Valley	2.8	2.5	2.8	3.5
Total	8.2	7.7	8.5	11.5
South Coast Air Basin	303.0	322.9	358.4	359.1

Source: 1980 and 1995 without-PIA emissions were taken from "Preliminary Inventory and Air Quality Forecast, 1974-1995," prepared by the staffs of the South Coast Air Pollution Control District, the California Air Resources Board, and the Southern California Association of Governments.

The objective of this study was to compare the magnitude of air pollutants emitted if PIA were built versus if PIA were not built. The geographic area considered in this study includes both the South Coast Air Basin (SCAB) and Southeast Desert Air Basin (SEDAB). Two types of primary sources were used in this comparative study and they are:

- motor vehicles (on freeways and surface streets)
- aircraft (jumbo jets and medium range jets)

This emission comparison was based on the determination that Los Angeles International (LAX) and Ontario International (ONT) Airports would accommodate the future air passengers projected for PIA if Palmdale International Airport were not built. LAX would handle 90 percent while ONT would handle the remaining 10 percent of the air passengers. This determination was made by the DOA based on discussions with the Southern California Association of Governments as to population growth and future airport capacities in Southern California

The two air basins which define the study area (also referred to as the region) and the location of each airport are shown in Figure 12. It can be seen that LAX and ONT are located in the South Coast Air Basin and PIA is located in the Southeast Desert Air Basin.

The passengers projected for PIA and allocated to LAX and ONT if PIA is not built are presented in Table 18. It was assumed that one air passenger is equivalent to one vehicle round trip (to and from the airport). Average daily vehicle trips with and without PIA are shown in Table 19.

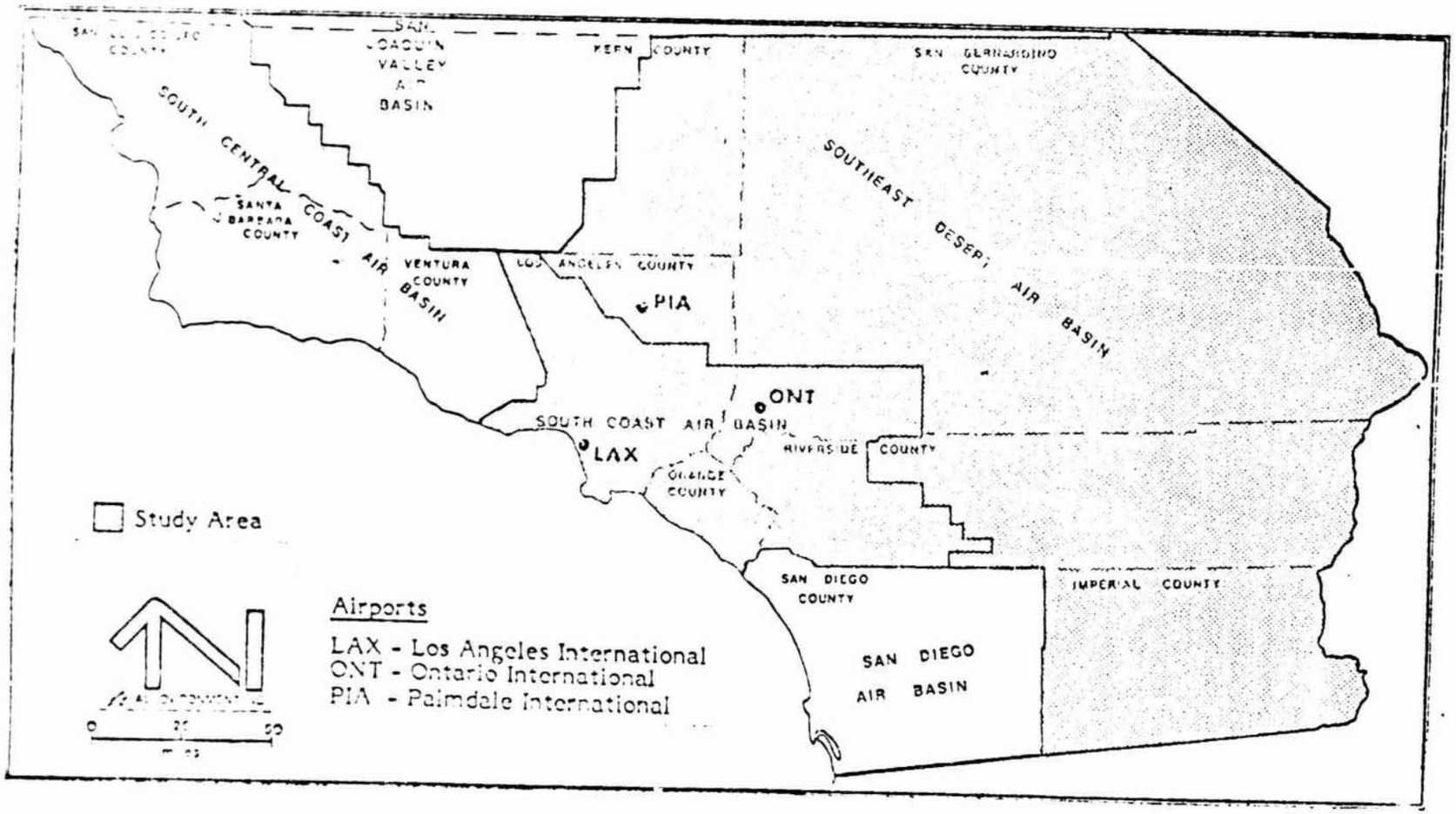


FIGURE 12 Location of airports and the air basins.

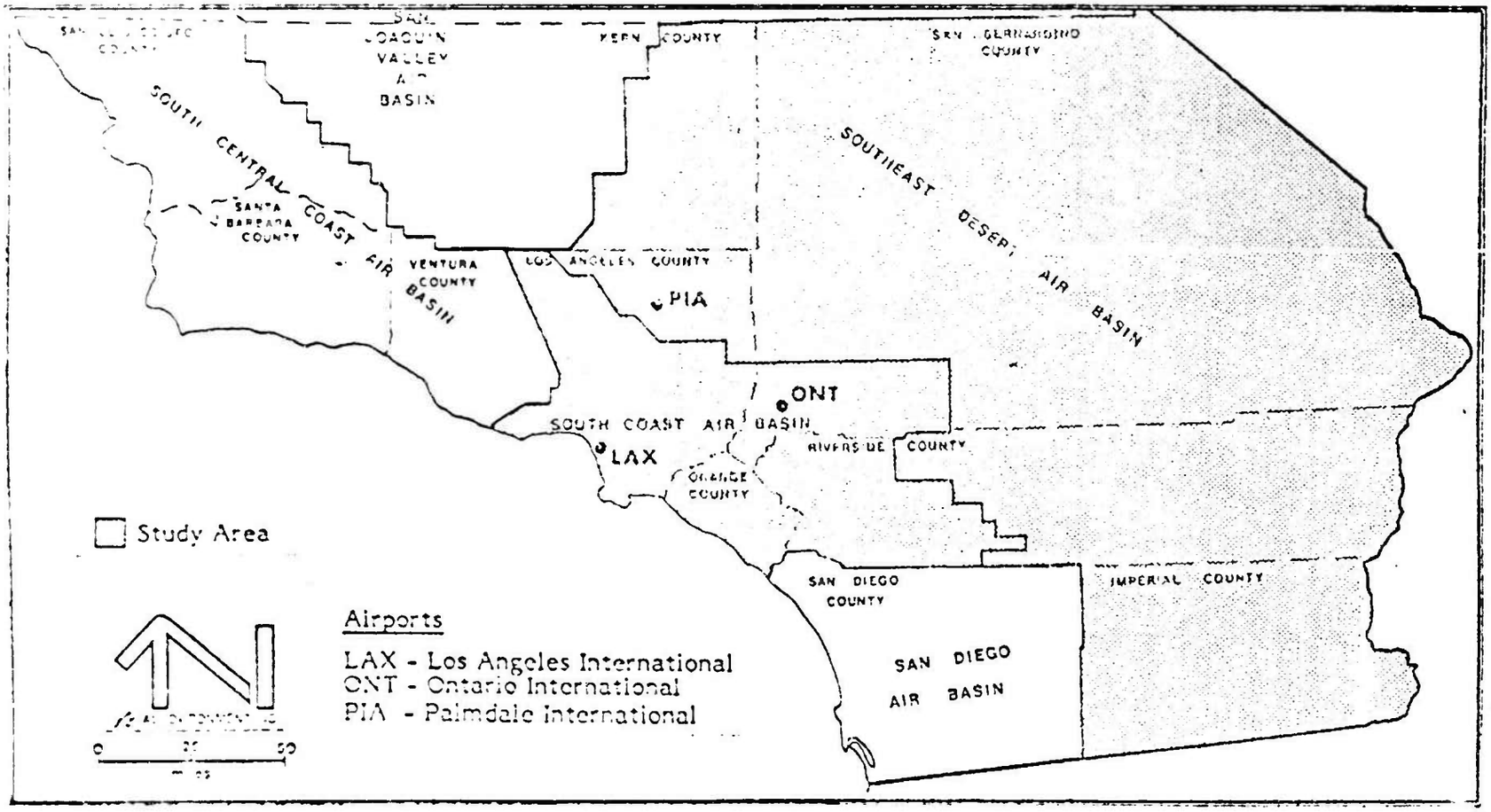


FIGURE 12 Location of airports and the air basins.

TABLE 18. Distribution of air passengers with and without PIA.

Scenario/Airport	Million Annual Passengers 1985	1990	1995
With PIA			
PIA	1.5	6.0	12.0
LAX	40.0	40.0	40.0
ONT	11.2	11.2	11.2
Without PIA			
LAX[1]	41.35	45.4	50.8
ONT[2]	11.35	11.8	12.4

TABLE 19. Distribution of the PIA generated vehicle trips with and without PIA.

Scenario/Airport	Average Daily Vehicle Trips[a] 1985 (1.5 MAP)	1990 (6 MAP)	1995 (12 MAP)
With PIA			
PIA	2334	9337	18674
Without PIA			
LAX[b]	2101	8403	16807
ONT[a]	283	934	1867

[a]Assumes only 80% of MAP due to interlining (transferring of passengers)

[b]90% of the PIA passengers assigned to LAX

[c]10% of the PIA passengers assigned to ONT

NOTE: A vehicle trip is defined as a round-trip to and from the airport.

Three air pollutants which are principally associated with mobile sources (i.e.; motor vehicles and aircraft) were considered for this study. These pollutants are: carbon monoxide (CO); hydrocarbons (HC); and nitrogen oxides ((NO_x). Since suspended particulate emissions from both motor vehicle and aircraft sources either with ot without PIA would be less than one ton per day, they were excluded from this study. Also, since sulfur dioxide emissions from these sources are smaller than particulate emissions, they were not considered.

In order to compare the magnitude of motor vehicle emissions for vehicle trips to PIA versus allocating those trips to LAX and ONT, it was necessary to analyze both the vehicle speed characteristics and travel distances. On the regional scale both speed and distance from each airport to a population center influence the magnitude of resulting emissions. While in the vicinity of each airport where the vehicle trips converge, speed variation is the important variable controlling differences in emissions.

In comparing aircraft emissions, the amount of aircraft delay time caused by airfield traffic congestion is the controlling factor for increasing or decreasing emissions.

This study was divided into three major areas:

- Comparison of motor vehicle emissions in the vicinity of PIA versus LAX and ONT.

- Comparison of regional motor vehicle emissions from vehicle trips between population centers and the vicinity of PIA versus LAX, and ONT.

- Comparison of aircraft emissions at PIA versus LAX, and ONT.

Total motor vehicle trips were divided into an airport vicinity component and a regional component because detailed evaluation of vehicle speeds near each airport was required to determine changes in emission. Vehicle speeds are less important on the regional scale and they were evaluated using a generalized methodology.

Table 20 shows the comparison of CO, HC, and NO_x emissions for with and without PIA for 1995. The estimates of future emissions show, except for NO_x, that there would be more emissions if PIA is not built than with PIA. It appears that NO_x emissions would be the same with or without PIA.

It is interesting to note that, although the regional motor vehicle emissions (vehicle trips between each airport and population center) are estimated to be greater if PIA is built, motor vehicle emissions in the vicinity of LAX and aircraft emissions from excess air traffic delay provide a substantial offset which accounts for total emissions being higher if PIA is not built.

While the magnitude of CO emissions are shown to be higher if PIA is not built, the HC and NO_x emissions are only slightly higher. This is primarily due to the following: small changes in emission rates with respect to vehicle speed, and the lower HC and NO_x emission factors as compared to CO emission factors.

A comparison of the with and without PIA emissions to the basin-wide emissions from all future sources, in both the SCAB and SEDAB, shows that the PIA related emissions are extremely small (less than 1 percent) as compared to the basin-wide emissions. Tables 21 and 22 show the total projected emissions from all sources in the SCAB and SEDAB, respectively.

The results indicate that if PIA is not built more emissions would be generated in both the SCAB and SEDAB than if PIA is built. However, by building PIA, sources would be shifted away from the SCAB toward the SEDAB and cause a net decrease in emissions in the combined basins.

TABLE 20. Regional emission comparison with and without PIA for 1995.

	Average Daily Emissions (tons/day)					
	Without PIA			With PIA		
Emission Sources	CO	HC	NO_x	CO	HC	NO_x
Motor Vehicles						
Airport Vicinity[1]	1.68	.16	.13	.77	.08	.12
Regional[1]	6.17	.63	1.28	9.12	.92	1.90
Aircraft						
LTO's[1]	5.65	.79	5.0	5.65	.79	5.0
Excess Delay[2]	5.27	.69	.53	0	0	0
TOTALS	18.77	2.27	6.94	15.54	1.79	7.02

[1] Includes motor vehicle and aircraft sources associated with PIA air passengers if PIA is built, or allocated to LAX and ONT if PIA is not built.

[2] Includes all aircraft at LAX that would be delayed excessively due to additional PIA aircraft trips if PIA is not built.

TABLE 21. Total emissions for South Coast Air Basin.

	Estimated Emissions (tons/day)								
	CO			HC			NO_x		
Source Category	1985	1990	1995	1985	1990	1995	1985	1990	1995
Stationary	935	1020	1130	717	789	858	486	510	549
Motor Vehicles on Road	1650	1450	1440	312	236	214	415	372	398
Jet & Piston Aircraft	188	196	205	25	26	17	16	17	18
Other Mobile	354	374	394	73	77	91	104	110	116
TOTAL	3127	3040	3169	1127	1128	1180	1021	1009	1081

TABLE 22. Total emissions for Southeast Desert Air Basin.

	CO			HC			NO_x		
Source Category	1985	1990	1995	1985	1990	1995	1985	1990	1995
Stationary	782	891	1050	93	104	119	149	188	216
Motor Vehicles on Road	92	81	80	18	14	12	28	26	28
Jet & Piston Aircraft	74	80	84	18	18	19	5	5	6
Other Mobile	53	58	63	13	15	17	33	36	39
TOTAL	1001	1110	1277	142	151	167	215	255	289

Source: California Air Resources Board Emissions Projections - 1977

Projected Air Quality for the Antelope Valley

To derive projected air quality, proportional scaling with Larsen's statistical concepts[1] was used to obtain frequency distributions of pollutant concentrations. It was assumed that peak concentrations of inert pollutants are proportional to total emissions in the Antelope and Santa Clarita Valleys (see Table 17), while peak oxidant concentrations are proportional to total non-methane HC emissions. Ozone, CO, NO_2, and particulate air quality data at Lancaster were used since this station is closest to the proposed PIA.

Table 23 presents the maximum predicted concentrations and expected frequency of exceedance of standards for ozone and CO. Air pollutant concentrations for the 1995 build case represent growth-induced impacts from the construction of PIA. Reduction in concentration of both pollutants over 1973 levels is expected corresponding to non-methane HC and CO emissions. All state and federal CO standards will be met under either alternative. For 1995, this table shows there will be a 0.4% increase in time when the ozone standard will be exceeded with PIA built than under the no-build alternative. Neither State of California nor federal one-hour ozone standards will be met under either alternative. However, the sort of proportional modeling used in the projection relates the O_3 to the local sources, which is incorrect for the Antelope Valley situation. The numbers are given here to provide a perspective.

Forecast concentrations of NO_2 and particulates are presented in Table 24. Again, growth-induced impacts have been considered when computing pollutant concentrations for the 1995 build case. Only the annual geometric mean (AGM) of particulates is predicted. The highest 24-hour average is often related to natural phenomena (e.g., dust storms) and not to man-made emissions, therefore, no really meaningful predictions can be made. All state and federal AGM standards will be exceeded under either alternative. Particulates are the only pollutant for which 1995 levels are expected to be higher than 1973 levels. This is because significant motor vehicle emission reductions are not anticipated and because the projected population increase if PIA is built increases particulate emissions in the study area by 35% (although increasing airport emissions by only 0.3 tons/day). It is emphasized that this proportional scaling for particulates greatly over-predicts the particulate problem, since the scaling ignores the fact that the main particulates are and will continue to be natural. The numbers are presented here to give limits only.

---

[1] R.I. Larsen, "A Mathematical Model for Relating Air Quality Measurements to Air Quality Standards," EPA Publication No. AP-89, 1971.

TABLE 23

PREDICTED OZONE AND CO CONCENTRATIONS AT LANCASTER

Year/Alternative	Oxidant		CO			
	Percent of Time 1-hour Standard (0.08 ppm) Exceeded	Predicted Peak 1-hour Concentration (ppm)	Percent of Time 1-hour Standard (35 ppm) Exceeded	Predicted Peak 1-hour Concentration (ppm)	Percent of Time 8-hour Standard (9 ppm) Exceeded	Predicted Peak 8-hour Concentration (ppm)
1973						
Present*	2.7%	0.26	0.0%	15	<0.1%	10
Present**	1.5	0.21	0.0	17	0.0	-
1980	<0.1	0.15	0.0	8	0.0	5
1995						
No build	<0.1	0.15	0.0	7	0.0	5
Build	0.4	0.19	0.0	9	0.0	6

*Predicted 1973 value.
**Actual 1973 value.

TABLE 24

PREDICTED NO_2 AND PARTICULATE CONCENTRATIONS AT LANCASTER

Year/Alternative	NO_2 Annual Average (ppm)	NO_2 Maximum 1-hour Average (ppm)	Suspended Particulates AGM (ug/m^3)
1973			
Present*	0.01	0.08	84
1980	0.01	0.05	79
1995			
No Build	0.01	0.04	87
Build	0.01	0.06	118

*Actual 1973 values.

With PIA built, the NO_2 maximum hourly average would be 0.06 ppm compared to 0.04 ppm for no-build, both well below the state standard of 0.25 ppm.

The Photochemical Smog Situation

O_3 arises in an air mass over a period of some hours through a complex interaction between NO_x, methane-reduced HC, and sunlight. Because of the reaction time requirements, one must consider the trajectory of air parcels from the pollutant source regions. The O_3 maximum usually occurs some time in the noon to 4 p.m. period in the most populated portions of the Antelope Valley, with the significant pollutant source being considered to be the concentrated morning traffic peak in the 6-9 a.m. period.

With respect to PIA and the Palmdale-Lancaster complex the situation can be considered in two distinct parts: (1) where the significant pollutant sources are the northwest Los Angeles, Oxnard, and contiguous mountain regions, and (2) where the PIA-Palmdale-Lancaster region is itself the 6-9 a.m significant source.

Visibility

The current California visibility standard is less than ten miles whenever the relative humidity is less than 70%. There is no federal standard. The visibility at the Palmdale Airport was poorer than this

level on an average of 87 days a year for the period 1956-1974. The 24-hour California particulate standard of 100ug/m^3 corresponds roughly to an average visibility of 8-12 miles; thus, exceedance of that standard can often be expected to result in exceedances of the 10-mile visibility standard. Since such particulate exceedances are predicted for 1995 regardless of whether PIA is built or not, the same exceedance situation can also be expected to prevail for visibility.

Visibility reduction in the study area results from: (1) increased particulate loading in the atmosphere as a result of strong winds blowing over the desert surrounding the study area, (2) photochemically generated aerosols, and (3) particulate matter resulting from combustion and vehicle operation.

Considering each of the contributory factors in turn, the impact on visibility of the proposed project due to blowing sand is very difficult to assess. The impact, if any, would be very small and might even be beneficial because buildup of the airport would result in developments over existing desert areas and would reduce the acreage of loose topsoil that could be stirred up by strong winds. As stated before, the impact would be small since the amount of paved or landscaped land would be small compared to the vast desert area surrounding the study area. During the construction period some impact of blowing dust can be expected; normal construction dust control procedures should minimize this effect, however.

The future impact of photochemical aerosols on the visibility of the area should be essentially the same as the present situation.

Aircraft and vehicle emissions can be expected to produce sufficient particulates to cause a localized impact on the visibility in the immediate vicinity of the airport during the most stable mornings; although quantitative estimation of this effect is not possible, the overall effect should be slight.

It should be noted that these three visibility degradation factors tend to occur at different times. Blowing sand occurs when there is strong wind --typically in the afternoons. The photochemical aerosol effect will be felt mostly on summer afternoons when winds are not too strong. The combustion particulates will have their greatest effect in the most stable conditions on winter mornings.

In summary, considering the blowing dust, the photochemically generated aerosols, and particulate matter resulting from combustion and vehicle operation, the build/no-build decision can be expected to have negligible effect on visibility in the Antelope Valley or on areas downwind from the airport. The effectiveness of source controls in the Los Angeles area will have a much more significant effect on the visibility in the Antelope Valley, and in most cases is the key to improvement of visibility there.

Summary of Findings

Air Quality - Typical Conditions

Under typical conditions no present state or federal standards for CO will be exceeded in the airport vicinity. Background values for each pollutant are computed, based on emissions in the whole Antelope Valley-Santa Clarita Valley area. HC does exceed standards because of a high background, but HC is not itself considered a health hazard. NO_x concentrations just barely permit exceedances at the PIA boundary in 1995. Particulates have exceedances due overwhelmingly to background values.

Air Quality - Severe Inert

It has been found for PIA that under the severe inert conditions, CO federal and state hourly standards are not forecast to be exceeded in the airport vicinity. The eight-hour CO standard will almost be exceeded for PIA in 1995. NO_2 will exceed the one-hour standard whether PIA is built or not. This pollutant is attributed to higher combustion temperatures found in jet engines, and its impact can be minimized by even stricter NO_x controls. Federal standards for HC are exceeded whether PIA is built or not.

Area Air Quality

For the overall area of the Antelope and Santa Clarita valleys, pollutant projections were made based on observations at Lancaster scaled to predict areawide emissions. No CO or NO_2 exceedances are predicted. HC and particulates are exceeded due to the background. Oxidant exceedances are found to be reduced in 1980 and 1995 over exceedances in 1973.

The Photochemical Smog Situation

The source of photochemical smog in this area is almost exclusively portions of the Los Angeles area and other coastal regions far from Palmdale-Lancaster. Any decisions about PIA will have negligible impact on the oxidant exceedances. The exceedances become relatively rare in time, due to emissions controls; the sources have been trending down for some time in the South Coast (Los Angeles) Air Basin.[1]

Air Quality Impacts

The proposed project will result in an increase in all pollutant (except ozone) concentrations in the immediate vicinity of the airport. (Ozone values in this area will probably be reduced as a result of ozone depletion by NO emitted from sources in the airport.) However, no exceedances of either the one-hour or the eight-hour CO standards are expected in 1995. Both particulate and HC standards will be exceeded regardless of whether PIA is built or not. This is because of the high background values that exist in the study area. As for the NO_2, no exceedances are expected under typical meteorology, while the one-hour California standard will be exceeded whether PIA is built or not under severe meteorological conditions.

In the regional scale, the differences in air quality with or without the project are small. There will not be any exceedance of CO and NO_2 air quality standards in 1995, while exceedances of O_3, particulate, and HC standards will occur whether PIA is built or not.

State Air Quality Certificate

The DOA requested the State of California Air Resources Board (ARB) to issue an air quality certificate pursuant to the Airport and Airway Development Act for the proposed PIA porject. The ARB, in a letter dated October 10, 1978, provided the following response:

"The PIA project clearly demonstrates that the area encompassing the project's proposed location has a severe photochemical oxidant problem. In addition, the proposed project will interfere with the attainment and maintenance of the national ambient oxidant standard (0.08 ppm) in the Southeast Desert Air Basin. The siting of a major source, such as an airport, which would cause or aggravate violations of ambient air quality standards is prohibited by federal law unless emissions are offset through implementation of mitigation measures or by reduction of emissions through trade-offs in the airport area. If the proposed PIA is built, we estimate a reduction of almost 11 tons per day of total hydrocarbons will be needed in the area impacted by the airport by 1995 to meet the 0.08 ppm oxidant standard. Of this amount, almost 6 tons per day is attributable to the airport, therefore it will be necessary to offset this tonnage to assure the airport's construction and operation will not interfere with attaining and maintaining the oxidant standard.

"Our investigation has revealed the following examples of mitigation measures which might be used to reduce emissions:

- A transit service program which accommodates the estimated trips to PIA commensurate with the level of service planned.
- Restriction of motor vehicle parking at PIA.
- A program to tow aircraft, as feasible, to and from runways at PIA and LAX.
- A program to control evaporative emissions from gasoline-powered support vehicles utilized at PIA.
- A program to install and use vapor recovery systems at PIA during the refueling of all aircraft.

---

1. South Coast Air Pollution Control District, "Air Quality Trend in the Los Angeles County," December 1975

"The 'trade-off' concept permits new or modified sources to be approved if any increases in emissions therefrom will be more than offset by reductions from the same or other sources. This concept is in the Clean Air Act and the Federal Environmental Protection Agency is implementing it nationwide. Therefore, in addition to a mitigation program, there may be other activities in the area which are causing pollution that the Department of Airports could aid in reducing and receive emissions reduction credits as trade-offs.

"Accordingly, to facilitate certification, I recommend that you submit a proposal containing mitigation measures and trade-offs which will produce 6 tons per day of hydrocarbon emissions reductions by 1995."

The DOA is currently preparing mitigation measures to facilitate issuance of an air quality certificate by the ARB. The DOA has given a written assurance to the FAA that the necessary air quality certificate can be obtained from the ARB, (see Appendix F).

WATER QUALITY, AND FLOOD HAZARD

Sources and Availability of Supply

Historical Uses

The economy of the Antelope Valley has long been sustained by pumping water for beneficial uses, principally irrigation. In effect, the economic growth of the area has been made possible by a form of "mining for water," meaning the depletion of groundwater sources by pumping from wells. Because of this extensive pumping, groundwater withdrawals exceed recharge from the mountains, thus creating a general overdraft condition. In 1950 there were more than 1,000 wells in Antelope Valley.

With the increasing use for agricultural, municipal, and industrial purposes, groundwater levels have decreased more than 200 feet in some places. Average pumping lift from wells was 320 feet in 1967. In the same year, a report to the USGS Water Resources Division stated that if the decline continued as projected, pumping for irrigation would become too costly by 1985 and probably would be discontinued.

In 1972, urban consumption was 23,000 Acre-Feet (AFT) and agricultural consumption, 124,000 Aft. Urban consumption was approximately 19% of agricultural consumption. This urban use percentage will continue to increase with increasing municipal and industrial activity.

Current Sources and Associated Conditions

(1) Geologic Structure/Hydrologic Properties. The floor of Antelope Valley is composed mainly of erosional sediments created by downwash of the surrounding mountains. This unconsolidated material is an excellent medium for receiving and absorbing runoff from the mountains.

Beneath the deposits of the recent age, the other older alluvium is finer grained and better sorted. Where these materials are saturated, as in the major drainageways and settling basins, they constitute the major water-yielding deposits of the area.

- Hydrologic Subunits

An examination of water elevation shows that there are many hydrologic subunits in Antelope Valley which form separate and distinct groundwater basins, each of which has been named. One major subbasin, the Lancaster Subunit, and several small subbasins supply most of the water used in the Valley.

(2) Surface Water Runoff/Aquifer Recharge. The water for Antelope Valley groundwater recharge flows down from the mountains, over the bajadas, and onto the Valley floor. The land adjacent to and south of the proposed airport site absorbs much of the water because the soils are very

dry and permeable. During wet periods of the year, the excess water runs across the Valley floor to the dry lakes north of the site. There, much of this water is lost to evaporation.

Little Rock Reservoir and Palmdale Reservoir, both in the San Gabriel Mountains, are the two principal facilities which conserve and store excess runoff. The total annual recharge is that quantity of groundwater which can be consumed annually without permanently lowering groundwater levels. This has been estimated by the USGS at 76,000 Aft for Antelope Valley. This amount is 5% of the total annual precipitation in the basin.

(3) Regional Groundwater Quality. The water in the older alluvium, the principal aquifer of the area, is generally suitable for most domestic, irrigation, industrial, and commercial uses. There has been no record of any contamination of groundwater by surface water recharging in the Valley. If stringent discharge requirements for wastewater continue to be enforced, this is not expected to be a problem.

Water quality at the airport site, like that in the surrounding Palmdale and Lancaster Municipal areas, is generally suitable for all uses.

Water Use and Demand

(1) Present Consumption. Because of the decreasing levels of groundwater and the accompanying subsidence of pumping areas, a maximum withdrawal level of 300 feet has been set for safe and economic yields from wells in the Valley.[1] Many wells are quickly approaching this limit. Increased pumping costs resulting from greater water table depths have already precluded the use of many of the original wells.

At present there are three water agencies serving the area. Palmdale Water District serves Palmdale and the surrounding area. Its present annual consumption, mostly urban, is 5,000 Aft drawn from wells. Its entitlement from the California Aqueduct water is 17,300 Aft per year.

The existing storage capacity is 6.4 million gallons with another two million gallon tank presently under construction. A water treatment plant of 10 to 15 million gallons capacity per day is planned in the future. Most of the distribution network to meet present and future demand is

---

1. North Los Angeles County General Plan, Environmental Resources Management Element, November 1974.

already constructed. The Antelope Valley-East Kern Water Agency (AVEK) serves Lancaster, Quartz Hill, Pearblossom and other outlying areas. Its present annual consumption is 65,000 Aft; 10,000 Aft for urban and 55,000 Aft for agricultural use. Its entitlement from the California Aqueduct water is 138,400 Aft per year. AVEK has three water treatment plants. The Quartz Hill treatment plant has a capacity of 14 million gallons per day. Expansion to 28 million gallons is planned in 1985 with ultimate expansion to 56 million gallons. The Rosamond treatment plant has a capacity of 14 million gallons per day with future expansion to 28 million gallons. The Pearblossom plant presently under construction at a cost of $71 million will have a capacity of three million gallons per day with ultimate expansion to 10 million gallons. The Quartz Hill and Pearblossom plants are located near the California Aqueduct and the water is fed by gravity. The Rosamond plant is supplied by pipelines. Most of the distribution lines have already been constructed and a few additional lines will be constructed as demand develops. The third water agency is the Little Rock Creek Irrigation District with 2,300 Aft per year entitlement.

(2) California State Water Project. The seriousness of the above-described situation has been partly alleviated with completion (in 1972) of the California State Water Project. With this water supply, the residents of Antelope Valley will be able to meet their municipal and industrial needs with imported water while using groundwater and available surface water for agricultural irrigation.

Future Water Supply and Quality

Hydrologic Budget

Municipal and industrial water consumption is forecast at 0.224 Aft per capita per year in 1980, and 0.233 Aft in 1990. These figures were multiplied by the population figures to obtain the total consumption of to 37,000 Aft in 1990 without PIA. To calculate agricultural water consumption, 2.37 Aft per year was multiplied by the agricultural acreage through 1990.

The total water supply available by 1990 is estimated at 234,000 Aft based on natural water recharge and the entitlement from the California Aqueduct. Imported water allotments based on the 1973 California State Water Project report are estimated to be 158,000 Aft in 1990. For 1995, the same supply level was assumed.

With the projection of an increasing use of imported water in addition to the natural supply, a net surplus is expected. This surplus, based on allocated water, is estimated at 91,000 Aft without the airport and at 80,000 Aft with the airport in 1995. There appears to be enough water available for potential growth in Antelope Valley under either future condition.

The Effect of the Proposed Airport on Water Quality and Supply

Construction of the airport would have the following effects on the surface water and groundwater systems in Antelope Valley:

- The breaking and bulldozing of ground would increase the amount of exposed soil, making it more susceptible to wind and water erosion. Thus, there would be increased siltation loads in the local drainageways. This siltation would not affect local wells, as they have concrete encasements.

- There would be a general disruption of surface water flows across the site and a minor concurrent effect on the subsurface water flows.

- A certain amount of chemicals, oils, and waste materials would be dumped on the surface during construction. This probably would not influence the water quality of the perched or subsurface water table because of the depth of these formations below the surface.

The significance of any one of these impacts, except for the possible disruption of surface water flows and patterns and infection of the perched water table to the north of the site, would not be major. However, necessary preplanning and implementation by the DOA will avoid any detrimental effects from construction activities.

Flood Hazards and Effects on Drainage Patterns

Historical and Existing Conditions

(1) Precipitation Records. The average annual rainfall is about 4-6 inches on the Valley floor. In the mountains surrounding the Valley the average is greater than 19 inches per year and in some places, particularly in the high peaks, there are recorded rainfalls of up to 40 inches.

(2) Surface Drainage/Stream Runoff. The four streams which drain the mountains in the immediate vicinity of Palmdale and Lancaster are Big Rock, Little Rock, Amargosa, and Anaverde Creeks. The major contributors to direct recharge are Big Rock and Little Rock Creeks, each encompassing a drainage basin of approximately 123,000 acres.

During wet times of the year, when rainfall is heaviest in the mountains and the sediments are saturated with water, flows continue down major stream courses to dry land, where waters pond and eventually evaporate. When this occurs, much of the outskirts of both Palmdale and Lancaster are affected by the flows. One of these courses, Little Rock Creek, drains directly across the PIA site from south to north between

Plant 42 and 110th Street. When runoff is sufficient, this flow drains finally into Rosamond Dry Lake to the northwest. Because the Federal government will not guarantee loans for residential construction in floodways, expansion of urban areas is effectively prevented unless flood control programs are implemented.

(3) Little Rock Creek

Fanning outward from the base of Angeles National Forest, in the vicinity of 70th Street East is Little Rock Creek and floodplain. The County Engineer and Army Corps of Engineers have designated Little Rock Creek as a floodway (major flow of water during a storm) and a floodplain (those areas into which water overflows in the event of a major storm). Historically, significant damage to private and public property has resulted from flooding along this drainage course. Consequently, little development has occurred within the area. Land uses which have been implemented have capitalized on the area's natural attributes; as a resource for sand and gravel. Significant sand and gravel excavations have been conducted in the area for an extensive period. Recurrence of major flooding intensifies the resource available for excavation.

(4) Amargosa and Anaverde Creeks

Amargosa and Anaverde Creeks cross the western section of the Palmdale planning area and are responsible for much of the flooding to the north in the central Lancaster area. Much of the Creeks' runoff is characterized as "sheet flooding" (i.e., a shallow sheet of water of generally uniform depth over a wide area). Such flooding is usually more of a nuisance, rather than a threat to life and property. However, intensive future development may sufficiently alter existing ground elevation so that serious problems could result in older developed and underdeveloped areas.

Effects of Airport Development and Operations on Drainage and Flooding

Construction of the airport would affect drainage and flooding as follows:

(1) Construction Phase. There would be a good deal of earth-moving activities in building runways, installing pipes and storage tanks, and preparing for other facilities. Construction activity could alter the floodplain area of Little Rock Creek, change the natural drainageways, and cause running water to be redirected into areas unsuitable for such drainage and magnitude of discharge, particularly at flood times. Flood control measures (as discussed below) will be implemented to mitigate the impact.

(2) Operations Phase. An extensive system of flood control (as discussed below) would have to be installed to prevent impact of flood waters on the airport or, conversely, impact on the natural drainageways by the airport. These measures would have to be instituted both at the airport site and in the foothills of the San Gabriel Mountains.

The development of airport facilities, as well as the induced development of the areas around Palmdale-Lancaster, would result in a minor increase in the amount of impervious ground surface. Such surfaces would increase velocity and quantity of runoff, thus altering the drainage regime and groundwater recharge system in the Valley. Unless these airport and urban discharge waters were controlled and redirected to groundwater recharge zones, a valuable resource could be lost.

It is also critical to the mission of Edwards AFB that the Rosamond and Rogers Dry Lakebeds be maintained. The DOA agrees with the Air Force that the existing conditions of these lakebeds should be maintained. The dry lakebeds are devoid of vegetation due to the alkalinity of the clay. Groundwater derived from precipitation in the mountains gradually works down desert plains to dry lake basins, where excess water reaches the surface and evaporates. The alkaline condition of the soil on the playas is in large part due to evaporation of near surface groundwater.

To protect the dry lakes, runoff in the Palmdale area would be handled through the utilizaion of spreading grounds, retention basins, and soft-bottom channels for the purpose of aiding in the recharge of the groundwater. The major mountain streams would utilize retention south of Palmdale to reduce peak discharges and enhance groundwater recharge where soil is most porous.

The DOA concurs with this analysis and will pursue flood control design methods that make it possible to control peak discharges to the north of the PIA site.

Safety and Limitations of Existing Flood Control Facilities

Palmdale Water District operates two facilities which mitigate seasonal disruptions in water flow (rainfall) by storing excess runoff -- Little Rock Reservoir and Dam, and Palmdale Reservoir.

(1) Little Rock Dam. The dam is located at the head of a major drainage basin leading to Palmdale, the town of Little Rock, and the airport site: failure of the dam at current operating capacity would cause flood conditions. However, an examination of flood inundation maps prepared by the State Office of Emergency Services indicates that flood waters would not envelop the site or its immediate southerly environs. Furthermore, the current land use plan designates this area for floodplain management.

(2) Palmdale Reservoir. Palmdale Reservoir was built in 1891, with a maximum storage capacity of 4200 Aft. In 1966, the reservoir was redesigned to withstand horizontal and vertical earth movements of up to 20 feet. As an additional flood control measure, land below the dam has been set aside as "flood easement," wherein building is prohibited.

Planned Improvements and Mitigating Actions

Flood Control and Surface Drainage

- County

The NLAC General Plan recommends the following mitigation actions for flood control and protection. The DOA agrees with these recommendations and will take necessary actions within its resources to implement them in cooperation with other public agencies.

- The floodway and floodplain of Little Rock Creek would be designated as a "Floodplains Management Area," facilitating development only in accordance with designated standards to minimize the potential hazards to life and property.

- Within the floodway, or watercourse itself, only certain extractive industrial (such as sand and gravel), agriculture, open space and light recreational uses would be facilitated.

- In surrounding floodplains, residential, commercial, or industrial uses can be facilitated providing appropriate flood protective measures are exercised, subject to approval by the Flood Control District and the City or County Engineers (as applicable). Such protective measures would require that the bottom elevation of the structure, or first floor, be at least one foot above the level of the "design flood." Any development or design feature which would increase the level of the design flood by more than one foot would be offset by approved stream improvement requirements (costs incurred by the developer).

- Expansion of existing facilities in the floodway would not be permitted.

- Flood control measures would be constructed to protect existing urban areas where economically feasible.

- Amargosa and Anaverde Creeks should be channelized through urban areas and other protective measures (fill, banking, etc.) implemented as development occurs.

- Arterial and secondary highways should be designated to facilitate their use in carrying water draining from the foothills.

Additionally, the Plan recommends utilizing the floodplain and floodway for groundwater recharge activities. For many years the groundwater level of the Antelope Valley basin has been dropping dramatically. This effectively has curtailed once intensive, agricultural production. The ability to capture water draining from the National Forest and recharge the groundwater basin would be of considerable benefit.

Once sand and gravel operations cease, the Plan recommends development of the floodway for light recreational uses (horseback riding, picnic areas, dune buggy courses, hiking, and other such activities). In the floodplain abutting the floodway, are dense groves of Joshua Trees. It is recommended that every effort be pursued to retain the integrity of the native vegetative habitat.

- U.S. Army Corps of Engineers (Los Angeles District)

The Corps conducted a survey to study "streams flowing through the Antelope Valley with a view to their improvement in the interest of flood control, conservation of water resources, and related purposes." The results of their studies are summarized as follows:

- "The Antelope Valley is an inland desert area with no natural outlet to the sea. Alluvial fans have formed at the transitions from the steep mountain slopes, which form the rim, to the flat valley floor, which drains into normally dry lakes. Streams varying in length from about 10 to 50 miles are well-defined in the mountains and foothills, but are barely defined and lose their identities where they flow through and over developed and undeveloped areas on the valley floor. In fact, the waters spread and cover much of the valley floor, including the Cities of Palmdale and Lancaster.

- "The continued growth of industry and population in the City of Los Angeles in the last decade has forced growth and expansion of the urbanized area of the county. That part of Antelope Valley in Los Angeles County has shared in the growth to some extent, averaging 2 to 3 per cent per year over the past 10 years. Channel improvements, which have been constructed by local interests, are not adequate for the control of 100-year and larger floods in the area.

- "Preliminary consideration was given to structural flood control measures, such as reservoirs, levees, and channels requested by local interests or developed by the Corps. The scope of these preliminary studies permitted determination as to whether any flood control solution might be economically justified.

- "Structural solutions for Fairmont Wash, Portal Ridge Wash, proposed Almondale channel, and Big Rock Creek in Antelope Valley

what about flood protection for plant 42?

were found not to be economically justified because the cost of channel improvements would exceed the value of the existing development that is subject to flooding. Structural solutions were considered for Amargosa, Anaverde and Little Rock Creeks, and proposed Palmdale and Pearland Channels. Flood control structures could not be economically justified for these streams at this time, because the existing development in the flood plains is sparse and the future development will be required to be flood proofed.

- "Although the aggregate damages resulting from large, infrequent floods are high, the damages resulting from smaller floods are estimated to be small. Thus, the average annual flood damages are not large enough to justify structural solutions. Recognizing the lack of economic justification for flood control in the area, the flood damage can be minimized by flood proofing and flood plain management. To reduce future flood damage and hazard, local interests should utilize to the maximum extent possible the flood plain management, flood proofing of existing structures and the flood insurance programs.

- "The conclusion reached as the result of this study is that a flood problem exists along the streams flowing through Antelope Valley but the lack of development does not justify a flood control project at this time. It is also concluded that, because protection can be provided as part of the airport construction, the Corps of Engineers has no interest in joining with the City of Los Angeles in developing a flood control program for the proposed Palmdale International Airport.

- "With the Federal flood insurance program in force and with its mandatory regulation of the flood plain, existing guidelines and those to be developed would provide the basis for the orderly development of the Antelope and Fremont Valleys. The ultimate solution to avoiding flood damages is wise planning and strict regulation to keep new development out of the flood plain. Regulation will not reduce damages to existing development, but they will prevent it from becoming worse. Although there are no improvements in which the Corps can participate, there will be a need and desire for local solution to the future flood problems. At request, the Corps flood plain management program can assist the local government in providing technical services in assessing solutions to the flood problems."

- Airport Flood Control

The treatment of storm water drainage would be designed in the master plan phase of the airport in accordance with the NLAC General Plan.

Structural options to dissipate flooding at the proposed airport site are shown in Figure 13. These alternatives would permit the flow of storm runoff across recharge areas, and therefore not adversely affect local groundwater recharge rates. The DOA will consider these alternatives in its master planning and will select an alternative for flood control purposes. The DOA will also allow for the cost of the selected alternative in its financial planning.

With respect to runoff originating from the proposed PIA site, about 15% of the 17,700 acres will be developed with impervious surfaces. Because of the extent of the remaining undeveloped area, it will be possible to control peak discharges to the north at a level that is equal to or less than the discharge on the 17,700 acres prior to development. Runoff from impervious surfaces will be directed to short-term holding facilities that would be required for a period of up to the first thirty minutes of peak storm runoff. Thereafter, storm waters from these surfaces would be released into soft bottom channels and spreading grounds. In this way the proposed airport will not adversely contribute to the flood control problems downstream, while at the same time it will contribute to conserving some of the flood water during off-peak periods.

Proposed Actions for Maintaining Water Quality and Supply

The DOA has had exploratory discussions with the Palmdale Water District (PMD) on the issue of securing sufficient water. With PMD's allotment from the State Water Project, the airport would be able to obtain an adequate supply for its own direct purposes. During the airport master plan and design stages, a water distribution system would be established to provide water, and additionally to control erosion and sedimentation, to prevent pollution of water courses and groundwater sources, and to maintain high standards of water quality.

Antelope Valley. The implementation of the several plans of affected agencies will result in improved water supply and quality for the entire Valley. Use of imported water is expected to stabilize the subsidence problem by reducing the demand for groundwater and by bringing pumping quantities into balance with natural recharge rates.

City of Palmdale. In its efforts to provide enough quality water to meet the needs of its citizens, the City of Palmdale supports the development of basins for impoundment of storm runoff, the acquisition of spreading grounds for groundwater recharge, and the preservation of open space in the recharge areas of Little Rock Wash and the present quarry sites.

Antelope Valley-East Kern Water Agency (AVEK). In June 1974, the AVEK received voter authorization to begin construction of a distribution system for the State Water Project aqueduct water. Known as the DAWN project, it delivers water to the West Valley. Early reports

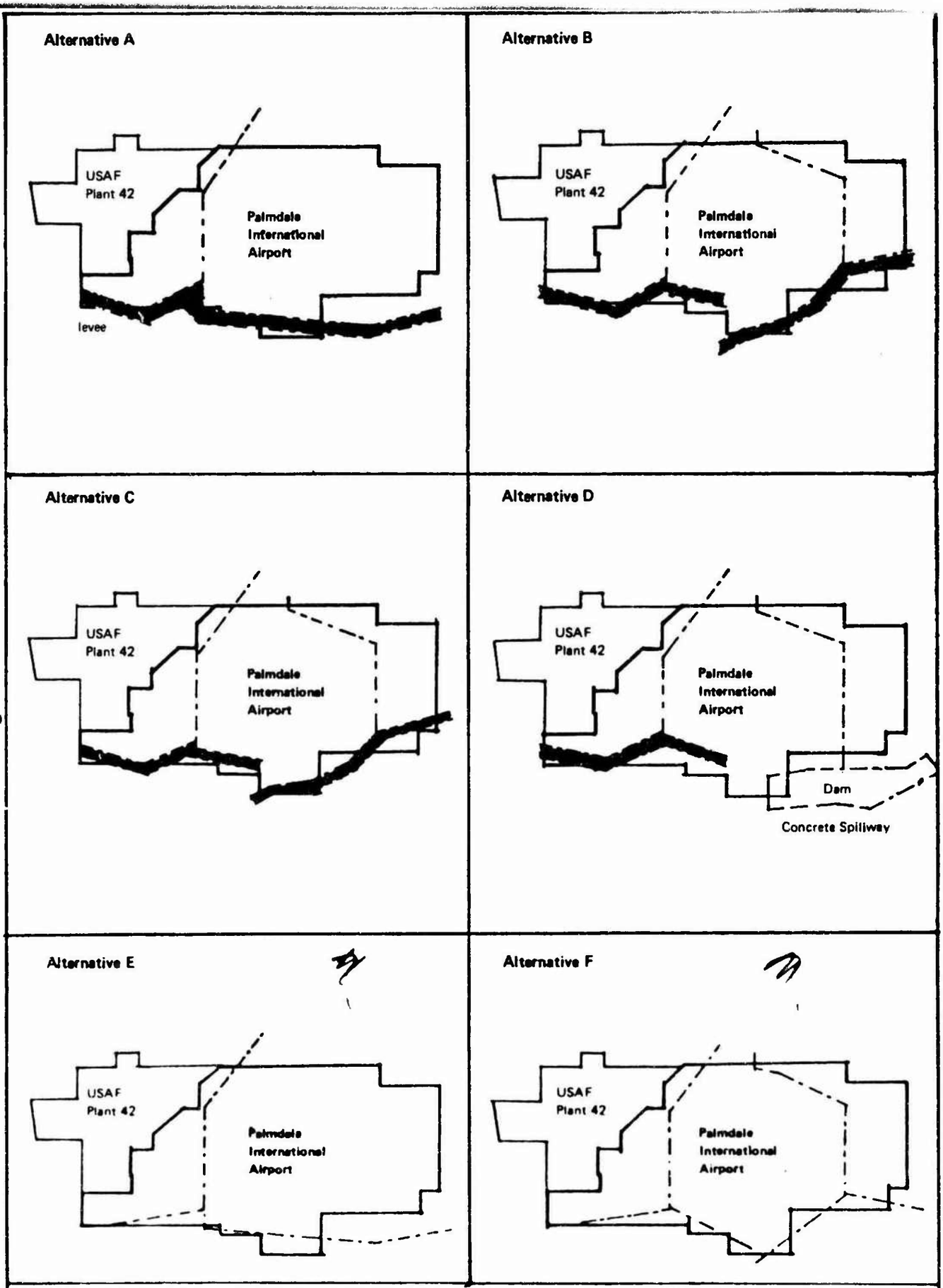


FIGURE 13 ALTERNATIVE STRUCTURAL SOLUTIONS FOR FLOOD PROTECTION OF PROPOSED PALMDALE INTERNATIONAL AIRPORT

Scale 1" = 3 miles

Source: U.S. Army Corps of Engineers, Preliminary Study, February 1976

indicate that this water may sell for half the cost of pumped groundwater. There is little doubt that less expensive water will be an incentive to farmers.

Airport Water Pollution and Soil Erosion Control. In the design and construction of the airport, permanent means for control or prevention of soil erosion would be used not only to protect slopes, pavement, and other facilities, but also to reduce potential sources of water pollution. The control of sediment could be achieved by erosion control processes, through construction management and remedial actions that keep earthwork in place, and, to a lesser extent, by the building of control structures for capture of the sediment load by settling. For permanent control the following would be used:

- Selection of appropriate gradients for backslopes and channels.
- Use of turf, soil stabilization, or, in extreme cases, pavement to control established grades.
- Establishment of settling basins in areas of major runoff from unpaved surfaces to reduce the velocity of drainage as well as to catch and settle out any sediment.

All measures to prevent and control soil erosion would be carefully considered during master planning; prior to construction of airport facilities and access roads, the various procedures and methods to be utilized would be detailed and related to each aspect of the construction process.

SOCIAL IMPACTS

General Description

Rural in character 25 years ago, Palmdale and Lancaster, the principal communities in Antelope Valley, are today semi-urban and supported largely by industry and agribusiness. The change has resulted from the earlier development of Edwards Air Force Base and subsequently of Air Force Plant 42 and related service and support activities, and more recently from construction of the Lockheed L-1011 production plant and completion of the Antelope Valley Freeway and the California Aqueduct.

Proximity to metropolitan Los Angeles has also contributed to increasing development and urbanization. The population growth and urban sprawl of Los Angeles have made themselves felt in the Valley: the North County population is now increasing more rapidly than that of the rest of the county.

Palmdale is the older of the two communities and reflects more strongly the Valley's agricultural tradition and its role as a transportation crossroads.

In contrast, Lancaster is the commercial center, more influenced by the growth of the aerospace/scientific industries and educational institutions. With its increased population, it has become more of a residential community, although many work elsewhere in the area. It is also the location of the Antelope Valley Junior College and Los Angeles County district offices. Its more urbanized appearance results largely from such activities.

The spacious desert and the numerous recreational areas in the Valley and in the mountains have attracted, and continue to attract, many of the area's residents and visitors.

Regional and Community Characteristics

The Region and Los Angeles County

Six-county Region. This section focuses on a variety of economic parameters, discussing them first at the regional level. Subsequent parts of the analysis will focus on a subregional discussion including North County, and the Palmdale-Lancaster area, giving a detailed analysis of these various economic parameters in terms of the six-county area.[1]

---

1. These six counties comprise the Southern California Association of Governments' regional definition and that agency's publications were used extensively in the analysis. These counties were Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial.

- Population

The total population of the six-county region was indicated by SCAG data to be 10,044,623 in 1970. Within the six-county area, Los Angeles County accounts for about 70% of the total population with 7,030,169 persons.

The population series developed by the State Department of Finance indicates that the average annual growth rate of population in Los Angeles County will be much smaller than that in any other county and the six-county region as a whole. For the years 1970 through 2000, the average annual growth rate for Los Angeles County is 0.4% with the D-100 series. This is in marked contrast to much higher growth rates in other counties in the Southern California region. The largest projected percentage increase is indicated for Ventura County at an annual rate of 2.8% for the years 1970 through 2000.

- Housing

For the six-county region, the number of dwelling units was estimated by the U.S. Census to total 3,566,434 in 1970. Of this total, 67% were single-family dwellings and the remainder, multi-family units.

As would be expected, the majority of housing is concentrated in Los Angeles County with a total of 2,537,578 dwelling units. However, Los Angeles County has a much lower percentage of single-family households (62%) than the other counties in the region.

The second largest regional total for dwelling units is in Orange County, numbering 462,777, 72% of them single-family units.

In the counties of Riverside, San Bernardino, and Ventura, there is even greater emphasis on single-family households, which represent about five-sixths of all housing in these counties.

- Race

Within the region the minority population is largely concentrated in Los Angeles County. There are, however, significant minority populations in all counties in the region. Spanish-surname or Spanish-speaking people constitute 18.3% of the Los Angeles County population.

North Los Angeles County - Santa Clarita and Antelope Valleys

- Population

The North Los Angeles County area includes four regional statistical areas in the demographic profile exhibit from SCAG. These are: Newhall, Lancaster, Palmdale, and San Gabriel Mountains.

TABLE 25

POPULATION GROWTH CHARACTERISTCS
NORTH LOS ANGELES COUNTY AND SANTA CLARITA AND ANTELOPE VALLEYS
1940-1973

	North County	Santa Clarita Valley		Antelope Valley	
		Number	Percent	Number	Percent
Population					
1940	15,171	4,437	29%	10,734	71%
1950	28,345	8,075	29	20,270	71
1960	83,157	14,987	18	68,170	82
1970	132,624	49,084	37	83,540	63
January 1973	142,765	54,891	38	87,874	62
July 1973	146,568	56,794	39	89,774	61

Source: North Los Angeles County General Plan, November 1975.

Within North County the greatest numerical growth was in the Newhall-Saugus area. Lancaster's population also increased significantly. Palmdale had the highest percentage increase between 1970 and 1973 -- 3.5%.

- Housing

For the North County area, the regional planning data indicate that there were 43,556 dwelling units in 1970. The largest number -- 16,874 -- was in the Lancaster area. Sizable numbers of housing units were also concentrated in the Newhall and Palmdale areas -- 14,115 and 11,096, respectively. Fully 82% of all housing units in the Antelope Valley have been constructed since 1950. The comparable figure in the Santa Clarita Valley is 89%.

The housing market in North Los Angeles County is distinct from the rest of Los Angeles County. A greater percentage of the population owns homes than rents, and a greater percentage of all units are single-unit structures than in the rest of Los Angeles County.

Palmdale-Lancaster

- Population and Housing

Population for the Palmdale-Lancaster area was 82,875 in 1970 (Table 26). Intercensal estimates by the Los Angeles Regional Planning Commission indicate that the Palmdale-Lancaster area had grown to 88,323

by 1973. Thus while population growth was leveling off and in some cases declining in much of Los Angeles County, growth in Palmdale-Lancaster continued. Between 1970 and 1973 the population increased at an average annual rate of 3.5% in Palmdale and 2.3% in Lancaster. This contrasts with a countywide rate of less than 0.1%.

TABLE 26

PALMDALE-LANCASTER POPULATION CHARACTERISTICS - 1970

	Total Population	Percent Under 18	Percent over 65	Median Age
Lancaster (Regional Statistical Area No. 9)	51,446	38%	8%	28.2
Palmdale (Regional Statistical Area No. 10)	31,429	38%	8%	25.8
Total	82,875			

Sources: U.S. Department of Commerce, Bureau of the Census, and Southern California Association of Governments.

The same data show 27,970 housing units in the Palmdale-Lancaster area. The majority of these units -- 16,874 -- are in the Lancaster area.

• Education

According to the North Los Angeles County General Plan Study, "the community college in the Antelope Valley responds to the needs of the Valley by providing courses that are directly related to the types of employment that are available in the Antelope Valley. For example, courses are offered in airplane mechanics, air traffic control, aircraft hydraulic systems, and other aerospace-related subjects. The school also offers courses in electronics, construction technology, and engineering among others. These are course offerings that are clearly related to the major employment sector in the Antelope Valley."

School districts are ranked according to the number of students who regularly attend school -- i.e., the average daily attendance (ADA). The largest Elementary School Districts are Lancaster, with 6387 ADA, and Saugus, 5029 ADA. The Antelope Valley High School District has the largest ADA (6536).

Probable Short- and Long-term Effects

Population

Population growth in North Los Angeles County without development of PIA will occur at a rate similar to that of anticipated employment growth during the period 1970-2000. Using projections developed by the State Department of Finance with allocations to regional statistical areas made by SCAG, population in North County will grow from the 1970 population of 132,000 to 239,000 for an average annual growth rate of 2.3%. By way of comparison, the same population forecast for the entire Los Angeles County area shows an average annual growth of only 0.4%; this indicates a significant shift in additional population growth within the county to the North County area. Table 27 shows the estimated distribution of this forecast population within the North County area.

According to the county study, the population increase will occur, for the most part, in primary urban development areas. About 80% of the population now lives in these areas, while approximately 18% lives in rural communities and 2% in rural areas. By 1995, 90% of the population will live in the primary urban development areas, while 8% will live in the rural communities, and 2% will continue living in the general rural areas.

Housing

The number of housing units that will be needed in North Los Angeles County through 1995 was based on the population projections, a vacancy rate of 5%, and a distribution of housing densities.

By 1995, 123,315 units will be needed if the airport is built. This is more than 37,000 more than would be required if the airport were not built. The majority of these units would be built in the Antelope Valley, especially in the Palmdale area which could capture 35% of the airport-induced units.

In addition to the number of units, the presence of the airport will affect the density at which units are built. Due to the pressures of urbanization the number of units per acre will increase at a greater rate with the airport than without. From a 1975 overall density of 2.1 units per acre the 1995 density will increase to 3.5 units per acre with PIA, but will only increase to 2.6 units per acre without it.

Less than 3000 additional acres will be needed by 1995 if the airport is built and most of this will be in the Palmdale area. Palmdale will be the most affected area with the presence of the airport. It will have an increased urban character which will mean higher-density construction, more congestion, and a greater number of multiple dwelling units. Currently in Antelope Valley 8% of the dwelling units are in multiple units. By 1995 it is expected that this will increase to 10%.

TABLE 27

ESTIMATED POPULATION GROWTH IN NORTH LOS ANGELES COUNTY
WITH AND WITHOUT PIA - 1970-95
(000s)

				1985		1990		1995	
	1970	1975	1980	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA
Palmdale	28.4	30.2	32.1	45.3	50.2	50.6	63.8	53.8	84.8
Remainder of Antelope Valley	54.5	62.0	70.6	76.5	80.2	86.7	96.6	92.3	115.6
Total Antelope Valley	82.9	92.2	102.6	121.8	130.4	137.3	160.4	146.1	200.4
Santa Clarita Valley	49.3	55.7	62.9	78.0	81.7	87.4	97.3	93.4	116.7
Total North Los Angeles County	132.1	147.9	165.5	199.8	212.1	224.7	257.7	239.5	317.1

Source: Arthur D. Little, Inc., estimates.

Another trend which is likely to occur with or without the airport is an increase in the number of mobile home units. According to the Palmdale General Plan draft, this trend will be encouraged as it will help ease the low-income housing problem. However, the General Plan suggests that the community put more restrictions on the location of the units, particularly mobile home parks. The plan also recommends some methods for equalizing the tax payments of regular homeowners and mobile home owners.

Social

The proposed airport will add to the changing social character of the two communities. Normal growth without the airport will give rise to change; the impact of the airport will be to bring about the changes described below sooner and to a greater degree. With new industrial, commercial, and institutional facilities and a concomitant demand for additional public services, Palmdale and Lancaster will become more urbanized. Residential density will increase with the construction of multi-unit housing. The airport will spur the present urbanization of Lancaster, where most of the new arrivals to the Valley will probably find housing.

Consideration of a new airport has already caused heavy land speculation, starting in the early 1960s. This speculative activity has focused on Palmdale, but has also involved other parts of the Valley. Speculation has resulted in tax increases because of a rise in assessed valuations. In some cases these higher taxes have made agricultural activity much less attractive, thus contributing to its decline.

The health care facilities will require expansion under the impact of the airport and related growth. There will also be a need, however, for some specialized clinics to augment hospital services as part of a comprehensive health care plan for the Valley. Several other institutions, such as schools and libraries, will require additional facilities.

Construction Phase. The major impact of the construction phase will be the influx of construction workers. Most will probably commute, some will live in mobile homes, and others will seek permanent housing. These employees will create a demand for public services and, conversely, will contibute to the income flow and purchasing power of the community. This will be felt throughout the local economy, giving the area all the rewards and problems of a boom period.

The initial construction activity (1980-90) may place an additional burden on the limited local housing supply. This situation could stimulate pressures for trailer parks, higher rents, and price increases for new homes.

Traffic increases on local roads, as well as dust and noise associated with construction, will also affect local residents and add to their sense of inconvenience.

The gradual buildup of construction-related jobs, while providing employment and related economic opportunities, will signal the beginning of further shifts from a low-key desert community to a more active heterogeneous society.

Operations Phase. Once the airport is in operation other impacts from population growth and urbanization will be felt. In the long run, a greater heterogeneity of population and life-styles will almost certainly result. The minority population will increase, as will the range of income and individual and community interests.

Success in accommodating these population increases and blending with the existing patterns and life-styles is directly dependent on the responsiveness and ability of the county and local governments to make plans and implement them.

The population increase will result in some increase in crime and related activities and the need for more law enforcement. The school districts and other special service districts will require expansion.

In the long term, the airport will provide a sense of stability and continuing activity as diversity of employment and business opportunities come about. The productivity of the Valley will be measurably enhanced. Indirectly, this will benefit the social structure of the surrounding communities by providing a continual and more consistent level of employment and available income.

Impacts Most Likely to Occur

With the planning for and construction and operation of the airport, social impacts on local communities cannot be avoided. Mitigation of adverse impacts will require a commitment from concerned parties to coordinate their efforts and apply their leverage to obtain and implement available programs and open up opportunities, particularly in the areas of housing, employment, and personal services.

It is also recognized that some of the disruptive social impacts will occur even without the airport, as natural growth will make some improvements necessary. Without the airport, such changes will be of lesser magnitude, and the pace of events will be slower. Without the airport, there will probably be less of a tourist/traveler and Los Angeles basin influence.

The NLAC General Plan Study has identified four human resource issues as follows. While such issues are not entirely attributable to PIA development, they do characterize the type of impacts most likely to occur.

Issue One: Employment Diversification

In North Los Angeles County, the type and amount of employment is of real concern. The major requirement is diversification of local industries since this area is geographically isolated from other sources of employment. The most significant employers in the Valley are dependent on the military, the aerospace industry, or government procurement. In recent years, employment levels in these industries have fluctuated dramatically, and the impact on local communities has been significant.

Development and maintenance of human resources in the Antelope Valley is made more difficult by the cyclical nature of the local employment base. The only real solution to this problem is an intensified effort to develop a more diversified employment base.

Issue Two: Regional Dependency

Developmment of the Palmdale International Airport is based on the need to provide sufficient air travel capacity for the Southern California region in the future. Both the ultimate sizing and the siting of this facility are based on a complex interplay of social, economic, environmental, and political forces in this six-county region. It is clear that PIA is not intended merely to serve the local air transit needs of North Los Angeles County. At the same time, the facility will benefit all of Southern California and insure its continued economic viability into the next century.

The region should take affirmative steps to insure the even growth of PIA and to help diversify the local economy so this facility will occupy an increasingly smaller proportion of the total economy.

Issue Three: Poverty

Poverty affects not only the poor, but also the entire community because opportunities for increased productivity and full participation in the affairs of society are lost. The County of Los Angeles, the City of Palmdale, and the City of Los Angeles will play large roles in the development of the Palmdale International Airport; therefore, they should use leverage to insure equal employment opportunities at PIA. They should also encourage potential employers to provide job training for poverty-level residents.

Issue Four: Educational Equality

In many important ways, the issue of human resources in a community depends on the ability of residents to participate in the economy. The foundation for full participation is laid in the educational system, which provides skills and training for future citizens of the area. Schools are an asset to the community, and every effort should be made to increase their effectiveness.

Possible Actions to Minimize Social Effects

Several actions can be taken to counter the above-described impacts. Los Angeles County is engaged in a long-range comprehensive planning program that includes the Antelope Valley. This above-referenced NLAC General Plan Study effort is focusing on 14 different elements, including social factors.

The growth of the area will occur gradually, as the airport is not expected to be in operation until the mid 1980s. Unlike the rapid growth experienced in some Southern California counties (such as Orange), growth in the Palmdale-Lancaster area is expected to proceed at a moderate rate even after the airport is in operation. The long duration of airport construction and the development of induced growth will provide a measure of stability and consistency. This time span will allow for planning to meet future needs to occur.

Personal Safety

Criminal Statistics

The major impact of the airport will be in those crimes which occur on the airport site. According to LAX experience, the major airport site crimes are ones of opportunity. These include personal robbery, purse snatching, auto pilferage and theft, and office thefts. The rates for Antelope Valley with and without the airport show the slight impact the airport will have on the rate of crime. In 1995, the impact is the greatest at 532 per 10,000 population, This is only 6% greater, or 31 crimes, than the rate without the airport.

Accident Statistics

As the population increases, the number of accidents increases. However, the rate of accidents does not necessarily increase. In fact, if the airport is built, many road improvements are planned which will upgrade the road network and result in a decrease in the traffic accident rate.

The number of traffic accidents for Palmdale residents in 1995 is 26% above the 1210 accidents that are estimated to occur if the airport is not built. This would mean an increase of 315 accidents. For Antelope Valley as a whole, the increase in accidents with PIA is 10% higher than the 3287 accidents that would occur without a Palmdale facility.

Public Service Facilities

Educational Services

Existing Conditions. North County has 17[1] autonomous school districts, each providing educational services and governed by an elected board of trustees. In October 1975, there were 4773 students enrolled in the eight elementary and junior high schools in the Palmdale area with an average enrollment of 596 students. The high school for the area averaged 2353.

Impacts. At the community level, general facility requirements can be forecast based on population forecasts. As the population of North County grows, so will the number of school-age children, although the rate of growth will not necessarily be the same. In-migration will account for much of the population growth in North County. At the elementary and junior high school levels the presence of the airport results in 8600 more children for both areas in 1995. The largest increase, 4900, will be in Palmdale. The number of senior high school children will increase from 7100 in 1975 to 12,200 without PIA and to 16,800 with PIA by 1995.

By 1995, the Palmdale districts would need 11 elementary schools without the airport, or three more than at present. In contrast, with the airport 17 schools would be required, nine more than at present. For the rest of the Valley, no new schools would be required without PIA, while three would be required with PIA. The difference for the high schools is not as great. By 1995, seven schools, or four above the existing number, would be needed without the airport, while nine would be needed with it, for a difference of two.

The estimated costs of providing school facilities in the Antelope Valley area would be $52.56 million (1975 dollars) with no airport over a 20-year period. With the airport, the cost would more than double to $107.64 million, over the same period, or a difference of $55 million. The largest outlay would most likely occur during the 1990-95 period when $14.1 million would be required without PIA, or $51.2 with PIA.

Law Enforcement Services

Existing Conditions. According to the North Los Angeles County General Plan, Palmdale contracts for full traffic and criminal services from the County Sheriff's Department. In surrounding unincorporated areas, on the other hand, criminal services are provided by the Sheriff's Department and traffic enforcement services by the California Highway Patrol. The two agencies have a reciprocal emergency back-up service arrangement. This results in a combined law enforcement program that is more comprehensive than either could provide individually.

---

1. Two community colleges, two high schools, 13 elementary schools.

Currently, there is one Sheriff's station in North County. The Sheriff maintains small holding facilities but there is no county jail in the area. Prisoners are transported routinely to downtown Los Angeles, where the central jail is located near other justice facilities.

At present, approximately 116 sworn personnel work out of the Sheriff's Antelope Valley Station, representing 1.31 law enforcement personnel per 1000 population. These ratios of personnel, when combined with Highway Patrol personnel, are commensurate with other small Southern California cities (as taken from the 1974 Municipal Year Book). The Highway Patrol offices in the study area are manned by 44 uniformed CHP personnel.

Impacts. Currently there are no plans to increase the present level of law enforcement services in the Antelope Valley area. It is expected that additional stations and personnel will be added, although not necessarily in direct proportion to population increases. The number of new stations required by 1995 is 3 without PIA and 4 with PIA.

Fire Protection Services

Existing Conditions. Fire protection is provided in Antelope Valley by the Los Angeles County Fire Department. In addition to fire protection, which includes both facilities and services, the department provides rescue services through a paramedical squad.

Impacts. Higher levels of service will be expected as the area continues to grow. In anticipation of growth, the department has purchased sites to be held in reserve for future stations. A station in Palmdale is scheduled for construction in the future.

The Valley area has an adequate number of stations through 1990 without PIA with one new station required by 1995. In contrast, the induced growth will require four additional stations at a cost of $1.25 million for buildings and equipment.

Health Care Services

Existing Conditions. Statistics computed by the Comprehensive Health Planning Council of Los Angeles indicate that the total hospital capacity in the area is generally adequate to serve current demand.

Impacts. The presence of the airport would require nearly double the number of beds by 1995. Increased future bed count could be provided in the form of a new 300-bed or larger central hospital and small dispersed clinics. This system of interrelated health care facilities, along with existing hospitals, would continue to serve community needs.

Antelope Valley is classified as a health status problem area because of the concentrated location of hospitals versus the dispersed population of the Valley. The NLAC plan considered this a major issue. With in-filling of population, increased densities and expanded services, this condition may be overcome; the airport is not expected to aggravate the situation. It is estimated that by 1990, one 300-bed hospital is required without PIA. With PIA, one hospital is required by 1985 and another by 1995.

Aviation Safety

Aviation safety is concerned with the prevention of accidents, the prevention of death and injury, and the survival and safety of passengers, crew, and persons on the ground. It is equally concerned with aircraft operations in the air and on the ground.

Air Safety. The Federal Aviation Administration has the primary responsibility for air safety at PIA, as at all other major airports.

To accomplish its responsibilities it is expected that PIA will be equipped with extensive navigation and safety aids to control traffic. These will include a nondirectional radio beacon, VHF-OMNI-directional range (VOR), and tactical air navigation (TACAN) systems. Furthermore, the runway system will have visual approach slope indicators and be equipped with instrument landing systems (ILS).

The FAA will also operate terminal radar control for all arrivals and departures. This system will provide control of the air traffic in the immediate region of the airport by means of radar and air traffic controllers. Certain segments of the airspace surrounding PIA will also be designated as Terminal Control Areas requiring air traffic control clearance prior to operating within the area. In addition to the installation and operation of navigational aids at the airport and the existing regional air traffic control systems, the FAA will provide for operation of a control tower for directing traffic both in the immediate airspace region of the airport and on the ground and a flight service station which is available to provide aviation and weather information to pilots at the airport.

Preliminary studies indicate that there is sufficient airspace to maintain proper and safe clearances and accommodate future aviation traffic, even though there are several military air bases in the area and some of the airspace is restricted by the military.

The 2500-foot altitude of the site and the warm summers will affect aircraft operations at PIA. These conditions will result in payload penalties on long-haul nonstop flights of 4000 miles and over. The airlines will operate in accordance with standard operating procedures that account for temperature, altitude, travel distance, aircraft characteristics, etc., to determine payloads for proper and safe aircraft operations.

Ground Safety. The Los Angeles DOA will develop and operate several services at the airport similar to those at LAX which affect ground safety. Fire protection services will be established at the airport to respond to aircraft and structural fires, aircraft emergencies involving crashes and rescues, fuel spills, and ambulance calls. It is also expected that specially trained teams will be provided to deal with bomb threats against aircraft and buildings.

The Los Angeles DOA will also prepare a complete and detailed operations manual for PIA in accordance with FAA regulations. The emergency operating procedures section of this manual will apply to all airport tenants in the event of any type of emergency. In addition to defining responsibilities, the manual will prescribe procedures for responding to aircraft crashes (whether on the airport or not), structural fires, hijacking, bomb threats, radiological incidents, and other emergencies.

Safety Effects of Noise Mitigation Measures

- Takeoff and Climb-out Noise Reduction

The use of reduced thrust on takeoff results in measurably lower noise levels along the sideline of the runway. Since the resulting climb-out altitudes will be lower for reduced-thrust operations, tradeoffs occur between sideline noise and noise under the departure flight track. Often, reduced-thrust takeoffs are favored by the airlines because they reduce engine maintenance costs and result in a slight fuel economy. A reduced-thrust takeoff, however, requires a longer takeoff roll, thus moving the decision point for aborted takeoffs farther down the runway. PIA is designed to have 14,000-foot runways for this and other reasons. The noise reduction achieved by this procedure, expressed in effective perceived noise levels in decibels, is approximately 20%.

- Approach and Landing Noise Abatement

The abatement of noise impact by modified approach and landing procedures is under study by airport operators, the FAA, and the National Aeronautics and Space Administration (NASA).

Because less airframe drag requires less power, reduced flap settings on approach can lessen noise appreciably. This procedure has the endorsement of the Air Transport Association and ALPA for visual flight rule approaches subject to pilot discretion. If properly executed, it is a safe procedure. In addition to a 30% reduction in the Community Noise Equivalent Level (CNEL) area, this technique also reduces fuel consumption considerably.

Displacement of Property Owners and Relocation Procedures

Description of Current Displacement Activities

As of July 1976, approximately $83.6 million worth of property had been purchased by the Los Angeles Board of Airport Commissioners for the proposed Palmdale International Airport site. As of this date, land acquisitions totaled 15,630 acres, purchased from 2451 property owners.

The proposed airport site is sparsely populated, with only a small number of residents spread throughout the 17,700 acres. The DOA's specific count on housing at the site in 1968 was 154 dwelling units. To date, the DOA has purchased all dwelling units of which 26 are rented, 13 are scheduled to be demolished, and the rest have been cleared. Most of these units are concentrated in two small areas, one around 50th and Q streets and the other between 70th and 80th at N Street.

According to the 1970 Census Block data there were 109 dwelling units in these two areas with a population of 413 persons. Average dollar value of homes owned was in the $13,000-20,000 range.

There were originally four industrial buildings on the airport site. One of these, a 15,000-square foot, aircraft-oriented machine shop, is still being utilized. Once acquired it will continue to be leased by the DOA to the present occupant over the next few years. The land for the other three industrial facilities has already been acquired and the buildings are now vacant. In addition, there was one small commercial parcel located at Hensley Corners. This parcel, which housed a small market, a gas station, and bar, has been acquired and vacated. The Desert Aire Golf Course, although purchased by the DOA, is still in operation.

The airport site had about 2140 acres under agricultural (primarily alfalfa) cultivation in 1968. Two large agricultural parcels remain in use, one of 773 acres and the other of 320 acres. Both parcels are used for alfalfa production while all other agricultural land remains dormant.

The land acquisitions at the proposed Palmdale airport site will cause the complete relocation of residents in the 154 dwelling units identified by the DOA. Most of these residents will relocate in housing in the immediate Palmdale area. Most of the project's displacement has already occurred; the significance of displacement of remaining residents is small by comparison.

Relocation Assistance Programs

In providing relocation assistance when land is acquired, the DOA program accords with the Board of Airport Commissioners' resolution of February 16, 1972, making the program conform with the provisions of both the state and federal relocation legislation. To make occupants and owners aware of the benefits of this program, the following steps were taken:

Mailing of relocation assistance packets to all the property addresses.

At the time of escrow closing, advice to occupants of their benefits.

Establishment of relocation assistance office in the Palmdale area.

Placement of signs on avenues of intersections leading to the project advising displacees of the availability of certain relocation benefits.

As a result of this program, in the Palmdale area nearly $188,100 in benefits have been paid to 117 claimants. These benefits have included relocation assistance, moving expense allowance, replacement housing supplement, rental supplement, and such other expenses as increased financing costs.

Federal Relocation Policy, Public Law 91-646. The applicable federal legislation is Public Law 91-646, dated January 2, 1971, cited as the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. Its purpose is to provide for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal or federally-assisted programs. The act also established uniform and equitable land acquisition policies for such programs.

The law states that whenever property acquisition for a federal program or project results in the displacement of any person, that person shall be eligible for compensation for:

Actual reasonable expenses in moving himself, family, and personal property.

Actual direct losses of tangible personal property as a result of moving, or discontinuing a business or farm operation.

Actual reasonable expenses incurred in searching for a replacement of residence, business, or farm.

Moving and related expenses, as well as replacing housing for the homeowner as well as tenants of rental units.

The law also requires the availability of a relocation assistance advisory service, which should be available for displaced persons at a project site.

AIRPORT ACCESS AND REGIONAL GROUND TRANSPORTATION

Existing Surface Transportation Network

The proposed airport site at Palmdale is approximately 61 miles north of the central business district of the City of Los Angeles by way of existing freeways. Access to the site, and the Antelope Valley, is presently primarily by auto over a series of interstate freeways and state highways; this is supplemented by daily service by Greyhound Bus Lines.

The Regional Highway Network

The primary freeway access from the Los Angeles basin to the airport site and Antelope Valley is via State Highway Route 14. The four- and six-lane freeway runs from the northeastern corner of the San Fernando Valley, past Palmdale and Lancaster, to just beyond Rosamond where it reverts to a four-lane highway. It continues on to Mojave, about 35 miles north of Palmdale. At its southern terminus, this route joins Interstate (I-5), the Golden State Freeway, which leads into the central Los Angeles area.

I-5, in turn, connects with I-405, the San Diego Freeway, and the Hollywood Freeway, both of which traverse the San Fernando Valley. The former leads into the coastal areas of the basin and LAX while the latter leads into the central Los Angeles area. Both interstates are the principal routes to areas farther south of Los Angeles, such as Long Beach and Orange County. They also feed into the numerous interstates and state highways that serve as the principal transportation network for the metropolitan region, as shown in Figure 14.

The Antelope Valley Freeway traverses the San Gabriel Mountains through the Saugus-Newhall area via Soledad Canyon. A seven-mile stretch of the freeway at its junction with I-5 was recently reconstructed to bring the road up to interstate standards.

Access from Bakersfield and other parts of the southern half of the San Joaquin Valley-Kern County area is via State Highway 58 going east and connecting with the Antelope Valley Freeway at Mojave. Route 58 also connects with Barstow and points farther east beyond the Mojave Desert. Route 14 in turn extends north from Mojave into the Owens Valley, eventually connecting with U.S Route 395.

Access to the Antelope Valley directly from the west, at the juncture of the San Gabriel and Tehachapi mountains (near Gorman and I-5), is via State Highway 138. This route, also designated Lancaster Road and Avenue D, runs just north of Lancaster where it joins Highway 14. This route then turns south, passes through Palmdale, and then heads southeast along the base of the San Gabriel Mountains. It eventually joins I-15, the main north-south route between Las Vegas, Barstow, and the San Bernardino-Riverside Area.

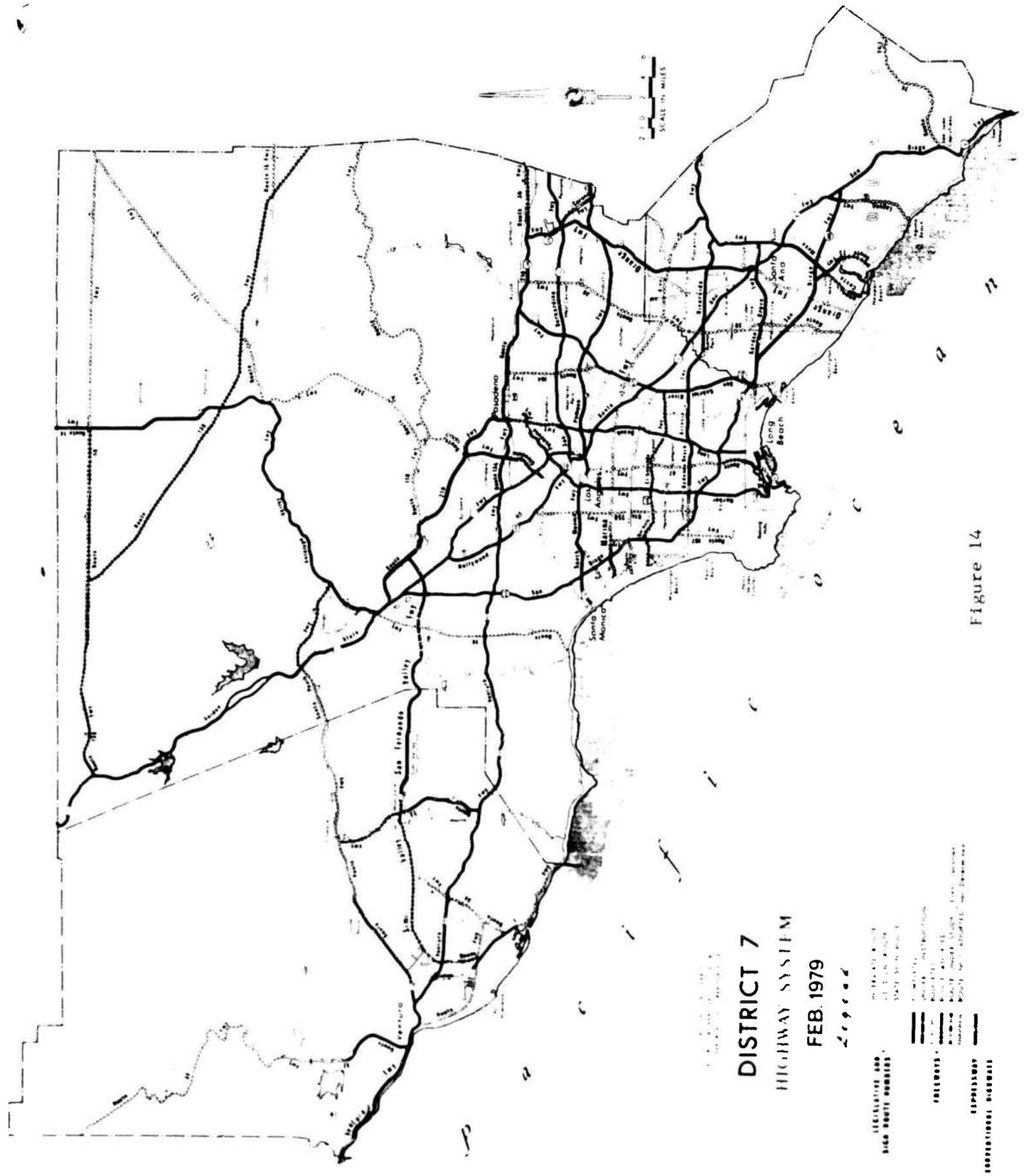


Figure 14

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

All of the above-mentioned interstates are either 4- or 6-, and in some places 8-, lane divided highways. The state highways are mostly 2- or 4-lane undivided all-weather roads except for Route 14 and portions of Route 58 leading to Bakersfield. These latter two routes meet interstate limited-access standards. Route 138 is mostly a 2-lane highway for its full segment in the Valley.

Local Access Circulation in the Antelope Valley

The following description of local circulation is adapted from the NLAC Palmdale Community General Plan.

The basic framework for vehicle circulation is a standard one-mile arterial grid pattern. This system serves traffic movements quite well, particularly through traffic. In some of the older residential areas, this grid pattern is divided into smaller and smaller divisions. Closely spaced street grid patterns are not desirable since they tend to encourage through traffic in residential areas. This dispersal of traffic can also unnecessarily impede traffic flow on the primary arterial network. In areas such as these, proper subdivision design can help to channel traffic to carefully selected points. Frontage roads, loop or curvilinear patterns, reflecting this approach, are found in the newer developments.

(1) Daily Traffic Flow. To evaluate existing traffic in the Antelope Valley, 24-hour traffic counts[1] were compiled. Palmdale Boulevard (State Route 138) is the highest-volume east-west street in Palmdale, carrying between 8600 and 25,500 vehicles per day. Avenues P, R, and S (in descending order) are also important east-west corridors.

Sierra Highway, through Palmdale, carries from 2000-15,000 vehicles per day. Traffic volumes drop off significantly south of Avenue R. Although the Antelope Valley Freeway carries 17,000-19,000 daily vehicles through Palmdale, Sierra Highway still carries a major proportion of intercommunity traffic between Palmdale and Lancaster. Many of these trips have trip ends at the Lockheed and Air Force Plant 42 employment centers. Other north-to-south corridors do not carry exceptionally large volumes of traffic, although 5th, 15th, 20th, and 30th streets handle between 3000 and 4000 vehicles per day.

Avenue J is now the highest-volume east-west street in Lancaster, with between 10,000 and 22,000 vehicles per day. Avenue I, Avenue K, and Lancaster Boulevard are also important east-west arterials. All carry more than 10,000 vehicles per day.

Sierra Highway, through Lancaster, carries between 3000 and 16,000 vehicles per day. Traffic remains high south to Palmdale but drops off significantly north of Avenue H. Although the Antelope Valley Freeway carries from 10,000-17,000 vehicles per day through Lancaster, Sierra

1. CALTRANS 1978 counts.

Highway still carries a major proportion of Palmdale-Lancaster intercommunity traffic and serves the important employment centers which lie midway between the two communities.

(2) Traffic Generators. Another important part of evaluating traffic conditions is to locate the major traffic generators in an area to determine the primary destinations of most vehicle-trips.

Heavy traffic flows in the a.m. and p.m. peak hours are created by the Lockheed, Air Force Plant 42, and Edwards Air Force Base industrial traffic. The Antelope Valley Freeway north of Lancaster, Avenue P east of Sierra Highway, and Avenue M east of Sierra Highway are good examples of highly directional peak hour traffic. On the other hand, Palmdale Boulevard (passing through the commercial area of Palmdale) and the Pearblossom Highway show "balanced" peak hour traffic flow by direction. One surprising result was learning that the Antelope Valley Freeway south of Palmdale also has balanced directional flow in the peak hours. It had been previously thought that a directional flow toward the south in the morning and toward the north in the afternoon might be occurring along this freeway, reflecting a strong employment relationship with the Los Angeles basin. Examination of trip data for the Antelope Valley confirmed that more than 85% of existing trips generated within the Antelope Valley stay within the area.

(3) Goods Movement. There are presently no designated truck routes in the Antelope Valley. Recent truck percentages in the daily peak six hours were obtained from the Los Angeles County Road Department along various corridors within the Antelope Valley.

Train movements on the trackage in Palmdale occur at a rate of more than one per hour. There is presently only one grade separated railroad crossing in Palmdale, at Avenue S. Therefore, vehicular traffic on the east-west corridors is subject to significant delay each time a train passes through Palmdale. It is important to recognize the impact of these goods movement corridors because, in the future, goods movement within the Antelope Valley will increase along with population and employment. This increase must be handled adequately on the proposed transportation system for Palmdale.

Planned Surface Transportation Improvements

The entire Los Angeles region currently has several freeways fully or partially completed (see Figure 14). Most of these routes are designed to serve traffic flows within the basin and to relieve overcrowded conditions of the existing network. Some would only indirectly provide access to Palmdale, others would become more direct links between the basin and the Valley.

The Foothill Freeway (I-210) skirts the southern baseline of the San Gabriels reaching from Glendale and Pasadena and farther east into San Bernardino. This new freeway connects with I-5 near its juncture with the Antelope Valley Freeway. The last remaining portion of this freeway is presently under construction with an estimated completion date of January 1981. This metro bypass would provide a six-lane freeway access to Palmdale from the Pasadena and Glendale areas. Construction of the remaining portion of the San Fernando Valley Freeway (Route 118) is expected to be completed by June 1982.

The California Transportation Commission is presently considering rescinding route adoptation for the following freeway routes shown in Figure 14: Route 48, Route 138, Route 118 east of Moorpark (Simi Valley Freeway), and Route 23 north of Moorpark. A decision is expected in the summer of 1980.

The Angeles Forest Freeway (Route 249) and the Angeles Crest Freeway (Route 2) have had a low priority in terms of design and construction although they have been indicated on district highway plans for more than ten (10) years as unadopted routes. It is doubtful that these freeways will ever be built.

Ground Trip Forecasts and Impacts, Airport Access Circulation

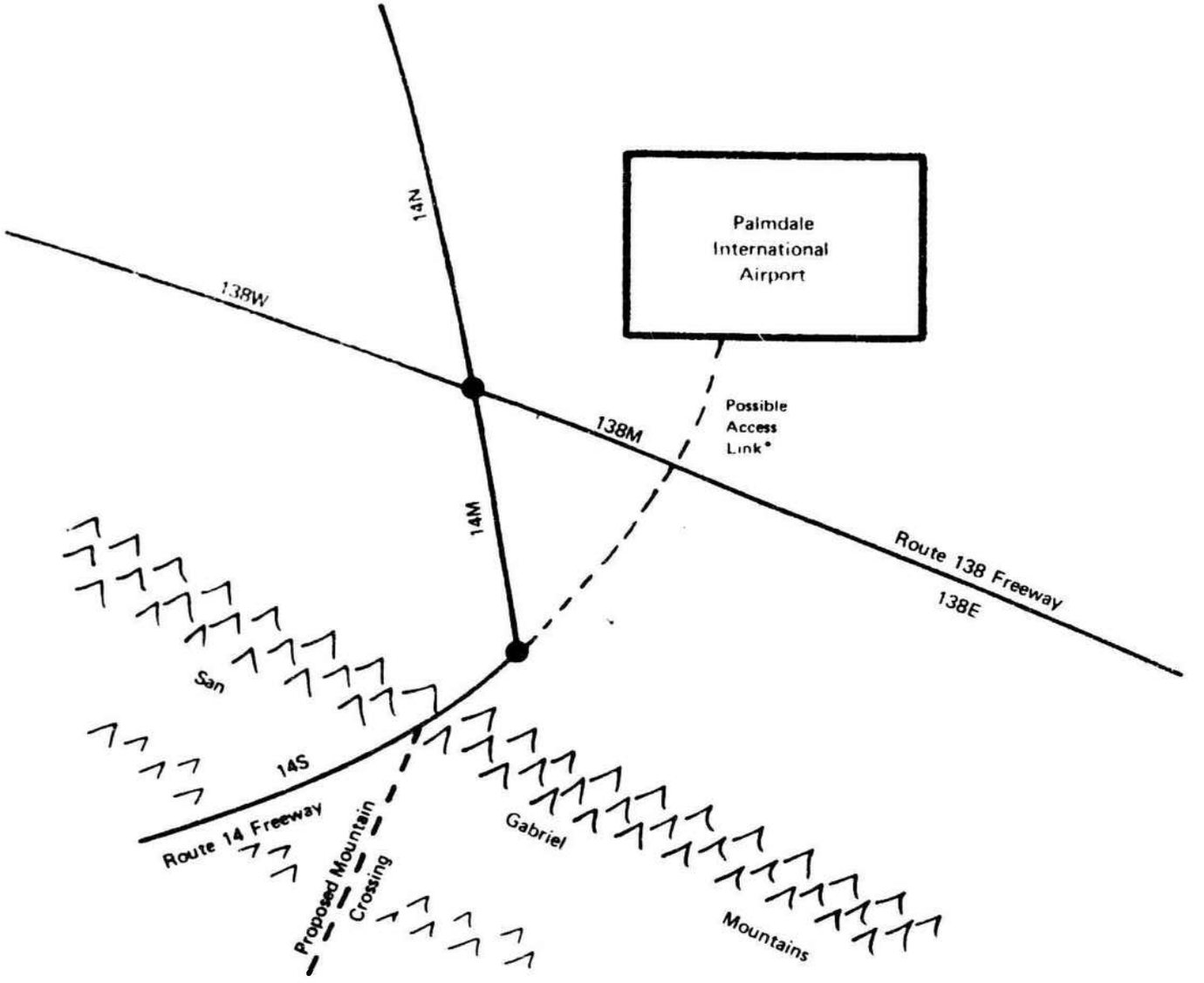
The principal ground transportation access route for PIA will be the Antelope Valley Freeway (Route 14) and, to a lesser extent, Route 138, a two-lane highway. It is uncertain that the planned Route 138 will be built and even less likely that Route 122 will be built. The development of the airport, however, is not contingent on the existence of these latter routes. Since the existing routes intersect at Palmdale Boulevard, this analysis focuses on the traffic projections split over four segments of these roads designated by the route number and letter as follows. (See Figure 15).

Route 14, north of Palmdale, 14-N
Route 14, south and over the San Gabriel Mountains, 14-S
Route 138, northwest of Palmdale, 138-W
Route 138, southwest of Palmdale, 138-E

The traffic demand data used in this analysis are derived from the LARTS projections for 1990. These projections are made in terms of average daily person-trips (ADPT) among LARTS traffic zones for a five-county region.[1]

Since Los Angeles Regional Transportation Survey (LARTS) projections are available only for 1990, estimates for 1980, 1985, and 1995 have been based on percentage distribution of the SCAG D/E 2a population projections for the SCAG six-county region.

1. Los Angeles, Ventura, Orange, and the western portions of San Bernardino and Riverside counties.



*See Figure 11 for access route location.

FIGURE 15 DIAGRAMMATIC LAYOUT OF ACCESS FREEWAY SEGMENTS

LARTS Traffic Projections

The LARTS group, using a predictive model,[1] forecast traffic flows for three different regional spatial allocations,[2] using a total regional population figure of 12.7 million[3] in 1990. Traffic allocations corresponding to the "dispersed" population concept were used since these population estimates most closely matched the North County population estimates assumed in the land use and economic impact analysis of the airport. This concept emphasized a dispersed low-density future growth out from existing urban centers with heavy growth in North Los Angeles County.

Regional and Local Traffic Projections

To estimate the effects of PIA, it is necessary to disaggregate the generated traffic into its components. There are three prinicipal components:

* First, the traffic which will be generated by normal population growth in the area. As North Los Angeles County grows, the population will use the transportation facilities. Since this growth in traffic volume will occur with or without PIA, it is called baseline volume.

* Second, activity at PIA will generate traffic not only because of people working at PIA, but also because a facility such as PIA induces a certain amount of areawide population growth above the baseline growth. This additional population generates additional traffic (induced volume).

* Third, the passengers arriving at and leaving from PIA will generate additional traffic volume.

(1) Airport Traffic Generation. Air Passenger forecast demand for PIA has been distributed by length of haul and place of origin for 1985, 1990, and 1995. The forecasts have been reduced by 20% to account for interlining at the airport. Thus the total number of passengers arriving at or leaving PIA is expected to be 1.2 MAP in 1985, 4.8 MAP in 1990, and 9.6 MAP in 1995. Most of the total demand by the year 1995 will come from the North County (1.1 MAP), the San Fernando Valley (3.2 MAP) and the rest of Los Angeles County (3.7 MAP).

The annual number of person-trips resulting from PIA activity is derived directly from the above MAP distribution figures. The North County MAP portion of generated trips (from Table 28) is divided between the Antelope and Santa Clarita valleys. Passengers from the Bakersfield area are minimal in number and were not included.

1. CALTRANS Trip Generation Model.
2. SCAG Alternative Population Forecast Patterns, November 1973.
3. Based on SCAG D/E 2a population allocation,.

TABLE 28

AVERAGE ANNUAL AND DAILY PERSON-TRIPS - 1985, 1990, 1995
PALMDALE INTERNATIONAL AIRPORT
(in thousands)

Year and Destinations	Freeway Segments						
	14-N	14-S	138-E	138-M	138-W	PIA Access	Total
1985 North County							
Antelope Valley	54.1	-	10.0	79.4	25.3	20.5	-
Santa Clarita Valley	-	68.2	-	-	-	68.2	-
San Fernando Valley	-	1,020.6	-	-	-	1,020.6	-
Total Annual Person-trips	54.1	1,088.8	10.0	79.4	25.3	1,109.3	1,198.6
Average Daily Person-trips	0.15	3.0	0.03	0.22	0.07	3.0	3.3
1990 North County							
Antelope Valley	168.8	-	30.9	248.0	79.2	63.9	-
Santa Clarita Valley	-	195.3	-	-	-	195.3	-
San Fernando Valley	-	1,982.6	-	-	-	1,982.6	-
Other Los Angeles County	-	1,676.5	-	-	-	1,676.5	-
Ventura County	-	212.2	-	-	-	212.2	-
Riverside County	-	-	93.9	-	-	-	-
San Bernardino County	-	-	139.1	-	-	-	-
Orange County	-	153.0	-	-	-	153.0	-
Total Annual Person-trips	168.8	4,219.6	263.9	248.0	79.2	4,283.5	4,731.6
Average Daily Person-trips	0.5	11.6	0.7	0.7	0.22	11.7	13.0
1995 North County							
Antelope Valley	342.9	-	62.8	503.8	160.9	129.8	-
Santa Clarita Valley	-	363.5	-	-	-	363.5	-
San Fernando Valley	-	2,785.0	-	-	-	2,785.0	-
Other Los Angeles County	-	4,001.8	-	-	-	4,001.8	-
Ventura County	-	611.9	-	-	-	611.9	-
Riverside County	-	-	270.8	-	-	-	-
San Bernardino County	-	-	411.4	-	-	-	-
Orange County	-	450.1	-	-	-	450.1	-
Total Annual Person-trips	342.9	8,212.3	745.0	503.8	160.9	8,342.1	9,933.8
Average Daily Person-trips	0.9	22.5	2.0	1.4	0.4	22.9	27.2

The average daily person-trips have been subsequently derived for 1985, 1990, and 1995. During this time total ADPTs will increase from 3300 to 27,200 with the largest increase occurring on the proposed PIA access segment. This segment, which leads into segment 14-S, will carry approximately 84% of the total PIA person-trips by 1995.

(2) Total Traffic Forecasts. To establish a baseline forecast of traffic for a situation where it was assumed that there would be no PIA, LARTS forcasts were adjusted to reflect a lower population level and consequently lower traffic levels.

To develop revised baseline traffic estimates, the LARTS 1990 traffic volume forecasts were adjusted downward by the ratio of the population figure for both the with- and without-PIA assumptions to the D/E 2a forecast. These forecasts, under the assumption that adjustments to traffic volume are directly proportional to area population adjustments, are shown in Table 29. The table also indicates the additional loads from the traffic generated directly.

* Average Daily Person-trips

Total person-trips over the seven freeway segments are determined by combining the LARTS and PIA trip forecasts. LARTS trips are aggregated into those occurring within the five-county region and those traveling over outside freeway routes. Airport generated person-trips are divided into 20% passengers traveling with visitors and 80% traveling without visitors. The resulting total ADPTs for 1995 on each freeway segment are shown in Table 29.

Comparing the with- and without-PIA situations, it is seen that segment 14-S will experience the greatest absolute as well as percentage increase in volume if the airport is developed and achieves a level of 12 MAP in 1995.

* Average Daily Vehicle-trips

In order to determine average daily vehicle-trips it is assumed that the LARTS intra-region person-trips will be made by car or bus and that all outside freeway person-trips will be made by car. The 80% airport person-trips without visitors are assumed to be by either car or bus, while the 20% passenger group with visitors will travel by car only. Since it is difficult to estimate the actual number of visitors in a local situation such as Palmdale, it is assumed that the person-trip/vehicular ratio is 1:1 for this 20% group. The estimated number of vehicular trips is then doubled to account for the additional visitor return (or arrival) trip. The ratio for the rest of the passengers (80%) and the LARTS person-trips to autos is 1:1.4. The number of buses is determined on the basis of a 50-seat capacity vehicle.

TABLE 29

TOTAL AVERAGE DAILY PERSON-TRIPS - 1995
LARTS AND SCHEDULED INTERNATIONAL AIRPORT, EACH FREEWAY SEGMENT
(in thousands)

	Freeway Segment													
	14-N		14-M		14-S		138-E		138-M		138-W		PIA Access	
	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA
LARTS														
Intra-region	71.9	99.7	99.9	138.6	54.6	75.6	23.6	32.6	14.4	19.8	14.4	19.8	-	-
Outside Freeways	63.3	63.3	25.3	25.3	25.3	25.3	53.8	53.8	24.1	24.1	24.1	24.1	-	-
Subtotal	135.2	162.0	125.2	163.9	79.9	100.9	77.4	86.4	38.5	43.9	38.5	43.9	-	-
PIA														
20% with Visitors	-	0.2	-	-	-	2.4	-	0.4	-	0.3	-	0.1	-	4.6
80% Without Visitors	-	0.7	-	-	-	20.1	-	1.6	-	1.1	-	0.3	-	18.3
Subtotal	-	0.9	-	-	-	22.5	-	2.0	-	1.4	-	0.4	-	38.6*
1995 Total	135.2	162.9	125.2	163.9	79.9	123.4	77.4	88.4	38.5	45.3	38.5	44.3	-	38.6
Difference with PIA	27.7		38.7		43.5		11.0		6.8		5.8		38.6	

*Total includes estimated employment and other trips.

Source: Arthur D. Little, Inc., estimates.

Since ground travel vehicular access is assumed to occur by bus and automobile, three alternative allocations of trip demand were developed: I -- a high auto, low bus use at a 90%-10% split, II -- a moderate use of bus at 15%, and III -- a high bus ridership of 40%. These alternatives were based on observations of typical airport auto-bus use patterns (90%-10%), new bus ridership patterns at a few airports with viable public transit systems (85%-15%), and projected bus rapid transit operations using a designated freeway lane for buses (60%-40%).

These alternatives are shown in Table 30 for 1995. They are derived from the LARTS intra-region and 80% PIA person-trips and ratios as noted above. The total ADT traffic for each freeway segment is a combination of these alternative trip allocations, the 20% PIA visitor/passenger ADT, and the LARTS outside freeway ADT.

If the airport were not constructed, the present Antelope Valley Freeway would be sufficient until the year 1995. Four to six lanes of freeway will be required to carry a 1995 peak hour auto traffic flow of 8200 cars with a 90% car-10% public transit split. Further, since freeway lane capacities are based on mixed traffic flow of 2% trucks and 1% buses, this factor discounts the need for a special bus lane under the no-airport conditions. (See Table 31.)

Impacts on Transportation Links

(1) The Airport Ground Access Link to the Freeways. The actual location of the link to Route 14 requires further study that would be accomplished during the airport master planning stages. In the draft North Los Angeles County General Plan it is recommended that a direct exclusive access route to PIA from the Antelope Valley Freeway be developed. Regardless of the location of the access link, the traffic flow estimates given below would be the same.

The traffic flows for this link are based on the passenger and employee forecasts for 1985, 1990, and 1995. Using an 85% auto-15% bus split and the same visitor and auto/person-trips ratios as discussed above, the total ADT can be estimated for each mode as shown in Table 32. In addition, the number of trucks using this roadway is assumed to be 2% of the passenger ADT. These ADTs are translated into peak hour flows based on a 9% factor. The number of lanes is determined by using a single lane capacity of 1800 cars per hour, adjusted for rolling terrain and to account for the mixed traffic.

As can be seen in Table 32, the peak hour flows are forecast to increase from 470 autos in 1985 to 3490 in 1995. While only 2 lanes are indicated in 1985, it is expected that the initial construction would be for 4 lanes, which would be satisfactory through 1995.

TABLE 30

AVERAGE DAILY VEHICLE-TRIPS - ALTERNATIVE MODAL ALLOCATIONS
EACH FREEWAY SEGMENT - 1995
(with and without PIA)

Alternatives	Freeway Segment													
	14-N		14-M		14-S		138-E		138-M		138-W		PIA Access	
	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA
A. Auto and Bus Person-trips (000s)														
LARTS Intra-region	71.9	99.7	99.9	138.6	54.6	75.6	23.6	32.6	14.4	19.8	14.4	19.8	-	-
PIA - 80% Without Visitors	-	0.7	-	-	-	20.1	-	1.6	-	1.1	-	0.3	-	18.3
Total	71.9	100.4	99.9	138.6	54.6	95.7	23.6	34.2	14.4	20.9	14.4	20.1	-	18.3
B. Modal Split ADT														
I - 90% Auto (000s)	46.2	64.5	64.2	89.1	35.1	61.5	15.2	22.0	9.3	13.4	9.3	13.2	-	11.8
10% Bus	144	201	200	277	109	191	47	68	29	42	29	40	-	37
II - 85% Auto (000s)	43.6	61.0	60.6	84.1	33.1	58.1	14.3	20.8	8.7	12.7	8.7	12.4	-	11.1
15% Bus	216	350	350	416	164	287	71	103	43	63	43	60	-	55
III - 60% Auto (000s)	30.8	43.0	42.8	59.4	23.4	41.0	10.1	14.7	6.2	9.0	6.2	8.8	-	7.8
40% Bus	576	800	800	1,108	436	764	188	272	116	168	116	160	-	148
C. Auto ADT (000s)														
LARTS - Outside Freeways	45.2	45.2	18.1	18.1	18.1	18.1	38.4	38.4	17.2	17.2	17.2	17.2	-	-
PIA - 20% with Visitors	-	0.4	-	-	-	4.8	-	0.8	-	0.6	-	0.6	-	9.2
Total	45.2	45.6	18.1	18.1	18.1	22.9	38.4	39.2	17.2	17.8	17.2	17.8	-	9.2
D. Total ADT														
1 - 90% Auto (000s)	91.4	109.7	82.3	107.2	53.2	84.4	53.6	61.2	26.5	31.2	26.5	31.0	-	20.0
10% Bus	144	201	200	277	109	191	47	68	29	42	29	40	-	37
II - 85% Auto (000s)	88.8	106.2	78.7	102.2	51.2	81.0	52.7	60.0	25.9	30.5	25.9	30.1	-	19.3
15% Bus	216	350	350	416	164	287	71	103	43	63	43	60	-	55
III - 60% Auto (000s)	76.0	88.2	60.9	77.5	41.5	63.9	48.5	53.9	23.4	26.8	23.4	26.5	-	17.0
40% Bus	576	800	800	1,108	436	764	188	272	116	168	116	160	-	148

Source: Arthur D. Little, Inc., estimates.

TABLE 31

1995 PEAK HOUR TRIPS, AUTOS AND BUSES AND FREEWAY LANE REQUIREMENTS
(with and without PIA)

	Freeway Segment																					
	14-N				14-M				14-S				138-E				138-M				138-W			
	Without PIA		With PIA		Without PIA		With PIA		Without PIA		With PIA		Without PIA		With PIA		Without PIA		With PIA		Without PIA		With PIA	
	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus	Auto (000s)	Bus
1995 Peak Hour Vehicle-trips (9% of ADT)																								
Alternative I	8.2	13	9.9	18	7.4	18	9.6	25	4.8	10	7.6	17	4.8	4	5.5	6	2.4	3	2.8	3	2.4	3	2.8	3
Alternative II	8.0	19	9.6	31	7.1	31	9.2	37	4.6	15	7.3	26	4.7	6	5.4	10	2.3	4	2.7	4	2.3	4	2.7	4
Alternative III	6.8	52	7.9	72	5.5	72	7.0	100	3.7	40	5.8	69	4.4	17	4.8	24	2.1	10	2.4	15	2.1	10	2.4	15
Freeway Lanes Required																								
Alternative I	6	0	6	0	5	0	6	0	4	0	6	0	4	0	4	0	2	0	2	0	2	0	2	0
Alternative II	6	0	6	0	5	0	6	0	4	0	6	0	4	0	4	0	2	0	2	0	2	0	2	0
Alternative III	4	0	5	0	4	0	5	0	4	0	5	1	4	0	4	0	2	0	2	0	2	0	2	0

Source: Arthur D. Little, Inc., estimates.

TABLE 32

AVERAGE DAILY VEHICLE-TRIPS -
PALMDALE INTERNATIONAL AIRPORT ACCESS ROAD*

	1985	1990	1995
Million Annual Air Passengers (local originating demand)	1.2	4.8	9.6
PIA Average Daily Trips	3,300	13,000	27,000
Employees	1,875	6,000	12,000
Passengers and Visitors			
Bus	8	30	60
Auto	2,940	11,570	24,208
Employment and Other			
Truck	58	230	430
Bus	4	36	72
Auto	2,277	7,286	14,571
Total Average Daily Trips			
Truck	58	230	480
Bus	12	66	132
Auto	5,217	18,856	38,779
Peak Hour Flow			
Truck	5	21	43
Bus	1	6	12
Auto	470	1,697	3,490
Number of Lanes Required	2	2	4

*Assuming 85% auto-15% bus split; see Figure 11 for location.

Source: Arthur D. Little, Inc., estimates.

(2) Effects on the Existing Freeway Network. The impacts on the Antelope Valley Freeway would not be severe until the 1990s. However, by the mid-1990s some improvements may be necessary as this route is not 6 lanes for its full length. This would be particularly true if a separate lane of the present freeway were designated as a bus express lane. Route segment 14-N would be sufficient through 1990 as it has 6 lanes up to Rosamond and it is expected that much local traffic will disperse before this point; 14-S, however, will be in need of 6 traffic lanes by this time.

The impact on Route 138 would be less severe as this road does not cross the mountains. However, complete reconstruction would be required to bring it to freeway standards as it is now only a 2-lane undivided highway with some 4-lane segments. However, the airport is not critically dependent on it for access.

A critical point in the ground transportation network to PIA is the intersection of the Antelope Valley Freeway (14-S) with the Golden State Freeway (I-5). This junction is located in the northeast corner of the San Fernando Valley near Sylmar. The 7-mile section of Route 14 leading to this point, and a 5-mile section of I-5 below this point, have recently been reconstructed to a 6-lane and, at some stretches, 8-lane freeway. Approximately 2 miles south of this intersection I-5 connects with I-210, the Foothills Freeway. Two miles beyond this junction I-5 connects with the San Diego Freeway, I-405, which runs southwest; I-405 also connects with the proposed San Fernando Valley Freeway (Route 118), providing access to Ventura County. Five miles further on, I-5 again splits to the south where it connects with the Hollywood Freeway, State Route 170. I-5 is a 6-lane and at times 8-lane freeway which is highly traveled during peak commute hours as it traverses the San Fernando Valley.

Assuming the development of PIA, the peak hour ADT at the 14-S, I-5 intersection is estimated to range from 11,000-12,800 cars in 1995, depending upon the degree of bus ridership -- i.e., 16-70 buses. These demands are based on the LARTS 1990 flows on I-5, plus the traffic on 14-S, this latter including Antelope Valley and PIA traffic less that amount which goes to the Saugus-Newhall area. All of the LARTS I-5 traffic is assumed to travel by auto, while the 14-S traffic is allocated to three alternative auto-bus modal splits.

The same assumptions as above, regarding ridership ratios, visitors, and lane capacities, wer ed.

On a typical day in 1995, it appears that the difference in traffic volumes associated with a "with-PIA" scenario and one "without PIA" will result in an increased ADT of about 31,000 on I-5 just below the intersection with the Antelope Valley Freeway (14-S). This translates into a peak hour flow difference of 2000-2800 vehicles depending on the mix of auto and bus movements.

The traffic from Antelope Valley is expected to be accommodated within the presently designed I-5 Freeway. The impact can be considered negligible in comparison to PIA traffic and it will not require any significant improvements to the eastern San Fernando Valley freeway network.

Impact of Ground Access Improvements

The primary impact of the airport and induced activity at least for 1995 on the freeway will be the need to provide six lanes throughout the Antelope Valley Freeway. The impacts of the construction phase will cause only minimal relocation and displacement as improvements to Route 14 will be on an existing right-of-way. Similarly, land acquisition is expected to be limited, to not involve any taking of public lands, and to have minimal impact on landowners and local residents. Construction will certainly cause some noise and air pollution and careful attention will have to be given to this stage of development so as to prevent water pollution, soil erosion, disruption of drainage patterns, and loss of animal habitats or vegetation. Noise and air pollution will also increase, although the latter, to a large extent in the mountains, will be dispersed by the winds. Similarly, the noise impact will be only moderately adverse because of the sparse population in the mountains and distance of the road from residential areas.

The land use and economic impacts will be the most noticeable in the long term. Along Route 14, however, this impact is already apparent. Not only has the Antelope Valley Freeway provided access to new markets, but suburban extension of the Los Angeles basin has occurred along its spine. This is most readily seen in the growth activities of the Saugus-Newhall area. The freeway is expected to continue to provide this transportation link that serves such growth activities, whether the airport is built or not.

The impacts on I-5 are also considerable with PIA and with no other ground access route. The increase in traffic will contribute additional pollutants to the San Fernando Valley. Similarly, the noise levels will also increase, although within a limited range as the road is heavily traveled already. There will also be some adverse impacts from construction of additions to both the 14-S and I-5 roadways in terms of dust, noise, earth movement, equipment movements, and traffic delays. However, such impacts are not considered severe as improvements will be accomplished incrementally over a long period of time.

Even if PIA were not built, a certain amount of construction improvements and subsequent impacts would occur so as to handle future traffic loads generated by normal growth.

Use of Resources

The construction of additional lanes for the existing freeways and Route 138 will not result in any significant commitment of natural resources and no known location of mineral resources will be covered over. While there will be use of sand, gravel, cement, and steel reinforcing for

construction purposes that is not retrievable, their use cannot be considered a loss of a highly valued resource. Further, there is no use of public lands or recreational areas, nor will the roadways infringe upon any habitat or endangered species since existing rights-of-way will be followed.

The use of fuel by the airport-generated traffic could be considered an additional use of resources. It is recognized that PIA, being almost the farthest airport on the average from most basin communities, would cause greater fuel usage. This would result in nearly 21.5 million gallons of fuel annually by 1995 with 85% car use. Without PIA it is estimated that the 12 MAP would use nearly 17 million gallons of fuel to reach other airports. Similarly, with PIA direct and indirect employment travel would require 19.2 million gallons of fuel. Without PIA the requirement would be 14.4 million gallons.

The construction of additional freeway lanes to accommodate PIA-induced traffic will require additional financial resources. Improvements to 14-S to bring it up to six lanes are estimated but these would be made even without the impetus of the airport-induced traffic.

Future Demand, Local Circulation

In the development of a circulation plan for the City of Palmdale, it was necessary to examine future land use changes within the city and to coordinate transportation needs of the Palmdale circulation network with those expected changes. This knowledge was accumulated while studying the community from various technical levels in conjunction with local citizen input. Critical land use changes affecting transportation needs over the next 20 years have been discussed previously in the "Existing and Planned Land Uses" section.

The timing of all land use changes is extremely critical to the implementation of circulation roadway improvements. Circulation improvements will be implemented only as these land use changes occur and as economics dictate.

Analysis of Future Palmdale Circulation Needs

(1) Roadway Needs. The NLAC General Plan developed average weekday traffic projections for the proposed arterials in the Palmdale circulation network and the number of required lanes for 1995 and holding capacity projections. These traffic projections were developed by calculating approximate growth factors based upon LARTS vehicle-trip growth in the area of the improvement. Growth of trip volumes between zones and growth of internal zone trips were combined to develop these factors.

Lane requirements were based upon "maximum cutoffs" of 10,000 vehicles per day for 2-lane facilities and 25,000 vehicles per day for 4-lane facilities. It is recommended that all 2-lane Palmdale arterials with projected volumes of more than 10,000 vehicles per day at land use holding capacity be considered as potential 4-lane facilities. This will provide adequate flexibility to allow full land use intensity to occur in any specific area within Palmdale without jeopardizing the primary circulation network.

Perhaps the most important factor in new development is the timing of PIA development. Improvements to PIA travel corridors will correspond with actual usage of the PIA facility. Extreme caution will be exercised before allocating large financial resources to a particular facility before PIA usage trends are clearly established.

(2) PIA Impacts. The allocation of non-employee-related 1995 vehicle-trips from PIA to Palmdale circulation network is based on the following assurances by DOA (in addition to those given previously concerning projected airport usage levels):

* A PIA master plan primary objective will be to encourage the highest level of transit usage, particularly for the longer-distance airport trips. This will be accomplished by developing efficient remote terminals capable of handling baggage and passengers in the San Fernando Valley and Los Angeles basin as part of the PIA master planning to be undertaken at a later date.

* A direct exclusive access route to PIA from the Antelope Valley Freeway will be provided. On the plan, an access corridor extends from the Antelope Valley Freeway directly into PIA from the south. Since the primary direction of travel to and from PIA is from the Los Angeles and San Fernando Valley areas, this corridor appears to be the most logical location.

* Assuming increased patronage at PIA, a proposed freeway connection to the airport would be made only after average weekday passenger-related traffic generated by the airport exceeds 15,000 vehicles per day along the main access corridors (about 6-8 MAP on the given time schedule) between 1990 and 1995. When airport passenger-related traffic increases to about 25,000 vehicles per day, such a connection becomes nearly essential since it is additive to the local "native" traffic. The exact location of an interim access corridor will require further study pending the preparation of an airport master plan. A most important factor for consideration is that virtually unimpeded access to the airport is critical to achieve growth projections for the airport. Major activity centers

will not be allowed access from the primary airport access corridor (interim or permanent) since such developments would create congestion which will reduce significantly the attractiveness of PIA -- especially for those who must travel long distances to the airport, as the bulk of travelers are projected to do.

* If the airport continues to grow beyond the 12 MAP projected for 1995, the capacity of the Antelope Valley Freeway as the primary access corridor will provide a severe limitation on the final airport capacity unless alternative high-speed ground access is provided at some point. The feasible alternatives for such access are very limited.

Local Circulation Policies and Plans[1]

Recommended Circulation Policies

This subsection focuses upon resolving the issues described above. The policies outlined below are intended to provide the necessary flexibility for accommodating future changes in land use that will affect the Palmdale circulation network.

(1) Complete the following existing arterials to four travel lanes (as land use changes occur):

* Avenue Q from the Antelope Valley Freeway to 40th Street East

* Avenue R from the Antelope Valley Freeway to 40th Street East

* Avenue S from the Antelope Valley Freeway to 30th Street East

* Division Street, 10th Street East, 20th Street East, 30th Street East, and 40th Street East between Avenues Q and S.

(2) Periodically reexamine current traffic volumes and future projections to coordinate road improvements with actual land use development.

(3) Railroad grade crossings should be implemented if Public Utilities Commission funds become available, in the following sequence:

* Palmdale Boulevard

* Sierra Highway

* Avenue P

(4) It is recommended policy to keep all but service trucks out of future residential areas of Palmdale. Palmdale should also maintain periodic counts of truck volumes on local arterials. Additional truck routes should be considered only if truck volume increases above 7% on any arterial and this increase is accompanied by significant delays or safety problems. With the pending airport construction and subsequent air cargo considerations, it will be particularly important for Palmdale to keep close surveillance on future goods movement to insure a proper balance between it and passenger vehicle movement.

(5) It is recommended that the City of Palmdale design any future interim or permanent airport access corridor with the objective of promoting the smooth flow of traffic to and from PIA. This can be accomplished by several methods including limiting the extent of commercial development along the corridor, limiting access to commercial development along the corridor, buffering the airport access corridor from adjacent development, or all of the preceding. Easy access to the airport is critical if the airport is to achieve projected use levels.

Looking Beyond 1995

The needs identified in the Circulation Plan have been developed around a 20-year land use concept. However, it is important to understand that 1995 is only a particular point in the development of a community -- not an end of itself.

North Los Angeles County currently has a document called the "Master Plan of Highways" which has been adopted by the Los Angeles County Regional Planning Commission and the Board of Supervisors. This Master Plan was developed under a valid concept and has resulted from many years of preliminary engineering studies concerning all potential major and secondary roadway alignments in the region. Its primary purpose is preserving right-of-way in all possible areas where future growth might occur. It is hoped that this would allow areas to develop with adequate access and, at the same time, save Los Angeles County roadway costs by requiring private developers to dedicate sections of the Master Plan system adjacent to their developments.

SANITARY WASTES

SEWAGE AND NONSOLID WASTES

Existing Waste Treatment Characteristics, Systems, and Standards

Wastewater and sewage are in general characterized by the following:

* Sanitary wastes generated by daily activities of people, including cleaning, washing, toilet use, and food preparation.

* Wastes related to aircraft handling such as fuel transportation and storage, grease, solvents, aircraft washing detergents, phenols, and oil.

* Wastes related to storm water pollution such as firefighting foams, oil and fuel spills, tire tread removal, herbicides and pesticides, air pollution washouts, and earthen materials.

* Industrial wastes such as chlorides, sulfates, soluble oils, phenols, cyanides, heavy metals, caustics, acids, and other toxic wastes.

The handling of wastes is accomplished by a system of collection, treatment, and disposal. The operation of the system in North Los Angeles County is under the jurisdiction of several sanitation districts. The site of the proposed airport lies within Los Angeles County Sanitation District No. 20 (Palmdale area) and borders on Sanitation District No. 14 (Lancaster area). Private septic tanks and municipal sewers serve the two districts.

Sanitation District No. 20 maintains a sewage treatment plant equipped for primary and secondary treatment with a capacity of 3.1 million gallons per day (MGD). The plant serves approximately 13,000 people in the Palmdale area. Another 10,000 residents in the area do not have sewer service. Sanitation District No. 14 maintains a sewage treatment plant equipped for primary, secondary, and tertiary treatment with a capacity of 6.5 MGD. This treatment plant serves a population of approximately 38,000 out of a total population of approximately 42,000.

Air Force Plant 42 maintains a secondary treatment plant consisting of primary treatment and oxidation ponds, with a capacity of 1.0 MGD.

The remainder of North Los Angeles County, not in the Lahontan district, is served by Sanitation District No. 26 (5.0 MGD) in the Newhall area, Sanitation District No. 32 in the Valencia area, and the Gorman Sewer Maintenance District. It is estimated that 100,000 of the North Los Angeles County population have sewer service while 30,000 utilize septic tanks and leaching fields.

Water quality standards for the Antelope Valley area are determined by the Lahontan Region of the California Regional Water Quality Control Board. The Lahontan Region issues standards for each municipal treatment plant individually and updates such standards periodically.

Sewage Disposal Demand

The popluation growth induced by the development of the airport will significantly affect the volume of sewage and the sewage treatment systems for the Antelope Valley.

The sewage generated at airports by employees, passengers, visitors, aircraft washing, and general maintenance is estimated on the basis of 30 gallons of water used per passenger per day with a 90% return to the sewer systems. It was assumed that hotel guests would generate 60 gallons of wastewater per person per day. Industrial wastes, which include major aircraft overhaul and light industrial effluents, are assumed to be 1.5 MGD per 10 million air passengers.

For permanent residents, 174 gallons per person per day were assumed with 90% return. These estimates are shown in Table 33, based on the population estimates as shown. It can be seen that population increases, whether or not induced by the development of the airport, will generate sewage in excess of the capacity of the existing treatment plants.

The Impacts of Future Sewage Disposal Demands

Construction Phase

The sewage generated during construction is expected to be minimal and is considered to have an insignificant impact. It could be treated in a number of ways. For one, a temporary sewer connection for construction facilities could be made to either the Sanitation District No. 20 treatment plant or to the Air Force treatment plant.

A secondary effect of airport development will be the construction of sewage systems and sewage treatment plants in the North County area. Such projects will have short-term effects in terms of construction noise, use of roads by construction vehicles, and some additional contaminants introduced into the air due to clearing, grubbing, and stripping of the land and cut-and-fill procedures. By using sound construction practices these effects can be minimized.

Operations Phase

(1) Sanitary Sewage. With the increased sewage loads, new sewage treatment plant will have to be built or existing plants expanded to keep pace with the development of the region and the upgrading of water quality standards. The Los Angeles County Regional Planning Commission has already studied the water and waste management problems for North Los Angeles County. Their plan called for a capacity of 42 MGD which is greater by 7.03 MGD than the total Antelope Valley demand estimate of

TABLE 33

SEWAGE GENERATION, ANTELOPE VALLEY
WITH AND WITHOUT PIA - 1975-95

	1975	1980	1985 Without PIA	1985 With PIA	1990 Without PIA	1990 With PIA	1995 Without PIA	1995 With PIA
Population (000s)	94.5	102.7	121.8	130.4	137.3	160.4	146.1	200.4
Sewage Load (mgd)								
Antelope Valley*	14.80	16.08	19.07	20.42	21.50	25.11	22.88	31.38
Airport	-	-	-	0.40	-	1.49	-	2.99
Total	14.80	16.08	19.07	20.82	21.50	26.60	22.88	34.37
Increased Sewage Load Due to PIA (mgd)	-	-	-	1.65	-	5.10	-	11.49

*Based on 174 gallons per capita with a 90% return.

Source: Arthur D. Little, Inc., estimates.

34.37 MGD shown in Table 33. Included is a proposed DOA airport facility that would handle 13 MGD, more than sufficient to meet the 2.99 MGD demand estimate.

The existing Sanitation District No. 20 sewage treatment plant is located on the proposed airport property about one mile west of a proposed runway. As the Palmdale area develops due to the influence of the airport, a larger capacity will be required. The County Sanitation Districts propose to expand their plant Nos. 14 and 20 to meet the future needs of the Antelope Valley. The Sanitation District should be provided a lead time of at least 2 years for this expansion.

(2) Wastes Related to Aircraft Handling. Leakage or accidental fuel spills can discharge oil solvent and petroleum wastes into water bodies, groundwater recharge areas, or aquifers. Mechanical failures of equipment and illicit dumping into storm drains can add pollutants to water supply sources. Plane washing involves wastewater containing grease and oil products and detergents with high phosphorus content.

Positive impacts associated with the use of reclaimed wastewater on surrounding airport lands will be a supplementary source of agricultural water and groundwater recharge. Most remaining particulate and bacteriological elements will be removed through soil percolation.

(3) Wastes Related to Storm Drainage Pollution. These wastes generally occur over the runway and apron areas as well as parking lots and roadways. Most often they will be random fuel and oil spills or leakages which can lead to serious pollution and explosions. In addition, fire-fighting foam has a very high organic content with concentrations of hydrolized proteins and metallic salts. These materials cause serious water pollution problems. Use of toxics for insect and vegetation control can also result in pollution.

(4) Industrial Wastes. Effluents from industrial activities are often very toxic, containing cyanide, acidic chromate wastes, and chlorides. These wastes not only affect water quality, but have toxic effects on all living organisms and impair the use of water by affecting taste and odor.

Adequate measures will be taken to collect and treat the industrial and sanitary wastes described above. So, there should be no appreciable effect on the water quality in the area. Many of the sewer improvements will follow existing lines and rights-of-way, thus minimizing direct effects in the more urbanized areas.

Even with these impacts, however, the region should benefit from full development of a regional sewage treatment system. With urbanization, either with or without the airport, private septic tanks and leaching fields will become obsolete and all residences will need to be sewered. There is also a potential for water conservation by reclaiming the wastewater for recreational and irrigation purposes as is being done in the Lancaster and Palmdale districts. Moreover, through such water reclamation practices, the existing water supply may be further extended.

The only irreversible and irretrievable commitment of resources is the land used for treatment facilities. This effect probably will be somewhat mitigated by expansion of existing facilities at their present sites.

Future Plans for Sewage Treatment

Treatment Plants

The DOA proposes to develop an industrial pretreatment plant on the airport property. The treatment system for the airport is briefly described below:

A completely separate sanitary wastewater collection system would be built; industrial wastes would be collected in a holding pond and pretreated. At specified intervals, pretreated wastes from the holding pond would be sent to the treatment plant. Waste oil would also be collected and disposed of separately through reconditioning or other means. Since industrial and petroleum wastes may be toxic to the biological activities in the treatment facilities, they will be adequately pretreated at all all times.

Similarly, separate storm drainage and maintenance collection systems would be constructed. Maintenance wastes would go through oil separation at the site to remove nonemulsified oil, through another process to remove emulsified oil and control pH, and finally to the joint treatment plant for treatment with the sanitary wastes. Storm drainage, on the other hand, would be captured in a holding basin during the first 30 minutes of a storm, but thereafter would bypass the holding basin. Water from this basin would be released periodically to dampen out the spike load effects of major storm runoff from impervious surfaces. Usually, treatment is not considered for storm drainage because of its low-occurrence, high-volume character. A major program to avoid the contamination of storm water by illicit use will be implemented.

Treatment of Fueling and Maintenance Wastes

(1) Fuel Spills. Under no circumstances such potentially explosive waste fuel will be allowed to enter the regular storm drainage system, since it is difficult to separate it from the storm water at a point further downstream.

The best method for dealing with spills is to rapidly contain them and to use a petroleum absorbent material on surface-lying fuel. Each refueling facility will have an individual oil-water separator to skim as much oil as possible before allowing discharge to the main drainage system.

(2) Routine Maintenance and Aircraft Washing Wastes. As solvents and detergents used in washing are immediately diluted in water, which makes their removal more difficult, low phosphate content detergents will be used. Some form of separator or oil skimming device will be located in the maintenance facility since oil from the aircraft will be in the wash water.

(3) Spills During Fuel Transportation and Storage. Large-scale transportation by pipelines requires adequate inspection and the establishment of procedures for minimizing the size and number of accidental spills, and for dealing with spills when they occur. Above-ground storage areas will be completely enclosed by low berms to force all storm drainage around the tanks through an oil-water separator before discharge to the storm drainage system. Below-ground pipelines and storage tanks will be inspected periodically for leaks.

(4) Industrial Wastes. These wastes will be neutralized or pretreated before they enter a conventional waste treatment facility. The most successful treatment process is to integrate treatment of wastes directly in the industrial process, where they may be isolated, concentrated, and reduced before they have a chance to become mixed or diluted. This latter process is more suited to the Palmdale area as the soils have a high permeability and the potential for groundwater pollution is present.

SOLID WASTES

Characteristics and Existing Standards

Currently, solid waste collection and disposal in the North Los Angeles County area are handled by private companies. The County Sanitation District's principal function is to ensure that required procedures and standards are followed in the operation of waste disposal facilities and services. The district also operates landfill dumps and undertakes long-range planning. Due to air pollution, however, incineration is prohibited and almost all of the solid waste in Los Angeles County is disposed of in sanitary landfills. All of the existing landfills in North county are privately owned and operated.

Two sanitary landfills are in operation in the vicinity of the airport: the Lancaster Dump and the Antelope Valley Dump, which receive an average of 8060 and 3800 cubic yards, respectively, per month.

Each landfill site is limited to those parcels of land having the appropriate zoning. Zoning permits are obtained from the county RPC and an operating license is required. Adequate measures must be taken to eliminate and control odors, insects, and rodents. A water supply system adequate for fire-fighting purposes must be constructed and maintained. No burning of any kind is permitted. Adequate facilities must be provided to divert flood or storm waters around the waste disposal site.

Solid waste materials can be broadly classified as rubbish, food wastes, and noncombustibles. Rubbish is comprised of cellulosic, plastic, rubber, oil and paint, linoleum, street sweepings, etc. Food wastes are comprised of garbage and fats. Noncombustibles is a general classification for metals, glass and ceramics, ashes, and similar materials.

Generation of Solid Wastes

The amount of solid wastes generated at the airport is based on 3 pounds per passenger per day. This figure includes the solid waste generated by passengers, visitors, hotel visitors, and airport employees involved in all airport services. For permanent residents, the base is the Los Angeles County average of 7.5 lbs per person per day and a density of 600 lbs of refuse per cubic yard of landfill is used to estimate the volume of landfill required.

The waste generated by the airport will amount to about 7 tons daily in 1985, including waste accounted for by hotel visitors. This amount will increase to 28.4 tons daily in 1990 and to 56.7 tons in 1995. This amount of refuse will require approximately 0.42 acres of land fill, 100 feet deep, annually, or about 2 acres between 1990 and 1995.

It is anticipated that without the airport in 1995, refuse will be 548 tons daily in the Antelope Valley and require 4.03 acres, as shown in Table 34. The impact of the airport will result in 751.5 tons of refuse needing 6.15 acres of landfill annually. With the airport, wastes will increase the landfill demand to 6.57 acres. Without the airport, the Antelope Valley will require about 17 acres of fill between 1985 and 1990 and about 19 more acres to 1995. With the airport, the estimated fill would be 20 acres total by 1990 and 28 additional acres by 1995.

Future Solid Waste Disposal Impacts

Construction Phase

During construction of the airport facilities, construction debris will constitute the greatest amount of waste generated. This waste material will be disposed of on the airport site if adequate sites were identified; otherwise, it would be trucked to other suitable areas as fill. Measures will be taken to minimize the effect of this disposal such as minimizing the area of land exposed, covering haul trucks, and covering and seeding dumping areas according to county regulations. In addition, toxic wastes or wastes that will affect groundwater will not be permitted to be discharged in any of the Valley dumps.

TABLE 34

ANNUAL SOLID WASTE GENERATED AND LANDFILL NEEDS, ANTELOPE VALLEY
WITH AND WITHOUT PIA - 1975-95

			1985		1990		1995	
	1975	1980	Without PIA	With PIA	Without PIA	With PIA	Without PIA	With PIA
Population (000s)	94.5	102.7	121.8	130.4	137.3	160.4	146.1	200.4
Daily Refuse (tons)[a]	354.4	385.1	456.8	489.0	514.9	601.5	547.9	751.5
Annual Refuse in Landfill (000s cu yd)[b]	431.3	490.7	558.8	652.4	626.5	853.2	651.6	994.6
Annual Landfill (acres)[c]								
Antelope Valley	2.67	3.03	3.45	4.03	3.87	5.27	4.03	6.15
Airport Landfill	-	-	-	0.06	-	0.21	-	0.42
Total	2.67	3.03	3.45	4.09	3.87	5.48	4.03	6.57

a. Based on 7.5 pounds per person per day.
b. Six hundred pounds of refuse per cubic yard.
c. Average 100 foot deep fills, ~161,800 cu yd/acre.

Source: Arthur D. Little, Inc., estimates.

During the construction phase some unavoidable impacts will be experienced in terms of dust and debris hauling to landfill sites. Use of good construction practices should minimize these impacts. Furthermore, it is anticipated that the amount of refuse generated will be small and will occur over a 3-5-year period. Therefore, it will be only a minor part of the total refuse operation of the Valley.

Operations Phase

Sources of solid wastes at an airport are generated by functional areas of the airport complex. The collection and disposal of solid wastes at most airports is usually the responsibility of private collection operators(s) contracting individually with tenants. The public areas and regulation of collection remain the responsibility of the airport management.

Collection and handling methods will be the focus of master plan studies for the airport. Any storage containers would be placed where they would not interfere with aircraft operations and would be accessible to collection vehicles and to tenants. Processing equipment would be located near generators of bulky wastes where they serve a single building or cluster of buildings.

The long-range cumulative effects of airport development along with the induced growth of the Valley will result in waste generation that will begin to outstrip existing landfill capacities by the year 1995. This will occur even if the airport is not built. It is imperative, therefore, that the several jurisdictions and private collectors establish a long-range plan for locating suitable sites for future operations. The more recent studies by the county have identified the need for facilities and have developed use criteria for sanitary landfills. It is expected that with the impetus of the airport and further urbanization of the Valley, the objectives of these studies will be implemented. This type of planning and operation should result in maintaining and enhancing long-term productivity. The principal solutions to solid waste management lie in providing operational systems that utilize physical procedures as well as adherence to regulations. Future solutions will be oriented toward such handling as well as reclamation and reuse.

Use of Land

It could be considered that the land required for sanitary landfills in the North County area represents an irreversible commitment of resources. However, this resource should not be considered irretrievable as landfills may be used for a variety of community purposes after they have been filled.

Solid Waste Disposal Management Proposals

The short-term impact of disposal of airport construction debris will be minimized as discussed previously. Some construction debris may be disposed of on the airport site itself to fill low-lying areas as will be determined in the airport master plan studies. It is projected that airport solid waste will constitute about 6.4% of the total Antelope Valley area solid waste by 1995. The airport management will institute a waste disposal system for the site.

The increased population in the North County area, induced by the development of the airport, will require new solid waste disposal facilities. Sanitary landfill appears to be the most judicious approach to solid waste disposal in the North Los Angeles area. Los Angeles County submitted a comprehensive solid waste management plan to the State Solid Waste Management Board[1] Benefits of such a plan include operational economies, long-range planning for land acquisition and use of new technologies, and improved and coordinated fiscal and management operations. It is recognized that well-designed landfills have been used for a number of years for a variety of purposes including recreational parks and the construction of all types of buildings. Potential deep landfill sites exist in the canyons of the mountains surrounding Antelope Valley. The Valley itself provides some potential for shallow landfill sites.

The high desert area has also been considered as a dumping ground for sewage and industrial waste material, including toxic chemicals. The California High Desert Resource Conservation and Development Group is presently reviewing all study efforts regarding this concept.

The prime physical considerations of a potential location are the practicality of preventing water pollution and gas migration. Sites subject to uncontrolled flooding such as river beds, stream beds, swales, floodplains, or washes should not be used. Ditches, piping, and dikes should be used, where necessary, to keep surface waters from flowing across the interface of the landfill and natural soil. This will minimize erosion of the earth cover and water intrusion, thereby minimizing leachate production. All such diverted waters should be guided to properly operating drains.

1. The study, completed in October 1975, was prepared by the County Engineer, County Sanitation Districts, and the County Health Service Department.

Location of Landfills

The DOA will use its influence and best efforts to close or control landfill operations within the general vicinity of PIA according to guidance provided in FAA Order 5200.5, "FAA Guidance Concerning Sanitary Landfills On or Near Airports."

Landfills located in the vicinity of an airport may be incompatible with safe flight operations. Those conditions that are not compatible must be eliminated, to the extent practicable, thus providing a safer environment for aircraft operations.

Sanitary landfills will be considered as an incompatible use if located within areas established for the airport through the application of the following criteria:

Landfills located within 10,000 feet of any runway used or planned to be used by turbojet aircraft.

Landfills located within 5,000 feet of any runway used only by piston type aircraft.

Landfills outside of the above perimeters but within the conical surfaces described by FAR Part 77 and applied to an airport will be reviewed on a case-by-case basis.

Any landfill located such that it places the runways and/or approach and departure patterns of an airport between bird feeding, water, or roosting areas.

ECOLOGY

Description and General Characteristics of Vegetation

The Valley in General

The vegetative communities of the Antelope Valley region are composed chiefly of thornbushes and perennial shrubs, with sparse annual grasses and rapidly growing herbaceous plants. Other trees, plants, and ephemerals occur in pockets of higher moisture, in transitional areas, and in canyons and drainage courses, giving the region its tremendous variety and character.

There are four major areas in the region that have distinct vegetative associations: the Valley floor and its alkaline playas, where sea blite, pickleweed, and saltbush predominate; the well-drained bajadas and plains, with the creosote bush, sagebrush, burroweed association; the floodplains and drainage courses, with groves of mesquite and cottonwood, and other deciduous trees; and the upper mountain slopes with scatterings of juniper and pinon pine.

(1) The Valley Floor. This zone encompasses the playa lake beds, whose compact clay soils keep them nearly devoid of vegetation, and extends to about the 2,400-foot contour. The drainage is poor, the water table high, and there are substantial concentrations of salts and alkalies present in the soils. All of the vegetation provide excellent sources of food, habitat, and escape cover for wildlife.

(2) Bajadas and Plains. The gently sloping alluvial fans from the mountain fringes to the floor of the basin support the most abundant vegetation in Antelope Valley. On these lower and drier slopes (below 4,000 feet), the chaparral of the high country is replaced by sagebrush. It is the grey-green pubescent leaves of this low-growing shrub that give the landscape its characteristic "dusty" appearance.

The most conspicuous tree form in the bajadas is the Joshua tree (Yucca brevifolia). Bontanically a member of the lily family, this 10-20 foot tree thrives in groves on well-drained alluvial fans and lower mountain slopes. It has been estimated that Joshua trees are among the oldest living things in the desert -- ranging from 300-1,000 years old. The Joshua tree is now protected as a symbol of the Southwestern desert. Saddleback Butte State Park (formerly Joshua Tree State Park), 10 miles east of the airport site, is just such a nature preserve and wildlife sanctuary.

(3) Floodplains and Drainage Courses. Deep canyons of the nearby mountain ranges and periodically inundated stream channels change local microclimates such that many varieties of desert brush and trees are supported. Cooler daytime temperatures because of proximity to the

mountains, warm nighttime temperatures because of cold air drainage, and additional moisture creates a rich and diverse vegetative cover. Cottonwood, California live oak, sycamore, honey locust, and the acacia comprise this plant community.

On lower dry wash channels and floodplains, particularly along Big Rock and Little Rock Creeks, are clumps of desert willow and catclaw acacia.

(4) Upper Slopes. Some portions of the San Gabriel mountain areas entrap sufficient moisture to support conifers, chiefly pine and fir. The Jeffrey pine predominates. California scrub oak, incense cedar, and live oak also add variety to the vegetation above 5,000 feet. Pinon pine and scrub juniper become dominant between 4,000 and 5,000 feet.

This is also a zone of chaparral (brush) vegetation -- densely branched and leathery leaved shrubs such as chamiso, buckthorn, Christmasberry, and manzanita.

Throughout the Valley floor and into the uplands, thousands of perennial wild flowers bring the somber-hued desert to life with color at the end of a rainy winter season. Antelope Valley boasts an abundance of yellow-orange California poppies and purple lupines, particularly in the Quartz Hill, Fairmont, and Neenach areas.

In addition to the natural vegetation, there is significant development of agriculture. Alfalfa, grain crops, dry farming, and fruit production have been important in the development of the Antelope Valley economy. Sugar beets, potatoes, and small grains (barley, oats, and wheat) are the other significant irrigated crops. There are also many acres of orchards producing almonds, peaches, and pears.

The area of greatest ecological significance in the Palmdale planning area, as identified in the NLAC General Plan, is Ritter Ridge. Some 25 species of mammals, 53 species of birds, and 19 species of reptiles have been recorded from the ridge. The mouth of Little Rock Creek has also been designated as a significant vegetative and wildlife habitat.

Characteristics of the Site

The proposed airport site is located in the transitional vegetative zones between the lower bajada slopes and the Valley floor, straddling the 2,500 foot contour. There are no rare or endangered species found on the site.

The approximate acreages and vegetative species of the several plant communities on the site, as defined in the NLAC General Plan, are as follows:

- Cultivated and Urban (4,000 acres). In 1968, there were 2,140 acres under cultivation, primarily in alfalfa. Approximately 1,100 acres are still farmed while the remainder lie dormant. Other land uses are for a golf course, sewage disposal plant, or for homes or commercial purposes.

- Desert (7,100 acres). These areas are dominated by the spiny grey-green growth of the sagebrush, saltbush, and rabbit brush. The creosote bush is also found in this area and is mixed in with the burro-bush and Mormon tea.

- Desert Woodlands (5,800 acres). This area is dominated by groves of Joshua trees, particularly in the central southern part of the site (approximately 2,100 acres). Other stands of the Josua tree in the northeast portions of the site are mixed in with creosote bushes, rabbit brush, and Mormon tea.

- Barren (700 acres). These acres generally follow the Little Rock Creek wash because of disruption or unsuitability of natural substrate. It is generally devoid of vegetation, although some scattered bush scrub and disturbed grasslands will be found.

Description and General Characteristics of Wildlife

The wildlife of an arid desert region such as the Antelope Valley-Mojave Desert must acclimate itself to extremes of temperature and precipitation, and adapt itself to the scarcity of food and shelter in the desert habitat. Each animal or biotic resource adapts or evolves in its own particular way to harsh desert conditions.

As noted in the NLAC General Plan, "Though wildlife may not traditionally be associated with desert environments, it is abundant and extremely fragile. Sensitive desert species have moved outward from the developed portions of the Valley, to the east of Little Rock Creek, to the north of the metropolitan Lancaster area, and into the Sierra Pelona and San Gabriel Mountains."

Mammals

The mammalian population of the desert floor is represented by 36 genera, comprised of 75 species and subspecies. Two-thirds of the mammalian population are rodents or gnawing animals. Of these rodents, the mice are the most prevalent.

Other rodent creatures typical of the Antelope Valley are the miniature Antelope ground squirrel, the Mojave ground squirrel, and the roundtailed squirrel.

The cottontail and the black-tailed jackrabbit are seen perhaps more than any other mammal in the Valley. Rabbits in the Valley have been known to cause considerable damage to crops and fruit trees. The kit fox and

the Arizona grey fox are common residents of the Mojave Desert and Antelope Valley.

The antelope or pronghorn deer, for which the Valley was named, once roamed freely, in large herds, over the region. Settlers, railroads, and man-made structures restricted their range, habitats, and numbers; what few remained in the late 1800s have since left the Valley.

Many of the Valley's mammals fulfill a useful role in maintaining the resident wildlife population in balance.

Reptiles

Occupying the sandy, rocky areas of the Antelope Valley are found perhaps the most common inhabitants of the desert, or certainly the most characteristic -- the reptiles. Lizards are probably the most frequently seen reptiles. The desert tortoise is also seen in the Valley.

Snakes, though not numerous, are often seen at night in the Valley. The best known species are the olive-green Mojave rattler and the little horn rattlesnake or sidewinder. The most common is the Pacific or Western rattlesnake. The rattlesnakes of the Valley are the only poisonous reptiles. Snakes generally occupy the sandy and low rocky areas feeding on rodents and other reptiles.

Amphibians

Due to the lack of standing fresh water and permanent water courses, and to a lack of general adaptation to an arid environment, there are few amphibian species, hence a limited toad and frog population, in the Antelope Valley. Amphibians are in abundance in some places and have adapted well to man and are extremely beneficial for insect control.

Birds

A wide variety of birds occur in the Valley, particularly in the Palmdale-Lancaster area, because of the nearness to the San Gabriel Mountains, the mountain valleys and riparian vegetation, and the tree and grain crops. Most of these birds are seed and insect eaters.

Many of these birds are migrants and by late April have passed through the Valley, leaving the endemic birds such as Say's phoebe, the raven, the roadrunner, the horned lark, the California quail, the white-rumped shrike, the verdin, the gnatcatcher, and the thrashers as the true desert inhabitants. Most of these birds depend on seeds, succulent plants, and berries, and on their own metabolic processes for their water needs. The few marshes, lakes, and reservoirs that do occur in the Valley are frequently inhabited by wading and water birds; however, because of the general lack of surface water in the area, these birds are few in number. The golden eagle is likewise a part-time resident of the Valley. The prairie falcon, a species listed as threatened, also appears in the area.

Endangered Species

The Mojave ground squirrel, a rare species, generally favors the borderlands of farm fields and, in particular, adheres more closely to the foothills where rainfall and flowering annuals are more abundant.

The golden eagle ranges from as far north as Alaska to the mountains and badlands of western North America and as far south as Mexico. This extensive range, coupled with the very low probability of secluded nesting habitats within the Antelope Valley, suggests that the Palmdale area is not essential to this eagle's existence.

The California condor occupies several preserve areas to the southwest of Palmdale in the Sespe and Sisquoc sanctuaries. The closest one is 50-60 miles from the proposed airport and is located on the southern face of the San Gabriel Mountains. These birds seldom visit the Valley and operations at PIA are not expected to affect their habitats or soaring activities.

Ecosystem Interrelationships

Any region's ecosystem is a complex relationship of animal life and vegetation dependent upon, and affected by, the variables such as climate, soils, and water. The ecological balance is very sensitive to man's encroachment and to changes in natural forces.

The value of vegetation in this relationship is often overlooked. Vegetation protects against the loss of soil through erosion and sedimentation. It also serves as a deterrent and energy absorber of flood waters. Vegetative communities such as the chaparral of the mountainsides and valleys, or the sagebrush of the desert, also provide habitats for numerous varieties of birds and small mammals such as deer, fox, rabbits, bobcats, and rodents.

Vegetation serves as the "primary producer" in the ecological food web, providing the herbivores with their primary source of food. These animals in turn provide a food supply for the carnivorous animals. If vegetative cover is maintained, the ecosystem, in turn, is protected.

Most animals stay within their habitat areas and do not stray far from local conditions and food supplies. Each animal is related to every other animal in a region or life zone by a complicated food web or food chain structure. Each animal in the food chain depends on each animial underneath it and/or vegetative cover for subsistence; therefore, habitats of the species in the food chain interrelate and overlap.

If change to the ecosystem brought about by man's activities is of significant enough proportions, the whole character of the ecosystem will be changed and replaced by a more tolerant (to man) ecosystem composition. If the vegetative cover is disturbed significantly, the balance between

vegetative cover and wildlife could be upset and animals could find themselves without basic requirements to coexist. However, if a minimum of brush area is maintained, the ecosystem will also be maintained -- with sufficient cover a proper balance of predator-prey relationships is maintained.

The Effects on Flora and Fauna

Construction Phase

The Antelope Valley has a rich, interdependent, fragile ecosystem -- one that has taken many years to adapt to the harsh desert conditions. With the construction of the airport, a certain amount of site clearance, grading, replacement of surface soils with impermeable cover, alteration of major and secondary drainageways, construction of on-site facilities and disposal systems, and water withdrawal will be necessary. Most of the vegetative cover in the vicinity of the runways and terminal facilities will be removed. The initial 1980-1990 development will disturb about 6,000 acres. Of this acreage, a maximum of 15% will be covered with impermeable coverage by 1995.

Only those areas with premanent structures such as runways or facilities will be directly impacted over a long term, for other areas will be revegetated and reinhabited by many of the wildlife species presently on the site. Off-site vegetation along road and utility access routes will probably be damaged or removed because of construction activity. Consequently, the wildlife associated with this vegetation will be displaced and moved to contiguous areas.

The primary airport development will occur in the central part of the site, between 50th and 75th Streets east and from Avenue P-8 north. Approximately 6,500 gross acres of land will eventually be developed for runways, terminals and support facilities, parking and circulation, and clear zone areas.

The access road within the airport and the ancillary support facilities will most likely be located in areas along 40th Street east and west of this, and require about 3,700 gross acres. Some minor development will occur in the east central part of the site and use about another 5% of the desert lands.

The initial construction activity, however, will probably have only a limited effect. In the initial phase of airport buildup, wildlife -- mostly small mammals and reptiles -- will move to other areas within the site. Though some of these displaced animals will perish, impacts due to such activities will most probably not affect a significant part of the Antelope Valley desert ecosystem.

Operations Phase

With the advent of further development and increase in activities, some changes in the vegetation and wildlife ecosystems must be expected. Some species will probably disappear from the area altogether, not only because of land clearing, but from inability to adapt to man and his activities. The larger predatory birds and mammals probably will disappear very early, since they forage for prey over wide areas and cannot easily avoid contact with man. Animals affected in this way will be the white-tailed kite, the golden eagle, and the prairie falcon, which have disappeared from many areas inhabited by man in California. Animals adapted to living with man, and living in an unbalanced environment, will propagate rapidly and remain, resulting in extreme populations; coyotes and rodents are typical examples of this case.

Many of the smaller animals -- namely, the reptiles, amphibians, and smaller mammals (other than rodents) -- will also be unable to adapt to the general uses by man and will disappear to the more remote parts of the site and beyond.

There will probably be an increase in the number of songbirds and migrants, and birds such as horned larks, kildeers, and owls which depend for their existence on open fields. An increase in surface water storage settling basins and effluent ponds in the Palmdale-Lancaster area will attract an additional number of waterfowl and affect the migratory habits of all of the bird species in the Valley. In terms of numbers of species alone, the birds should suffer least.

The Probable Ecological Impacts

With increasing urbanization, the wide variety of both vegetation and animal species in the Palmdale-Lancaster part of Antelope Valley will be reduced. The resultant dominant population will be characterized by large numbers of individuals, but relatively few species. They will survive more on the basis of adaptation to man than to the desert conditions.

The birds in the vicinity of the proposed airport pose a hazard to aircraft operations. The greatest potential hazard is birds which soar and wheel at moderate to high altitudes and remain airborne for long periods of time. These birds tend to be among the larger and heavier kinds, but are not expected to be the dominant species.

The direct impact of the proposed Palmdale Airport on the vegetation and wildlife species in Antelope Valley could be considered minor, as only a certain amount of indigenous flora and fauna on the site will be displaced. However, the impacts of further urbanization of the Valley and the resultant changes in the way of life in the Palmdale-Lancaster area could be significant in terms that these would alter the general conditions that presently support a desert ecology.

To the extent that the wide variety of the existing ecological system is valued, the degree to which it is lost can be considered an irretrievable commitment of resources. Once the commitment to the airport is made the desert ecology cannot be maintained in areas of intensive development, nor can it be easily retrieved. It will not, however, be totally lost as large areas of the airport will be reserved as aircraft clear zones, as buffer zones, and environmental protection areas. This land area, which will total approximately 7,500 acres (42%), will remain essentially devoid of buildings or paved areas. Of this amount, approximately 3,800 acres at the eastern end of the site from 80th Street east will remain as a single block, relatively untouched by development and suitable for wildlife. Another block of land, between 60th and 75th Streets east, would remain in its present state. The land, about 1,000 acres, is also the location of numerous Joshua trees.

Protective Measures

The impacts of the initial building phase will be contained with proper attention paid to construction guidelines. The desert ecology will be further protected and maintained with the proper attention as to which areas on the site should be cleared and which protected, with proper control of flood waters and increased runoff due to the clearing of the site, and with institution of proper measures as soon after construction activities as possible -- e.g., replanting of native vegetation.

Native vegetation, such as stands of Joshua trees, will be protected where land is not needed for airport facilities. The site will be surveyed in detail during the master plan design stage and areas suitable for preservation will be identified. Vegetative cover, since it acts as an animal habitat, a pollution guard, and a means of erosion and flood control, will receive priority in the land use design of the site and the surrounding region. The DOA will develop, during the master plan stage and implement during the airport operational stage, a resource management plan. Its objective will be to protect and enhance the endemic vegetative cover and animal habitats. Consideration will be given to effective waste water management and distribution as a means of providing life support.

The management plan will be directly applicable to the two blocks of land in the eastern and southern areas of the site identified above. Particular attention will be paid to methods to increase the wildlife carrying capacity and enhance the vegetative cover of these areas.

The DOA will seek ways to support efforts by public and private groups to acquire and/or develop wildlife and wild flower sanctuaries in the Antelope Valley. The DOA will work closely with the State Department of Fish and Game in developing these and other possible mitigation measures.

The NLAC General Plan contains a plan for habitat management. This plan is coordinated with other environmental resource management plans. These areas are located primarily in the desert, in the eastern portion of the study area and on the north slope of the San Gabriel Mountains outside the Angeles National Forest boundaries.

ECONOMY

The Airport as an Instrument of Change

Tne degree to which airports effect change is a function of the level of service provided, the amount of activity, and the role of the airport in the national and regional system of airports. On a regional scale, the location of the airport can be an influencing factor in formulating and achieving regional development objectives.

In Los Angeles County the issue involves increasing urban growth in the northern part of the county. The proposed airport site at Palmdale would increase population and economic activity in that area. The airport at the proposed location would be an important stimulus for jobs, business, and development. In addition, new businesses locating within Southern California that make heavy use of air transportation services will view the location of an airport as an important locational consideration.

The airport will be especially significant as an instrument of change in Palmdale because it means construction of an entirely new facility rather then expansion of an existing one. This is especially important because of the location in a relatively low population area with limited development. Employment, income, housing, population, and land use would all be affected. Airports traditionally encourage the urbanization of the region immediately around the facility. Employment and population increase, as does the amount of land absorbed for urban development. Especially important is the stimulus to new residential and business locations and the development of new communities.

An airport has significant impact on change involving economic and financial matters. In terms of income effects, the population in an airport development area often acquires increased purchasing power in the form of disposable income. Similarly there is often an increase in the immediate household income level as well as in taxable sales revenue from local commercial activity. Regarding fiscal matters, the area of an airport location often finds that additional expenditures are required to provide service improvements to meet the needs of its expanded population. The growth which accompanies an airport facility means additional tax sources through such revenue-raising means as property and sales taxes.

A new airport facility brings with it the need to insure access to the airport area. Because of this the airport is also a growth-inducing factor with regard to encouraging new modes of ground transportation as well as expansion of the capacity of existing modes.

An airport essentially involves a large capital investment in order to meet increased demands for air service. Because of the size of the proposed airport at Palmdale, the economic implications are great and varied. In terms of regional impacts the airport will play a multitude of roles. For the Southern California region a new airport will significantly expand air service capacity. This increased capacity would have an especially important effect because it would come at a time when systemwide capacity would not be sufficient to meet air travel demand.

There will be major effects in terms of employment. In the short run, there will be significant increases in construction employment; in the long run, with expanded airport operations, major increases will take place in airport and air service employment. Additional employment increases would be in establishments such as hotels and motels as well as travel agencies. The source of these employees would include other workers in the region, new arrivals to the labor force from outside the region, new entrants to the labor force, and those who are currently unemployed or underemployed. The payroll from these jobs will in turn be spent on such things as housing, clothing, and other retail purchases. This in turn generates induced employment to support these expenditures. In addition, the airport facilities would also provide increased employment for aircraft maintenance and for airline management offices.

Regional and Local Employment Patterns.

Total employment for the six-county region in 1970 was approximately 4,204,360. The largest percentage of employees are in the services sector (28%) and the manufacturing sector (27%). Trade accounts for 21%, while employment in agriculture is minimal, accounting for only 1% of the regional work force.

For Los Angeles County, total employment was 3,219,500, with the principal emphasis again on the services, manufacturing, and trade employment sectors. In terms of percentage distribution among categories, employment in Orange County is fairly comparable to Los Angeles County. Riverside County has more employment in agriculture. Regionally agriculture is not emphasized with the exception of Imperial County, where agriculture employs about 19% of the labor force.

* Economic Structure of Antelope Valley

While manufacturing consistently accounts for a major portion of total employment in the Antelope Valley, this number has varied dramatically through years due to the aerospace/military nature of most of the area's economic activity.

Wholesale and retail trade, service industry and the Government employ a significant number of workers. The number of construction workers fluctuated considerably; 1969 and 1970 saw great expansion in the construction section, much of which was due to the enlargement of the Lockheed plant.

The major industrial firms in the Antelope Valley are primarily aircraft firms such as Lockheed, McDonnell Douglas, and Northrop Corporation, which build and test aircraft at the Air Force Plant 42 facilities. Poultry is the predominant type of farming centered in Lancaster and consists largely of turkey growers. The construction industry is also prominent in the Valley, adding significantly to the economic base.

Economic Impacts of PIA

Industrial Development in the Vicinity of an Airport

Studies which have been made of industrial development and air transportation availability indicate that the proximity of air transportation is often an important factor in industrial location. Los Angeles International Airport has experienced considerable growth in the airport vicinity. There has also been growth in the vicinity of the new Dallas/Fort Worth airport.

The case in Palmdale is somewhat different and it is not as likely that the airport will attract those industries which require air transportation if other factors such as access to major population centers and commercial markets are not also present. Since there is presently limited manufacturing in North Los Angeles County, aside from the aerospace firms, Palmdale cannot be expected to experience the same magnitude of growth as Dallas/Fort Worth. Greater distance from major population centers also means greater distance from markets for finished products -- another important factor in a business location decision.

Several factors have to be overcome before substantial industrial development occurs around Palmdale. The most important of these is the distance from Palmdale to metropolitan Los Angeles. The aerospace industry may attract some related industries to the airport vicinity but in the past this has been insignificant. It appears that the industrial development around the Palmdale Airport will be primarily oriented to airline and airport-related activities.

One area where industrial development might be successful would be in industries which could take advantage of both the local air transportation and the major rail line which runs through Palmdale. This currently carries a great deal of freight from the Central Valley to the Los Angeles basin, and also out to Victorville along the new bypass.

Employment Impacts of PIA

The potential impacts of PIA on the economic structure of North Los Angeles County, with particular reference to the Antelope Valley portion are discussed below. Economic impact is defined as the difference in economic indicators between the two following situations:

* The structure and the level of activity of the North Los Angeles County economy if the project is developed as planned, and

* The structure and the level of activity of the economy if the project is not built and development occurs without the project as an impetus for accelerated growth.

The net difference between the two alternative situations represents the real impact that PIA will have on the economy. The proposed development can be separated into two phases for purposes of analysis -- construction and operations -- although, because of the size of the ultimate development, the two phases will overlap.

Assuming the start of construction in the 1980s, the southern runway (7R-25L) and its attendant passenger facilities will be completed in the 1980s. Operations will then commence on that runway, with construction continuing on the north runway (6L-24R).

Economic impact has been evaluated in terms of direct, indirect, and induced effects. Direct and indirect refer to that marginal economic activity -- employment, income, and population growth -- stimulated on the site and off the site by creation of PIA. Induced impacts refer to the increased employment, income, and population growth resulting throughout the North Los Angeles County area from this new direct and indirect activity. The magnitude of the direct impacts determines the level of induced impacts through the application of the economic principle known as the multiplier effect.

(1) Construction and Operations Phase (1980-95). The combined construction and operations phase of Palmdale International Airport is expected to last 15 years. Airport operations would begin in the mid-1980s. It is expected that Plant 42 will be utilized up to the time that Palmdale is opened.

It has been assumed that labor costs amount to 45% of construction costs and that the average annual salary of a construction worker in Southern California in 1976 was $19,000. Thus to build for a capacity of 12 MAP would require 821 construction workers a year from 1980-90 and 642 a year from 1990-95 (Table 35).

TABLE 35

CONSTRUCTION COSTS FOR PALMDALE INTERNATIONAL AIRPORT
(costs in millions of 1975 dollars)

	Cost: Total and Annual (15-yr construction period)	Labor Cost (45% of construction cost)	Number of Jobs (average salary $19,000/yr)
1980-90 (6 MAP)	$346.4 $34.6/yr	$15.6/yr	821
1990-95 (12 MAP)	$134.9 $27.0/yr	$12.2/yr	642
Total Cost	$481.3		

Source: Arthur D. Little, Inc., estimates.

Direct employment at the airport is estimated to be 750 employees per MAP in 1985 and 1990. Approximately 80% of direct employment is composed of primary employment, which includes airline flight personnel, aircraft maintenance and traffic services, and freight forwarders. Secondary (the other 20%) employment is made up of federal and local government personnel

and concessionaires. The Federal Government's functions include security, FAA, weather, and customs and immigration service. Local governments are responsible for management and maintenance of the airport facilities. Concessions include all those serving the passengers, the aircraft, and the airport.

In addition to the direct employment generated by PIA, indirect and induced employment is created. The amount of indirect employment is based on experience at LAX. Indirect employment encompasses personnel employed in industries related to airport activity but not located on the airport site. These activities include hotel, motel, restaurant, and related functions which provide goods and services to the passengers utilizing PIA.

Induced employment is determined by applying a multiplier to basic industry employment. In the Los Angeles region, a multiplier of 1.5 (2.5 for total employment) has been found to approximate the "spin-off" employment. The multiplier was applied to the sum of primary direct employment, construction employment, and indirect employment, since these constitute basic employment.

In 1985, the total number of jobs (direct, indirect, and induced) created by PIA would be 4810 (Table 36). In 1990 the employment figure would jump to 13,078.

TABLE 36

PALMDALE INTERNATIONAL AIRPORT DERIVED EMPLOYMENT - 1985, 1990, AND 1995

	1985 (1.5 MAP)	1990 (6 MAP)	1995 (12 MAP)
Direct Employment			
Primary	900	3,600	9,600
Secondary	225	900	2,400
Construction	821	821	642
	1,946	5,321	12,642
Indirect Employment	113	450	1,200
Subtotal	2,059	5,771	13,842
Induced Employment	2,751	7,307	17,163
Total Employment	4,810	13,078	31,005

Source: Arthur D. Little, Inc., estimates.

(2) Operations Phase (1995 on). The employment patterns which are expected to develop at PIA will be different from those of any other airport in the Los Angeles region except LAX. Rather than becoming a short-haul and medium-haul airport, as are Ontario or Orange County airports, Palmdale is designed to be an international airport. It will therefore be the second major airport in the metropolitan region.

As Palmdale moves from the combined construction and operations phase into the operations phase, flight operations will change from being either short-haul, or medium-haul, to include an increasing percentage of long-haul and international operations. As this occurs, direct employment requirements will increase accordingly. By the time PIA moves into full operation in 1995, it is expected that employment will have reached 1000 per MAP and will remain at that level. The resulting employment projections are shown in Table 36. Employment will be around 31,000.

Overall Projections of Economic Activity in North Los Angeles County

The changes that will occur in economic activity and population in North Los Angeles County and in particular the Antelope Valley area will depend greatly on the existence or nonexistence of the proposed PIA.

Growth Without PIA

There will be a modest expansion in industrial activity in and around Palmdale and a continuing push of residential activity from the presently urbanized area of Los Angeles, especially into the Santa Clarita Valley.

Based on an examination of alternative employment forecasts for the area, it was concluded that without creation of PIA employment would grow at a moderate rate similar to the E-0 series employment forecast developed by SCAG. Using this forecast, just over a doubling of employment will occur in the period 1970-95. Employment will grow from the 1970 level of almost 37,000 jobs to 75,150 in 1995 for an average annual increase of 2.9% during the period.

Growth with PIA

If PIA is built, growth trends in North County will be quite different. The activity at PIA and the resultant creation of additional employment -- direct, indirect, and induced -- will cause a dramatic upswing in employment and population in North County. This will be particularly true in and around the Palmdale and Lancaster portions of the Antelope Valley.

Combining the estimated employment resulting from PIA with the base employment level forecast for the area provides the overall employment growth for North County. Employment will grow from 37,000 in 1970 to 106,200 in 1995. By 1995 employment levels will be 41% greater than the base level employment for 1995 assuming no major airport facility in the area. Thus, PIA will have a significant effect on the economic activity for this area.

Public Costs and Revenues

Tax Structure

The following discussion is based on the taxation system in existence prior to passage of Proposition 13. The impact of Proposition 13 on the revenues to be generated in the future cannot be determined at this time and therefore its effect is not considered in the discussion here. However it can be reasonably assumed that State financial assistance would be available to provide necessary services for future growth with or without PIA. Also it can be assumed that the special districts would be able to levy fees on users of facilities. Proposition 13 is not expected to have any appreciable impact on the decision whether to build or to not build PIA.

Tax levies within Los Angeles County are composed of four general rates: county general purpose, school district, municipal district, and special purpose district rates. Taxes on any parcel in the North County include the first two of these and several special district taxes. Special districts include those providing sewers, water, irrigation, roads, mosquito abatement, etc. Municipal rates, which apply in most parts of the county, do not apply in North County since Palmdale does not levy one, although it has already established taxing districts for future use.

The Antelope Valley and Newhall-Saugus areas are subject to the general county rate, flood control levies, and school district tax rates. In addition, each area must pay for water, sewers, roads, and irrigation. The Antelope Valley also has a hospital district and a mosquito abatement district. The areas in or near Palmdale, Newhall, and Lancaster also pay for street lighting on public highways.

Impact of PIA on Public Costs and Revenues

(1) Costs, Revenues, and Growth. The construction of Palmdale International Airport and the resulting increase in population and economic activity would place increased demands on the public sector, particularly in Antelope Valley. The expected growth would necessitate additional public capital expenditures, such as expanded water, sewage disposal, and flood control facilities. By 1995, with a population of some 320,000 people in North County -- including 200,000 in the Antelope Valley -- the nature of the demand for public services will differ markedly from that currently required.

(2) Method of Analysis. It is important for purposes of this analysis to differentiate between the financing plan for the airport and the fiscal impacts attributable to the airport. The airport will be owned and operated by the Department of Airports of the City of Los Angeles and will become part of the regional airport system. The revenues attributable to the airport and the concessions, hotels, motels, and restaurants on the airport land will play an integral part in the airport financing, but will not be considered as revenues to the community.

The purpose here is to determine the cost/revenue impacts of the airport project and assess the impact on the population and the economy brought about by the airport, compared to the impact of growth that would occur without the airport.

(3) Direct and Indirect Public Capital Costs. This discussion focuses on airport impacts during the period 1980-95. Costs will be discussed primarily in terms of capital expenditures and estimated operating costs which will be required at certain levels of population. The main emphasis will be on the impacts which will be felt by the public sector by 1995.

Table 37 shows the estimated capital requirements for public investments required in the Antelope Valley over the period 1980-95. The public investments required to service the direct and indirect population and economic activity growth associated with PIA at a level of 12 MAP by 1995 will probably range between $395-419 million. These investments are over and above those related directly to airport facility construction.

Under the assumption of no PIA, the investment required to provide for the needs of 146,000 people in the Antelope Valley will be between $240-256 million. The incremental capital investment associated with PIA will thus be around $150 million for Antelope Valley growth.

Public expenses incurred between 1980 and 1995 if the airport is built will be quite large in order to provide for the services required by the expanding population base. The largest expenses will be for water and drainage facilities and local circulation improvements. Water would be obtained from the State Water Project and supplied to users by the agencies.

To implement this, treatment plants, pumping stations, and transmission mains will have to be constructed at each turnout from the California Aqueduct. The irrigation districts will rely on water from the local reservoirs and groundwater sources for some time but will eventually have to go to the State Water Project for additional supplies.

TABLE 37

ESTIMATED COSTS FOR PUBLIC SERVICE
IMPROVEMENT, ANTELOPE VALLEY
WITH AND WITHOUT PIA - 1980-95
(millions of 1975 dollars)

	Without PIA	With PIA
Circulation	$ 45.8 - 61.5	$ 68.4 - 91.8
Sewerage Facilities	8.7	11.9
Water Systems	40.5	60.4
Drainage Facilities	71.5	106.6
Solid Waste Facilities	2.2	3.3
Education Facilities	52.6	107.6
Libraries	1.0	2.1
Police Services	3.4	4.5
Fire Protection	0.3	1.2
Health Care	14.7	29.3
Total	$240.7-256.4	$395.3-418.7
Operating and Maintenance Costs (125% of capital costs)	301-320	493- 523
Total Costs	$542-576	$ 888- 942

Source: Arthur D. Little, Inc., estimates.

In addition to these costs, capital expenditures will be required to provide customary population-serving facilities such as schools, libraries, recreation facilities, and fire stations.

ENERGY

Air Transportation and Aircraft Energy Usage

The energy intensiveness of the airplane has increased significantly when compared to other modes. Since 1950, the use of aviation fuel by certified air carriers has increased from 683 million gallons to 10.7 billion in 1973. This is expected to increase to approximately 12 billion gallons by 1980. However, in terms of total energy usage for transportation, airplane fuel utilization represents a relatively small part of the transportation industry totals. The large majority of energy demand for transportation is absorbed by automobiles and trucks with aircraft consuming about 8% of transportation fuel requirements.

Fuel consumption for intercity travel is highest for the auto, totaling 23.11 billion gallons in 1970. This compares to only 8.15 billion gallons for aircraft, although the fuels are not necessarily of the same type.

Energy Efficiency Improvements in Transportation

A number of studies have been made in the past dealing with energy consumption and conservation. Most of these have been on the macro level that focuses on national policies and alternatives. While such studies are not specifically applicable to an assessment of a particular facility such as PIA, they are indicative of possible trends.

A study done by Mitre Corporation in February, 1974, indicated that the primary options for conserving energy are as follows:

- Shift to more energy-efficient modes
- Improve energy efficiencies
- Improve usage patterns
- Reduce travel demand
- Increase load factors

This study concluded that:

> Encouraging more efficient use of existing modes and transportation systems is the only conservation strategy which can be employed for results in the near future.
>
> In a moderate time frame, mode shifts could be effected. But they would not allow significant energy savings, since without enormous capital expenditures for system expansion they could not bear substantial traffic shifted from automobiles.

Aircraft and Airport Use

Relative Energy Use and Efficiency of Aircraft Types

The following discussion on energy usage is derived from a study sponsored by the Federal Energy Administration (FEA) in 1975.[1] This study provided a data base on the industry's characteristics and addressed the extent to which the industry is aggravated by energy shortfalls and fuel prices.

In analyzing energy efficiency the study points out the importance of selecting suitable aircraft for a carrier's route. For example, in domestic use turbofan aircraft in 1973 produced 31.6 seat-miles per gallon (sm/gal) compared with 22.9 for turbojets. The wide-body turbofan jets were more efficient than other aircraft, producing 44 sm/gal in 1973. Despite these differences, however, these efficiencies were not realized during the 1973-74 energy crisis unless aircraft were operated on routes that had sufficient traffic to utilize capacity.

Effects of the Energy Crisis, 1973-74

During the 1973-74 period the airlines carried more passengers with less fuel. According to the above-mentioned study, consumption was reduced from 10.7 billion gallons in 1973 to 9.6 billion in 1974. This saving was attributable to several measures including reductions in schedules and service, elimination of service, aircraft grounding (particularly B-747s), and capacity reduction agreements no longer in force. Major reductions were achieved through efficiencies in process which include improvements in flight planning, engine starting and shutdown, air traffic control, takeoff and landing procedures, speed reductions, use of more efficient fuel altitudes, flap settings, control of fuel reserves, and greater use of flight simulators for training purposes. Speed control, altitude adjustments, and use of flight simulators were the largest savers.

The major impact of the energy crunch, however, was through the rise of fuel prices. Costs of fuel rose from $1.4 billion in 1973 to $2.3 billion in 1974 even though fuel use was reduced by a billion gallons. Fuel price as a percentage of total operating costs increased from 12% in the fourth quarter of 1973 to 19% in the first half of 1975.

---

1. "The Economic Impact of Energy Shortages on Commercial Air Transportation and Aviation Manufacture," Stanford Research Institute, June 1975.

In relation to air transportation activities in Southern California and the development of a Palmdale facility in particular, the above energy impacts have a varied effect. The forecast levels of activity are most directly affected, and the lowered growth rates used in recent studies reflect this. Reductions in aircraft operations and increases in PPO factors also reflect the impacts of fuel use. But many of the impacts of the energy crisis and the long-range effects of energy uses and shortages are industry-wide and are affected by national and international factors and policies. Although a number of the mitigating actions discussed below are applicable industry-wide, some are directly site-relevant.

In relation to alternative transportation developments that are less energy-intensive, some changes will occur. Some ground transportation systems will be expanded. However, it was noted in the FEA study that with the capital requirements of increasing U.S. fuel supplies so great, and limitations on massive energy-intensive undertakings so severe, it is unlikely that new high-speed transportation systems will be built in the next 15-20 years.

Aircraft Fuel Use at PIA

The estimated 1995 aircraft fuel use at PIA is based upon landing and takeoff (LTO) cycle fuel consumption rates. These rates for the total cycle, combined with the forecast of daily aircraft mix, indicate the total gallons of fuel used. It is estimated that in 1995 25.4 million gallons of fuel will be used annually, or about 213 gallons per LTO. Comparatively, LAX used about 230 gallons per LTO in 1972 and the total use was 110.4 million gallons.

Energy Efficiency Measures and Prospects

As discussed in the FEA study, reductions in fuel use were achieved by a combination of conservation measures and actions to increase fuel efficiency. For the most part these actions are expected to be continued on a nationwide basis by the air carriers.

The airlines also achieved major savings through choosing closer alternate routings, adopting fuel-efficient flight paths, and landing heavy (as opposed to dumping excess fuel). Further savings were made in ground handling, including gate or ramp holding versus takeoff flight line holding and reduced thrust on takeoff. Savings were also achieved through programs for aerodynamic cleanliness, systems to maintain engine efficiency, and reduction in use of auxiliary power units. These types of actions would be directly applicable to a Palmdale facility. Further fuel economy in air transportation, according to the air carriers, may be possible through improved aircraft utilization and scheduling, increased seating densities and load factors, and new aircraft and engine design.

It has been proposed that additional fuel savings may be possible by adjusting FAA regulations for consistency with the performance characteristics of present-day aircraft. These adjustments relate to changes in fuel reserve requirements, speed limitations at lower altitudes, and approach and departure patterns to increase fuel efficiency, without compromising safety.

A long-range approach to the energy crisis must focus on reducing fuel consumption per seat-mile through improvement in technological design. National Aeronautics and Space Administration officials believe that major fuel savings could be achieved through extensive use of composite materials, porous supercritical wings, and active controls. Conceptual designs of fuel-conserving aircraft indicate fuel consumption rates of one-third and one-half as much per seat-mile as current aircraft. Current research on fuel-saving characteristics of such aircraft has set a goal of achieving operational reality during the 1985-2000 period.

The FAA, in response to the 1973-74 energy crisis, instituted a six-point conservation program. This program is still in use and has been refined and improved, achieving the following savings:

		Fuel Saved (bbls/day)
1.	Revised Gate-hold Procedures	2,500
2.	Revised Flow Control Procedures	2,800
3.	Optimum Cruise Speeds	400
4.	Revised ATC Procedures	700-3,800
5.	Use of Simulators	3,300
6.	Airport Development	1,200
	Total	14,000

In addition, the FAA has investigated a number of conservation alternatives, as described below:

1. Additional/improved runway exits. By providing more direct routing between the terminal building and the runway considerable fuel savings could be produced. Therefore, FAA analyzed the potential for such fuel savings at three locations in FY 1974. At San Francisco, Chicago O'Hare and Newark Airports the analysis showed potential for saving about 5000 minutes of aircraft delay and over 1000 barrels of fuel per day. By continuing to stress these fuel conservation measures at other airports since that time, a much higher level of conservation has been promoted by the agency. This measure will be considered in the preparation of the airport master plan for PIA.

2. Optimum jet aircraft descent profile. In working with the airline industry another change in operational procedures has been pursued to provide fuel savings. Premature descent and level-off at lower altitudes where fuel consumption is high wastes fuel. The difference in fuel consumption between a continuous descent and one taken in three stages is about 2 barrels of fuel for a Boeing 727 aircraft during each landing. Based on average traffic activity this revised procedure produces fuel savings estimated at 6000 to 8000 barrels per day. The procedure was authorized by FAA in 1973 and has since been refined for even greater fuel efficiency through joint efforts with the airline industry.

It is probable that transportation systems as they are presently constituted will undergo changes as increased demand for services comes into conflict with rising fuel costs, more pronounced national objectives and policies, and continued air quality improvement actions.

The greatest change will probably be in the auto because of its dominant position. Adjustment in automobile size and load factors are the most promising strategies. Shifts to other modes are generally estimated to yield modest energy savings and such savings are dependent on the upgrading of the service and performances of those modes. Changes in the power plant and reduced per capita use also hold promise for fuel conservation. The latter measure is dependent on more efficient land use patterns, a strategy that is proposed in the current North Los Angeles County General Plan Study.

The energy requirements of the airlines have declined with the procedures mentioned previously. If fuel problems increase significantly, airline operations may be further curtailed. Until new fuels and engines become operable, petroleum-based fuels may have to be reserved for airline operations.

Residential Uses of Energy

Energy Uses

According to the Southern California Edison Company, the average kwh/dwelling unit annually in the Valley is 7608, while in Central Los Angeles it is 8700. Similarly, the Southern California Gas Company reports 1042 therms of gas per dwelling unit in the Valley versus 1200 therms in the basin. The estimates of fuel consumption for the 35,611 additional single-family dwelling units attributable to an airport activity of 12 MAP in 1995 are 270.9 million kwh and 37.1 million therms of gas in the Valley. This would amount to 46.9 million gallons of fuel.

Energy Conservation

The following summary discussion on conservation policies is taken from the Energy Conservation Element of the North Los Angeles County General Plan. During the 1973-74 crisis, the Los Angeles Department of Water and Power instituted strategies that resulted in reductions of energy use up to 30% over normal. These conservation policies would also be applicable to PIA facilities.

"Assuming that energy will continue to be a scarce (and increasingly scarce) resource, two basic objectives are appropriate:

1. Energy in all its forms shall be conserved to a degree commensurate with an optimum level of living and economic activities. Special consideration shall be given to conservation measures that relate to public health and safety.

2. The conservation of energy shall be pursued in an equitable manner."

Airport Uses of Energy

(1) Ground Service Vehicles. A number of different vehicles service the aircraft while they are at the terminal gates. Utilizing the service times of the typical vehicles for each type of aircraft and the daily aircraft mix, it is estimated that such vehicles would use slightly more than 1200 gallons of fuel per day. This would amount to 441,285 gallons consumed annually at PIA in 1995.

(2) Terminal Facilities. For planning purposes it is estimated that in 1995 there would be 10.4 million square feet of passenger and air cargo terminal and maintenance facilities at PIA. It is estimated that these facilities would consume 22.8 million kwh of electricity, or 1.7 million gallons of fuel oil, and 900,000 therms annually.

The DOA will, in the planning and design stages of terminal facilities, utilize the most efficient building designs, materials, maintenance and mechanical systems. Further, it is expected that the energy conservation standards for new nonresidential buildings, as promulgated by the State Energy Resources Conservation and Development Commission, will be fully in effect. The most recent standards, adopted in February 1976, have become effective. These regulations set standards on insulation, mechanical systems, heat loss reduction, use of materials, etc., and will be applicable to PIA facilities.

Other Transportation Uses of Energy

Vehicle Use at PIA

The use of autos, buses, and trucks on-site is generated by employees, passengers, and visitors. Based on the employment forecasts related to 12 MAP in 1995, it is estimated that 11.3 million vehicle-trips will be generated and use 4.11 million gallons of fuel. Autos, exclusive of taxis, account for nearly 91%, or 3.7 million gallons, of the total vehicle consumption, while trucks consume approximately 8%, or 317,700 gallons.

Travel to PIA

The auto and bus travel to PIA related to the 12 MAP from the several counties in the Los Angeles area will consume 21.55 million gallons of fuel in 1995. These estimates were based on LARTS data for trips per air passenger and distances between centroids of LARTS zones for a total of 301.76 million vehicle-miles traveled. Alternatively, if the 12 MAP were to travel to LAX the travel distance would be 199.9 million VMT consuming 14.28 million gallons of fuel.

Travel to Work

The estimates for fuel consumption for travel to work are based on the direct and indirect employment generated by PIA activity at 12 MAP in 1995. Travel within the Valley for this group, both to PIA and to other places of employment, will amount to 279.2 million VMT annually. This will result in 19.2 million gallons of gasoline and 69,000 gallons of diesel fuel being consumed. Without a PIA location and using other airports, employees will travel 174.5 million VMT and consume 14.37 million gallons of gasoline. A PIA location therefore results in approximately 105 million more VMT and 5 million more gallons consumed.

GEOLOGY

Characteristics of the Antelope Valley

As part of the region generally known as the Western Mojave Desert, the Antelope Valley extends over 700 square miles of Valley floor and about 800 square miles of drainage areas. The surface of the desert floor rises from about 2300 feet at the playas to about 3000 feet near the foothills, and is occasionally interrupted by isolated buttes rising several hundred feet above the floor.

The area is bounded on the north by a chain of buttes which flank the Soledad Mountain upland; on the south by the high mountains of the San Gabriel-Sierra Pelona ranges; on the east by an inconspicuous upland, part of which bears the name of Long Buttes; and on the west by the Tehachapi Mountains. In the San Gabriel Mountains, altitudes approach 9000 feet, with Mt. San Antonio at 10,064. During periods of heavy rains, water occasionally gathers and evaporates on the lowest part of the Valley floor in the north, forming "dry lakes."

The western and southern margins of the Valley have been formed by uplifting along zones occupied by the Garlock and San Andreas faults; the Soledad Mountain upland is also apparently bounded by vertical rifting.

Geologic History

The present relief of the Tehachapi and San Gabriel ranges is due to extremely rapid uplift during latest Tertiary and Quaternary time, and continuing into the present. This uplift followed a period of gently folding, faulting, uplift, and erosion of all earlier Tertiary sediments.

The uplift of the mountains bordering Antelope Valley has resulted in extensive erosion. Coarser grained sediments have concentrated themselves closest to the mountains; finer grained silts and clays have been carried farthest into the Valley. The erosion and contemporaneous deposition of the eroded material is continuing.

Description of the Palmdale District and the PIA Site

The geology of the Palmdale District, including portions of the San Andreas Fault Zone, the San Gabriel Mountains, and the Antelope Valley floor, has been mapped in some detail. The work done recognizes several subdivisions within the alluvial deposits forming the Valley floor. Alluvial gravel, sand and silt underlies the site of the proposed PIA.

Possible Seismic Risks, Effects, and Costs

Description of Local Faulting

The San Andreas Fault, which forms a straight trenchlike feature bearing about north 65° west through the mountains and hills along the southwest margin of the western Mojave Desert, is a vertical shear zone of

gouge and crushed rock of up to several hundred yards wide. The fault is highly active. The Garlock Fault system is a northeast trenching zone of high angle faults along which movements have been predominantly left lateral. Other faults have been mapped which either branch from or roughly parallel the San Andreas Fault Zone. There are no known or inferred faults within the site itself.

Recent attention has been given to the finding of the "Palmdale Bulge," a large blister-like swelling in the earth's crust in the western part of the Antelope Valley. The San Andreas Fault is considered not to be the primary cause of the bulge. Rather, it is thought that the bulge results from a fault that runs along the Los Angeles side of the San Gabriel Mountains and extends deeply underground on a slant toward the Mojave Desert. The land blocks on opposite sides of this fault are pressing against each other, resulting in a thrusting motion. There is no means of finding out when or if a thrust-type earthquake might occur because of the bulge and related seismic slip.

Seismic History

Of the historic earthquakes which have affected the site, by far the most important is the January 9, 1857, earthquake which was centered near Fort Tejon. The estimated Richter magnitude of this earthquake was 8 or greater. Ground surface rupture occurred along nearly 200 miles of the fault.

Two other major earthquakes have been recorded along the San Andreas Fault in this area. One occurred in 1894 and was apparently centered about 12 miles southeast of the site. Another earthquake occurred in 1899 and was centered near Cajon Pass. Both the 1894 and 1899 earthquakes apparently had magnitudes of about 7. Neither of these earthquakes is known to have produced ground surface rupture along the fault.

Current Seismic Risks

While a potentially damaging earthquake could occur on any of the numerous active or potentially active faults within the area, the most likely to produce a sever shock affecting the site is the San Andreas Fault Zone. It is the longest fault in California, and also one of the most active. The main branch of this zone is within two miles at the closest point to the site boundaries. Because of the proximity of the site to the San Andreas Fault System, it is likely that seismically-induced shaking of the site will occur at times in the future. Because there are no known faults beneath the project boundaries, direct ground rupture along a fault through the site does not appear a possibility. Since the water table ranges between 125 feet and 175 feet below the ground surface, liquefaction appears unlikely.

The distribution of differences in seismic shaking is depicted in Figure 16. These zones have been developed as a general guide to determine what areas can be expected to experience greater earthquake shaking intensities relative to other areas.[1] Three factors were used to determine the extent of the zones indicated: distance from an active fault (San Andreas), the maximum earthquake that can be expected on that fault, and the underlying bedrock conditions.

The liquefaction zones depicted in Figure 16 indicate those off-site portions of the study area where a loss of foundation support can be caused by a significant earthquake shock. This condition is the result of a sudden decrease of shearing resistance in a cohesionless soil (such as sand), accompanied by a temporary increase in pore water pressure.

Because of the near failure of the lower San Fernando Dam during the 1971 San Fernando earthquake, the State of California has conducted a complete review and upgrading of design criteria for dams. Special attention is being given to hydraulic fill structures, and some corrective work is in progress.

Potential Earthquake Effects on PIA and Induced Growth

(1) Deaths and Injuries. The extent of death and injury among future populations in the North Los Angeles County area will be a function of, among many other factors, the rate of growth at any point in time and the distribution of induced population growth.

It is estimated that 380 deaths and 1520 injuries would occur in 1995 with PIA as against 287 deaths and 1148 injuries without PIA. It should be noted, however, that an estimated 90% of the future residents induced by PIA will settle in the North County area, with the remainder residing in other sections of the county. These projections are based on ratios calculated in the National Oceanic and Atmospheric Administration (NOAA) report for a 4:30 p.m. assumed occurrence of an 8.3 magnitude earthquake on the San Andreas Fault. Serious injuries are computed at a 4:1 injury to death ratio.

The projections should not be considered precise, but only approximations; many factors can modify them, such as improved building codes and earthquake damage abatement procedures. In addition, these estimates for PIA growth should be considered high; many of those who would have moved to North Los Angeles County because of PIA would have lived elsewhere in the region and presumably could be victims of the same earthquake.

---

1. North Los Angeles County General Plan, Seismic Safety Element, Preliminary Draft, November 1974.

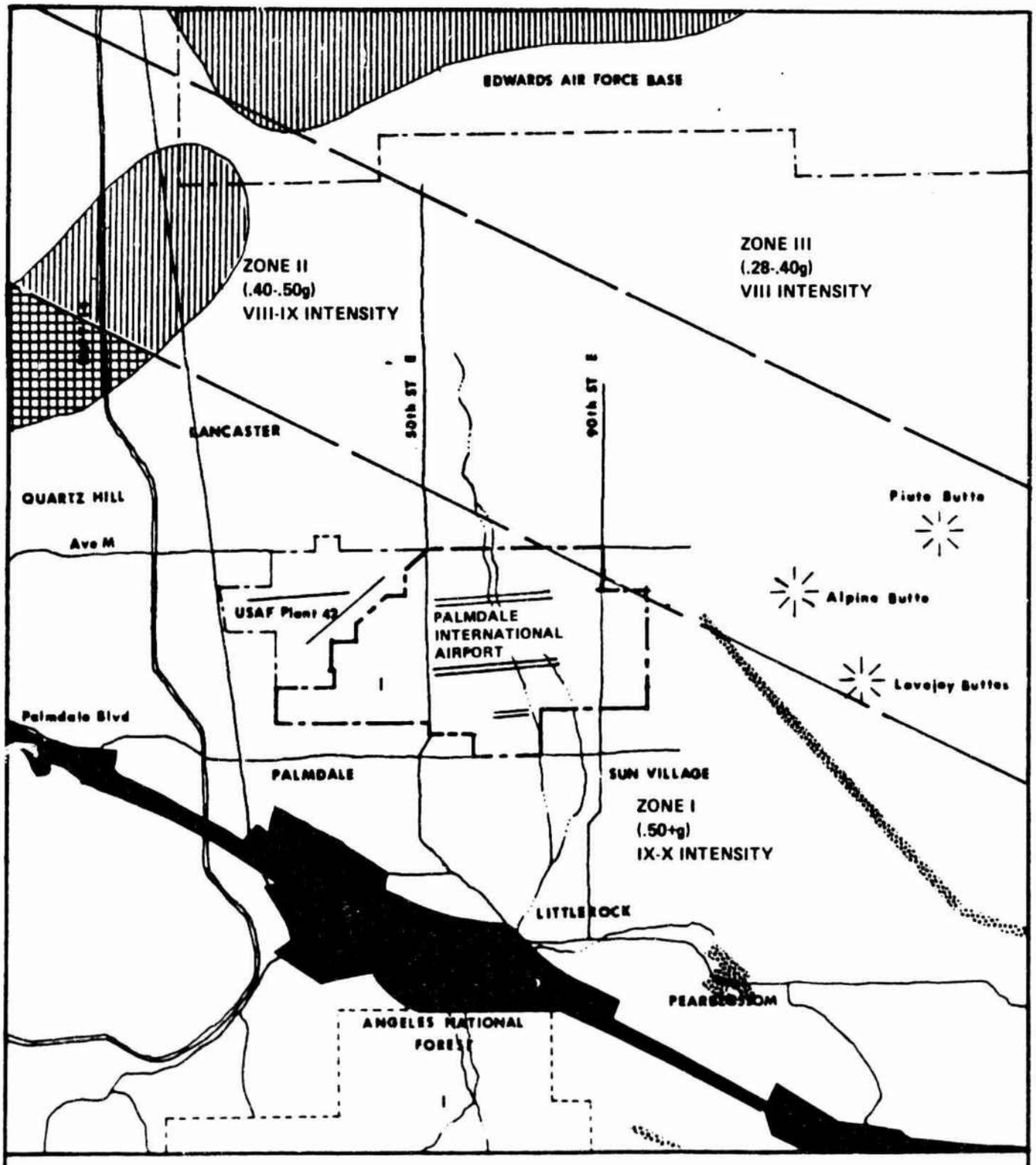


FIGURE 16 GEOLOGIC HAZARDS

- Active Fault Zone
- Potentially Active Fault
- Liquefaction Zone 1
- Liquefaction Zone 2
- g — Ground Accelerations, in terms of gravity

- I — Severe Intensity
- II — Moderate Intensity
- III — Least Intensity

NORTH

SCALE 0 3 6 MILES

Source: North Los Angeles County General Plan, November 1974.

(2) Single-family Housing. Some idea of the magnitude of future damage can be gained from an analysis of past events. For example, the 1971 San Fernando earthquake inflicted an estimated $500 million worth of damages.

Based on historic as well as other data used to extrapolate future earthquake effects, the previously cited NOAA report estimates that 71% of all single-family homes in the study area would receive some damage, and that each unit would average, roughly, $1,000 worth of losses. If such assumptions were used to estimate future losses to single-family structures in the North Los Angeles area, $91.2 million in damages in 1995 can be estimated with PIA as against $43.3 million without PIA.

As with the case of casualty projections, these estimates could be considered high because many of the same dwelling units listed here as damaged would be affected by the same earthquake event if they were built elsewhere in the Los Angeles County area. Moreover, these projections assume existing building codes, whereas future codes will likely reduce losses more effectively.

In the North County area, it is assumed that the number of major buildings of eight stories or more will continue to be very low as compared with the remainder of the county. Areas of greatest concern in the North County will be along the southern fringe, adjoining the San Fernando Valley, and along the base of the San Gabriel Mountains. No important critical structures will be located in active or potentially active fault zones without being designed to withstand stresses associated with maximum probable ground accelerations.

(3) Schools. The North Los Angeles County General Plan projects a need for additional elementary and secondary schools in the study area by 1995. Because there are no pre-Field Act schools in the area, it is believed that earthquake effects on these facilities will not result in significant damage or loss of life.

(4) Palmdale International Airport. The Alaskan earthquake of 1964, with a magnitude of 8.4, serves as a reasonable guideline for anticipating the effects of a similar event on the proposed PIA site.

Of the 64 inspected airports subjected to the above event, a total of 13 experienced runway or taxiway damage. Nearly all airports were operational within hours after the shock despite runway and building damage.

The runways of airports in the San Fernando Valley remained functional after the 1971 shock. Besides some glass breakage in the control tower at Burbank and Van Nuys Airports, there was a loss of electric power at several other airports which caused blackouts in terminal buildings and prevented the pumping of underground aircraft fuel.

Although it is reasonable to expect serious structural damage to some of the buildings, runways and taxiways should regain their functions within hours after a serious shock. However, damage to freeways and roads could impede access for several days. Curtailed electrical power could affect fuel pumping and require the use of emergency power for control tower operations.

Mineral Resources

The impacts on resources resulting from the development of PIA are expected to be minimal since few or no resources are located on the site. Some sand and gravel deposits may be used for airport construction if economically feasible. Off-site impacts are similarly minimal as no new extraction is expected and existing sand and gravel operations are sufficient.

Engineering Constraints and Planning Considerations

The proximity of the San Andreas Fault with its associated ground shaking magnitudes must be taken into account for all development and construction plans made in this region. Structures should be designed and constructed to withstand such forces by complying with local building codes designed for earthquake protection.

Earthquake-resistant design requirements will involve an investigation of dynamic soil properties to evaluate site-specific potential loss of shear strength and potential deformations and loads imposed during seismic activity. Particular attention will be given to the design and location of underground storage tanks and utility lines to resist earthquake-induced compaction, settling, and alluvium disturbance.

Residential, commercial, and industrial development associated with the airport will also be subject to engineering design and land use controls relating to seismic problems. Land use zoning is advisable to prevent development in drainage areas downstream from the water storage dams located in the foothills of the San Gabriel Mountains or on flood control plains and water courses, areas that usually contain unconsolidated soils.

The airport design specifications will include a full testing program for each type of structure on the site when appropriate to evaluate the relative behavior of different soils during seismic activity. Anticipated mechanical response of soils at the site to seismic activity, therefore, will be considered in the design and construction of all facilities and in soil compaction.

Mitigating Actions

Based on the available information, the PIA site appears to have the same geologic and seismic hazards as most sites in the Palmdale area outside the fault zone. However, it is likely that future intensive seismic shaking will occur at times on and around the site. Such

intensive shaking could produce minor consolidation of the Quaternary sediments beneath the site as well as some surface rupture or displacement due to lurching. Because of the depths to the water table, liquefaction appears unlikely.

To reduce the extent of damages resulting from a major earthquake, the following recommendations can be followed:

a. The use of seismic zones depicted in Figure 16 is considered sufficient for evaluating the suitability of most land uses, except for the most important or critical. Delineation of these zones is not intended for use in defining seismic design criteria, although there is a general correlation between these zones and the increasing range of anticipated ground acceleration. Therefore, on-site investigations should be conducted to determine more precise ground response figures and the extent, if any, of fill material. The recommendations of a foundation engineer, seismologist, and engineering geologist should be considered in both the design and construction phases of the project, and all structures should be designed to compensate for the earthquake potential of the area.

b. Development should be restricted in active or potentially active fault zones. The Alquist-Priolo Act designates major active or potentially active fault zones. It also establishes policies and criteria to assist cities and counties in dealing with seismic hazards. State jurisdiction applies to all new real estate developments or structures for human occupancy in fault zones (one-quarter mile or more in width). Local governments have the option of adopting more restrictive requirements, especially for critical structures such as hospitals and schools.

c. The recommendations listed in the report of the Los Angeles County Earthquake Commission, San Fernando Earthquake, should be adhered to by the appropriate agencies.

d. The policies and recommendations set forth in the Seismic Safety Element of the North Los Angeles County General Plan should be considered as a part of the development program for the Antelope Valley area.

Relative Seismic Hazards of Alternative Airport Sites

The analysis of seismic factors concerning the PIA site and vicinity shows that location to be associated with a high degree of risk from ground shaking due to the proximity of the San Andreas Fault. Such an analysis, however, does not involve a comparison of relative risks between the PIA site and other alternative airport sites in the Southern California regional airport system. Any one of these potential sites and vicinities will probably sustain some damage from a major earthquake stemming from any one of a number of active or potentially active faults in this region. Among other factors, the degree of damage to any site will be determined by the magnitude of the earthquake, distance from the causative fault, and underlying soil conditions.

Because data which might provide reliable estimates of recurrence values for given accelerations are largely unavailable, it cannot be accurately stated which faults will produce major earthquakes during the next 50-100 years. Consequently, it must be assumed that any known active or potentially active fault within the region is a potential source of a damaging earthquake.

ARCHAEOLOGICAL/HISTORICAL SITES

General Findings and Recommendations

An archaeological investigation of the proposed airport site was contracted for and completed during summer 1973 in three stages:

- Compilation of data relating to the existence of known archaeological and historical resources in the Palmdale-Lancaster region and to the present status of investigations of these resources.

- A surface and limited subsurface survey of the proposed runways and randomly designated portions of the airport site to locate, identify, and assess any features of archaeological or historical significance not previously known from this area.

- Assessment of the direct impact of the project on the surveyed areas.

No archaeological or historical features of major significance were found to exist in the impact areas surveyed. The project made use of standard archaeological and transect methods.

Construction of the runways and passenger terminals will not disturb any significant archaeological or historical features dating to within the past [illegible] years. However, the possibility of the existence of sites dating [illegible]rlier periods of prehistory has not been explored in sufficient detail to make a statement regarding the impact of the proposed runways on such of these features as might be present.

In addition to this survey of the site, the NLAC General Plan study identified the unique cultural and geological features for the North County study area. Their findings indicated that there are no unique or historical features located on the site. The Historical Landmarks Committee of Los Angeles County has also verified this condition.

Based upon the findings of the field survey, it is determined that construction of the runways and passenger terminals will not disturb any significant archaeological or historical features on site.

Recommendations for Future Research and Protection of Resources

- The 3520 acres examined in the survey represent only 18% of the proposed airport site. Further field examination should be conducted prior to master planning and construction activities in the area located between 75th and 105th streets East to the north of Avenue P due to the proximity of known sites in the Big Rock Wash drainage.

- Careful attention should be given during actual construction to indications of habitation or of exploration of the area by aboriginal or early historical peoples. An archaeologist should be retained to make periodic checks of deposits exposed during grading and earth-moving operations and to investigate features noted by construction crews. The latter should also be alerted to the possible existence of such features so that unnecessary destruction can be prevented.

INDUCED SOCIOECONOMIC IMPACTS

The creation of a major international airport at Palmdale will generate additional population growth and economic activity, and increase and change the use of land throughout the Antelope Valley. It will be a stimulus for jobs, businesses, and community and urban development. The airport will be an especially significant instrument of change because it means construction of an entirely new facility along with various service/support activities rather than expansion of an existing one. It will encourage further urbanization. Employment and population will increase as will the amount of land absorbed for urban development.

In the short run, development of the airport will result in significant opportunities for construction employment. As the airport begins operations, airport, aircraft, and air transportation service employment will predominate. Further employment will occur in more commercially-oriented activities such as hotels and motels as well as other ancillary travel activities. The payroll from these jobs will in turn be spent on such things as housing, retail purchases, and community services. This in turn will generate a secondary, or induced, round of employment and business opportunities.

The North County area has been experiencing significant population growth rates in recent years. With or without the airport, this growth will continue to be in excess of either regional or county overall growth rates. It is estimated that with PIA operating at a level of 12 MAP by 1995, population and economic activity in the area will be about one third more than that which would probably occur without the airport. For the total North Los Angeles County area it is anticipated that population will increase from the 1975 level of 148,000 to a level of 317,000 with PIA in the year 1995. The estimated increase without PIA is, by contrast, forecast to be 240,000 by 1995. Further, employment by 1995, assuming the development of PIA, will be at a level of approximately 106,000. This compares to estimated employment without PIA of just over 75,000.

In addition, airport-induced population and economic growth in the North County will be accompanied by an increase in land use demand for residential, commercial, industrial, and recreational purposes. With PIA, the population-serving land area will increase from approximately 94,000 acres currently to 137,000 acres in 1995; without PIA it is estimated to be 110,000 acres. Moreover, the development of the airport will generate significant additional requirements for community services and related infrastructure facilities such as highways, local circulation streets, and water distribution and sewage and solid waste management and disposal systems.

For the six-county SCAG region as a whole, it is not expected that the development of PIA will result in the creation of significant economic growth over and above that foreseen during the next 20 years. Since the purpose of PIA is to provide for the accommodation of some of the anticipated demand for air transportation in the greater Los Angeles area, the creation of PIA reflects an intra-regional shift in growth from that which might otherwise occur in other geographic subareas within the greater Los Angeles area.

SECTION IV: ALTERNATIVES TO THE PROJECT

This section examines possible alternatives to the development of a new airport facility located at Palmdale. This discussion will focus on three alternative concepts of providing air transportation services, including no further improvements. In addition, below discussion of operational and technological developments that can possibly expand the capacity of airport facilities or lead to improvements of or diversion to other modes of transportation is provided.

INTRODUCTION

Planning for the accommodation of the demand for air transportation in Southern California has engaged the efforts of the aviation industry, aircraft owners, users, operators, and transportation planners for more than two decades. Beginning with the early attempts to provide serviceable airports during the 1920s and 1930s, followed by the significant aviation development during World War II, the air transportation industry has been under continuous pressure to provide adequate, safe, and reliable services and facilities. In response, several major commercial airports have been developed, such as Los Angeles International, Ontario International, Long Beach Municipal, Orange County, and Burbank-Glendale-Pasadena Airports, along with Van Nuys and Torrance Municipal as general aviation facilities and March, Norton, Point Mugu, and El Toro as military fields.

The Southern California Regional Airport Study,[1] conducted in 1964, was the first comprehensive study for the region. From this study it was not anticipated that the region needed a new major airport during the period to 1990. Its projection of air passenger activity by 1970 of 15.3 million annual passengers is low by comparison with actual 1970 activity for the greater Los Angeles area of 24.1 MAP. The difference becomes more striking for the long range (1990): the study forecast 38.7 MAP compared with current FAA forecasts of approximately 69.4 MAP.

Several airports and most of the counties of the region have also undertaken comprehensive aviation planning studies. In most instances, present facilities have been determined to have a finite capacity for a number of environmental and physical reasons. These limits, in the face of the expected demand, have led to increased pressures to seek viable alternatives.

Three broad system concepts have been developed within which alternatives are described and evaluated. The concepts are briefly described as follows and discussed in detail in the text to follow.

---

1. Stanford Research Institute, Regional Airport Study, March 1964.

- Alternative A. This concept assumes that further major expansion of existing airport facilities and supporting services would not be pursued as a course of public policy. Any improvement to the several airports comprising such a system would be minimal and primarily for safety and maintenance purposes.

  The activity demand levels would be allocated to the basic group of existing airports now providing commercial air carrier service. The basic airport group consists of Los Angeles (LAX) and Ontario (ONT) International Airports, Long Beach Municipal (LGB), John Wayne (Orange County) (SNA), and Burbank-Glendale-Pasadena (BUR) Airports. In discussing this alternative concept, consideration would be given to effects of limiting airport capacity, and to the uses of other modes of transportation.

- Alternative B. This concept focuses on expansion of the above-designated airports to provide additional system capacity. These improvements would be based on plans currently proposed but would not include new airport facility development. The capacity increases would also reflect the effect of improved air traffic control measures and changes in aircraft mix, performance, and occupancy ratios.

- Alternative C. Addressed under this option is the capability of the designated airports to accommodate demand by realizing ultimate capacity, under constrained physical, operational, technical and environmental conditions. As part of this exercise, the use of military airports and short takeoff and landing transportation systems is investigated. In addition, alternative sites for new airport development are evaluated as a means of providing additional capacity to the existing system of airports.

ALTERNATIVE TECHNOLOGIES

1. Remote Terminals

To provide relief to airport access congestion and consequently increase airport terminal capacity, a system of satellite or remote collector terminals was proposed in the SCRASS study. The concept has also been the subject of a study by the U.S. Department of Transportation and the Los Angeles Department of Airports.

The satellite system analysis by DOT indicated that such remote terminals could be considered attractive and economically viable when located in or near downtown city centers. For the Los Angeles area it would appear that such a system with three to five satellites might attract up to 30% of air passengers, particularly if it were part of a larger transit system.

During the 1990-2000 decade, such a system, to be effective, should be related to an areawide rapid transit system (if in operation) and should be established consistent with other access improvements. It should also be related to any new airport proposals. Satellite terminals could result in some relief of airport access problems as they would serve some passengers. The main terminal, however, would probably continue to attract most travelers.

The alternative most likely to develop is one of small functional stations located throughout the region at points of high demand with frequent and reliable service and flexibility to meet a changing market.

2. Diversion of General Aviation

In a sense, diversion has already been accomplished at LAX. General aviation currently accounts for 13% of the total number of airport operations at LAX; it has been slowly declining over the years. Similar reductions in GA activity have occurred at other major air carrier airports.

No assessment was made of general aviation airport capacity to absorb diversion. This capacity is of critical importance to the Los Angeles area where the demand would assume significant proportions over time with a limited number of airports. Furthermore, future growth in general aviation that would otherwise be accommodated at major airports would require new facilities. The sites for, and the cost of providing, such facilities are limited in Southern California.

3. Future Developments of Other Transportation Modes

a. Technological Developments

Developments over the past few years have suggested that high-speed ground transportation (HSGT) and short-haul air transport technology could in the future divert a significant number of passengers from conventional aircraft.

The significance of such developments is seen in the fact that almost half of the forecast air passengers for the Southern California region are destined for points less than 500 miles away. A high percentage of this travel is in the San Diego-Los Angeles-San Francisco corridor.

As a consequence, technological developments relating to air transportation systems such as STOL have been studied extensively off and on for more than a decade for applicability to the California corridor. The prospects of these systems as competition for or relief of conventional systems for short-haul intercity travel in California can best be summarized by saying that they might come about within the next 15-20 years. The application of these systems to Los Angeles, therefore, in terms of carrying capacity and diversion of air passengers is an unknown quantity at this time.

b. Conventional Rail

This type of rail transit is characterized by the turbo-train currently in operation between Boston and New York and the Metroliner operating between Washington and New York. Both systems operate in the 80-120-miles per hour speed range with the condition and curvature of the track being the primary determinant of their operating speed.

The recommendations contained in the Northeast Corridor report of 1971 were, in effect, that in spite of all the study, there were too many uncertainties about the future of new technology fixed-guideway systems and air transport developments to recommend a massive investment in high-speed rail systems.

c. Intercity Ground Transportation Studies

A report was prepared by the California Department of Transportation, in cooperation with the Comprehensive Planning Organization (CPO) of the San Diego region and the Southern California Association of Governments, entitled "San Diego-Los Angeles Rail Passenger Service Engineering Feasibility Study." Completed in December 1975, the report addresses all modes of intercity travel in the San Diego-Los Angeles corridor. A wide range of rail alternatives was examined, ranging from relatively modest, incremental facilities upgrading through the consideration of high-speed ground transportation.

This analysis indicated that modest improvements to the existing rail system had the most solid cost/revenue picture, with the annual revenue/cost ratio decreasing for each increased improvement. The study indicated that improved rail has only a marginal effect on diverting travelers from other modes.

d. Short-haul Air Transportation Systems

The 1972 National Transportation Report concluded that:

"Technological innovations within the transportation industries can alter the growth of total passenger and freight traffic; more significant is their influence on the division of traffic among the various modes. Because of the long lead times for the commercial application and widespread implementation of technical innovations, it is very possible that new transport technology will not affect the total traffic volumes moving on the various modes more than marginally during the next 20 years. While transportation innovations may have great implications for transportation investment planning, they will neither significantly diminish nor divert the traffic moving on the conventional modes during the forecast period."

"Passenger traffic levels are particularly unlikely to be radically altered as a result of technical innovation. No substitutes for the automobile's domination of the short-distance market or for the airplane's domination of the long-distance market appear to be

probable. The development of short or vertical takeoff and landing aircraft and of a tracked air-cushion vehicle will proceed, but their impact on total passenger-miles will be marginal at best during the forecast period (1970-1990)."

Special consideration has been given to the segregation of short-haul from medium- and long-haul traffic as a means of relieving congestion, with the possibility of short-haul passengers being served at a variety of existing general aviation facilities in major metropolitan areas. Whether or not this so-called "segregated" air system will become a reality depends on many factors, including those of a nontechnical nature such as community acceptance. One of the main stumbling blocks to the segregation of traffic to date is that aircraft have not been developed that can meet generally agreed upon performance and noise standards for operating in an urban environment; equally important, one has not been developed with operating economics that are attractive to the airlines.

Uncertainties are also raised about the levels of patronage being sufficient to support such a widely dispersed and costly system. Past transportation history has indicated that short-haul systems serving low-density markets are belabored with financial and operational failures except when highly subsidized. A STOL system would most likely serve as a support component to other more established methods of conventional air transportation, rather than a true alternative to new aviation facilities.

ALTERNATIVE CONCEPT A: SATISFYING AVIATION DEMAND WITH MINIMAL AVIATION FACILITY DEVELOPMENT

For this concept and the two following, B and C, the FAA regional demand forecasts of 55 MAP in 1985, 69 MAP in 1990, and 85 MAP in 1995 are used.

1. Description of the System and Assumptions

The accommodation of demand at a level determined by the capacity at existing facilities represents essentially a no-action alternative. It is based on the premise that the existing major air carrier airports (LAX, ONT, LGB, BUR, and SNA) will continue to serve as the core of the air carrier transportation system while retaining their present basic facilities and conditions. It is assumed that minor incremental improvements to these airports and their terminals would occur, such as repair and strengthening of runways, construction of additional taxiways, and terminal building remodeling. These general improvements would be undertaken to maintain current operational standards and levels. It is also assumed that there would be no major new developments or expansion of aviation facilities. Community constraints, such as the need to minimize noise, are also considered to be important limitations on the use of these airports.

Some minor changes would occur, however. For one, the air carrier aircraft mix would gradually change to reflect a greater use of new generation wide-body jets, thus increasing the number of passengers that could be handled per aircraft operation. For another, improvements in airspace and airport control methods and equipment would allow for more aircraft operations.

2. General Characteristics of the Basic Airports

a. Los Angeles International Airport

The airport is owned by the City of Los Angeles and operated by the Los Angeles Department of Airports. The site has been utilized as a major air carrier facility since 1946. The present individual airline terminal concept was effected in 1962 and occupies 265 acres of the total 3500 site acreage. The runway complex utilizes approximately 1257 acres while 420 to the northeast are used as a buffer zone.

(1) Present Facilities. The principal terminal facilities consist of seven ticketing satellite buildings, a control tower and administration building, a central utility plant and two general services buildings, plus a centrally located theme building. These buildings are located between the two sets of parallel runways and are connected by one major access and circulation loop roadway. There are also two other major terminals, one for commuter and supplemental airlines and the other for cargo. These

terminals are utilized by 38 major air carriers, three commuter lines, and 19 supplemental carriers. In addition, six of the major airlines operate large maintenance bases.

The airport has parking space for 8246 cars in a central lot. Several perimeter parking lots have been constructed to provide an additional 12,383 spaces. There are proposed plans to add another 10,047 spaces in the central area and 16,700 spaces in peripheral lots. Public transportation is available through limousines, local bus lines, rental cars, and taxis.

There are four parallel runways at the airport which are oriented east-west. On the south side of the terminal are runways 25-R (12,090 feet) and 25-L (12,000 feet). This latter runway has an Instrument Landing System. Runways 24-R (8925 feet), with an ILS, and 24-L (10,285 feet) are on the north side. The two sets of parallels are separated by approximately 4800 feet.

(2) Level and Type of Aviation Activity. During 1978, LAX handled 529,000 total aviation operations. Of this number, 456,000 or 87%, were commercial air carrier and air taxi operations which carried 31.3 MAP.

This level of activity was achieved by a variety of commercial jet aircraft that provide international and long-, medium-, and short-haul services. There were also local commuter, air taxi, and air cargo operations as well as a small volume of military, government, and general aviation activity. It is anticipated that under Alternative Concept A, LAX will continue to provide these services into the future because of its facilities, capacity, and long-standing role as the region's major airport.

(3) Airspace Capacity. As LAX is the dominant airport in the Los Angeles region, the Air Route Traffic Control System (ARTC) has been designed to maximize access and minimize conflicts with routes to other airports and their terminal control areas. A Terminal Control Area has been instituted for LAX which eliminates the mixing of controlled and uncontrolled aircraft within approach and departure airspace. These conditions, coupled with the absence of any adverse terrain features near LAX and further improvements in control operations, assure LAX of nearly unconstrained airspace capacity in the future.

(4) Airport Terminal Capacity. The FAA estimated practical annual capacity is 448,000 air carrier operations. This capacity has already been exceeded in 1978 and is expected to be exceeded in coming years, causing heavy congestion in the terminal areas. The 31.3 MAP accommodated in 1978 is the saturation capacity of the existing terminals based on current physical conditions of the airport, aircraft mix and PPO factor.

(5) Ground Access. Access to and within the airport is one of the prime factors restraining LAX from attaining ultimate capacity. The congestion that occurs on Century Boulevard is estimated by the DOA to limit ground access to 27 MAP. Extremely heavy congestion was encountered

on Century Boulevard in 1978 when the passenger count reached 31.3 MAP. The planned construction of I-109 from I-609 in Norwalk to Sepulveda Boulevard near LAX, with 6-10 lanes and an exclusive busway, will markedly improve airport access. The construction of a five lane elevated roadway structure and terminal expansion (LAX Airport Improvement Program EIS, 1980), will exceed congestion goals of 40 MAP on a yearly basis by 1984.

(6) Environmental Quality. Air and, in particular, noise pollution are major factors influencing continued growth at LAX. In an attempt to mitigate the impacts of noise on residential and other areas, the DOA has taken several steps. These include acquisition of land under the approaches to the north runways, instituting over-water landing approaches from the west at night, and restricting use of LAX by noisy aircraft or aircraft that will not meet Federal Aviation Regulations, Part 36, by 1981. At the same time, the increased use of the newer generation of aircraft has provided some relief.

These improvements also modify the impacts on air quality. Moreover, various proposals for Los Angeles as a whole (such as rapid transit) to alter the use of the automobile and reduce emissions, as proposed by the Environmental Protection Agency, should benefit the airport and its environs. These factors suggest that 30 MAP may be a reasonable level of activity.

b. Ontario International Airport

Located in the City of Ontario, ONT has been operated since 1967 by the Los Angeles Department of Airports under a joint powers agreement. The airport is located 35 miles east of downtown Los Angeles and has a land area of 1442 acres.

(1) Present Facilities. In addition to land available to serve airline needs, the airport accommodates the 163rd Tactical Air Support Group of the California Air National Guard, several large aerospace industries, and ground services for private and business aircraft.

The terminal building contains airline ticketing counters and sales offices of nine major airlines and a commuter airline, and space for other support services. Parking for more than 1800 automobiles is provided in an adjacent nine-acre lot.

The existing runway, oriented east-west, is 10,000 feet long and is equipped with an ILS. A second, diagonal runway is 4750 feet long. A new replacement runway 10,200 feet long to accommodate the newer, larger aircraft is under construction.

(2) Level and Type of Aviation Activity. Since 1959, ONT has been designated by the major air carriers as an alternate facility when weather conditions at LAX are below minimum for landings or takeoffs. Furthermore, a CAB ruling, issued March 28, 1969, states that ONT holds the status of a hyphenated facility with LAX. Under this ruling, major airlines certificated to serve Los Angeles may, without further permission from the CAB, initiate service from Ontario on any of their authorized routes.

During 1978, the airport accommodated 174,000 aircraft operations, including 48,000, or 27.6%, commercial air carrier and air taxi operations. During this time service was provided for 1.85 MAP.

(3) Airspace and Airport Capacity. LAX traffic patterns and the nearby location of two military fields and three general aviation airports appear to limit capacity to about 195,000 annual air carrier operations, or 12-14 MAP.

(4) Terminal Capacity and Ground Access. The existing terminal is estimated to have a capacity of about 2 MAP. Significant additional capacity can be achieved only through major relocation and the construction of a new building.

Access to ONT is considered excellent due to the San Bernardino Freeway and the improvements to Terminal Way, the main airport circulation road. These roads (particularly the circulation road) are expected to provide ample access capacity for some time in the future.

(5) Environmental Quality. The major noise impacts occur to the west of the airport in those sections of Ontario lying under the takeoff flight path. Some of the noise also affects Montclair, Chino, and Pomona.

In terms of air pollution, the conclusions of a recent EIS study for ONT indicate that, based on 1985 projections of air and surface traffic, the California standard for particulates would be exceeded slightly even with the introduction of new aircraft. The other contaminants will all remain below the 1971 State and Federal Standards.

c. Long Beach Municipal Airport

This airport is owned and operated by the City of Long Beach.

(1) Present Facilities. The existing terminal is small but adequate, and capable of handling current demand. However, any significant increase in demand would require a new terminal complex. The airport also provides support facilities and services for a large number of general aviation aircraft on a land area of approximately 1300 acres.

In addition to the typical aviation service facilities provided at LGB, the McDonnell Douglas Aircraft Corporation production plant is located on airport property. This plant employs about 24,000 people who are engaged primarily in the production of the DC-10.

Operational facilities consist of one 10,000-foot runway (12-30), with an ILS, diagonally bisecting two sets of parallel runways of 4000-6000 feet in length at right angles to each other.

(2) Level and Type of Aviation Activity. During 1978, air activity at LGB reached 602,000 annual operations. Scheduled and nonscheduled air carrier service accounted for 17,000 operations, or 2.8%, while general aviation and McDonnell Douglas test and training flights made up the bulk of operations. Nearly 446,000 passengers were transported by the air carriers in 1978.

(3) Airspace and Airport Capacity. LGB lies within the shadow of the LAX terminal control area and air traffic patterns. Any significant increase in air carrier operations would result in conflicts with LAX and require adjustments in air traffic patterns for both airports. It would appear that LGB is operating near capacity under present conditions.

(4) Ground Access. The major means of ground access to LGB is the San Diego Freeway adjacent to the airport. The approach road to this airport is adequate but would be strained at passenger volumes approaching 1 MAP.

(5) Environmental Quality. The location of the airport in the midst of developed urban land has given rise to strong complaints about aircraft noise. Both the approach and departure paths of RW 12-30, used by all jet aircraft, are over residential areas.

The City Council, responding to citizen concern, has set a policy that no further air carrier traffic growth will be permitted with the current generation of jet aircraft. The lease agreements limit the number of flights per day and the type of aircraft that can be used, and prohibit flights between 11 p.m. and 7 a.m. At the limits set on air activity, air quality is not a restraining factor in the use of LGB.

d. Burbank-Glendale-Pasadena Airport

The airport was owned and operated by Lockheed Aircraft Corporation as a privately-owned air carrier airport until recently. The State Legislature authorized the formation of a joint powers agency to purchase, operate and maintain the airport. The Cities of Burbank, Glendale and Pasadena formed the Hollywood-Burbank Airport Authority (HBAA). Transfer of the title from Lockheed to HBAA took place on June 29, 1978.

(1) Present Facilities. The ground facilities for the airport serve a number of different activities. A small terminal that contains airline ticketing areas and related functions is now operating at near capacity. In addition, Lockheed has a number of manufacturing, maintenance hangars, and related structures. These buildings, with their apron areas, occupy a considerable amount of the 550 acres of the airport property and are aligned along both runways, restricting airport terminal expansion unless demolished. In addition to servicing military aircraft, these facilities are utilized by a large number of general aviation and business aircraft.

Although the airport is centrally located in relation to major population and activity areas of the Los Angeles Metropolitan Region, it is in a heavily urbanized area at the eastern end of the San Fernando Valley. It is also bracketed on three sides by the Verdugo, Santa Monica and San Gabriel Mountains, all less than five miles away. Furthermore, a substantial residential area is situated just south of the airport.

The airport has two runways in cross configuration, 6955 (15/33) and 6088 (7/25) feet in length. The latter runway is equipped with an ILS.

(2) Level and Type of Aviation Activity. BUR provides short-haul and local air carrier service. Because of runway length, it cannot accommodate jet aircraft larger than a 727 or DC-9 operating on short-haul stage flights, although the L-1011 tri-jets are serviced there.

During 1978, there were 287,000 operations at BUR, including 51,000 air carrier flights which carried 2.1 MAP.

(3) Airspace and Airport Capacity. The terminal airspace control area for BUR is adjacent to that of LAX. It also overlaps three general aviation fields -- Van Nuys, San Fernando and Whiteman. Airspace at the current level of operations is adequate.

(4) Terminal Capacity and Ground Access. The existing terminal building is operating above its capacity. Current expansion plans would increase this capacity to 2.5 MAP. Access to the airport is adequate with the nearby location of Interstate 5 and the six-lane arterial connection via Hollywood Way.

(5) Environmental Quality. With the proximity of residential areas to the airport, BUR activity engenders serious noise complaints. As a result, the city has attempted to regulate aircraft activity to lessen noise impacts. With urban development having already occurred adjacent to airport property lines, acquisition of land does not appear to be a feasible solution to resolving noise problems or allowing for airport expansion. It is expected, therefore, that noise will continue to be a factor limiting growth of the airport.

A modest growth in aircraft activity does not appear likely to result in conditions that would exceed federal and state air quality standards. However, during days of low inversion that affect the entire San Fernando Valley, certain standards may be exceeded because of high concentration points.

e. John Wayne (Orange County) Airport

The County of Orange both owns and operates this airport. SNA is the only airport in this rapidly growing county that provides air carrier service.

(1) Present Facilities. The major facilities consist of a small terminal building and attendant functional areas, and service, aircraft parking, and hangar areas for general aviation activity. The terminal is generally considered inadequate for current use and for the steadily increasing demand. Parking and other general support facilities and areas have sufficient capacity to accommodate a modest growth in activity. The airport site of 525 acres, with one proposed and one fully functional freeway at both ends of the runway, is physically restricted from expansion without major land use modification.

The airport has one 5700-foot runway (19R-1L) and an ILS and a second parallel runway (19L-1R) 2888 feet long. This latter runway is used by general aviation aircraft only.

(2) Level and Type of Aviation Activity. SNA primarily serves the short-haul and local aviation demands of Orange County. The very high percentage of general aviation operations at SNA serves as a constraint to increased air activity.

In 1978, there were 604,000 annual operations at SNA, of which 49,000, or 8.1%, were air carrier operations handling 2.26 MAP.

(3) Airspace and Airport Capacity. Airspace capacity is affected by the traffic patterns of El Toro, and to a lesser extent by Long Beach, Los Alamitos, and Meadowlark Airports. Aviation activity at a demand level of 2.3 MAP is tolerable. Above this level, however, the potential for conflicts will begin to be realized.

(4) Terminal Capacity and Ground Access. The existing terminal building is currently near saturation. Further reconstruction of this terminal would be required to accommodate larger demand. Access to the airport is considered excellent.

(5) Environmental Quality. As a result of noise impacts on nearby areas, particularly under the takeoff path, commercial aircraft activity at SNA has been restrained as a matter of public policy. The continued growth and urbanization of the county in the vicinity of SNA would also give rise to concern over noise impacts.

It is not thought that air pollution by aircraft emissions would constitute a significant problem for the area in the future. The airport contributes a very small percentage of total pollutants for Orange County.

3. Airport Capacity vs. Demand

The existing conditions of the basic group of airports and the physical and/or community constraints described above are the principal determinants of airport capacity. It is anticipated that a reasonable level of capacity will be about 45 MAP to meet the demand levels of 69 MAP in 1990 and 85 MAP in 1995. In each case, minor improvements have been assumed.

4. Possible Effects of Alternative Concept A

a. Economic Activities

The effect of capacity limitations on economic activities would not be felt immediately. One effect that might be felt relatively soon under this alternative is the geographic redistribution of activities. A further clustering around the existing airports, and highways leading to them, of those businesses and industries most dependent on air commerce could be expected.

It is estimated that by 1990 there would be a loss of nearly 13,000 jobs and a payroll reduction of $270 million when the no-expansion alternative is compared to a 1990 activity level of 40 MAP. Similarly, it is estimated that the reduction in the purchases of goods and services within the service area of LAX would be $241.1 million in 1990. This assumes current traffic demand at LAX was not met at the other airports in the five-county area. Air visitor expenditures are estimated to be reduced about $778 million in 1990.

The no-expansion alternative would reduce the economic costs of environmental impacts at LAX when compared to future growth. The estimated costs for 1980 and 1990 are about 60% of the 1975 costs of approximately $600 million.

b. Mobility

As the population in the Los Angeles area continues to grow, further demand will be placed on transportation systems. Their capacities will be taxed if improvements for all modes and reasonable alternatives are not planned for and executed in the near future.

In 1974 20.4 million people, 60% of whom were out-of-state visitors, visited seven major outdoor attractions in the area. Nearly 5 million of these visitors arrived by air through LAX. As a commercial and financial center, downtown Los Angeles attracts more than 1.5 million visitors annually. Important to these activities is a viable air transportation system, providing adequate levels of service, which the existing system has done.

c. Access to the Existing Airports

Access, particularly at LAX, both internally and externally, is already constrained. To a lesser extent, LGB and BUR will experience similar problems of congestion. Buses, or some other form of public transit collector system, will be required to relieve the heavy reliability on the automobile. Transit systems to airports will have to carry at least 20-30% of passenger demand, which is far greater than their current share of the market.

d. Air Traffic Delays and Limitations in Service

There will inevitably be air traffic delays caused by periods of supply/demand imbalance, such as are already experienced at LAX at the peak of the holiday season. In order to minimize these delays, it may become necessary to limit operations at those airports suffering the most extended delays, thus affecting both airline economics and passenger convenience.

A further effect of heavy demand will be to extend the peak hour period of airports. While it is possible for a system to function at or near capacity continuously, the chance for a breakdown of any of the components of the system is greater. At high levels of activity this can be highly disruptive and have a serious ripple effect that could tie up the entire national system.

e. Future Markets

The availability of adequate air commerce has been an important factor for enlarging the market territory of many products. For instance, Los Angeles area fruits, vegetables, and flowers are flown east for sale in New York and New England; Southern California fashions are sold throughout the country. Similarly, products from the Far East find a ready market in Los Angeles. In fact, much of the economy of Southern California is based directly or indirectly on aviation. If it becomes necessary to restrict the use of aviation facilities, the shipment of local products may be restricted, thus affecting the area's economic viability.

f. National System

Los Angeles is designated as a "large hub" by the FAA, meaning it is one of the 22 largest metropolitan region passenger generators in the United States. These major hubs, although they consist of about 5% of the nation's total number of scheduled air carrier airports, account for more than 75% of air passengers. This designation places these airports in an advantageous position in terms of service (frequency and number of through and connecting flights) and of receiving more advanced technological equipment (aircraft and Navaids) and planning assistance sooner than smaller hubs. These airports also have a high level of interline connection activity because of their many originating flights.

Los Angeles has the potential to continue to fulfill a major role in the national system and benefit from it if the area is willing to take timely and appropriate action. In the absence of adequate air carrier facilities, however, there will be increasing challenges to Los Angeles in maintaining its competitive position in the national airport system.

g. Other Transportation Modes

Prospects for improved rail transit are uncertain in the short term. High-speed rail systems require a long lead time for development. Such service would require a major public commitment of land and financial resources, and high-density travel, for a manageable fiscal operation.

The more conventional modes of bus and rail transportation will not be able to keep pace with additional demand unless expanded and improved. The decline in use of the rail systems is well known and documented. New equipment and improvements to roadbeds represent formidable economic and technical obstacles that require a national commitment, not yet shown, to be overcome.

5. Conclusions

The most adverse impact of this suggested course of action would be the inability of the Los Angeles area to accommodate increased air travel demand. This, in general, would result in loss of economic activity, both in terms of employment and development of business opportunities. Similarly, recreation and tourism and the related mobility of society would be restricted, counter to past trends and desires.

While such limitations on air transportation could stimulate improvements in other modes of travel, such modes, in the face of the projected air passenger demand by 1995, might be sorely put to move this number of travelers. The attempt to build new facilities and systems on such a large scale quickly is not likely to occur when taken in the face of past history and current environmental concerns.

ALTERNATIVE CONCEPT B: SATISFYING AVIATION DEMAND WITH PARTIAL AVIATION FACILITY DEVELOPMENT

1. Description of the System and Assumptions

This alternative assumes the existing major air carrier airports continue to function as the air carrier airports serving the greater Los Angeles metropolitan area. The capacity of this group would be increased in accordance with currently planned improvements as described below. The general features and conditions of these airports as described in Alternative Concept A would still apply. It is also assumed that no new air carrier airports would be developed.

a. Los Angeles International Airport

It is assumed that with increased activity, general aviation will be reduced to 10% or less of all operations by 1985. Furthermore, increases in air cargo will occur with more night flights and the greater carrying capacity in the holds of wide-body jets.

(1) Terminal Facilities. It is assumed that the planned reconstruction of the south runways and the Sepulveda tunnel would be accomplished, as well as improvements to taxiways and airport lighting. Two new airline terminals and related improvements to intra-terminal circulation, such as an upper roadway are assumed implemented. It is anticipated that these measures would increase LAX capacity to 40 MAP.

(2) Ground Access. In order for LAX to accommodate 40 MAP, major improvements to the ground transportation access and circulation systems will be required. The recently completed Final EIS has proposed the following measures:

- Improve the traffic facilities in the airport area by building additional freeways. Construction of Route 105 will begin in near future. Development of Route 170 is proposed
- Establish a centralized employee car pool center
- Improve the bus access system
- Provide exclusive bus lane systems throughout the area
- Provide a grade separated pedestrian system in the central terminal area
- Improve traffic flow within the airport

(3) Environmental Quality. Continued action by DOA in terms of operational procedures, restrictions on night flights, and further land acquisition are assumed to keep aircraft noise within tolerable limits. In addition, the change in 1985 to an air carrier fleet mix having quieter engines should alleviate the noise impact. Moreover, with a 40 MAP limit and a larger PPO factor, the number of air carrier operations would increase by only 58,000 annually over the 422,000 experienced in 1972. Air pollution, however, will continue to be a problem at LAX.

b. Ontario International Airport

(1) Terminal Facilities. The construction of a new 10,200-foot runway parallel to the existing one is underway. The existing runway is assumed to have been reconstructed and extended to 12,200 feet, along with the necessary related taxiways. With these improvements and more positive airspace control, the airport should be able to accommodate increased demand.

In order to accommodate future demand at a 12-14-MAP level, a new terminal building, as well as the necessary auto parking and aircraft apron parking areas will have to be constructed. It is assumed that this work would be accomplished by 1985.

(2) Ground Access. Both terminal and access road development will be restructured to serve the new terminal. It is assumed that the planned realignment of access and circulation roads will be accomplished. Furthermore, the recently completed Devore Freeway provides ease of access for the San Bernardino/Riverside basin populace.

(3) Environmental Quality. A recently completed environmental analysis of airport expansion found that the adverse impacts would be minimal. The airport will contribute to adverse conditions at times of inversion and severe inputs from the Los Angeles basin. Overall exposure to excessive noise levels will be reduced somewhat because of new equipment and changes in flight patterns.

c. Long Beach Municipal Airport

(1) Terminal and Access Facilities. There are currently no plans for expansion of the airport facilities. Current public policy is to disallow any increase in aviation activity, including the use of new quiet jumbo jet aircraft.

It is assumed, therefore, that with the community constraint and restricted ground access and terminal capacities, approximately 0.6 MAP would be the limit.

(2) Environmental Quality. Assuming that a greater percentage of jet aircraft meeting FAR Part 36 standards would use the airport, it would appear that noise impacts would be lessened in the future. Because of the low level of activities anticipated, other effects on environmental quality should not adversely increase.

d. Burbank-Glendale-Pasadena Airport

(1) Terminal Facilities and Ground Access. It is assumed that, for this airport, the limited terminal and access capacity restrain activity to 2.5 MAP. Moreover, the proximity of established urban development and confined airport land area prevent further expansion of the airport. The nearby mountains and existing runway characteristics also constrain the possibility of making any significant improvements to capacity.

(2) Environmental Quality. The strongly expressed community concerns over noise indicate that substantial increases in activity are not possible. BUR is also in a particularly sensitive situation since its runways cannot readily accept the more quiet larger jet aircraft. It is assumed, therefore, that 2.5 MAP would represent the tolerable limit of activity and not create conditions that would result in environmental degradation.

e. Orange County Airport

(1) Terminal Facilities. While it is possible to expand the terminal building, support areas, and access roads to accommodate future demand, it is assumed that overall physical constraints limit SNA to a maximum of 3.7 MAP. This assumption is based primarily on the limited land area of the airport, the confining freeways close to the runway, and the anticipated continued high general aviation activity level. Also, public policy is expected to continue to be directed toward keeping activity within tolerable limits.

(2) Environmental Quality. The assumed increases in air carrier operations are expected to meet federal and state air and noise quality guidelines by 1985.

2. Probable Effects of Alternative Concept B

It is estimated that by 1985 the basic group of airports would have a capacity of approximately 59 MAP, sufficient to meet the 1985 demand estimate of 55 MAP. By 1990, however, these airports would begin to have a capacity deficit of up to 10 MAP. This occurs even though these capacities reflect technological developments in aircraft, aircraft control procedures, and ground access improvements.

Effects similar to those described for Alternative Concept A would be experienced by these airports under Alternative B. However, the effects would be felt in the late 1980s, as compared with the early 1980s under Alternative A. The major effects after 1985 would be increasing delays and subsequent costs to passengers and airlines, access congestion and ground delays, decreased opportunities to travel and restriction on mobility, and constraints on business opportunities and economic activities. Furthermore, as aircraft congestion and delays occur, high levels of activity will be spread over longer hours, increasing the potential for serious air and noise pollution, even with new equipment and technology.

The environmental impacts of Alternative B were considered tolerable for most airports at an activity level of 55 MAP. Improvements in engine noise suppression and air pollution controls and adoption of "preventive" aircraft operational procedures should limit pollution to the levels now experienced at the basic airports. The most significant impacts will be felt in delays due to access problems and airport congestion at peak hours.

The improvements to the airports may also cause some adverse impacts in terms of construction noise, dust, and inconvenience. Some relocation of property owners may also be experienced at LAX and ONT and possibly other airports because of property acquisition for noise protection and airport expansion. Ecological impacts will be minor as most of these airports exist in urbanized areas where the major impacts on natural conditions have already occurred. Similarly, impacts on water, drainage, and waste disposal systems will be minor because of their urban setting.

3. Conclusions

This alternative could satisfy demand into the mid 1980s wherein the basic airports would accommodate approximately 59 MAP. The environmental consequences of operating the basic airports would be severe. The consequences, therefore, of limited capacities at the existing airports would probably increase the pressures to develop other transportation modes.

ALTERNATIVE CONCEPT C: SATISFYING AVIATION DEMAND BY PROVIDING ADDITIONAL AVIATION FACILITIES

1. General Description of the Concept

It was found in considering Alternative B that planned improvements of existing major air carrier airports would meet total demand through about 1985 and about 85% of demand forecast for 1990. To expand capacity beyond the level of 59 MAP, a range of measures is explored, including use of the existing air carrier airports with their planned capacities, use of four existing military airfields, and the development of completely new airports. These measures are to accommodate an expected demand of 55 MAP in 1985, 69 MAP in 1990, and 85 MAP in 1995.

2. Description and Use of Military Aviation Facilities

There are currently 18 major military airports in the 10-county Southern California region. Use of these airports varies widely, with several of them having a specialized function such as Edwards AFB which serves as an experimental aircraft test base. All are under the jurisdiction of the U.S. Department of Defense and are operated by either the Air Force, Navy, or Marine Corps. In this EIS, four facilities are considered as possible candidates for civilian commercial aviation operations, the others being outside of the Los Angeles service area: March and Norton Air Force bases, El Toro Marine Corps Air Station, and Point Mugu Naval Air Station.

a. The Use of Military Facilities

All four facilities have a critical military use and mission with only a remote indication by the DOD that they can be made available in the near or distant future for joint use or transferred to civilian ownership. Discussions along these lines have been conducted among several institutions over the past decade with little success.

The following statement in the Orange County aviation study indicated that:

> "At this time, the likelihood of a complete phasing out of military flight activity from El Toro is considered extremely remote. Even if a cutback in worldwide military commitments occurs, budget priorities and military economics will bring about consolidation and regrouping of units to the more efficient and well equipped bases such as El Toro. For now, it is likely that operations at El Toro will remain steady or show an increase."

The same general point is applicable to March AFB in its role as an SAC base and Point Mugu as a missile test facility. Of the four facilities, only Norton AFB appears to have a less sensitive role in the priorities of maintaining military bases.

Realization of the potential of these bases would require acquisition, in whole or in part, at a significant cost, and the development of necessary terminals, support facilities, and ground access improvements at additional costs. For example, the estimated cost of acquiring and relocating El Toro is $354 million. Strong objections to any change at March have been raised at Riverside.

Both March and Mugu would appear to be the most attractive candidates for civil use based on compatible surrounding land uses. The relative remoteness of these facilities (particularly March with its sizable acreage) lessens the potential for noise problems. Norton and El Toro, however, already encountered objections to noise, and it is this factor that limits their usefulness to 1 and 2 MAP, respectively.

A further constraint on both March and Norton is their location in a basin noted for its severe air pollution conditions. Significant levels of activity at either or both of these facilities would exacerbate this problem.

In conclusion, it appears that the military airports are likely to play only a minor role in the regional air transportation picture of the future. None of them can be considered a major alternative site for a new aviation facility because of the uncertainties over availability as well as other adverse features mentioned above.

3. Construct New Airport Facilities

The existing airports have been investigated for their potential capacity to meet demand without constructing new facilities. For one, Ontario has always been considered capable of handling significant loads of activity. However, as discussed in Alternative Concept B, none of these airports, including Ontario, can provide sufficient capacity to satisfy total demand, either alone or as a group. Limited land area, inadequate ground access, topographical features, constrained airspace, or incompatible land uses eliminate most available sites, leaving four as reasonable for consideration: Long Beach Offshore, Northeast Orarge County, Edwards AFB, and Palmdale. All four sites are relatively separate from residential land uses, much more so than any of the existing major air carrier airports. However, all will affect some of the local population and have been the focus of public concern.

a. Long Beach Offshore (LBO)

The development of an international airport offshore from Long Beach has been proposed on several occasions. An offshore airport is technically feasible and could be constructed by known techniques. It could accommodate 22 MAP under normal conditions. This proposal was analyzed in the SCRASS report and was not considered a viable alternative.

Impacts on the environment by the construction and existence of an offshore airport are potentially serious and adverse. They include ocean current changes, beach erosion, shifts in tidal sands, and upsetting the sensitive ecological balance of marine life along the Southern California coast. Effects on public and private beach property and use, particularly for recreation, are also regarded as a major problem. The location was also noted by SCRASS as one of the poorest in Southern California for air quality impacts, with pollution generated by LBO flowing up the San Gabriel Valley into the most polluted area of the Los Angeles basin. Further, this proposal has no visible institutional or community support. The basic location and limited surface areas of an offshore airport present additional problems.

b. Northeast Orange County

In the past few years, the need for a new airport serving the Los Angeles-Orange County area has been under consideration. The most prominent site has been an area of 29,000 acres designated as "Chino Hills," on the Orange/San Bernardino County line.

The suggested site is presently in the undeveloped Chino Hills area. It is generally north and east of the population centers of Orange County and Los Angeles, respectively. Direct ground transportation access would have to be provided at additional expense, from the Riverside Freeway that comes within seven miles of the site on the south.

The site lies within a crowded airspace, having potential conflicts with LAX, Ontario, and March AFB. Southern California Airspace Utilization Committee (SCAUC) recommended against the site on that basis, although the FAA stated that the site could accommodate up to 120,000 annual operations, or approximately 5 MAP.

Construction of the airport would require minimal displacement of homes or businesses. It would appear that noise would affect some nearby areas. Opposition to the site is reported to be almost as strong as that leveled against El Toro, particularly by communities such as Brea that would be most affected by the airport.

The mountainous character of the site would require major earth movement and construction costs would be significantly higher than for other alternatives. The potential environmental destruction that would result from this earth movement is a significant impact.

c. Edwards Air Force Base, Flight Test Center (AFFTC)

This facility is owned by DOD and operated by the U.S. Air Force, which began testing operations there in the 1930s. It is the major flight test facility for experimental aircraft, missile, and rocket propulsion in the country. It is considered a vital component of the nation's defense establishment.

The site comprises approximately 301,000 acres, mainly in Kern County. There are five major runways on the base, one of them exceeding seven miles in length. Because of the sensitive nature of operations, a sizable block of airspace is restricted to military use. These areas extend about 90 miles from the base to the northeast.

There are many aviation-related activities at Edwards including NASA. Facilities of most major aircraft companies and aviation-related industries are located at AFFTC.

The southern edge of the site is located approximately 10 miles north of Lancaster and 20 miles beyond Palmdale. Access is by the Antelope Valley Freeway on the west and State Highway 395 (I-15) on the east. Direct road travel time is 55-70 minutes to downtown Los Angeles.

Two dry lakes, Rosamond and Rogers, 2200 feet above mean sea level, are the dominant natural features. Rosamond Lake is the principal drainage basin for the western section of Antelope Valley, and is fed by several dry washes which generally flood during the runoff season. Surrounding these lakes to the north and east are hills and buttes rising to about 3000 feet elevation. The Tehachapi Mountains, ranging from 4000-6000 feet high, are approximately 15 miles to the northeast. The principal reasons for locating the base in the northern edge of the Antelope Valley were remoteness from urban areas, open spaces, and excellent weather conditions.

The site is remote from heavily populated communities and has ample ground area and freeway access. Its environmental impacts would probably be minor, although some adverse noise and air pollution would occur.

Edwards' key defense use in research and development is one that DOD will not readily relinquish. The nature of activities at Edwards would not be compatible with civil air carrier movements. If the base did revert to civil use, relocation of Edwards would mean consideration of environmental impacts somewhere else.

Another adverse impact would be the loss of employment opportunities through a change in use of AFFTC. The base has been a steady source of jobs in the area for many years. The skills now required are not expected to be readily adaptable to civil airport jobs. The subsequent economic adjustments might be quite severe, especially in an area that does not have many other employment opportunities. For these reasons, Edwards was not considered a viable alternative.

d. Palmdale International Airport

This proposed airport site is located in the Antelope Valley just east and north of the City of Palmdale. The city boundaries enclose all of the 17,700-acre site. Most of this land has been zoned for industrial use for the purpose of creating a compatible land use barrier around the airport.

A description of the site and proposed facilities, the primary adverse impacts that cannot be avoided, and the natural and physical features are discussed and impacts addressed more thoroughly elsewhere in this EIS.

4. Capacity vs. Demand

In this alternative concept the capacities of the five basic airports are estimated considering an increased PPO factor and facility planned limits.

Capacity estimates for the five basic airports range from 58.8 MAP to 70.8 MAP. The capacities of these airports, considering environmental factors and planned improvements are 59 MAP.

In addition, a second option is hypothesized. This option represents a mixture of the capacities of the several airports. The underlying assumption is that three of the basic airports, LGB, BUR and SNA, are not likely to exceed their environmental limits of 6.8 MAP (collectively). LAX and ONT may, however, reach their runway capacities, 48 and 16 MAP, respectively, albeit at some environmental costs of delays, ground access, congestion, and air and noise pollution. The total for this option, therefore, would be 70.8 MAP.

It can be seen that these combinations would not satisfy the 1995 demand of 85 MAP.

From this analysis it can be seen that the addition of PIA to the Southern California air transport system only augments the capacity of the system. Even with PIA, the forecast of demand for 1995 at 85 MAP exceeds capacity unless the existing airports are operated at very high levels of activity, options which have been identified in this and other studies as being environmentally costly.

5. Probable Effects of Alternative Concept C

The evaluation of impacts must be made within the context of the several proposed combinations of airports. If it is determined that the existing airports are not utilized beyond their planned capacities of approximately 59 MAP, then the environmental impacts at this level can be considered as generally tolerable since further technological improvements in engine design and operation, aircraft performance features, and airspace control procedures and equipment will have been introduced. While this level of activity will result in some adverse impacts, it is anticipated that by 1995 the magnitude will be less and the mitigating actions more effective.

The direct capital construction costs for improving these facilities are estimated to be $412 million, as shown in Table 38. Indirect costs related to mitigating pollution impacts and providing public service facilities are estimated to be $631.5 million in 1972 dollars.

TABLE 38

COST ESTIMATES - SELECTED AIRPORTS, 1975-90
(millions of 1972 dollars)

Facility	MAP	Capital Construction	Pollution		Public Services
			Air	Noise	
LAX	40.0	$368.8	$9.0	$182.6	$ 21.0*
ONT	12.0	25.4	-	62.0	348.0
LGB**	0.6	-	-	-	-
BUR	2.5	N.A.	N.A.	N.A.	N.A.
SNA	3.7	18.1	-	8.9	N.A.
Total	58.8	$412.3	$9.0	$253.5	$369.0

N.A. = Not available.

*Access and circulation costs only.
**No improvements or costs assumed.

The use of the four military airfields is in doubt, as their combined maximum capacity is estimated at 13 MAP. This capacity, however, is achieved under saturated conditions that would cause severe environmental impacts.

While no new airport development can be built without some adverse impacts, removal of some aviation activity and induced effects from the urbanized Los Angeles basin can be considered beneficial. This would also allow for continued growth, however modest, on a rational, manageable basis. However, the direct construction costs of a new site development for 12 MAP would range from $415-750 million.

6. Conclusions

To satisfy the demand for air travel in Southern California by the year 1995, a combination of several alternative options is required. As noted above, these options include using and extending the basic groups of existing airports, acquiring and using four military bases, or developing a new airport site(s) such as at Chino Hills and Palmdale. Use of other modes of transportation is another consideration for augmenting the transportation system of the Southern California region.

Heavy use of the basic group (at 71 MAP) and the military bases (at 13 MAP) would result in environmental degradation at each airport. This would be particularly true in terms of noise and air pollution, access, incompatible use with surrounding communities, and adverse impact on actual physical or natural conditions. Furthermore, a heavy use of Ontario would conflict with use of March and Norton and vice versa, thus bringing their full use into question.

The development of a new airport at Palmdale would have some adverse impacts as discussed in this EIS. Northeast Orange County is also a possible site, but at a smaller capacity than PIA and with more difficult terrain on which to build. Edwards AFB is considered unavailable under almost all circumstances because of its military functions and distance from markets. Long Beach Offshore has comparatively greater environmental and financial constraints than any of the above potential candidates.

The probability of improving LAX to accommodate more than 40 MAP and serve as the major airport in lieu of PIA is not environmentally sound. Air and, particularly, noise pollution would be severe in an area already heavily urbanized, as would congestion and delay from limited ground access facilities.

Sophisticated short-haul systems, while their development and use are probable, are not generally expected to be operable prior to the next 15-20 years. For planning purposes, a STOL system might be expected to carry 10-15% of the total short-haul market, or 3-4 MAP, in 1995.

Similar use could be expected of a high-speed surface transportation system which might serve the San Francisco-Los Angeles-San Diego corridor and divert 20-30%, or 4-6 MAP, in 1995. The capital cost of a San Diego-Los Angeles corridor system alone, however, has been estimated at $861 million.

EVALUATION OF ALTERNATIVES

This environmental analysis is influenced by the assumption that the relative state of affairs in the Los Angeles region, the nation, and the world will vary but not change significantly.

Future travel demands under current trends over a 20- to 25-year period will certainly stimulate the emerging development of other transportation modes as will the pressure of more pervasive, national energy conservation policies, whether or not PIA is operational. The high capital cost of establishing such systems will tend to depress their development, and the competitive position of air transportation will tend to depress ridership and the ability to cover operational costs in the short run.

However, certain international, economic, social, and environmental forces could combine to drastically change past trends in air travel, related life-styles, and methods of conducting business. For example, if the relative value of the dollar were to decline, if real income were to stabilize or not grow as projected, if fuel shortages were to become more critical and if more leisure time and/or higher-cost travel resulted in a shift to slower but less costly conveyances, then certain assumptions and results would be altered. Under such assumptions, Alternative A might therefore be more suitable to a much larger strategy to respond to a changing world.

It is not possible, however, in this study to develop and define independent projections of all of the critical facets of the economy and patterns of life that would be affected by an alternate set of assumptions that imply reduced mobility and propensity to travel. Nevertheless, it is important to acknowledge that such changes are possible.

Alternative C is comparatively more responsive based on a continuation of current trends. A major air facilities expansion program would accommodate the anticipated growth of the regional economy, provide for long-distance travel, sustain the current level of service, sustain air freight dependent markets, and keep the aviation facilities of the Los Angeles area in balance with the nation's air transport system. This strategy results, however, in both adverse and beneficial impacts discussed elsewhere in this report.

Given steady trends, the minimal air transport facilities improvements strategy characterized by Alternative A might depress, and would certainly redistribute, the region's economic activities and employment opportunities, inhibit long-distance travel, adversely affect air travel service, discourage air freight dependent markets, and weaken Los Angeles' position in the nation's network of airports. While such conditions may or may not stimulate development of other modes of transportation, they may well exacerbate environmental conditions at the existing airports since they would be overutilized and congested.

This summary comparison tends to emphasize the most basic attribute of a transportation service; it exists to serve other, non-transportation objectives. Given current trends, and presuming that undesirable adverse effects can be mitigated, air transportation, with its existing and planned support infrastructure, is a reasonable strategy.

SECTION V: ACTIONS TO MINIMIZE UNAVOIDABLE ADVERSE EFFECTS

The plans, improvements, and controls to mitigate adverse impacts will require coordination among several agencies. To implement these plans, etc., the Department of Airports will work closely and conscientiously with other county, state, and federal agencies. A number of measures as described below can be employed to minimize the overall environmental impacts of the proposed airport.

A. ENVIRONMENTAL PROTECTION CONTROLS ON CONSTRUCTION ACTIVITIES

Construction controls as recommended by FAA Advisory Circular 150/5370-7, "Airport Construction Controls to Prevent Air and Water Pollution," will be used as guidance in complying with applicable air and water quality standards during construction. All practices will be in accordance with State of California and federal regulations.

1. Open Burning of Combustible Wastes

Open burning is not allowed in Los Angeles County due to air pollution problems. Any burning that is permitted will be undertaken strictly in accordance with applicable federal, state, or local regulations.

2. Air Pollution Controls

Proper construction procedures will minimize, if not eliminate, any significant generation of dust outside the immediate construction site. Furthermore, this site will be sufficiently large to allow for a balanced cut and fill operation. Most dust-generating activities will be limited to the site with little or no fill hauled from outside.

Control of dust and other air pollutants will be made the responsibility of the construction contractor.

Bituminous mixing plants will be equipped with a dust collector to waste or return uniformly to the hot elevator all or any part of the material collected.

3. Permanent and Temporary Water Pollution and Soil Erosion Control

In the design and construction of the airport, permanent means for control or prevention for soil erosion will be used not only to preserve and protect slopes, pavement, and other facilities, but also to reduce potential sources of water pollution. Such means include, but are not limited to, selection of appropriate gradients for backslopes and channels and provision of berms, drainage features, soil stabilization, pavement, and turf to control or prevent erosion from wind or water. All measures to prevent and control soil erosion will be carefully considered during master planning; prior to construction of airport facilities and access roads, the various procedures and methods to be utilized will be detailed and related to each aspect of the construction process.

Soil cover removed during the site grading phase of construction will be used on all unpaved portions of the final site. Excavated materials from the site will also be used for fill requirements in the site; any excess materials will be used for reclamation purposes.

Construction will include temporary pollution control measures to ensure that soil erosion which might cause water pollution is minimized. Such measures will be shown on the plans or ordered by the design engineer and may consist of construction of berms, dikes, dams, drains, and sediment basins, or use of fiber mats, woven plastic filter cloths, gravel, mulches, quick growing grasses, sod, bituminous spray, and other erosion control devices or methods.

At preconstruction conferences or prior to the start of the applicable construction, the construction contractor will be required to submit, for acceptance, his schedules for accomplishment of temporary erosion and pollution control work. He will also submit, for acceptance, his proposed method of erosion control on haul roads and borrow pits, and his plan for disposal of waste materials.

To minimize transportation of soil by stormwater runoff occurring during construction operations, siltation ponds will be installed within the airport site to permit the settling of eroded materials prior to the discharge of storm flows to downstream channels.

Water from aggregate washing or other operations containing sediment will be treated by filtration, a settling basin, or other means sufficient to meet applicable standards so that the quality of any water courses into which it may be discharged will not be adversely affected.

Appropriate measures will be used so that pollutants such as fuels, lubricants, bitumens, raw sewage, and other harmful materials will not be discharged into or near drainage swales or water impoundment areas. Similarly, wash water or waste from concrete mixing or curing operations will not be allowed to enter such surface water areas.

4. Applicability of Controls

All applicable state and federal plans and procedures will be followed. All controls mentioned above will be considered in the preparation of the plans and specifications. A Design Engineer's Report, accompanying the plans and specifications, will cover erosion, and air and water pollution prevention elements.

Permanent and temporary control measures will be included in the construction contracts as bid items.

Permanent and temporary control measures will be maintained by the contractor during the life of the contract. Thereafter, the airport owner will accept responsibility for maintenance of permanent measures.

5. Noise

Given the semi-rural character of the area and the anticipated relocation of residents living within the construction site, there will be few inhabitants who will experience noise disturbance attributable to construction. Where this becomes a problem, the operating schedule will be altered.

The contract engineer will supervise the construction activity in order to mitigate and control noise wherever possible. A series of simple noise monitoring stations will be established to check periodically on contractor compliance with noise abatement measures.

6. Surface Traffic

Some of the construction activities, such as earth moving by heavy equipment and trucks, may cause noise and vibration, and some temporary stoppage or rerouting of local traffic. Most heavy equipment, however, will be confined to the immediate construction on-site, except for some minor hauling operations, thus reducing impacts. The contractor will be required to submit construction schedules that will meet any restrictive statutes and/or controls established by the supervisory engineer.

The DOA will work with the State Highway Department and County Engineer to schedule temporary road construction or existing road improvements in phase with airport construction. Temporary construction access roads on the airport site will also be built to accommodate worker and construction traffic.

7. Other Impacts Relating to Construction

Pipelines, telephone lines, power lines, and other infrastructure facilities must also be provided for the airport and related development in the area. Providing these facilities will cause some disruption and displacement of activities. Residential areas will be avoided, however, and disruption and displacement will be minimized. It is expected that placement of these facilities will follow existing road corridors wherever possible.

B. GOVERNMENTAL SERVICES AND INSTITUTIONAL PROGRAMS

1. Grant-in-aid Programs and Revenue Sharing

There are various state and federal programs which can assist in meeting the service needs associated with the airport. Many governmental programs are geared to planning for change, for example:

> State Programs -- law enforcement, planning grants, land and water conservation, community developments, vocational and technical education, human relations program, comprehensive health planning.

Federal Programs -- Neighborhood Facilities Grants, public works planning, water and sewage facilities, Federal Housing Administration Mortgage Insurance Program, air pollution control, library services, economic development.

2. Development of General and Regional Plans

Among the cost prominent of planning activities at the local government level is the North Los Angeles County General Plan, being accomplished under the auspices of the RPC. This planning effort represents a systematic approach to meeting the planning needs of the entire North County region.

3. Applicable State and Federal Statutes and Commissions

Recent legislation has reflected an increasing concern with pollution and other impacts of an airport as they affect nearby communities. Such statutes are applicable to the development of PIA.

4. Relocation Assistance

In providing relocation assistance when land is acquired, the DOA's program conforms with the provisions of both the state and federal relocation legislation: Uniform Relocation Assistance and Real Properties Acquisition Policies Act of 1970; Relocation Guidelines, State of California; and Relocation Assistance Program, City of Los Angeles.

As a result of this program in the Palmdale area, nearly $188,100 in benefits have been paid to 117 claimants. These benefits have included relocation assistance, moving expense allowance, replacement housing supplement, rental supplement, and other expenses such as increased financing costs.

C. AESTHETIC AND VISUAL

Airport facilities and buffer landscapes will be designed by architects and landscape architects with a view toward maximum aesthetic and visual enhancement. Particular attention will be paid to the preservation of native vegetation and the planting of similar varieties of indigenous flora on the airport site. Regional concepts will also be recognized in airport development as promulgated in the North Los Angeles County General Plan.

D. SOCIAL

Several actions have been taken to counter the adverse social impacts. The county, for one, is engaged in a long-range comprehensive planning program that includes the Antelope Valley.

The Los Angeles County government has many ongoing programs, administration and staff, and other resources to bring to bear in mitigating efforts. Another mitigating factor is that the growth of the area is expected to occur over a long period of time; the airport is not expected to be in operation until the mid-1980s at the earliest. Related growth will proceed after that at a moderate rate. This lead time will allow for planning to meet future demands and changes. The 14 elements for the North Los Angeles County General Plan address the critical issues, impacts, policies, and programs relative to future growth with PIA included, several sections of which are included in this EIS.

E. ACCESS TRANSPORTATION

Good engineering and design practices, as utilized by the State Department of Highways, should mitigate any adverse environmental effects. It should also be noted that, prior to any action being taken on freeway improvements or corridor location, a comprehensive Environmental Impact Report will have to be prepared according to both federal and state statutes, including consideration of mitigating actions and review by public and private interests.

In response to the impacts of passenger travel to PIA, it is expected that by 1995 two additional lanes will be constructed for those sections of the Antelope Valley Freeway now having only four lanes. A four-lane, seven-mile access road from the freeway to PIA will also be built. It is also expected that Route 138, traversing the Valley east and west, will be built. These improvements will accommodate air passenger, local, and other through traffic demands. Local arterials to be improved to four lanes are segments of Avenues Q, R, and S, and Division Street.

F. PUBLIC LANDS AND LAND USE CONTROLS

There are approximately 3,950 acres designated as public lands for regional use as recreational parks, wildlife sanctuaries, and wild flower or nature preserves which are presently undeveloped that represent a potential resource for public use. There are also 381 acres of land designated for urban and local parks that can be developed to meet the already existing deficit in such parks.

The DOA will develop a land, wildlife, and resource management program for PIA. This program will result in the preservation of about 5,000 existing acres as is, development of on-site public recreation lands, and revegetation and landscaping of the site.

The North Los Angeles County study group has proposed policies and programs regarding each of the 14 general plan elements which all affect land use in the Valley. In addition, a buffer zone has been established around most of the proposed airport, while the rest has been designated public open space or industrial uses.

Further, 18 land use issues, such as population and land use distribution, resource utilization, land use compatibility, and adequacy of public services, were identified and appropriate policies were formulated. It was also recommended in the General Plan that future growth in the county be allocated to communities on the basis of ability to accommodate growth within economic and environmental considerations. Three centralized community types were proposed with the remaining areas classified as the general rural area. Criteria for classifications and policies for community development were also formulated, including implementation procedures. The DOA has also given assurance to support land use policies and programs as established in the General Plan.

G. AIR QUALITY

The photochemical smog from Los Angeles looms as the largest pollution problem in the study area -- and its magnitude is relatively independent of what goes on in the study area. As has been noted, an increase of NO_x emissions in and immediately upwind of the study area may appreciably decrease the O_3 concentrations there, which would minimize the mid-afternoon peak and also bring down the nighttime levels.

As to diminishing the local CO, HC, and NO_x emissions, proposals have been made to minimize these during ground operations. These include towing of aircraft to and from runways, idling and taxiing on less than all engines, and ground control procedures to minimize the operations of the engines while the aircraft is on the ground. All proposals promise to reduce emissions and are currently under study by the FAA. For those pollutants related to human health for which PIA is a significant source (CO and NO_x), the impact will be minimized by avoiding downwind (northeast of airport) development of sensitive receptors, such as hospitals and schools.

The DOA is currently working on a proposal to reduce 6 tons of hydrocarbons per day attributable to the airport to meet the oxidant standard. This is in response to the State of California Air Resources Board requirement for issuance of an air quality certificate.

The DOA will continually seek methods, in conjunction with the FAA and the airlines, to minimize airport-related air pollution, and will work actively with the regional and local governments and planning agencies to develop and implement coordinated land use plans which are designated to ensure that development near the airport is compatible with the human and natural environment.

H. NOISE

1. Land Use Controls in the Vicinity of PIA

Incompatible land areas adjacent to the airport site have a relatively low residential density and are forecast to remain so.

Approximately 86% of the 17,700 acres proposed for the airport site, so as to include the critical noise impact zones, have been acquired.

Incompatible land uses can be controlled by the enactment of local zoning ordinances to limit development to compatible land uses. The City of Palmdale already has designated a buffer zone and industrial land use zone around PIA.

The DOA will employ controls on the land within its jurisdiction to ensure land uses compatible with the airport's operations. The DOA seeks to work with the local communities and planning agencies in every possible way to ensure that the entire area will be developed in a manner compatible with the noise impact relating to airport operations.

2. Building the Site Development Controls

All buildings where heavy traffic activity is expected, such as the passenger terminal, cargo areas, and maintenance areas, will be grouped near the center of the site. For passenger protection, buildings will be designed to attenuate exterior noise from aircraft operations. Areas of outdoor public use will be protected from ground noise by proper shielding or setbacks.

Vehicles serving the airport will also generate noise as they collect in and near the airport. Master planning will employ design concepts which will distribute vehicles so as to avoid concentrations of autos.

3. Aircraft Operational Procedures

During the study, two techniques were examined closely as possible for methods of minimizing the impact. They were noise abatement takeoffs or landings and curfew of operations.

The introduction of noise abatement procedures eliminated all incompatible uses within the 65 CNEL noise contours in all study years.

The curfew produced about the same overall effect as the noise abatement procedures.

Noise abatement procedures provide the greatest operational benefits while achieving a significant noise reduction. It is the more balanced of the two options.

Other operational techniques which will be followed, include:

Adopting aircraft flight patterns to minimize overflight of residential and other noise-sensitive land uses.

Modification of takeoff and climb-out procedures to either increase overflight altitude or reduce thrust and noise by power cutback.

Relocating aircraft away from noise-sensitive areas during ground engine run-up, using run-up sound suppressors and barriers, or restricting the time of operation.

4. Control of Engine Noise at Its Source

Currently, government-sponsored and private industry programs are under way to reduce the noise generated by the older turbojet and low bypass ratio turbofan-powered airplanes. Some of the noise control measures presently being examined include:

Retrofit of JT-8D turbojet engines used on Boeing 707 and McDonnell Douglas DC-8 aircraft.

Design and fabrication of modification kits to include sound-absorbing liners in engines inlet and exhaust ducts of low bypass ratio turbofan engines.

Early retirement of the older, noisier fleet of turbojet- and turbofan-powered aircraft, and replacement with aircraft employing the quieter, advanced technology jet engine.

I. WATER SUPPLY AND QUALITY

The airport should obtain an adequate supply of water for its own direct purposes from Palmdale Irrigation District's allotment from the State Water Project. During the airport master plan and design stages, a water distribution system will be established. This system will not only provide water, in conjunction with surface drainage and wastewater systems, it will be designed to control erosion and sedimentation, maintain high standards of water quality, and prevent pollution of watercourses and groundwater sources.

In addition to the various engineering practices that can be employed to protect waterways, recharge aquifers, and prevent groundwater pollution, a number of governmental agencies have established quality standards.

J. GEOLOGY AND SOILS

The proximity of the San Andreas Fault (and the Palmdale "Bulge"), and the likelihood of earthquake motion along it in the future, must be regarded in all development and construction plans made in this region. The airport design specifications will include a full testing program for each type of structure on the site, when appropriate, to evaluate the relative behavior of different soils during seismic activity. Anticipated mechanical response of soils at the site to seismic activity, therefore, will be considered in all design and construction, and possible soil compaction.

Foundation construction will take into account settlement of surface and subsurface soil layers. Particular attention will be given to the design and location of underground storage tanks and utility lines to resist earthquake-induced compaction, settling, and alluvium disturbance. During the master planning stage for the airport, specific soil conditions and locations will be identified. This identification will be used in locating structures compatible with soil properties.

K. ECOLOGICAL

The impacts of the initial building phase will be contained with proper attention paid to be the construction guidelines. Further protection and maintenance of the desert ecology will be achieved with: proper care during construction as to which areas should be cleared and which areas protected on the site; proper control of floodwaters and increased runoff due to the clearing of the site; proper measures instituted as soon after construction activities as possible, such as replanting of endemic vegetation; and the establishment of an airport resource management plan. Further, a 3,800 and 1,000 acre block of land, in the east and south central area of the site, will essentially remain undisturbed, and suitable for native wildlife and vegetative species.

L. SEWAGE

The treatment system for the airport will be as follows:

A completely separate sanitary wastewater collection system would be built; industrial wastes would be collected in a holding pond and pretreated. At specified intervals, pretreated wastes from the holding pond would be sent to the treatment plant. Waste oil would also be collected and disposed of separately through reconditioning or other means. Similarly, separate storm drainage and maintenance collection systems would be constructed.

All domestic sanitary sewage would be treated in the District 20 Water Reclamation Plant. The treated effluent would be used to irrigate various types of fodder crops. Solids would be used as soil conditioners.

During storm periods, the runoff from impervious airport surfaces, including runways and aprons, would not be able to be treated in the Water Reclamation Plant. A short-term holding facility will be constructed for a period of up to the first 30 minutes. Thereafter, storm waters from impervious airport surfaces would flow into the future flood control facilities to be built by the County and Army Corps of Engineers.

M. SOLID WASTE

During airport operation, airport solid wastes may be disposed of in a number of ways. A sanitary landfill may be developed on airport land or the airport may seek to dispose of its wastes in existing landfills in the same area.

Collection and handling methods will be the focus of master plan studies for the airport. A central transfer point would be established for transporting the wastes to a landfill site.

The increased population induced by the development of the airport will require new solid waste disposal facilities. Sanitary landfill appears to be the most judicious approach to solid waste disposal in the North Los Angeles County area.

The more recent studies by the county have identified the need for facilities and have developed use criteria for sanitary landfills. It is expected that, with the impetus of the airport and further urbanization of the Valley, the objectives of these studies will be implemented.

N. ENERGY

Based on the experience of airlines during the 1973-74 energy crunch, the following measures have been used to reduce fuel consumption. It is expected that such measures would be applicable to PIA operations where appropriate.

Aircraft Flight Operations

- Climb to cruise as fast as possible
- Select fuel-efficient cruise altitudes and speed en route
- Hold to cruise altitude as long as possible
- Use fuel-efficient descent profile

Aircraft Ground Handling

- Reduce engine usage in taxiing in and out
- Take delays at gate with engines off
- Delay start-up of engines until pushoff
- Increase use of towing

Other

- Increase use of simulators instead of aircraft in flight training

Energy conservation measures for buildings would involve increased insulation, reduction in use of glass, construction of more multi-family structures as opposed to single-family, adherence to regulations being proposed by the State Energy Resources Conservation and Development Commission, and development of more dense urban concentrations as opposed to suburban extension.

A number of measures could also be instituted to reduce transportation energy consumption on a local level. These would include increasing vehicle occupancy, increasing transit patronage, restricting traffic, pricing actions, and restrictions on fuel sales. Long-term energy-related savings, particularly as they relate to PIA and the Valley, are expected to be achieved in the form of changes to the propulsion plant and reduced per capita use resulting from more efficient land use patterns.

SECTION VI: RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This section examines tradeoffs between short-term impacts and long-term gains anticipated to result from the project. Short-term impacts are largely confined to the construction periods and involve temporary disruptions, whereas long-term impacts involve the permanent alterations which are associated with the completed operational project.

Short-term impacts on the natural environment include dislocation of wildlife as vegetation is cleared, and an increase in siltation in the local drainageways due to soil erosion. Pollution control measures to minimize soil erosion will be employed.

Construction activity will most likely have only a limited effect on the ecosystem. In this phase some animals inhabiting the site will move elsewhere on or off the site, and others will either not move or not survive a move and perish.

With the advent of further development and increase in activities, some changes in the vegetation and wildlife ecosystems must be expected. This will include the complete disappearance of some species from the area. However, no endangered species are involved.

Proper construction procedures will be used to minimize, if not eliminate, any significant generation of dust within or outside the immediate construction site. Furthermore, this site will be sufficiently large to allow for a balanced cut and fill operation.

Open burning is not allowed in Los Angeles County because of air pollution problems. Any burning that is permitted will be undertaken strictly in accordance with the applicable federal, state, or local regulations. Noncombustible materials will be buried by proper landfill operations.

Given the semi-rural character of the area and the relocation of residents living within the construction site, there will be few inhabitants who will experience noise disturbances attributable to construction.

Some of the construction activities may cause noise and vibration, and some temporary stoppage or rerouting of local traffic. Most heavy equipment, however, will be confined to the immediate construction site, except for some minor hauling operations, thus reducing impacts.

Short-term disruptions to the human environment include dislocation of 413 families. Relocation of all families have already occurred. One commercial activity and three of the four industrial operations have ceased to exist.

Other short-term effects that are not necessarily caused by the construction process itself may accompany it. One of these is the potential temporary drop in property tax revenues caused by removal of some airport property from the tax rolls before accompanying development has had a chance to become an offsetting addition to tax rolls. The DOA currently is paying its full share of property taxes on the land it has acquired to date, an arrangement which is expected to continue for some indefinite time. There are also available grant-in-aid programs from various governmental agencies for capital improvements to the public infrastructure, such as schools, public safety, community facilities, streets, and sewers.

A second effect is that increases in land value may change the local land uses because the existing use may become uneconomic. The existence of competent local and regional planning agencies in the region, and the requirement for more planning in recent state and federal legislation providing grants-in-aid, are strong indications that the necessary planning will occur.

A third short-term effect is increased administrative and service burdens (e.g., utilities, police, fire protection, roads, sewage treatment, water supply, recreational facilities, and schools) on the local governments by the demands of the airport and related development. "Gearing-up" for the administrative and service burdens, associated with the airport and related development, is primarily a planning function. Already some of this planning is under way. Increases in land values and other tax-yielding activity, as the area develops a broader and stronger economic base, should keep public revenues in step with increased administrative and service responsibilities.

The construction and operation of the proposed airport will, in the long run, preclude some of the agricultural uses of the site and surrounding lands affected by growth inducement. It must be emphasized, however, that since the early 1950s the agricultural identity of the Antelope Valley began to decline as the aircraft industry offered more nonagricultural employment, coupled with the trend toward increasing urbanization. In sum total, Valley use of land for crop production dropped from 86,139 acres in 1959 to 50,563 acres in 1975. Due to the above considerations, it can be seen that PIA, while not a cause of agricultural decline, is a significant factor leading to further urbanization.

These short-term adverse impacts must be measured by long-term gains anticipated to result from the project. Airport construction is directly related to economic, social, and cultural development of the service area. The project will directly create numerous new employment opportunities and indirectly generate other spin-off jobs in support industries. In addition, increased commercial carrier service will extend regional industry's ability to sell their goods. New jobs and expanded commerce create more expendable income which will have the effect of a positive multiplier on the regional economy.

Air transportation is an important component in the social and economic framework of the Los Angeles region. It provides a strong link with domestic and international activity on which Los Angeles thrives and with which it interacts.

The proposal for a new air carrier airport has been predicated on the fact that, notwithstanding very significant investment in improvements at LAX and ONT and other principal existing commercial airports, they will not have the capacity to meet the air traffic levels forecast beyond the mid-1980s. Thus, unless the Los Angeles metropolitan area provides new and adequate aviation facilities along with significant improvements in existing and new ground transportation modes, the result will be a decline in the quality of transportation services, and the social and economic activity dependent upon them.

Apart from the contribution to the region of adequate future air carrier facilities, location of the airport at Palmdale will provide the opportunity for more localized community benefits. The improved network of streets and highways will upgrade the current level of circulation in the North County area. This will be beneficial to anticipated regional growth.

The airport will be a stimulus for more comprehensive regional and local planning efforts. Such planning, as accomplished in the North Los Angeles County General Plan study, sets the stage for more orderly growth, phasing of developments, a more rational allocation of resources, and cooperative provision of public services.

The Palmdale site, being removed from the more urbanized areas of the Los Angeles region, will have less conflict with the more densely populated centers than do the existing airports. Air and noise pollution impacts will also be more manageable as the area in and around PIA will be more compatibly planned for airport use. This is not to imply, however, that the development and operation of PIA is not without adverse impacts, as discussed elsewhere. Other infrastructure improvements such as sewage treatment, waste disposal, surface drainage, and utility supply will be accomplished under quality control in an area now having little control. The region can benefit overall from the scale of infrastructure development necessary for the airport.

It is anticipated that the increased economic growth (in terms of employment) that will occur because of PIA will be about 41% greater than that which will occur without PIA. While this will have a significant impact on the North Los Angeles County area, it will be an intra-regional shift in activity and will not be a growth-inducing stimulus for the region as a whole.

By 1995, the construction of the airport is expected to be completed and direct employment is expected to be 1,000 employees per MAP. Total employment, including direct and induced employment less construction jobs, is estimated at 4,000 in 1985, 12,300 in 1990, and rising to 30,400 by 1995.

Under the assumption of no PIA, the investment required to provide for the needs of 150,000 people in the Antelope Valley will be between $240 - 256 million. The incremental capital investment associated with PIA will be around $150 million for additional infrastructure facilities. Operating and maintenance costs without PIA will be about $300 million and with PIA about $500 million.

The construction of flood control and drainage facilities would have some unavoidable adverse impacts, such as dust, noise, marring of the landscape, and disruption of native flora and fauna. In addition, construction would require some commitment of financial and material resources. The long-range effect of this work, however, would result in a net benefit to the Valley since it would both conserve water and reduce damages, such as occurred in the 1969 flood.

The management of surface waters to supplement the natural flows, drainage patterns, and recharge process could also provide outdoor recreation and enhance fish and wildlife regimes.

Thus, short-term disruption imposed by the project on the environment represents a tradeoff for the long-term economic vitality and improved standard-of-living anticipated to occur throughout the Los Angeles area as a result of the project.

Finally, the project will have one important positive short-term impact. Construction of PIA will inject thousands of dollars into the region's construction industry and reduce unemployment in the Los Angeles area.

SECTION VII: IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

In a development of an airport of the magnitude proposed for Palmdale, a number of resource commitments are required. The resources pertinent to this airport development are land, financial, natural, recreational, open space, and ecological.

LAND

Construction of the airport will have a significant impact on land use in North County. In addition to the 17,700 acres designated as airport land, 8,800 acres of vacant and agricultural land, along with 16,300 acres due to normal growth, will be turned to industrial, commercial, residential or recreational uses. The character of Antelope Valley will be significantly changed. However, construction of the airport is expected to have no effect on the existing acreage of military land or open space, as classified by the RPC. It will, however, diminish the supply of vacant agricultural land.

On-site airport land currently is used to a very limited degree. Most residential properties have been acquired and vacated, and only a single commercial use continues to operate. The Sanitation District property, the existing golf course, and the 773 acres of farmland are expected to continue their present use indefinitely.

Much of the airport acreage has always been vacant, has never undergone major capital improvements, is some distance from population centers, and has limited access.

FINANCIAL RESOURCES

A substantial financial commitment of $450 - 500 million will be required to construct the proposed airport and terminal facilities, as well as an access road to the airport. An additional capital improvement investment of $527 - 559 million by 1995 will also be needed for public facilities. Without the airport, these same facilities at a cost of $351 - 374 million will be required to accommodate normal, non-airport growth.

AIR, WATER, AND MINERALS

The natural resources cannot be considered irretrievable in relation to other regional demands inasmuch as the air and water are returned to the natural cycle. Moreover, the emissions related to the airport and associated activity are expected to be within the standards established by federal and state law, and it is anticipated that the airport will not have an adverse effect on the region's water quality.

Known and potential major sources of crushed rock, clay, limestone, dolomite, cement, and petroleum deposits have been identified in the North County area, but they are not located on or immediately adjacent to the PIA site. Several sand and gravel deposits are situated on the extensive floodplain and stream channel areas of the Little and Big Rock Creek Washes, and do extend into the site. Their use do not significantly curtail the range of beneficial uses of the environment.

Other resources, such as fossil fuels, labor, time, and materials consumed in construction of the airport and related development are also not considered to curtail the range of beneficial uses of the environment.

The allocation of State Water Project water can be considered an irreversible commitment already made by the local water districts since, by contract, they have an obligation to purchase the water allotted to them.

Improvement to surface drainage conditions, and control of flooding and erosion will require some commitment of financial ($107 million with PIA, $78 million without) and material resources. Use of these resources, however, will result in protection from the costly damage of floods, and the conservation of water supply sources.

RECREATIONAL, OPEN SPACE, AND OTHER AREAS OF INTEREST

The properties to be acquired for the airport do not include any publicly owned recreational lands, nor do they contain any outstanding aesthetic characteristics or features. To a certain extent the airport development will require an irreversible commitment of open space resources, some of it now used for agricultural purposes. The DOA is committed to an appropriate location of facilities and sensitive landscape treatment to blend the airport into and enhance the open space quality of the area. Moreover, the DOA plans to provide, where possible, airport property for recreational purposes. Such use would be subject to the conditions of Section 4(f) of the DOT Act of 1966 if the property is ever needed for airport purposes. There will be no irreversible or irretrievable commitment of any historical, archaeological, or paleontological data or material on the site; the site will continue to be surveyed, and any data or materials of interest will be recovered and preserved.

ECOLOGICAL

Some native common wildlife and vegetative species existent on the site will be displaced or eliminated, although there will not be any destruction of unusual wildlife habitat. It is also anticipated that the landscape improvements on the site, along with 5,000 acres left vacant, will continue to provide habitat for native common species.

However, the impact due to further urbanization of the Valley, the change in the agricultural regime, and the change in the general way of life will be significant in that they will change the general characteristics of the entire region that presently supports a desert ecology. Once the commitment to the airport is made, the desert ecology cannot be maintained as it now exists nor can it be easily retrieved unless land use management programs both on- and off-site are established.

ENERGY RESOURCES

The annual operation of PIA by 1995 would consume a considerable amount of fossil fuel resources -- 25 million gallons of aviation fuel, 4.46 million gallons of vehicular fuel on the airport, 21.46 million gallons in access travel, 2.4 million gallons of fuel oil for airport facilities, and 46.9 million gallons of fuel oil for additional residences in the Valley. Fuel consumption at an air facility elsewhere in the Los Angeles area would be approximately the same to accommodate 12 MAP. Access to such other facilities would consume approximately 21% less fuel than travel to PIA, or 17 million gallons total. The residential use of fuel for housing, located elsewhere if PIA were not built, would increase 15% to 53.8 million gallons of fuel oil.

SECTION VIII: SUMMARY OF PUBLIC HEARING ISSUES AND RESPONSES

The concept of a major commercial airport to be located in the Antelope Valley was formulated about the mid-1960s. In the process of developing this concept, the DOA has involved a number of governmental agencies at all levels, undertaken preliminary feasibility studies, sponsored an environmental impact study, and the preparation of a draft EIS.

Several public hearings and presentations have been made in conjunction with the above activities. In March and April 1969, the State Department of Aeronautics conducted a public hearing concerning development of the Palmdale facility. In July 1969, the DOA sponsored a public meeting in Palmdale at which the findings of the preliminary analysis of the proposed site were presented. The FAA followed this meeting with an informal hearing to gather facts relevant to PIA and airspace utilization. In November of that year, the State Environmental Quality Study Council conducted a noise abatement committee public hearing in Palmdale. These meetings were well attended by local citizens and representatives of various organizations, both in support of and opposition to the airport. The primary concerns focused on growth in and planning for the Antelope Valley, air and noise pollution, access to the proposed site, the need for a new aviation facility, and the right of the local residents to participate in the decision to locate a major new airport in their community.

The Southern California Association of Governments also held an airport public hearing in April 1973 on the regional aviation system study, which included discussions on the PIA proposal.

From all of these meetings and documents, a list of key organizations and individuals was compiled for the development of the citizens participation mechanism. Following the citizens' participation efforts and the preparation of the impact study, a public hearing was held in November 1974 in Palmdale. A number of comments resulted from this hearing and from a review of the 1974 report. These comments were incorporated into the July 1976 EIS. Subsequently, a public hearing was held in December 1976 and comments were received. The response to these comments are included in Volume Five, Chapter XI, Section F1 of the referenced January 1978 draft EIS prepared by the DOA.

It was deemed necessary to identify and contact the various organizations that could elect or appoint a representative to serve on a Citizens Information Committee (CIC), the citizens participation structure formed to review and comment on the environmental impacts of the proposed project. This committee was to consist of representatives of governmental policy-making and planning bodies, local community groups and organizations, and selected individuals.

In order to determine the participatory organizations, the DOA consultants spent approximately four months in Palmdale and Lancaster interviewing and explaining the purposes of a citizens participation mechanism. A cross section of traditional and nontraditional organizations and groups was, therefore, contacted. These included realtors, professionals, chambers of commerce, businesses, youth, elderly, low-income, educational interests, cultural, ethnic and racial minorities, consumers, conservationists, inner city interests, and social action groups. The agencies, organizations, and persons contacted are listed in Volume Six, Appendix B, of the referenced DOA draft EIS.

From the 37 organizations contacted, 43 individuals were interviewed. Subsequently, 26 of the organizations were invited to elect or appoint a representative to serve on the CIC. An additional 19 interested groups in the Antelope Valley and officials of city, county, state, and federal agencies were invited to appoint an observer.

The first organization and orientation meeting of the CIC was held in Palmdale, December 6, 1973.

The primary functions of the CIC were to review and comment on the environmental study task reports, and to make their comments and concerns known to the consultant. These reports were an output of the eight work tasks that were accomplished during the environmental study and integrated into the 1974 draft statement. They are as follows:

Task I - Is There a Need for Further Development of Aviation Facilities?

Task II - Alternatives for Satisfying Aviation Demand

Task III - Description of Proposed Project

Task IV - Determination of Noise Impact

Task V - Determination of Air Pollution Impact

Task VI - Determination of Impacts of Providing Access

Task VII - Determination of Economic and Land Use Impacts

Task VIII - Determination of Other Human and Natural Environmental Impacts

The committee's activity was divided into two phases. The first phase was a review and comment by the entire committee on the first three work tasks noted above: Need, Alternatives, and Project Description. The second phase of activity was structured around the work of three subcommittees. These committees were assigned a set of tasks for detailed review and reporting back to the full committee. The tasks for the subcommittees were grouped as follows: Noise, Air, and Access; Land Use and Economics; and Human and Natural Environment.

The principal issues and community concerns were extracted from the transcripts of the public hearings, news media articles, citizens' letters, and numerous interviews. These statements were addressed in the course of accomplishing the work tasks of the 1974 study and were further discussed at CIC meetings. In addition, a number of federal, state, regional, and county agencies were contacted informally during the preparation of the study for their review, concerns, and comments.

Upon completion of the draft environmental impact study in July 1974, copies were made available to the citizens and institutions which would be affected by the construction of an airport at Palmdale.

Two public hearings were held in November 1974. At these hearings, the majority of speakers expressed their support of the airport and of the environmental impact study. The major criticisms came from two institutions -- the Sierra Club and the Department of the Air Force.

Numerous comments by public and private interests were received by the DOA in response to the 1974 impact study. These comments are presented in summary below, while copies of the responses are included in Volume Six of the referenced DOA draft EIS.

It is noted that, in response to the public hearings and the comments received, several portions of the 1974 study were rewritten, amplified, or new sections were added. The major revisions are as follows:

- A reduction in air passenger demand regionally to 93 MAP in 1995 and the allocation of 12 MAP to PIA.
- A reduction in air and noise impacts resulting from a lower level of activity at PIA.
- An expanded discussion on the use of energy resources.
- An expanded discussion on social impacts as they relate to personal safety, public service facilities, public safety, housing, and education.
- A change in growth-inducing impacts in terms of land use and economic and fiscal implications.

- A review of the effects on access roads and further discussion on alternative modes of access.

- A more detailed discussion of the effects of possible seismic activity.

- A further discussion on surface drainage, flooding, and flood control facilities.

A synopsis of comments mace by federal, state, regional, and local public agencies, and several private groups or individuals is presented in Volume Five, Chapter XI-1, of the referenced DOA draft EIS. A similar format has been prepared to indicate the comments received and response to the December 9, 1976 public hearings, and the review of the amended EIS (Volume Five, Table XI-2).

APPENDIX A

RESPONSE TO COMMENTS ON AIR QUALITY

U. S. ENVIRONMENTAL PROTECTION AGENCY

U. S. DEPARTMENT OF THE NAVY

ENERGY AND AIRPORT ACCESS

U. S. DEPARTMENT OF TRANSPORTATION

EIS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

CC: LAX-600

Project #D-FAA-K51016-CA

Gerald M. Dallas
Chief, Airports District Office
P.O. Box 45018
Westchester Station
Los Angeles CA 90045

APR [illegible] 1979

Dear Mr. Dallas:

The Environmental Protection Agency has received and reviewed the draft environmental statement for the PALMDALE INTERNATIONAL AIRPORT DEVELOPMENT PROGRAM, PALMDALE, CALIFORNIA.

EPA's comments on the draft environmental statement have been classified as Category ER-2. Definitions of the categories are provided on the enclosure. The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequence of the proposed action and the adequacy of the environmental statement.

EPA appreciates the opportunity to comment on this draft environmental statement and requests three copies of the final environmental statement when available.

If you have any questions regarding our comments, please contact Betty Jankus, EIS Coordinator, at (415)556-6695.

Sincerely,

Sheldon M. Prindiville

for Paul De Falco, Jr.
Regional Administrator

Enclosure

RECEIVED
APR 12 1979
AIRPORTS DIV.

Air Comments

1. (DEIS, Section III, pp. 119-143)

   The Draft EIS does not quantify emissions predicted for the estimated time of completion (ETC) of Palmdale International Airport. ETC is considered "worst case" year for vehicle mobile source emissions. The Final EIS should identify the year and quantify all mobile source emissions occurring at the ETC.

2. (DEIS, Section III, p. 130, Table 37)

   The Draft EIS does not identify the assumptions and procedures used to quantify peak hourly averaged emissions. The Final EIS should include these assumptions and procedures.

3. (DEIS, Section III, pp. 122, 123, 126, 129)

   The Draft EIS uses the EPA's Supplement 5 to AP-42 to quantify mobile source emissions. Supplement 5 to AP-42 is outdated. EPA recommends the use of the California Air Resources Board's EMFAC-5 emission factors or EPA's Mobile Source Emission Factors (EPA-400/9-78-005 (3/78)) in the Final EIS.

4. (DEIS, Section III, pp. 144-155)

   The Draft EIS does not provide sufficient information to review the technical adequacy of the modeling procedures. The Final EIS should identify the modeling procedures, assumptions and inputs used to project air quality impacts.

5. (DEIS, Section III, p. 144)

   The Final EIS should identify the exact "severe meteorological-air quality regime" used in the modeling analysis.

6. (DEIS, Section III, p. 187)

   The Draft EIS states that "the Palmdale-Lancaster area will become a focal point for tourists, requiring construction of such facilities as hotels/motels, restaurants and entertainment areas." The Draft EIS indicates that the increase in population attributable to Palmdale International Airport is 77,000 in 1995 (DEIS, p. 128). The Final EIS should estimate and

analyze the secondary growth air quality impacts of Palmdale International Airport in accordance with requirements in Council on Environmental Quality's Preparation of Environmental Impact Statements: Guidelines (40 FR 20553).

7. (DEIS, Section III, p. 155)

The Draft EIS discusses mitigation measures for controlling hydrocarbons. The Final EIS should include an analysis of measures and/or tradeoffs available to reduce emissions of all pollutants which are likely to exceed State and National Ambient Air Quality Standards (Clean Air Act, as amended, 8/77, Section 165(a)(3), 173(1)).

8. (DEIS, Section III, pp. 144-145)

The CO analysis should include a microscale study of the passenger-auto loading/unloading zone at the terminal during worst case meteorology and peak one- and eight-hour traffic conditions.

Water Comments

1. (DEIS, Section III, p. 128)

The Draft EIS indicates that the increase in population attributable to Palmdale International Airport (PIH) is 77,000 in 1995. The Final EIS should assure that these figures are consistent with the Southern California Association of Governments (SCAG) approved population projections in accordance with Section 313 of the Clean Water Act of 1977.

2. (DEIS, Section III, pp. 232-233)

The Draft EIS states that wastewater flows from PIA are to be treated by the Los Angeles County Sanitation District #20 (LACSD). The Draft EIS also states that wastewater flows from PIA-induced secondary growth will be treated by LACSD #'s 14, 20, 26, and 32. The Los Angeles Regional Water Quality Control Board (RWQCB) should be requested to determine that the increased flows and waste characteristics will not result in the violation of the discharge requirements for the treatment facilities and that the increased flow is consistent with current facilities planning. These issues should be discussed in the Final EIS.

EIS CATEGORY CODES

Environmental Impact of the Action

LO--Lack of Objections

EPA has no objection to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1
II.	RESPONSE TO COMMENTS	1
	A. AIR QUALITY	1
	1. U.S. Environmental Protection Agency	1
	2. U.S. Department of the Navy, Naval Weapons Center	12
	B. ENERGY	15
	C. AIRPORT ACCESS	20
III.	ATTACHMENTS	
	A. Emission Updates for Latest Emission Factors	
	B. Modeling Assumptions	
	C. A Simple Unsteady Concentration Model Explicitly Incorporating Ground Roughness and Heat Flux	
	D. PIA Terminal Motor Vehicle Loading/Unloading Microscale Analysis	
	E. Working Memorandum #1, Review of Passenger Demand Forecasts	
	F. Working Memorandum #2, Estimate of Peak Hour Travel at PIA	
	G. Working Memorandum #3, The Effect of Fuel Prices on Air Travel Demand	

I. INTRODUCTION

This report was prepared by Arthur D. Little, Inc., at the request of the Federal Aviation Administration during the months of January-May 1980. The report addresses the comments made by several federal agencies regarding air quality, energy, and airport access based on their reviews of the Draft Environmental Impact Statement (DEIS) for the Palmdale International Airport (PIA), February 1979.

This response to comments is organized by each subject matter and the commenting agency. A response is provided directly following each comment. Any detailed analysis and related report prepared for the responses are provided in the attachments for further reference. The following comments and responses are in the context of the DEIS and are included as a matter of record and information in this FEIS.

II. RESPONSE TO COMMENTS

A. AIR QUALITY

1. U.S. Environmental Protection Agency

a.1. Comment: (DEIS, Section III, pp. 119-143)

The Draft EIS does not quantify emissions predicted for the estimated time of completion (ETC) of Palmdale International Airport. ETC is considered "worst case" year for vehicle mobile source emissions. The Final EIS should identify the year and quantify all mobile source emissions occurring at the ETC.

a.2. Response:

The estimated time for completion (ETC) for Palmdale International Airport is 1995. The analysis and computation of all mobile source emissions were done for this year.

b.1. Comment: (DEIS, Section III, p. 130, Table 37)

The Draft EIS does not identify the assumptions and procedures used to quantify peak hourly averaged emissions. The Final EIS should include these assumptions and procedures.

b.2. Response:

The assumptions used to quantify peak hourly averaged emissions are as follows:

- Civilian Aircraft

  1. Compute emissions from (Table 28 p. 124)

  2. Determine ratio of peak hour operation to average

     a. Use December for inert pollutants -- 2.22 ratio (Table 29, p. 124)

     b. Use August for photochemical pollutants -- 2.59 ratio (Table 29)

  3. Scale computed emissions according to ratio

- Military Aircraft

  1. Assumed not to change from average

- Collateral Ground Sources

  1. Traffic: Use peak hour traffic for 1995 (Table 29) times emission factor (Table 31, p. 126)

  2. Nontraffic: Assumed nontraffic sources increase the same as for aircraft

     a. Compute nontraffic amount (Table 30, Attachment A)

     b. Scale with ratios computed above

c.1. Comment: (DEIS, Section III, pp. 122-123, 126, 129)

The Draft EIS uses the EPA's Supplement 5 to AP-42 to quantify mobile source emissions. Supplement 5 to the AP-42 is outdated. EPA recommends the use of the California Air Resources Board's EMFAC-5 emission factors or EPA's Mobile Source Emission Factors (EPA-400/9-78-005, 3/78) in the Final EIS.

c.2. Response:

All mobile source emissions have been corrected using the latest California Air Resources Board (CARB) emission factor methodology. This methodology is described in Procedure and Basis for Estimating On-road Motor Vehicle Emissions (CARB, 1980). Emission factors were obtained from the CARB's EMFAC-6 computer program. These factors required a number of changes in tables and text. Attachment A gives the new computations in each of the affected areas. These include Table 26, p. 120; Table 30, p. 125; Table 31, p. 126; Table 35, p. 128; Table 36, p. 129; Table 37, p. 130; Table 38, p. 130; Table 39, p. 132; Table 42, p. 139; Table 43, p. 140; and Table 44, p. 141.

Since the emissions change, the air quality forecasts are also affected. These adjustments to the text are also given in Attachment A. The only table affected in this section is Table 49, p. 148. However, this change is due to a change in ozone air quality standard and not in the emissions. All conclusions in this section are still the same.

d.1. Comment: (DEIS, Section III, pp. 144-155)

The Draft EIS does not provide sufficient information to review the technical adequacy of the modeling procedures. The Final EIS should identify the modeling procedures, assumptions, and inputs used to project air quality impacts.

d.2. Response:

Inert pollutant impacts in the near scale (within 10 miles of the airport) were predicted using the AVQUAL model. A description of the model and model validation that was done for this study was included in the original AeroVironment air quality analysis for PIA (AV-FR-415). An excerpt from this report is given in Attachment B. A detailed discussion of the theory and development of AVQUAL is given in a paper, Attachment C.

For this study, AVQUAL was validated and then used to forecast CO air quality under both typical and severe methodology. Impacts of other pollutants, NO_x, HC, and particulate, were scaled from these runs. This model simulates only line sources; therefore, the forecasts used finite line sources to represent the airport for the forecasts. Typical meterology assumed wind at 8.5 mph and 230°; Stability D and infinite mixing; severe meterology assumed a wind of 2.5 mph and 200°; Stability F, and a 100-foot mixing height. These conditions were determined when the pollutant concentrations at Lancaster were either typical or severe, respectively. Emissions and background concentrations were those discussed in the report.

For regional (Antelope Valley) air quality, Larsen's (1971; EPA #AP-89) techniques were used to forecast ozone and CO exceedances. NO_x and particulate were also discussed based on scaling techniques. These methodologies are discussed in Attachment A (pp. 147-150). Mesoscale or regional diffusion modeling was not done because no widely acceptable regional models were available when this study was performed (1973-1974).

e.1. Comment: (DEIS, Section III, p. 144)

The Final EIS should identify the exact "severe meterological-air quality regime" used in the modeling analysis.

e.2. Response:

The severe meterology used was wind speed, 2.5 mph (1 m/sec), wind direction, 200°; Stability F; mixing height, 100 feet (30 m). This combination was found to have a 7% probability of occurrence based on historical data of Palmdale.

f.1. Comment: (DEIS, Section III, p. 187)

The Draft EIS states that "the Palmdale-Lancaster area will become a focal point for tourists, requiring construction of such facilities as hotels/motels, restaurants and entertainment areas." The Draft EIS indicates that the increase in population attributable to Palmdale International Airport is 77,000 in 1995 (DEIS, p. 128). The Final EIS should estimate and analyze the secondary growth air quality impacts of Palmdale International Airport in accordance with requirements in Council on Environmental Quality's Preparation of Environmental Impact Statements: Guidelines (40 CFR 20553).

f.2. Response:

The Preparation of Environmental Impact Statements: Guidelines, Section 1500.8(a)(3)ii states:

> "Secondary or indirect, as well as primary or direct, consequences for the environment should be included in the analysis. Many major Federal actions, in particular those that involve the construction or licensing of infrastructure investments (e.g., highways, airports, sewer systems, water resource projects, etc.), stimulate or induce secondary effects in the form of associated investments and changed patterns of social and economic activities. Such secondary effects, through their impacts on existing community facilities and activities, through inducing new facilities and activities, or through changes in natural conditions, may often be even more substantial than the primary effects of the original action itself. For example, the effects of the proposed action on population and growth may be among the more significant secondary effects. Such population and growth impacts should be estimated if expected to be significant (using data identified as indicated in 1500.8(a)(1) and an assessment made of the effect of any possible change inpopulation patterns or growth upon the resource base, including land use, water, and public services, of the area in question."

This guideline states that impacts due to induced growth should be analyzed. An analysis of this type was performed in the DEIS. The emission inventory given in Table 39 (Attachment A, p. 132) gives emissions for the areas corresponding to the populations given in Table 33 (Attachment A, p. 128) from which the population difference of 77,000 was obtained. These areas are (1) airport vicinity, (2) Antelope Valley, (3) Santa Clarita Valley, and (4) total North Los Angeles County. The emission differences in 1995 between the with and without PIA scenarios in North Los Angeles County are greater than the differences between these two cases at the airport. This increase would be due to secondary or population impacts.

Once emissions based on secondary growth were determined, the emissions totals for the region (North Los Angeles County) were used to estimate the expected background concentrations (Table 47, p. 145 and Table 48, p. 146). These backgrounds and predicted concentrations due to the emissions were computed to give impacts in the total area (both Antelope and Santa Clarita Valleys) due to both the airport and induced growth.

g.1. (Additional comment received 27 May 1980)

The estimated population growth due to PIA is given in Table 33 (page 128) and Table 56 (page 182). In terms of the emission increases associated with population growth, the effects of PIA are presented in Table 39 (page 132). The table indicates that emission projections "without PIA" are taken from analyses done by the Southern Californa Association of Governments (SCAG), the South Coast Air Quality Management District (SCAQMD), and the California Air Resources Board. It is not clear how emission projections "with PIA" were derived. If emission projections "with PIA" were calculated by the contractor, outdated mobile source emission factors may have been used.

g.2. Respose

Emissions for the airport area in Table 39 both without and with the PIA were calculated using the latest CARB emission factor methodology (EMFAC-6). Emissions for the Antelope and Santa Clarita Valleys were computed based on projected emission inventories for the Los Angeles County portion of the South-east Desert Air Basin (SEDAB) supplied by the California Air Resources Board. These emission inventories included all years presented in the table (1973, 1980, and 1995).

These inventories were the most updated ones available, since attempts to obtain more current ones from CARB were unsuccessful. The most recent emission inventory done is not being released due to inaccuracies, and one which will be based on the latest emission factors will not be available until December 1980.

It was assumed that the emissions in these inventories would be applicable to the Antelope Valley, since the area covered by the Los Angeles County portion of the SEDAB is roughly the same (see Figure 19, Attachment A). There were no emission estimates directly available for

the Santa Clarita Valley area. Therefore, the 1995 No Build emissions were scaled from the Antelope Valley emissions based on population in the two areas, with the following exceptions: (1) Railroad emissions were assumed to be the same, based on comparatively equal number of tract miles in the two areas; (2) No aircraft emissions were assumed in Santa Clarita Valley; (3) VMT dependent emissions were adjusted based on the ratio of Antelope Valley VMT to Santa Clarita VMT.

Next, the 1995 emissions for both valleys with the PIA built were computed. These emissions for both valleys were scaled by population differences between with PIA and without PIA (Table 33), except for aircraft and railroads. The railroad emissions were assumed to remain constant, and the airport emissions were adjusted to reflect the calculations of predicted emissions between the Build and No Build scenarios. These airport adjustments do include motor vehicle emissions based on the latest emission factors.

h.1. (Additional comment received 27 May 1980)

On page 138, there appears to be an inconsistency in the last paragraph on that page. Table 39 (p. 132) indicates an increase in emissions due to PIA, while Tables 42-44 show a "regional" decrease in emissions due to PIA. Page 138, paragraph 4, discusses only decreased emissions and seems to address airport sources only, as indicated by Table 42-44 (pp. 139-141).

Of primary concern is whether or not there will be an emissions increase due to PIA, and if so, this increase should be included in the appropriate Nonattainment Area Plan (NAP). A letter from the SCAQMD or the CARB would adequately clarify this issue.

h.2. Response

The statement on page 138, paragraph 4, does appear to be in error. If PIA is built, the emissions in the SEDAB will be higher than if not built. However, the localized emissions around Los Angeles International Airport (LAX) and Ontario International Airport (ONT) in the SCAB were projected to be higher if PIA was not built due to increased aircraft and vehicular traffic congestion around LAX and ONT. The increased amount in SCAB under No Build was higher than the increase in SEDAB with PIA built, leading to a conclusion that "regional" emissions would be lower with PIA. However, Tables 42-44 do not include the effects of secondary growth. Secondary growth is included in Table 39, and the impact from these emissions would be higher in both the SEDAB (Antelope Valley), and the SCAB (Santa Clarita Valley) if PIA is built. These increases are higher than the amount offset from traffic congestion decreases.

All impact predictions were based on the emission totals in Table 39, so that secondary growth impacts were included, and no localized pollutant shifts for SCAB (from LAX and ONT to Santa Clarita Valley) were analyzed. Also, the SCAB emissions in Table 39 do not reflect the increased traffic congestion emissions, but these were not adjusted since they were presented mainly for comparison, and were not incorporated into the impact analysis. These inconsistencies arose because results of two separate analyses done at different times were incorporated into the DEIS.

In conclusion, there will be an emissions increase due to PIA in the SEDAB. However, there is no Non-Attainment Plan (NAP) available yet for Los Angeles County. The State Implementation Plan (SIP) working documents do include an analysis of possible PIA impacts based on the DEIS, so it is expected that PIA will be included in the NAP.

In SCAB, it is predicted that the emissions will be shifted from the airport areas (LAX and ONT) to the Santa Clarita Valley if PIA is built. However, the emission differences between Build and No Build in SCAB will be a very small percentage of the total.

i.1. (Additional comment received 14 May 1980)

Do population estimates in the DEIS match those used in the SIP?

i.2. Response

The SIP used the California Department of Finance (DOF) D-100 series estimates, whereas the DEIS used the DOF E-0 projections and added to this additional population based on direct and indirect growth for the with PIA case and DOF E-0 projections for the without PIA case. These different population estimates are compared on pages 172 and 181 in the DEIS and, in general, the E-0s are about 5% higher than the D-100s. It is generally felt that these population figures are more realistic than the D-100s and, in any case, would give a conservative impact estimate since they are slightly higher.

j.1. Comment: (DEIS, Section III, p. 155)

The Draft EIS discusses mitigation measures for controlling hydrocarbons. The Final EIS should include an analysis of measures and/or tradeoffs available to reduce emissions of all pollutants which are likely to exceed State and National Ambient Air Quality Standards (Clean Air Act, as amended, 8/77, Section 165(a)(3), 173(1)).

j.2. Response:

Pollutants which are predicted in the DEIS to exceed the NAAQS are O_3, HC, NO_2, and particulate matter (PM). Ozone (O_3) is reduced by controlling hydrocarbons, so only HC, NO_2, and PM will be addressed.

Table 39 (Attachment A, p. 132) gave the emissions in North Los Angeles County for both with and without the PIA in 1995. The emissions increases due to this project for these three pollutants are predicted to be 4.4 tons/day for HC, 5.0 tons/day for NO_x, and 2.2 tons/day for PM. These emission quantities will need to be offset to assure that operation of this airport will not interfere with attaining or maintaining the standards.

AeroVironment performed a study in 1978 (Gelinas, 1978) to determine the emissions reductions available from various strategies identified to control airfield operation emissions. Aircraft operations at both Los Angeles International Airport (LAX) and San Francisco International Airport (SFO) were studied to provide definitive estimates of reductions possible. Nineteen potential strategies were identified but many were ruled out for cost and practicality considerations. Table II-1 summarizes the results for LAX of the six measures studied. The largest emission offsets for HC and PM seemed to be available from aircraft towing. Alteration of Deceleration Patterns were predicted to be the most effective for reducing NO_x.

Table II-2 gives the emissions reductions possible, based upon the percentages given in Table II-1, if aircraft towing were implemented at PIA. However, these percentages were derived from LAX and would be different for PIA. Also, other control strategies may be more viable at this location.

Since these emission reductions do not completely offset the pollutants and may not be feasible in this case, other offsets need to be identified. Other offsets could be trade-offs from reducing emissions at other sources. In general, HC trade-offs may be obtained basin-wide (in this case, Southeast Desert Air Basin (SEDAB), although some sources in the SCAB would also be appropriate), but NO_x and PM trade-offs should be in the vicinity, if possible. Occasionally, dispersion modeling can be used to determine the validity of PM and NO_x trade-offs.

A study of offset availability for this area (Engineering Science, 1978) gives some indication of companies which may have trade-off potential. Table II-3 list potential HC offset sources within 80 miles of PIA. These sources (except carbon manufacturing) are all in North Los Angeles County (as were the emissions) but only in the SCAB portion. However, the SIP (CARB, 1978) states:

> "Future oxidant concentrations in the western part of the air basin (SEDAB) will be determined primarily by events in the South Coast Air Basin. If efforts to obtain the oxidant standard are successful in the SCAB, western areas of the Southeast Desert Air Basin will approach, and perhaps attain, oxidant standards. Conversely, if existing trends in TOG and NO_x emissions in the SCAB are not altered by effective control strategies there will be little improvement in the Southeast Desert.
>
> The relationship between SCAB control strategies and Southeast Desert oxidant levels is complex. The major benefit to the Southeast Desert of a successful oxidant control strategy in the SCAB is lower oxidant concentration in transported air.

TABLE II-1. Summary of evaluation of selected strategies at LAX.

Selected Strategy	Percent Emission Change CO	HC	NO_x	TSP	Percent Fuel Use Change	Safety	Cost Impact	Implementation Time
Tow Aircraft	-39	-36	-4	-25	-28	P	ND	LT
Reduce Number of Engines	-21	-23	+2	+5	-3	S	Beneficial	I
Passenger Load Increase	-7	-7	-7	0	-7	S	Beneficial	LT
Control Departure Time	-4	-4	0	0	-2	S	Beneficial	I
Alt. Deceleration Pattern	+11	+11	-16	0	-1	P	Beneficial	I
Runway Assignment	-14	-10	-2	-15	-10	S	Adverse	NT

Notation:

Minus (-) indicates savings
Plus (+) indicates increase
S – No apparent safety problem
P – Potential safety problem
ND – Not Determined
I – Immediate Future
NT – Near-Term
LT – Long-Term

TABLE II-2. Emissions reductions possible at PIA with implementation of aircraft towing.

Pollutant	1995 Emissions* with PIA (tons/day)	Emission Reduction (percent)	Possible Emission Reduction (tons/day)	Emissions Offsets Needed (tons/day)
HC	18.2	36	6.6	4.6
NO_x	19.3	4	0.8	5.0
Particulate	11.5	25	2.9	2.2

*Total for North Los Angeles County (Antelope and Santa Clarita Valleys)

TABLE II-3. Future hydrocarbon emissions and potential offsets (tons/year).

	Source Category	Existing Emissions	Reductions Due to SIP	Future Emissions	Future Potential Offsets
1.	Surface Coaters	2,553	1,236	1,317	0
2.	Dry Cleaners (petroleum)	789	740	49	0
3.	Degreasers	2,040	3,056	0	0
4.	Petroleum Production and Refining	926	343	583	58
5.	Petroleum Marketing	535	206	329	33
6.	Drying, Baking and Curing Equipment	251	84	167	0
7.	Printing Equipment	3,248	4,850	0	0
8.	Carbon Manufacturing	221	110	111	11
9.	Manufacturing and Miscellaneous	384	186	198	19

> This benefit could be partially offset, however, if SCAB strategies do not also reduce projected emissions of ozone precursors, particularly NO_x in the central and eastern portions of the SCAB. These precursors could result in higher levels of 'locally produced' oxidant in the Southeast Desert."

Therefore, reductions in emission from these sources could prove to be more effective than reductions in emissions from the SEDAB. The sources on this table represent a total of 0.3 tons/day of offset. For particulate and NO_x, trade-offs from cement manufacturing may be more than adequate to obtain the remaining offsets. For example, trade-offs of up to 26.7 tons/day of NO_2, and 2.1 tons/day of PM could be available from these sources. Table II-4 details these and other potential offsets within 80 miles of PIA.

Other offsets mentioned in the DEIS, such as advanced combustor designs, transit service, restriction of vehicle parking, or vapor recovery, would also be possibilities. The Department of Airports will need to study which of these options would be the most feasible and cost-effective.

k.1. Comment: (DEIS, Section III, pp. 144-145)

The CO analysis should include a microscale study of the passenger-auto loading/unloading zone at the terminal during worst case meterology and peak one- and eight-hour traffic conditions.

k.2. Response:

A microscale study of this area has been prepared. The assumptions and results from this study are presented in Attachment D. In general, no exceedances of any CO standards are predicted for the passenger auto loading/unloading zone.

2. U.S. Department of the Navy -- Naval Weapons Center

a.1. Comment:

Pages 120, 132, 149, and 150-152 show that Palmdale International Airport will have an adverse effect on air quality. The Naval Weapons Center relies heavily on photo-optic instrumentation and any degradation whatsoever has a significant impact on our overall test and evaluation capabilities. The DEIS apparently gave no consideration to any impact greater than 10 miles away from the proposed PIA site.

TABLE II-4. Future particulate and NO_x emissions and potential offsets (tons/year).

			Kern and Los Angeles Counties				San Bernardino County			
	Source Category	Pollutant	Existing Emissions	Reductions Due to SIP	Future Emissions	Future Potential Offsets	Existing Emissions	Reductions Due to SIP	Future Emissions	Future Potential Offsets
1.	Chemical Manufacturing	PM	39	0[a]	39	20	63	--	--	--
2.	Asphaltic Concrete Batching	PM	60	0[a]	60	48	--	--	--	--
3.	Dry Cement Manufacturing	PM	315	0[a]	315	158	1,202	0[a]	1,202	600
		NO_x	220	0[b]	220	147	19,178	0[b]	19,178	9,589
4.	Mineral Processing	PM	82	0	82	41	--	--	--	--
5.	Carbon Manufacturing	PM	193	97	96	10	--	--	--	--

(a) Source category is not included in the draft (1978) State Implementation Plan (SIP). This does not preclude the possibility of it being included in the SIP.

(b) SIP requires cement kilns to convert to coal. However, these sources are presently using coal or are in the process of converting over.

a.2. Response:

The art of visibility modeling (i.e., relating pollutant emissions to air quality to effect on visibility) is in its infancy. Several models relating air quality to visual range exist but none have been validated.

Visibility is very good in the Naval Weapons Center (NWC) area of the South East Desert Air Basin. Typical visual ranges are 85 miles during the winter and 50 miles during summer (Kelso, 1980). In addition, when the visual range is reduced it is usually because of a regional haze (Kelso, 1980). Thus, it appears that by the time the pollutants reach NWC they are well mixed throughout the area.

The distance from the Palmdale area to the NWC ranges from 65-135 miles, and the direct and indirect emissions from the Palmdale International Airport (PIA) project are spread over a significant portion of the Antelope and Santa Clarita Valleys (total North Los Angeles County). Dispersion from diffusion and wind shifts over the distance to NWC, as well as the large area of the emission source would both act to mix the emissions from the PIA into the regional emissions.

Visibility has been found to be inversely related to the concentrations of air contaminants, especially aerosols in the size range from 0.1 um to 1.0 um in diameter. Researchers have found that primary particulate matter and secondary species like sulfates, nitrates, and photochemical aerosols have a negative impact on visual range (Latimer et al., 1978). Recent findings by Ouimette (1980) show that carbonaceous aerosols (especially soot) may play a very significant role in reducing visibility in the NWC area.

Thus, emissions of HC, NO_x, SO_2, and particulates have been related to visibility reduction. Because of the uncertainty in visibility modeling, especially over the long range dispersion distance between the PIA project and the NWC, no direct visibility modeling has been tried. However, one can quantitatively estimate the PIA project's upper-bound impacts on the visibility near the NWC.

The regional haze affecting NWC can be coming from several areas -- the San Joaquin Valley, South Coast Air Basin, as well as the SEDAB. Probably all of these areas have some impact on the regional haze. However, if one assumes that the regional haze is caused only by emissions from the northern parts of SEDAB, then the impact PIA has on visibility can be estimated. (The northern part of the SEDAB is used here to mean the Los Angeles, Kern, and San Bernardino Counties part of the SEDAB.) The percent increase in emissions in the northern part of SEDAB due to PIA will have an inverse impact on visibility by a similar percentage. This is a conservative assumption because emissions affecting the regional haze probably include more than just the northern part of SEDAB, and thus the PIA project percentage is probably smaller than the one determined here.

Table II-5 shows total emissions of particulates, HC, NO_x, and SO_2 in the northern part of SEDAB. Emissions from the PIA project, including both direct and indirect emissions of the same pollutants, are also shown in Table II-5, along with the percentage increase in total emissions for the northern part of SEDAB which they represent. These emission estimates are for the year 1995. These percentages range from 1.2% for SO_2 to 8.6% for HC. Thus, a conservative estimate of the upper bound impact of the PIA project on visibility near the NWC is in the range of 1.2% to 8.6%. This would have the effect of changing visual ranges from the typical summer value of 50 miles to a range of not less than 46-49 miles, while the typical winter visual range would change from 85 miles to not less than 78-84 miles. If the PIA project would cause an even smaller percentage increase in emissions causing the regional haze, which is likely, then the impact on visibility would be less.

B. ENERGY

a.1. Comment:

The assertion on page 9 is that crude oil price increases are likely to keep pace with, but not exceed, the present rate of inflation is very questionable, particularly in light of recent events in the international markets. Passenger projections could therefore be exaggerated, even in light of air fare deregulation. The final EIS should include (possibly as an appendix) a forecast scenario, with data, on the assumption that aviation fuel price increases will exceed the overall rate of inflation by a factor of two. Such a scenario, when coupled with the FAA forecasts, might indicate that the level of activity slated for PIA would be reached in some later year well beyond 1995 or call the need for the project into question.

a.2. Response:

After reviewing the most recent information on the effects of price and deregulation on air travel demand, it does not appear that these factors will substantially alter the timing or level of demand projected for PIA. Working Memorandum #1 (Attachment E) presents a review of recent passenger demand forecasts. Working Memorandum #3 (Attachment G) discusses many of the issues and changes associated with the relationships between price and demand. Briefly, based on current forecasts of oil pricing behavior, inflation, and income and on expectations of airline industry behavior under deregulation, it is likely that the offsetting effects of higher fuel prices and greater competition will result in demand that is not significantly different from the levels projected a few years ago.

The bases of the conclusion that external changes will not eliminate the need for PIA include:

TABLE II-5. 1995 emissions projections (tons/day).

		PM	SO_x	NO_x	HC
Antelope Valley and Santa Clarita Valley areas (including airport)	w/PIA	10.7	3.3	19.6	18.1
	w/o PIA	8.5	2.5	14.6	13.7
PIA-induced increment to two-valley area (tons/day)	difference	2.2	0.8	5.0	4.4
Los Angeles, Kern, and San Bernardino County portions of SEDAB*		184.7	26.4	165.9	51.4
Percent increment to northern section of SEDAB		1.2%	3.0%	3.0%	8.6%

*CARB (1978)

- The FAA macro model which is used to project passenger demand at the national level used mid-1979 economic projections to make forecasts for Fiscal Years 1980-81. Use of March 1980 economic forecasts, including significantly higher oil prices, resulted in no substantial changes in long-term demand levels.*

- Even with rising fuel costs, it appears that airlines will continue to offer substantial discounts to fill seats and maintain load factors. As a result, the most price-sensitive travelers, who were first attracted to air transportation as a result of deregulation, will not have to bear the full effect of higher fuel prices.

- The first round of deregulation has significantly increased the base level of air travel demand. As a result, recent passenger decreases of 5-10% in response to fare increases have only brought total traffic back to where it would have been without either deregulation or fuel price increases.

b.1. Comment:

The energy considerations appear inadequate as no provision is made for access to PIA other than by car or bus. The secondary impacts of the use of energy by employees and travelers may be significant and should be better analyzed.

b.2. Response:

Access to PIA will be provided primarily by car and bus. However, several other access proposals were evaluated and are discussed in Volume III of the Palmdale International Airport Environmental Impact Statement,** Section III-C-6 (DOA EIS). The alternatives considered include commercial VTOL operations (helicopter air taxi), STOL aircraft, an automobile ferry system using a tunnel under the San Gabriel Mountains, a road tunnel, various types of high-speed ground transit, fixed-rail rapid transit, the existing rail network, and bus rapid transit.

A bus rapid transit system, using dedicated freeway lanes and possibly remote airport access terminals, was judged to have significant advantages over the other alternatives. These include flexibility in responding to demand shifts, relatively low cost, ease of implementation, and existence of a usable right-of-way. The access alternatives were not

*Based on a telephone conversation with Mr. Gene Mercer, FAA, Office of Aviation Policy, Washington, D.C.

**Palmdale International Airport, Final Environmental Impact Statement, prepared for the City of Los Angeles, Department of Airports and the Federal Aviation Administration, Arthur D. Little, Inc., January 1978.

explicitly evaluated for their impacts on energy consumption. However, the capital and operating costs of these alternative access modes, except bus and possibly the existing rail network, would be prohibitive, particularly when the likely passenger volumes are considered. At 12 MAP, average daily person-trips to PIA would be about 27,000. These in turn would be distributed among several different points of origin and would occur throughout an operating day of 12 or more hours. It is unlikely that peak hour demand of 1000-2000 riders would justify the construction of a fixed rail or related system from PIA to the Los Angeles CBD.

The use of energy by employees and travelers is discussed briefly on pages 284 and 285 Section IV-G of the DOA EIS in an expanded analysis of energy use and impacts, including energy use with and without the airport and strategies to reduce transportation energy consumption. Table IV-85 shows that the with PIA case would require about 26% more fuel for employee and passenger travel, or about 9.5 million gallons per year. However, these estimates were based on average fleet fuel economy of 14 mpg. Based on current trends, fleet fuel economy in 1995 is likely to be closer to 30 mpg than to 15, so that the additional annual gasoline consumption associated with use of PIA would be less than five million gallons.

As discussed further in the response to Comment C below, the additional transportation energy requirements associated with PIA would be offset to some extent by residential energy consumption savings. In addition, long-term fuel price trends will probably lead to greater use of car pools by airport employees, and airport employers could be encouraged to support vanpools for workers, particularly those with the greatest commuting distances.

In summary, it appears that PIA would lead to increased secondary energy consumption by employees and travelers. However, the absolute amount of this increase is small in relation to total regional demand. Moreover, measures are available to reduce secondary energy use, particularly that required for employee transportation.

c.1. Comment:

On page 359, it is stated that if PIA is not built, residential use of fuel for housing elsewhere would increase. This is an unsubstantiated assumption. Even conceding its validity, the questions are where would their increase occur? Over what time period?

c.2. Response:

The statement on page 359 is the conclusion of an analysis discussed in more detail on page 283 of the same document. In essence, Southern California Edison and Southern California Gas Company provided information showing that the average dwelling unit in Antelope Valley

TABLE IV-85

1995 ESTIMATES OF NET ENERGY CONSUMPTION BY THE 12 MAP
USING PIA OR OTHER AIRPORTS

	Vehicle-miles Traveled (millions)		Gasoline (million gals)		Diesel (million gals)	
	Other Airports[a]	With PIA[b]	Other Airports	With PIA	Other Airports	With PIA
Travel to Work[c]						
Direct and Indirect Employment Travel	174.5	279.2	14.37	19.20	0.052	0.069
Auto and Bus Travel to Airports[d]						
From: Los Angeles County	191.1	231.2	13.58	16.44	0.066	0.079
Ventura County	27.4	25.5	1.95	1.81	0.009	0.009
Riverside County	5.6	11.1	0.40	0.80	0.002	0.004
San Bernardino County	6.8	13.2	0.48	0.94	0.002	0.005
Orange County	8.2	20.7	0.58	1.47	0.003	0.007
Subtotal	239.1	301.7	16.99	21.46	0.082	0.104
Auto, Bus, and Truck Travel Within Airports[e]						
Employment	14.0	14.0	1.40	1.40	0.005	0.005
Passengers and Visitors						
Arriving	11.9	11.9	1.19	1.19	0.006	0.006
Departing	11.9	11.9	1.19	1.19	0.006	0.006
Subtotal	23.8	23.8	2.38	2.38	0.012	0.012
Trucks	1.9	1.9	0.25	0.25	0.064	0.064
Ground Service Vehicles	-	-	0.43	0.43	0.015	0.015
Subtotal	39.7	39.7	4.46	4.46	0.096	0.096
Total	453.3	620.6	35.82	45.12	0.230	0.269

a. Assumes 12 MAP and related employees using LAX, ONT, and northeast Orange County equally instead of PIA.

b. Represents net difference between PIA and no PIA located at Palmdale.

c. Estimates from North Los Angeles County General Plan, November 1975; diesel demands = 0.0036% of total gallons.

d. Based on SARTS ratio of 1:1.4 or 0.71 trips per air passenger; gallons used estimated at 14 mpg; diesel demand = 0.0048% of total gallons.

e. Employment estimated at 1,100 employees/MAP; auto at 1.119 employees/vehicle; bus at 50 passengers/bus; trucks estimated at 0.128% of employee vehicle-trips.

consumed less energy than the average central Los Angeles unit. It was hypothesized that the difference was due to a greater sensitivity to the costs of energy among Valley residents and the fact that their homes tend to be insulated because of more extreme climate changes.

Throughout the assessment of PIA, it has been assumed that if the new airport is not built, the demand will be absorbed by other Los Angeles area airports. As a result, the direct and indirect employment associated with providing air transportation and other services to the 12 million annual passengers projected for PIA would still be needed. In the "with PIA" case, these jobs would be located in Antelope Valley, and the result would be a need for housing for about 36,000 new families by 1995. Without PIA, the aviation industry jobs which support these families would still exist, but the jobs and thus the housing required would be located in one or more other parts of the Los Angeles area, depending on how the air travel demand is met.

The statement that residential energy consumption would increase if PIA is not built is thus based on the following assumptions:

- Air travel demand projected for PIA would be met in the Los Angeles area.
- No matter where this demand is met, it would generate jobs to support about 36,000 families.
- Existing relationships suggest that these families would use less energy in their homes if they lived in Antelope Valley than if they lived in other parts of Los Angeles County.

Given more recent trends in fuel prices and public and private energy conservation efforts, it is probable that Antelope Valley housing will tend to lose its energy consumption advantages over time. (That is, housing in other parts of the county would include as much insulation and other energy conservation features as housing built in the Valley.) Therefore, by 1995, residential energy savings associated with PIA may not be as great as assumed. However, residential use of energy should, at worst, not be any greater with PIA than without it.

C. AIRPORT ACCESS

a.1. Comment:

Highways. As indicated on page 224, at least portions of the anticipated highway improvements needed to accommodate future airport demands will create significant environmental impacts. On page 346, it is stated that good design will minimize adverse impact. However, there is no indication when the "comprehensive" environmental study will be done. There is considerable discussion in the text of the effects of the

airport's demands on needs for highway improvements, but little if any on airport activity constraints or environmental impacts if the highway improvements are not accomplished or if there is significant delay. A more detailed discussion is needed to establish a time frame for the environmental studies for highway improvements and to identify the effects of any delay on airport activity or congestion and related environmental consequences.

a.2. Response:

This comment raises two issues: the need for an environmental assessment of highway improvements, and the effect of a failure to make the needed improvements on airport access and use.

As stated on page 224, the proposed highway improvements will (or could potentially) significantly affect the environment. Based on this determination, a complete environmental impact statement is required under the provisions of NEPA and CEQA. This analysis would normally be undertaken after a definite proposal to undertake the highway improvements is made. Logically, since the additional freeway lanes would be needed to accommodate airport access, their construction would not be seriously considered until work on PIA had begun. In fact, as discussed below, there are trends and mitigating measures which may reduce the need for access improvements. Nevertheless, existing laws ensure that planning for access improvements will include an adequate assessment of environmental impacts.

As mentioned on pages 224 and 226, the improvements to Route 14 will be needed to accommodate the 12 MAP level of demand projected for 1995. The existing freeway network is expected to be adequate through 1990 when PIA would handle 6 MAP.

As shown in Table 64 on page 221, PIA would have the most significant effect on the 14-S segment of the Antelope Valley Freeway, when peak hour traffic would be increased by 2800 vehicles (90% auto, 10% bus case). Since each lane can accommodate 1500-1800 cars per hour, the PIA demand would require two lanes (assuming 60% of the flow in the predominant direction). Without the additional lanes, the traffic level would be almost 2300 cars per lane, resulting in severe congestion and delay. An alternative would be the high transit case (60% auto, 40% bus). This would reduce traffic levels to about 1800 vehicles per lane. It is noted that this level is at the upper limit of the existing capacity. However, it would not be possible to dedicate a special lane for buses. Including 69 buses in the traffic mix would reduce the maximum acceptable vehicle load for each lane.

Based on the EIS assessment, it appears that access constraints could limit PIA to less than the planned level of 12 MAP if the needed highway improvements are not made. (This is currently the situation at Los Angeles Airport, and part of the reason that the new airport is

required.) It is the position of California State Department of Transportation (CALTRANS) that two additional lanes on Route 14 would be required if the airport is built. These facts notwithstanding, however, there are certain trends and events which could reduce the need for highway improvements to some extent.

The LARTS projections on which the non-airport traffic projections are based used the SCAG D/E 2a population forecasts as an input. The EIS traffic estimates adjusted the LARTS projections to account for the with and without PIA population projections (derived from the Department of Finance E-0 estimates and additional population related to airport employment). The most recent SCAG forecasts (SCAG 78) include the assumption that PIA would be operating at a level of 6-10 MAP by 1995. The SCAG 78 forecast of Antelope Valley population (with the airport) is 12% less than the EIS with PIA case. As a result, non-passenger traffic (which is tied primarily to population) would be less than projected in the EIS.

Long-term trends in fuel prices and transportation patterns suggest that baseline traffic will include a greater proportion of carpools than assumed. In addition, consumer preference for smaller cars may increase the freeway carrying capacity to some extent. Another possibility is that fuel prices will induce Valley residents to reduce the number of non-essential trips. To the extent that these and similar factors contribute to the reduction of baseline traffic levels, the existing freeway network will be more able to accommodate airport-related flows.

In order to present a conservative analysis (highest likely impact) in the EIS, it was assumed that peak hour traffic would be the peak hour share of all traffic. In fact, there are three different groups of traffic on these freeways, and their peak hours would not necessarily coincide. Baseline (non-airport-related) traffic typically peaks during the morning rush hour. For purposes of the air quality analysis (see page 127), it was assumed that peak airport operations would also occur during the 7-9 a.m. period, so that peak passenger travel would coincide with peak baseline travel. This would imply that peak airport employee travel could occur earlier or later than this, since it is logical that airport employees would need to be at work before the day's major passenger influx. To the extent that the peaks in these different traffic flows do not coincide, congestion on the existing freeways will be reduced.

Finally, the previous paragraphs suggest some measures which could be implemented by DOA and/or regional transportation planning agencies. In response to comments on energy, it was noted that airport employers could sponsor car and vanpools as a fuel conservation measure. Increasing the average number of employees per vehicle would also, obviously, reduce the number of vehicles required. Similar programs could be implemented, with or without DOA assistance, for other larger Antelope Valley employers -- Lockheed, Plant 42, and Edwards Air Force

Base. Increasing the average passenger per vehicle ratio from the assumed 1.4 per car to 2, which should not be difficult over the longer term, could reduce the number of vehicles by about one-third.

b.1. Comment:

As far as ground access requirements are concerned, we recognize that it may not be practical to do a full-scale environmental analysis of the improvements that would be needed to the 14-S segment of the Antelope Valley Freeway and I-5 by 1995. However, additional information on those proposals and the major environmental impacts associated with them should be included in the final EIS.

b.2. Response:

The proposal for improvements to the 14-S segments of the Antelope Valley Freeway and its principal environmental effects are described on pages 224 and 226. The impact of PIA would be the addition of two lanes, or 56 miles of road, to the existing freeway. As discussed in the previous response, a complete environmental analysis would have to be done before any construction work began. Detailed planning for freeway improvements would not begin until the airport is underway.

Because the Route 14 improvements are simply a widening of the existing roadway, it is expected that the principal activities will be grading and paving for the additional two lanes along the existing right-of-way. The highway was planned and built with the concept of having such lanes in the future. There would be no taking of public or private lands, destruction of habitat, or other significant impacts which might occur if a totally new road were to be built. The principal impacts of the construction phase would be dust emissions, noise, and construction vehicle traffic, and there are common construction practices for which there are acceptable mitigating actions. Such actions were used on this highway as recently as 1978 in the expansion of the connection of the freeway with I-5.

After the highway improvements are made, additional traffic lanes would create additional air pollution and noise. Because the airport's access requirements were assumed to be met as part of the EIS case, the air pollution and noise impacts of the PIA-related traffic have been incorporated into the overall EIS analysis of air quality and noise. The air quality impacts were also further addressed in this response to comments under Attachment A. Therefore, the operation (as opposed to construction) of the highway improvements should not have significant impacts beyond those already described in the EIS.

In summary, it appears that if highway improvements are required, their impacts will be minor. As one way of putting these impacts in perspective, the DOA EIS contains a detailed description of the environmental effects of a proposed freeway route through the Angeles

National Forest. This alternative would have serious consequences in terms of taking public recreational lands, destruction of sensitive habitat, etc. In this context, the proposed improvements to the Antelope Valley Freeway are a preferred alternative in terms of environmental and capital cost effects.

c.1. Comment:

The location of the project some 61 miles outside Los Angeles without adequate analysis of the impact of access improvements is improper. The statements on the impacts of ground access improvements are unsubstantiated and conclusory. The CEQ Guidelines clearly require a complete analysis of secondary impacts. On page 224, the EIS states that an access road would significantly affect the environment yet no analysis is planned at this time. This presents a clear segmentation problem under NEPA, as consideration of the access problem at a future date might foreclose alternatives present today. For example, mass transit construction may be foreclosed if the airport is not built with such systems in mind. Given the distance from Los Angeles to the airport (over 60 freeway miles) and the fact that fuel consumed getting to the airport would just about equal aviation fuel consumed, consideration must be given to a "total package" concept -- including access to and the airport itself considered together -- rather than in isolation.

c.2. Response:

As discussed in previous responses, the DOA EIS contains a discussion of several alternative modes of access, including fixed rail mass transit options. Based on the level of demand expected for PIA and the capital and operating costs of the various alternatives, it was concluded that bus rapid transit (and possibly some use of existing rail lines) was the most reasonable mass transportation option.

In addition, the types of impacts which would result from the proposed improvements to the Antelope Valley Freeway were reviewed. It appears that construction impacts will be relatively minor. The most significant long-term effects -- increased pollutant emissions and noise -- were addressed as part of the air quality and noise assessments contained in the EIS.

Finally, while it is true that PIA is about 60 miles from the Los Angeles CBD, almost half of the passenger demand is projected to originate in the San Fernando Valley and North County which are much closer to the proposed airport as shown in Table III-53 (p. III-166, DOA EIS) which shows the distribution of passenger demand. In relation to this area, travel to and from PIA would be less fuel consumptive than at other airports in the region as shown in Table 84 (p. 286). Total passenger fuel usage, however, is greater with PIA when compared to other airports.

The net energy consumption by vehicles among five Southern California counties for PIA and all other airports is shown in Table IV-85 (p. IV-275, DOA EIS).

It is fully recognized that a PIA facility would result in a greater consumption of fuel as shown in this table. As stated in the DOA EIS:

"c. Travel to Work

The estimates for fuel consumption for travel to work are based on the direct and indirect employment generated by PIA activity at 12 MAP in 1995. As shown in Table IV-85, travel within the Valley for this group, both to PIA and to other places of employment, will amount to 279.2 million VMT annually. This will result in 19.2 million gallons of gasoline and 69,000 gallons of diesel fuel being consumed. Without a PIA location and using other airports, employees will travel 174.5 million VMT and consume 14.37 million gallons of gasoline. A PIA location therefore results in approximately 105 million more VMT and 5 million more gallons consumed.

4. Uses of Energy Without PIA

If a Palmdale facility were not constructed to accommodate 12 MAP in 1995, then the other airports are assumed to absorb this demand. Based on the use of LAX, ONT, and another facility in northeast Orange County as destination points, it is estimated that the 12 MAP passenger vehicle-trips, equally distributed, would amount to 239.1 million miles, nearly 21% less than with PIA. As shown in Table IV-85, this would require 16.99 million gallons of gasoline as compared to 21.46 million gallons for a PIA location. Similarly, the direct and indirect employment travel, assumed to occur in the Los Angeles basin, would use 14.37 million gallons of gasoline, nearly 5 million less than with PIA. This difference is based on an average one-way distance to work in the Valley at 16 miles and 14.5 mpg, while in the basin it is 10 miles and 12.1 mpg. It is assumed that fuel usage at airports would be the same whether PIA were built or not, as the number of aircraft and employees would be approximately the same at other sites.

The total fuel usage if no PIA were constructed is about 10 million gallons less of gas and 0.04 million gallons less of diesel oil annually than

with PIA, as shown in Table IV-85. The terminal facility requirements, however, are not expected to vary from the with-PIA scenario, as additional facilities would be required elsewhere to accommodate the 12 MAP."

It is pointed out that this impact has been considered in conjunction with all other impacts, alternatives to the proposed action and mitigating actions as presented in the DOA EIS and the DEIS. Furthermore, delays in reaching LAX because of access congestion (already a factor at LAX) could add considerably to full usage.

References
(for Air Quality)

AeroVironment Inc. (1974): Air quality ananalysis and impact study of the proposed Palmdale Intercontinental Airport (AV-FR-415, AeroVironment Inc., Pasadena, CA).

California Air Resources Board (1978): Southeast desert air basin air quality and control strategy analysis, Chapter 19, SIP-78 working document.

California Air Resources Board (1980): Procedure and basis for estimating on-road motor vehicle emissions.

Engineering Science (1978): Analysis of offset available at four power plant locations. (including supplement No. 1).

Gelinas, G. (1978): Evaluation of emission control strategies for airfield operations at the Los Angeles and San Francisco International Airports (AV-FR-8059, AeroVironment Inc., Pasadena, CA).

Kelso, R. (1980): Telephone communication with Ray Kelso, Naval Weapons Center, May 7.

Ouimette, J. (1980): Telephone conversation with Jim Ouimette, California Institute of Technology, May 9.

Larsen, R. I. (1971): A mathematical model for relating air quality measurements to air quality standards. (EPA #AP-89).

Latimer, D. A., R. W. Bergstrom, C. D. Johnson, and J. P. Killus (1980): Modeling visibility. Paper presented at Second Joint Conference on Applications of Air Pollution Meteorology, New Orleans, LA, March 24-27.

Latimer et al. (1978): The development of mathematical models for the prediction of anthropogenic visibility impairment. EPA-450/3-78-110a, September.

References
(for responses to Energy and Airport Access)

U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy, FAA Aviation Forecasts, Fiscal Years 1980-1991, September 1979.

_____, FAA Aviation Forecasts, Fiscal Years 1979-1990, September 1978.

_____, Terminal Area Forecasts, Fiscal Years 1980-1991, November 1979.

Southern California Association of Governments, SCAG 78 Growth Forecast Policy, January 1979.

U.S. Congress, Office of Technology Assessment, Technology Assessment of Changes in the Future Use and Characteristics of the Automobile Transportation System, February 1979.

National Academy of Sciences, Transportation Research Board, Highway Capacity and Level of Service, 1979.

ATTACHMENT A

EMISSION UPDATES FOR LATEST EMISSION FACTORS

Excerpt of the Draft Environmental Impact Statement
for Palmdale International Airport
Palmdale, California
February 1979, pages 119-159
Department of Transportation
Federal Aviation Administration
Western Region
Los Angeles, California

ATTACHMENT A

EMISSION UPDATES FOR LATEST EMISSION FACTORS

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

FOR

PALMDALE INTERNATIONAL AIRPORT
PALMDALE, CALIFORNIA
DEVELOPMENT PROGRAM

PURSUANT TO SECTION 102(2)(C)
OF THE
NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
P.L. 91-190, AS AMENDED
AND
SECTION 16(c)(4)
OF THE
AIRPORT AND AIRWAY DEVELOPMENT ACT OF 1970
P.L. 981-258, AS AMENDED

FEBRUARY 1979

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration
Western Region
Los Angeles, California

TABLE 26

ANNUALLY AVERAGED TYPICAL TOTAL EMISSIONS
AT THE PALMDALE AIRPORT FROM THE VARIOUS SOURCES
WITH AND WITHOUT PIA
(tons per year)

Pollutant/Source	1980 Existing Airport	1995 Without PIA	1995 With PIA
CO			
Aircraft Sources	2,178	1,206	1,493
Collateral Ground Sources	1,661	1,046	4,674
Total	3,839	2,252	6,167
HC			
Aircraft Sources	598	451	565
Collateral Ground Sources	532	301	722
Total	1,130	752	1,287
NO_x			
Aircraft Sources	172	210	760
Collateral Ground Sources	120	73	283
Total	292	283	1,043
Particulates			
Aircraft Sources	17	17	62
Collateral Ground Sources	41	26	72
Total	58	43	134

The total HC emissions show a small rise in 1995; on the other hand, NO_x shows considerable increasing emissions in 1995, emphasizing the need for new aircraft engines to make NO_x reduction possible. Particulates show a small rise in 1995. These are, however, overestimates when the increasing trend toward low-lead fuel usage is taken into account.

Method of Estimating Emissions. Estimating emissions from a given source is, in general, a difficult problem; when the sources are aircraft and collateral ground-based ones, the problem is even more difficult. Each engine type has its own emissions rate, and variations are further enhanced by the present latitude afforded each aircraft at individual airports -- e.g., taxi-idle time and power setting still remain up to the individual airport and pilot. The collateral ground source emissions are equally difficult to specify. For some pollutants (e.g., CO), most of the emissions are automobile-derived. These emissions are mix- and speed-dependent; speed remains a difficult quantity to specify at airports, especially during peak emissions when traffic is generally stop-and-go. The other contributors to ground emissions -- e.g., operation of service vehicles, aircraft fueling systems, aircraft engine run-up during maintenance and ground check, etc. -- are even more difficult because both emission factors and operational models are not well defined.

In view of the uncertainty inherent in such estimates the philosophy in these calculations has been to overestimate emissions rather than underestimate whenever a choice was presented.

With PIA Built. For an aircraft the emissions of interest are those made during an LTO cycle. An LTO cycle is defined (by EPA) as that which included all normal operation modes performed by an aircraft between the time it descends through an altitude of 3500 feet (1100 meters) on its approach and the time it subsequently reaches the 3500-foot (1100 meter) altitude after takeoff. Each class of aircraft has its own LTO cycle. In order to determine emissions, the LTO cycle is separated into five distinct modes: (a) taxi, (b) takeoff, (c) climb-out, (d) approach and landing, and (e) taxi.

The emissions per LTO cycles for various engine types and for different emissions standards are presented in Table 27. Most of these factors were supplied by the EPA; some were estimated with appropriate assumptions -- these are so indicated. The table shows emissions per LTO cycle computed for engine types for which standards have been adopted for newly manufactured engines in 1981, and for newly certified engines in and after 1981. For piston engines the standards apply for 1981 and after. For a given year, say 1995, and for a given engine type, an average LTO cycle will obviously include a mix of engines covering the spectrum of emissions -- e.g., some with 1970 emissions (if engine lifetime is greater than 20 years), others with 1981, and so on. For a

TABLE 27

EPA EMISSIONS STANDARDS PER LTO CYCLE
(pounds per engine)

Engine Type	Number of Engines	1973				Newly Manufactured Engines - 1981				Newly Certified Engines - 1995			
		CO	HC	NO_x	Particulates[a]	CO	HC	NO_x	Particulates[a]	CO	HC	NO_x	Particulates[a]
JT-9D	4	47.0	12.2	31.4	1.3	17.9	3.1	12.9	1.3	12.5	1.6	12.9	1.3
JT-8D	3	14.6	3.3	5.8	0.4	5.0	0.9	3.5	0.4	5.0	0.5	3.5	0.4
JT-3D	4	50.6	43.5	7.3	1.2	7.1	1.3	5.1	1.2	7.1	0.7	5.1	1.2
JT-3C	4	50.6	43.5	7.3	1.2	7.1	1.3	5.1	1.2	7.1	0.7	5.1	1.2
JT-4A	4	50.6	43.5	7.3	1.2	7.1	1.3	5.1	1.2	7.1	0.7	5.1	1.2
CJ-805	4	31.9	12.0	5.8	1.2	7.1	1.3	5.1	1.2	7.1	0.7	5.1	1.2
CJ-501D	4	4.2	3.2	2.2	1.1	2.1	1.6	1.1	1.1	2.1	0.8	1.1	1.1
Small Turbofan (Business jets)	2	4.4	1.3	1.2	0.1	2.2	0.4	1.1	0.1	2.2	0.2	1.1	0.1
Piston (general aviation)	2	13.0	0.4	0.05	0.02	6.5	0.2	0.05	0.02	6.5	0.1	0.05	0.02
Piston (transport)	4	304.0[b]	40.7[b]	0.4[b]	0.6	43.4[c]	3.1[d]	0.4	0.6[d]	30.4	1.6	0.4	0.6
Helicopter	2	5.7[b]	0.5[b]	0.6[b]	0.3	2.9[e]	0.25[e]	0.6[e]	0.3	2.9	0.1	0.6	0.3

a. All particulates values taken from the Compilation of Air Pollutant Emission Factors (EPA, 1973) and assumed constant in time.
b. Taken from the compilation of Air Pollutant Emission Factors (EPA, 1973.
c. Reduction assumed the same as for JT-3d.
d. Reduction assumed the same as for JT-9d.
e. Scaled down from 1973 values by same ratios as exist for piston general aviation type.

Sources: 1973 and 1981 - U.S. Environmental Protection Agency, private communication with Dr. Robert Sampson, September 11, 1972; 1995 - a 30% reduction in CO over the 1981 value was assumed for large aircraft, the HC standards were reduced by 50% over 1981 values, and NO_x was assumed to be the same.

given engine type an effective LTO cycle may be defined as one which has been corrected for variability in emissions due to engine vintage variability. Effective emissions per LTO cycle are shown in Table 28. The number of airport operations was obtained from Table 29.

It is generally agreed from the current aircraft usage trend that the Pratt & Whitney JT-3C and Allison 501-D will be phased out of operation by 1990 and that the JT-9D (most commonly used in jumbo jets) and JT-8D (most commonly used in short- and medium-range jets) will be the most prevalent gas turbine engines at PIA in 1995.

The emissions for each type of engine were done in a straight-forward manner, being simply the product of the number of engine LTO cycles and the emissions per engine LTO cycle.

The military aircraft emissions were assumed to be unaffected by PIA and will be discussed in the next subsection (with PIA not built).

The collateral ground sources assumed were comprised of:

- Aircraft fueling systems
- Operation of service vehicles
- Aircraft engine run-up during maintenance
- miscellaneous sources at the airport (boilers, incinerators, paint spray booths, underground storage tanks, etc.)
- Vehicles entering and leaving the airport.

Four of the five sources (final results shown in Table 30) were handled by the same scaling technique employed for aircraft (the implicit assumption here being that ground operations bear a direct correlation with aircraft volume). The volumes of automobiles entering and leaving the airport were estimated from scaling arguments, but the 1980 and 1995 emissions factors (ARB EMFAC-6 emission factors, 1980) corrected for speed and mix were used in computing the total emissions (see Table 31).

With PIA Not Built (i.e., assuming existing airport).

The daily aircraft volume at the existing airport for 1970 is shown in Table 32. The growth rate of the airport from 1970 to 1980 was estimated from Table 33 using the population estimates for the total Antelope Valley without PIA for 1970 and 1980. These numbers enabled the deduction of military aircraft movement in Palmdale for 1970. Aircraft movement for future years was estimated in the same manner using the appropriate scaling parameters from Table 33. The results are shown in Table 34.

TABLE 28

EFFECTIVE EMISSIONS PER ENGINE LTO CYCLE AT PIA - 1995
(pounds per engine)

	Engine Type	
	JT-9D	JT-8D
Number of Engine LTO Flights	58,643	59,617
CO	23.8	7.4
HC	5.0	1.4
NO_x	17.5	4.1
Particulates	1.30	0.40

TABLE 29

ESTIMATES OF AIRSIDE AND GROUNDSIDE OPERATIONS
AT PALMDALE (1980) AND PIA (1995)

	1980	1995
Airside Operations		
Average Day Operations	92	324
Departures	46	162
Arrivals	46	162
Average Day of Particular Month		
July	95	331
August	97	350
December	92	300
January	83	275
Peak Hour Operations (8 a.m.)		
July	9	33
August	10	35
December	9	30
January	8	27
Groundside Operations		
Total Vehicles	1,314	11,912

Source: Arthur D. Little, Inc., estimates

TABLE 30

ANNUALLY AVERAGED EMISSIONS AT PIA FROM COLLATERAL GROUND SOURCES
(tons per year)

Ground Operation Source	1980 CO	1980 HC	1980 NO_x	1980 Particulates	1995 CO	1995 HC	1995 NO_x	1995 Particulates
Aircraft Fueling Systems	0	12	0	0	0	9	0	0
Operation of Service Vehicles	908	193	43	5	679	145	32	3
Aircraft Engines Run-up During Maintenance	109	131	7	23	82	98	5	18
Vehicles Leaving and Entering Airport*	644	67	37	5	3,913	373	222	44
Miscellaneous Sources at the Airport	0	129	33	8	0	97	24	7
Total	1,661	532	120	41	4,674	722	283	72

*Obtained from Table 31

Arthur D Little Inc

TABLE 31

ANNUALLY AVERAGED EMISSIONS AT PIA FROM VEHICLES ENTERING AND LEAVING THE AIRPORT
(tons per year)

Year	Number of Vehicles	Average Speed MPH	Distance Miles	Emissions Factor (lbs/mi)				Total Emissions (tons/year)			
				CO	HC	NO_x	Particulates	CO	HC	NO_x	Particulates
1980*	1,280,172	10	10	0.1006	0.0105	0.0058	0.00084	643.9	67.5	37.1	5.4
1995	14,767,213	15	10	0.0530	0.0050	0.0030	0.00060	3913.3	373.4	221.5	44.3

*Applies for existing airport since PIA (if built) will become operative after 1980.

Source: AeroVironment Inc. computation based on California Air Resources Board: Procedure and Basis for Estimating On-Road Motor Vehicle Emissions (EMFAC-6) 1980.

A Vehicle Mix of LDV = 95.4%, LDT = 1.4%, HDG = 2.4% and HDD = 0.8% was used.

TABLE 32

DAILY AIRCRAFT VOLUME (INCLUDING MILITARY)
AT THE EXISTING PALMDALE AIRPORT - 1970

Aircraft Type	Number of Engines	Daily Number of Flights
Jets	4	113
Piston		
Four-engine	4	10
General Aviation	2	17

TABLE 33

ESTIMATES OF POPULATION IMPACT WITH AND WITHOUT PIA
(000s)

Area	Actual 1970	1980	1985 Without PIA	1985 With PIA	1990 Without PIA	1990 With PIA	1995 Without PIA	1995 With PIA
Airport Site	28.4	32.1	45.3	50.2	50.6	63.8	53.8	84.8
Remainder of Antelope Valley	54.5	70.6	76.5	80.2	86.7	96.6	92.3	111.5
Total Antelope Valley	82.9	102.6	121.8	130.4	137.3	160.4	146.1	200.4
Santa Clarita Valley	49.3	62.9	78.0	81.7	87.4	97.3	93.4	116.7
Total North Los Angeles County	132.1	165.5	199.8	212.1	224.1	257.7	239.5	317.1

TABLE 34

ANNUAL AVERAGE OF AIRCRAFT LTO VOLUME AT THE EXISTING PALMDALE AIRPORT
(i.e., PIA not built)

Aircraft Type	1970	1980	1985	1990	1995
Jets					
Civilian	6,572	7,886	8,675	9,201	9,398
Military	75,920	75,920	75,920	75,920	75,920
Piston					
Four-engine	7,300	8,760	9,636	10,220	10,439
General Aviation	6,206	7,447	8,192	8,688	8,875
Total	95,998	100,013	102,423	104,029	104,632

TABLE 35

ANNUALLY AVERAGED EMISSIONS AT THE EXISTING PALMDALE AIRPORT
FROM COLLATERAL GROUND SOURCES
(tons per year)

Ground Operation Source	1980 CO	1980 HC	1980 NO_x	1980 Particulates	1995 CO	1995 HC	1995 NO_x	1995 Particulates
Aircraft Fueling Systems	0	12	0	0	0	6	0	0
Operation of Service Vehicles	908	193	43	5	496	106	23	2
Aircraft Engines Run-up During Maintenance	109	131	7	23	60	72	4	13
Vehicles Leaving and Entering Airport*	644	67	37	5	490	46	28	6
Miscellaneous Sources at the Airport	0	129	33	8	0	71	18	5
Total	1,661	532	120	41	1,046	301	73	26

*Obtained from Table 36

Beginning with the 1980 collateral ground emissions (shown in Table 30), future emissions were obtained by the same scaling techniques applied for aircraft in this subsection. The results are shown in Table 35. Table 36 shows the annually averaged emissions from vehicles entering and leaving the existing Palmdale Airport for 1980 and 1995.

Severe Case Emissions at Airport Source

Inert Season. Using the peak aircraft and ground vehicular movement (Table 29), severe case emissions were estimated for 1995. The hourly averaged values calculated (Table 37) refer strictly to peak hour emissions, 8-9 a.m.; the meteorology for maximum air pollution, on the other hand, persists between 6-9 a.m. The severe meteorological-air quality regime is not found to occur at other times, and especially does not persist for longer periods. For the purposes of forecasting the highest air pollution levels for the inert pollutants, the values shown in the table will provide overestimates.

Photochemical Season. Using the same methodology as outlined for the inert season, the pollutant loading for peak emissions was calculated for the photochemical season. The results are shown in Table 38.

Total Emissions in the Antelope Valley and Santa Clarita Valley Study Area

Total emissions, those comprising the Antelope Valley as well as those from the Santa Clarita Valley, are shown in Table 39. Both cases (with PIA built and not built) are shown in the table, as well as the emissions from the South Coast Air Basin.

All the pollutants studied show a decline, except particulates, from the 1973 values to a minimum during 1980. These trends come about because the largest contribution comes from automobiles which will emit progressively less through 1990 as present and future emissions standards take effect; after that, however, emissions are expected to increase because of population increases and hence more automobiles.

Base year (1973) emissions, emission projections, and traffic data for the Los Angeles County portion of the Southeast Desert Air Basin and base year (1973) emissions for the South Coast Air Basin were provided by the California Air Resources Board.

Comparison of Emissions From Automobiles and Aircraft Using PIA or Using LAX and ONT

In January 1978 a report* was prepared for DOA on an air pollutant emission comparison with and without PIA.

The objective of this study was to compare the magnitude of air pollutants emitted if PIA were built versus if PIA were not built. The

*Air Pollutant Emission Comparison With/Without Palmdale International Airport, AeroVironment Inc., January 1978.

TABLE 36

ANNUALLY AVERAGED EMISSIONS AT THE EXISTING PALMDALE AIRPORT
FROM VEHICLES ENTERING AND LEAVING THE AIRPORT
(tons per year)

Year	Number of Vehicles	Average Speed MPH	Distance Miles	Emissions Factor (lbs/mi)				Total Emissions (tons/year)			
				CO	HC	NO_x	Particulates	CO	HC	NO_x	Particulates
1980	1,280,172	20	10	0.1006	0.0105	0.0058	0.00084	643.9	67.5	37.1	5.4
1995	1,948,337	15	10	0.0530	0.0050	0.0030	0.00060	489.8	46.2	27.7	5.5

Source: AeroVironment Inc. computation based on California Air Resources Board: Procedure and Basis for Estimating On-Road Motor Vehicle Emissions (EMFAC-6) 1980.

A Vehicle Mix of LDV = 95.4%, LDT = 1.4%, HDG = 2.4% and HDD = 0.8% was used.

Arthur D. Little Inc.

TABLE 37

PEAK HOURLY AVERAGED EMISSIONS ESTIMATES AT
PIA FOR THE INERT SEASON - 1995*
(pounds per hour)

	CO	HC	NO_x	Particulates
Civilian Aircraft	467	95	322	25
Military Aircraft	130	86	29	3
Collateral Ground Services	6,698	773	388	86
Total	7,295	954	739	114

*1 ton/year = 0.228 lbs/hr.

TABLE 38

PEAK HOURLY AVERAGED EMISSIONS ESTIMATES AT
PIA FOR THE PHOTOCHEMICAL SEASON - 1995*
(pounds per hour)

	CO	HC	NO_x	Particulates
Civilian Aircraft	545	111	376	30
Military Aircraft	130	86	29	3
Collateral Ground Services	6,762	802	393	89
Total	7,437	999	798	122

*1 ton/year = 0.228 lbs/hr.

TABLE 39

TOTAL EMISSIONS INVENTORY FOR THE AIRPORT AREA,
THE ANTELOPE VALLEY (INCLUDING AIRPORT)
THE SANTA CLARITA VALLEY, AND SOUTH COAST AIR BASIN
(tons per day)

Pollutant/Area	1973	1980	1995 Without PIA	1995 With PIA
CO				
Airport	-	10.5	6.2	16.9
Antelope Valley	71.7	41.7	37.7	57.7
Santa Clarita Valley	82.8	39.7	31.7	39.5
Total	154.5	81.4	69.4	97.2
South Coast Air Basin	8,130.0	5,005.3	3,542.6	3,550.4
HC				
Airport	-	3.1	2.1	3.5
Antelope Valley	12.2	8.0	8.0	11.1
Santa Clarita Valley	12.3	6.6	5.7	7.0
Total	24.5	14.6	13.7	18.1
South Coast Air Basin	1,620.0	1,074.4	1,112.2	1,113.5
NO_x				
Airport	-	0.8	0.8	2.9
Antelope Valley	12.7	9.1	8.2	11.9
Santa Clarita Valley	13.3	8.4	6.4	7.7
Total	26.0	17.5	14.6	19.6
South Coast Air Basin	1,310.0	1,154.1	965.0	966.3
Particulates				
Airport	-	0.2	0.1	0.4
Antelope Valley	5.4	5.2	5.7	7.2
Santa Clarita Valley	2.8	2.5	2.8	3.5
Total	8.2	7.7	8.5	10.7
South Coast Air Basin	303.0	322.9	358.4	359.1

Source: 1980 and 1995 without-PIA emissions for Antelope Valley were taken from "Preliminary Inventory and Air Quality Forecast, 1974-1995," prepared by the staffs of the South Coast Air Pollution Control District, the California Air Resources Board, and the Southern California Association of Governments.

geographic area considered in this study includes both the South Coast Air Basin and Southeast Desert Air Basin. Two types of primary sources were used in this comparative study and they are:

- Motor vehicles (on freeways and surface streets), and
- Aircraft (jumbo jets and medium range jets).

This emission comparison was based on the determination that Los Angeles International (LAX) and Ontario International (ONT) Airports would accommodate the future air passengers projected for PIA if Palmdale International Airport were not built. LAX would handle 90 percent while ONT would handle the remaining 10 percent of the air passengers. This determination was made by the DOA based on discussions with the Southern California Association of Governments as to population growth and future airport capacities in Southern California.

The two air basins which define the study area (also referred to as the region) and the location of each airport are shown in Figure 19. It can be seen that LAX and ONT are located in the South Coast Air Basin and PIA is located in the Southeast Desert Air Basin.

The annual million air passengers (MAP) projected for PIA and allocated to LAX and ONT if PIA is not built are presented in Table 40. It was assumed that one air passenger is equivalent to one vehicle round trip (to and from the airport). Average daily vehicle trips with and without PIA are shown in Table 41.

Three air pollutants which are principally associated with mobile sources (i.e., motor vehicles and aircraft) were considered for this study. These pollutants are: carbon monoxide (CO); hydrocarbons (HC); and nitrogen oxides (NO_x). Since suspended particulate emissions from both motor vehicle and aircraft sources either with or without PIA would be less than one ton per day, they were excluded from this study. Also, since sulfur dioxide emissions from these sources are smaller than particulate emissions, they were not considered.

In order to compare the magnitude of motor vehicle emissions for vehicle trips to PIA versus allocating those trips to LAX and ONT, it was necessary to analyze both the vehicle speed characteristics and travel distances. On the regional scale both speed and distance from each airport to a population center influence the magnitude of resulting emissions. While in the vicinity of each airport where the vehicle trips converge, speed variation is the important variable controlling differences in emissions.

In comparing aircraft emissions, the amount of aircraft delay time caused by airfield traffic congestion is the controlling factor for increasing or decreasing emissions.

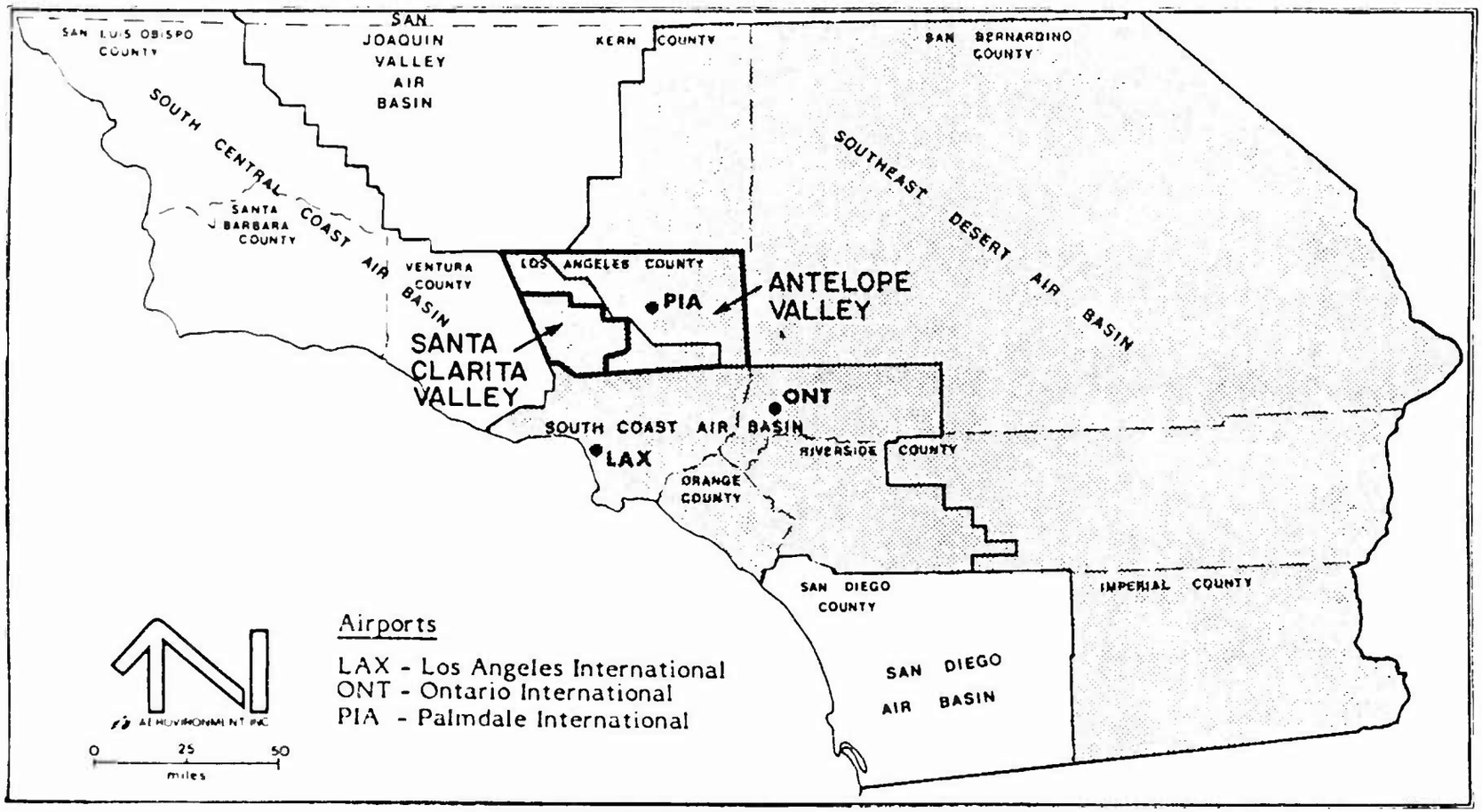


FIGURE 19. Location of airports, air basins, and valleys.

TABLE 40

DISTRIBUTION OF AIR PASSENGERS WITH AND WITHOUT PIA

Scenario/Airport	Million Air Passengers Per Year 1985	1990	1995
With PIA			
PIA	1.5	6.0	12.0
LAX	40.0	40.0	40.0
ONT	11.2	11.2	11.2
Without PIA			
LAX*	41.35	45.4	50.8
ONT**	11.35	11.8	12.4

*90% of the PIA passengers assigned to LAX

**10% of the PIA passengers assigned to ONT

TABLE 41

DISTRIBUTION OF THE PIA GENERATED VEHICLE TRIPS WITH AND WITHOUT PIA

Scenario/Airport	Average Daily Vehicle Trips[a] 1985 (1.5 MAP)	1990 (6 MAP)	1995 (12 MAP)
With PIA			
PIA	2384	9337	18674
Without PIA			
LAX[b]	2101	8403	16807
ONT[c]	283	934	1867

[a]Assumes only 80% of MAP due to interlining (transferring of passengers)

[b]90% of the PIA passengers assigned to LAX

[c]10% of the PIA passengers assigned to ONT

NOTE: A vehicle trip is defined as a round-trip to and from the airport.

This study was divided into three major areas:

- Comparison of motor vehicle emissions in the vicinity of PIA versus LAX and ONT.
- Comparison of regional motor vehicle emissions from vehicle trips between population centers and the vicinity of PIA versus LAX, and ONT.
- Comparison of aircraft emissions at PIA versus LAX, and ONT.

Total motor vehicle trips were divided into an airport vicinity component and a regional component because detailed evaluation of vehicle speeds near each airport was required to determine changes in emission. Vehicle speeds are less important on the regional scale and they were evaluated using a generalized methodology.

Tables 42 through 44 show the comparison of CO, HC, and NO_x emissions for with and without PIA for 1985, 1990, and 1995, respectively. The estimates of future emissions show, except for NO_x in 1995, that there would be more emissions if PIA is not built than with PIA. It appears that NO_x emissions in 1995 would be the same with or without PIA.

It is interesting to note, that although the regional motor vehicle emissions (vehicle trips between each airport and population center) are estimated to be greater if PIA is built, motor vehicle emissions in the vicinity of LAX and aircraft emissions from excess air traffic delay provide a substantial offset which accounts for total emissions being higher if PIA is not built.

While the magnitude of CO emissions are shown to be significantly higher if PIA is not built, the HC and NO_x emissions are only slightly higher. This is primarily due to the following: small changes in emission rates with respect to vehicle speed; and the lower HC and NO_x emission factors as compared to CO emission factors.

A comparison of the with and without PIA emissions to the basin-wide emissions from all future sources in both the South Coast Air Basin (SCAB) and Southeast Desert Air Basin (SEDAB) shows that the PIA related emissions are extremely small (less than one percent) as compared to the basin-wide emissions. Tables 45 and 46 show the total projected emissions from all sources in the SCAB and SEDAB, respectively.

The results indicate that if PIA is not built more direct emissions would be generated in the SCAB than if PIA is built. However, by building PIA, sources would be shifted away from the SCAB toward the SEDAB and cause a net decrease in primary emissions in the combined basins.

TABLE 42

REGIONAL EMISSION COMPARISON WITH AND WITHOUT PIA FOR 1985

	Average Daily Emissions (tons/day)					
	Without PIA			With PIA		
Emission Sources	CO	HC	NO_x	CO	HC	NO_x
Motor Vehicles						
Airport Vicinity*	2.32	.22	.15	.13	.01	.02
Regional*	1.07	.12	.18	1.56	.18	.28
Aircraft						
LTOs*	.88	.15	.63	.88	.15	.63
Excess Delay**	7.66	1.11	1.22	2.57	.34	.93
Total	7.66	1.11	1.22	2.57	.34	.93

*Includes motor vehicle and aircraft sources associated with PIA air passengers if PIA is built or allocated to LAX and ONT if PIA is not built.

**Includes all aircraft at LAX that would be delayed excessively due to additional PIA aircraft trips if PIA is not built.

TABLE 43

REGIONAL EMISSION COMPARISON WITH AND WITHOUT PIA FOR 1990

	Average Daily Emissions (tons/day)					
	Without PIA			With PIA		
Emission Sources	CO	HC	NO_x	CO	HC	NO_x
Motor Vehicles						
Airport Vicinity*	1.77	.17	.13	.41	.04	.06
Regional*	3.98	.41	.77	4.87	.50	.95
Aircraft						
LTO's*	3.48	.61	2.49	3.48	.61	2.49
Excess Delay**	4.89	.89	.36	0	0	0
Total	14.12	2.08	3.75	8.76	1.15	3.50

*Includes motor vehicle and aircraft sources associated with PIA air passengers if PIA is built or allocated to LAX and ONT if PIA is not built.

**Includes all aircraft at LAX that would be delayed excessively due to additional PIA aircraft trips if PIA is not built.

TABLE 44

REGIONAL EMISSION COMPARISON WITH AND WITHOUT PIA FOR 1995

Emission Sources	Average Daily Emissions (tons/day) Without PIA CO	HC	NO_x	With PIA CO	HC	NO_x
Motor Vehicles						
Airport Vicinity*	1.68	.16	.13	.77	.08	.12
Regional*	6.17	.63	1.28	9.12	.92	1.90
Aircraft						
LTO's*	5.65	.79	5.0	5.65	.79	5.0
Excess Delay**	5.27	.69	.53	0	0	0
Total	18.77	2.27	6.94	15.54	1.79	7.02

*Includes motor vehicle and aircraft sources associated with PIA air passengers if PIA is built or allocated to LAX and ONT if PIA is not built.

**Includes all aircraft at LAX that would be delayed excessively due to additional PIA aircraft trips if PIA is not built.

TABLE 45

TOTAL EMISSIONS FOR SOUTH COAST AIR BASIN

	Estimated Emissions (tons/day)								
	CO			HC			NO_x		
Source Category	1985	1990	1995	1985	1990	1995	1985	1990	1995
Stationary	935	1,020	1,130	717	789	858	486	510	549
Motor Vehicles on Road	1,650	1,450	1,440	312	236	214	415	372	398
Jet & Piston Aircraft	188	196	205	25	26	17	16	17	18
Other Mobile	354	374	394	73	77	91	104	110	116
TOTAL	3,127	3,040	3,169	1,127	1,128	1,180	1,021	1,009	1,081

Source: California Air Resources Emissions Projections - 1977

TABLE 46

TOTAL EMISSIONS FOR SOUTHEAST DESERT AIR BASIN

Source Category	Estimated Emissions (tons/day) CO 1985	CO 1990	CO 1995	HC 1985	HC 1990	HC 1995	NO_x 1985	NO_x 1990	NO_x 1995
Stationary	782	891	1,050	93	104	119	149	188	216
Motor Vehicles on Road	92	81	80	18	14	12	28	26	28
Jet & Piston Aircraft	74	80	84	18	18	19	5	5	6
Other Mobile	53	58	63	13	15	17	33	36	39
TOTAL	1,001	1,110	1,277	142	151	167	215	255	289

Source: California Air Resources Emissions Projections - 1977

Arthur D Little Inc

Air Quality Forecasts for the Airport Vicinity and the Antelope Valley

Air quality forecasts are made for CO, O_3, NO_x, HC, and particulates for 1980, and for 1995 if PIA is built or not built.

The typical case forecasts pertain to typical meteorology and assume annual emissions are evenly distributed in time. A dispersion model calculates the consequence of local emissions and this meteorology in the mesoscale, within about 10 miles of the airport complex. The emissions are considered to be double the annual rate, to compensate for the diurnal variation in the source. Areawide emissions are analyzed to provide background concentrations on which the dispersion model predictions are superimposed for comparison with standards.

Severe-inert case forecasts pertain to a combination of a severe meteorology-pollution situation of stable, low-wind speed conditions from 6-9 a.m. and severe pollutant emissions during the same period (Table 37). A dispersion model is used with appropriate "severe" meteorology and emissions impacts and background concentrations developed for the so-called inert pollutants (CO, NO_x, HC, and particulates) in a manner analogous to the typical case.

Next, another approach is employed to make projections for the overall air quality throughout the Antelope Valley. The air quality data from the Lancaster APCD station are interpreted within a framework of a particular statistical procedure coupled to emission projections to yield peak values and exceedance statistics for all pollutants. The values should be reasonable in Lancaster, and generally very conservative outside the urban areas. For O_3 the Valley is not the source, but the Valley emissions are assumed to correlate somewhat with the emissions which actually determine the O_3.

Next, the severe-photochemical situation is examined. The O_3 concentrations throughout the Antelope Valley are considered as they may relate to distant upwind sources, and to events in the Antelope Valley. Visibility is then considered as it pertains to local blowing dust and to photochemical smog. Further, consideration is given to power plant emissions.

Typical Case

Background levels for the various pollutants and the various cases are shown in Table 47. The present and future CO picture for the typical meteorological regime shows no exceedances downwind of the airport. For 1980, the sum of CO concentrations from the airport itself added to the background is under 1.3 ppm. For 1995 without PIA the CO is under 1.1 ppm. For 1995 with PIA the CO is below 1.4 ppm. When judged against the one-hour standards (California -- 40 ppm, federal -- 35 ppm), all these concentrations are very low. When judged against the federal eight-hour

TABLE 47

TYPICAL BACKGROUND CONCENTRATIONS OF THE VARIOUS POLLUTANTS AND FOR THE VARIOUS CASES IN THE AIRPORT AREA

Pollutant	1973 Tons/Day	1980	1995 Without PIA	1995 With PIA
CO (ppm)	154.5	0.8	0.7	0.9
HC (ppm)	24.5	1.2	1.1	1.5
NO_x (pphm)	26.0	1.9	1.6	2.1

standard of 9 ppm or the California 12-hour standard of 10 ppm, the concentrations are still very low. Such a result is to be expected for this pollutant under the typical conditions of moderate winds, deep mixing, and neutral stability.

The present and future HC picture is similarly clear, but with a very different answer. The background values by themselves (Table 47) are several times the federal standard of 0.24 ppm. The local effects of the airport are small, on the order of 0.1 ppm, but are superimposed on the background to yield still larger exceedances. The HC standards are not considered directly health-related, but may have an impact on the subsequent development of photochemical smog.

The NO_x situation involves low background values around 2 pphm, and maximum local impact values of about 0.8, 0.8, and 2.4 pphm at the airport boundary. There is no exceedance of the one-hour California standard for NO_2 of 25 pphm, and the federal annual average standard of 5 pphm is not expected to be exceeded in 1995 with or without PIA.

The contribution from the airport area for particulates is about 4ug/m^3 above background for 1980, and for 1995 2ug/m^3 for no-build and 7ug/m^3 for build. The background values exceed the California annual geometric mean standard for all years and options; these background values are primarily from natural causes -- i.e., blowing dust from the desert area surface.

Severe Inert Pollutants

The background values for the various pollutants are shown in Table 48.

TABLE 48

SEVERE INERT BACKGROUND CONCENTRATIONS OF THE VARIOUS POLLUTANTS AND FOR THE VARIOUS CASES IN THE AIRPORT AREA

Pollutant	1973 Tons/Day	1980	1995 Without PIA	1995 With PIA
CO (ppm)	154.5	2.1	1.8	2.5
HC (ppm)	24.5	3.0	2.8	3.7
NO_x (pphm)	26.0	6.7	5.6	7.5

The CO levels for 1995 with PIA for the severe inert meteorology case are near 16 ppm just outside the PIA area. The background in this case is 2.4 ppm (Table 48). For the severe case considered, the hourly CO federal standard of 35 ppm will not be exceeded. It is possible that under some unusual circumstances the federal 8-hour average standard of 9 ppm might be exceeded but the very stagnant conditions for many hours during peak traffic conditions is unlikely and was not found in the available anemometer records. The CO standard will not be exceeded in 1980 or 1995 without PIA.

In 1995 with PIA the HC level outside the airport is 3.7 ppm plus a background of 3.8 ppm, for a total of 7.5 ppm, well above standard. Analogous NO_x forecasts are 9.8 ppm plus a background of 8 ppm. It is apparent that at PIA the hourly NO_2 standards (25 pphm) would be exceeded since NO_2 is a main consituent of NO_x. Although the NO_x values would be about a third as large as for the build case, there would still be exceedances.

No consideration has been given to the additional turbulence contained in drainage winds and the urban heat island effect, both of which would enhance dilution. However, there would not be enough to negate the conclusions about NO_x exceedances. The fact that NO_x forecasts should be high is no surprise -- the higher temperatures at which combustion takes place in jet engines produce proportionally greater amounts of NO and NO_2; this emphasizes the need for even stricter NO_x controls.

In summary, CO standards will generally be met under severe conditions at PIA. NO_2 standards will be exceeded in 1995 with or without PIA under severe conditions.

Projected Air Quality for the Antelope Valley

To derive projected air quality, proportional scaling with Larsen's statistical concepts* was used to obtain frequency distributions of pollutant concentrations. It was assumed that peak concentrations of inert pollutants are proportional to total emissions in the Antelope and Santa Clarita valleys (see Table 39), while peak oxidant cncentrations are proportional to total non-methane HC emissions. Ozone, CO, No_2, and particulate air quality data at Lancaster were used since this station is closest to the proposed PIA.

Table 49 presents the maximum predicted concentrations and expected frequency of exceedance of standards for ozone and CO. Air pollutant concentrations for the 1995 build case represent growth-induced impacts from the construction of PIA. Reduction in concentration of both pollutants over 1973 levels is expected corresponding to non-methane HC and CO emissions. All state and federal CO standards will be met under either alternative. For 1995, this table shows there will be a 0.4% increase in time when the ozone standard will be exceeded with PIA built than under the no-build alternative. Neither State of California nor federal one-hour ozone standards will be met under either alternative. However, the sort of proportional modeling used in the projection relates the O_3 to the local sources, which is incorrect for the Antelope Valley situation. The numbers are given here to provide a perspective.

Forecast concentrations of NO_2 and particulates are presented in Table 50. Again, growth-induced impacts have been considered when computing pollutant concentrations for the 1995 build case. Only the annual geometric mean (AGM) of particulates is predicted. The highest 24-hour average is ofter related to natural phenomena (e.g., dust storms) and not to man-made emissions, and therefore no really meaningful predictions can be made. All state and federal AGM standards will be exceeded under either alternative. Particulates are the only pollutant for which 1995 levels are expected to be higher than 1973 levels. This is because significant motor vehicle emission reductions are not anticipated and because the projected population increase if PIA is built increases particulate emissions in the study area by 35% (although increasing airport emissions by only 0.3 tons/day). It is emphasized that this proportional scaling for particulates greatly over-predicts the particulate problem, since the scaling ignores the fact that the main particulates are and will continue to be natural. The numbers are presented here to give limits only.

*R.I. Larsen, "A Mathematical Model for Relating Air Quality Measurements to Air Quality Standards," EPA Publication No. AP-89, 1971.

TABLE 49

PREDICTED OZONE AND CO CONCENTRATIONS AT LANCASTER

Year/Alternative	Oxidant		CO			
	Percent of Time 1-hour Standard (0.12 ppm) Exceeded	Predicted Peak 1-hour Concentration (ppm)	Percent of Time 1-hour Standard (35 ppm) Exceeded	Predicted Peak 1-hour Concentration (ppm)	Percent of Time 8-hour Standard (9 ppm) Exceeded	Predicted Peak 8-hour Concentration (ppm)
1973						
Present*	2.7%	0.26	0.0%	15	<0.1%	10
Present**	1.5	0.21	0.0	17	0.0	-
1980	<0.1	0.15	0.0	8	0.0	5
1995						
No Build	<0.1	0.15	0.0	7	0.0	5
Build	0.4	0.19	0.0	9	0.0	6

*Predicted 1973 value.
**Actual 1973 value.

Arthur D Little Inc

TABLE 50

PREDICTED NO_2 AND PARTICULATE CONCENTRATIONS AT LANCASTER

Year/Alternative	NO_2 Annual Average (ppm)	NO_2 Maximum 1-hour Average (ppm)	Suspended Particulates AGM (ug/m^3)
1973			
Present*	0.01	0.08	84
1980	0.01	0.05	79
1995			
No Build	0.01	0.04	87
Build	0.01	0.06	118

*Actual 1973 values.

With PIA built, the NO_2 maximum hourly average would be 0.06 ppm compared to 0.04 ppm for no-build, both well below the state standard of 0.25 ppm.

The Photochemical Smog Situation

O_3 arises in an air mass over a period of some hours through a complex interaction between NO_x, methane-reduced HC, and sunlight. Because of the reaction time requirements, one must consider the trajectory of air parcels from the pollutant source regions. The O_3 maximum usually occurs some time in the noon to 4 p.m. period in the most populated portions of the Antelope Valley, with the significant pollutant source being considered to be the concentrated morning traffic peak in the 6-9 a.m. period.

With respect to PIA and the Palmdale-Lancaster complex the situation can be considered in two distinct parts: (1) where the significant pollutant sources are the northwest Los Angeles, Oxnard, and contiguous mountain regions, and (2) where the PIA-Palmdale-Lancaster region is itself the 6-9 a.m. significant source.

Visibility

The current California visibility standard is less than 10 miles whenever the relative humidity is less than 70%. There is no federal standard. The visibility at the Palmdale Airport was poorer than this level on an average of 87 days a year for the period 1956-1974. The 24-hour California particulate standard of 100ug/m^3 corresponds roughly to an average visibility of 8-12 miles; thus, exceedance of that standard can often be expected to result in exceedances of the 10-mile visibility standard. Since such particulate exceedances are predicted for 1995 regardless of whether PIA is built or not, the same exceedance situation can also be expected to prevail for visibility.

Visibility reduction in the study area results from: (1) increased particulate loading in the atmosphere as a result of strong winds blowing over the desert surrounding the study area, (2) photochemically generated aerosols, and (3) particulate matter resulting from combustion and vehicle operation.

Considering each of the contributory factors in turn, the impact on visibility of the proposed project due to blowing sand is very difficult to assess. The impact, if any, would be very small and might even be beneficial because buildup of the airport would result in developments over existing desert areas and would reduce the acreage of loose topsoil that could be stirred up by strong winds. As stated before, the impact would be small since the amount of paved or landscaped land would be small compared to the vast desert area surrounding the study area. During the construction period some impact of blowing dust can be expected; normal construction dust control procedures should minimize this effect, however.

The future impact on photochemical aerosols on the visibility of the area should be essentially the same as the present situation.

Aircraft and vehicle emissions can be expected to produce sufficient particulates to cause a localized impact on the visibility in the immediate vicinity of the airport during the most stable mornings; although quantitative estimation of this effect is not possible, the overall effect would be slight.

It should be noted that these three visibility degradation factors tend to occur at different times. Blowing sand occurs when t here is strong wind -- typically in the afternoons. The photochemical aerosol effect will be felt mostly on summer afternoons when winds are not too strong. The combustiuon particulates will have heir greatest effect in the most stable conditions on winter mornings.

In summary, considering the blowing dust, the photochemically generated aerosols, and particulate matter resulting from combustion and vehicle operation, the build/no build decision can be expected to have

negligible effect on visibility in the Antelope Valley or on areas downwind from the airport. The effectiveness of source controls in the Los Angeles Area will have a much more significant effect on the visibility in the Antelope Valley, and in most cases is the key to improvement of visibility there.

SUMMARY OF FINDINGS

Air Quality -- Typical Conditions

Under typical conditions no present state or federal standards for CO will be exceeded in the airport vicinity. Background values for each pollutant are computed, based on emissions in the whole Antelope Valley-Santa Clarita Valley area. HC does exceed standards because of a high background, but HC is not itself considered a health hazard. NO_x concentrations just barely permit exceedances at the PIA boundary in 1995. Particulates have exceedances due overwhelmingly to background values.

Air Quality -- Severe Inert

It has been found for PIA that under the severe inert conditions, CO federal and state hourly standards are not forecast to be exceeded in the airport vicinity. The eight-hour CO standard will almost be exceeded for PIA in 1995. NO_2 will exceed the one-hour standard whether PIA is built or not. This pollutant is attributed to higher combustion temperatures found in jet engines, and its impact can be minimized by even stricter NO_x controls. Federal standards for HC are exceeded whether PIA is built or not.

Area Air Quality

For the overall area of the Antelope and Santa Clarita Valleys, pollutant projections were made based on observations at Lancaster scaled to predict areawide emissions. No CO or NO_2 exceedances are predicted. HC and particulates are exceeded due to the background. Oxidant exceedances are found to be reduced in 1980 and 1995 over exceedances in 1973.

The Photochemical Smog Situation

The source of photochemical smog in this area is almost exclusively portions of the Los Angeles area and other coastal regions far from Palmdale-Lancaster. Any decisions about PIA will have negligible impact on the oxidant exceedances. The exceedances become relatively rare in time, due to emissions controls; the sources have been trending down for some time in the South Coast (Los Angeles) Air Basin.*

Air Quality Impacts

The proposed project will result in an increase in all pollutant (except ozone) concentrations in the immediate vicinity of the airport. (Ozone values in this area will probably be reduced as a result of ozone depletion by NO emitted from sources in the airport.) However, no exceedances of either the one-hour or the eight-hour CO standards are expected in 1995. Both particulate and HC standards will be exceeded regardless of whether PIA is built or not. This is because of the high background values that exist in the study area. As for the NO_2, no exceedances are expected under typical meteorology, while the one-hour California standard will be exceeded whether PIA is built or not under severe meteorological conditions.

In the regional scale, the differences in air quality with or without the project are small. There will not be any exceedance of CO and NO_2 air quality standards in 1995, while exceedances of O_3, particulate, and HC standards will occur whether PIA is built or not.

Effects of Oxidants on Human Health

There is a growing concern that air pollution may be a major health hazard. While direct cause and effect are hard to establish, suspected short-term effects include increased sensitivity to respiratory ailments such as the common cold and asthma, eye irritation, and increased load on the heart due to less efficient respiration. Possible long-term effect are emphysema and lung cancer.

The effects of air pollution may depend on the type of exposure, whether to an acute episode or to a lower concentration of pollutants over a long period of time. This long period exposure would be to what is called persistent air pollution -- low-grade contamination that is difficult to perceive and changes little from day to day. It is this type of pollution which will be of concern to the residents of the Antelope Valley in the future. Because of the pervasive nature of this type of pollution the effects are difficult to isolate, and were not really suspected until some acute episodes of air pollution dramatized the hazards of air pollution.

The study of air pollution's effects on health is a fairly new field. As a result methods of measuring both the pollution and its effect are constantly undergoing change. Much of the data are conflicting, especially in earlier studies. A more recent EPA report* contains a brief summary of the systematic studies which have been conducted in an attempt to determine if an association exists between

*South Coast Air Pollution Control District, "Air Quality Trend in the Los Angeles County," December 1975

episodes of high oxidant pollution and general mortality, acute illness, aggravation of chronic respiratory disease, impairment of performance, or untoward symptoms such as eye irritation.

No convincing relationship was observed between short-term variations in photochemical oxidants and daily mortality or hospital admissions, although there was a suggestion that mortality could be related to oxidant levels.

This study, as well as additional material presented in a report to the 1976 California State Legislature, indicates the lack of sufficient epidemiologic evidence on the health effects of photochemical pollution to draw conclusive results. Even for those demonstrated associations between pollution and health effects, such as asthma, pulmonary function, athletic performance, or heart and circulation conditions, data are inadequate to establish a positive minimum threshold level or margins of safety for each effect. The tentative state of the data on air pollution's effect on health, therefore, makes it difficult to provide an exact measure of the impact of pollution attributable to the presence of an airport at Palmdale.

The above discussion is not meant to imply that air pollution and its associated impact are to be disregarded or controls minimized. Quite to the contrary, continued controls and plans for emission reduction are critical for the continued maintenance of the air quality in the Valley and attainment of forecast levels. Furthermore, the oxidant standards will be exceeded some of the time in 1995 even with anticipated controls.

Measures for Reducing Emissions

To diminish emissions from the airport, proposals have been made to minimize emissions during ground operations. These include towing of aircraft to and from runways, idling and taxiing on less than all engines, and ground control procedures to minimize the operation of the engines while the aircraft is on the ground. All proposals promise to reduce emissions and are currently under study by the FAA. Modification of flight operations such as landing and takeoff to minimize emissions is not regarded as a productive approach. More promising is flight schedule modification to assist in more effective ground operations.

Other possible emission control measures are:

*U.S. Environmental Protection Agency, Office of Research and Development, "Photochemical Oxidants in the Ambient Air of the United States," February 1976.

- Reductions in carbon monoxide and hydrocarbon emissions can be achieved by modifying ground operational procedures for aircraft. These reductions are achieved by modifying engine operating power levels and by reducing the number of engines used in taxi/idle operations. Such controls can be implemented immediately and will probably result in fuel savings yielding a net benefit to the carrier. (A reduction in odor levels at airports should accompany the hydrocarbon emission reduction.) By reducing the time of taxi/idle or operating engines at higher and more efficient thrust settings control, emissions can be reduced.

- Reductions in carbon monoxide and hydrocarbon emission rates can be achieved by engine modifications. Further, a reduction in particulate emissions can be achieved by major modifications of combustors.

- Nitrogen oxide emissions can be reduced significantly through the use of water injection during takeoff and climb-out modes.

- Visible smoke emissions from turbine engines can be substantially reduced by minor combustor modifications. Such modifications have been substantially implemented for certain engines.

- Reductions in carbon monoxide and hydrocarbon emissions and significant reductions in nitrogen oxide and particulate emissions will accompany the introduction of advanced combustor design concepts in future engines. Complete elimination of visible smoke and substantial reductions of odor will also be possible with the advanced design.

The DOA requested the State of California Air Resources Board (ARB) to issue an air quality certificate pursuant to the Airport and Airway Development Act for the proposed PIA project. The ARB, in a letter dated October 10, 1978, provided the following response:

"The PIA project clearly demonstrates that the area encompassing the project's proposed location has a severe photochemical oxidant problem. In addition, the proposed project will interfere with the attainment and maintenance of the national ambient oxidant standard (0.08 ppm) in the Southeast Desert Air Basin. The siting of a major source, such as an airport, which would cause or aggravate violations of ambient air quality standards is prohibited by federal law unless

emissions are offset through implementation of mitigation measures or by reduction of emissions through trade-offs in the airport area. If the proposed PIA is built, we estimate a reduction of almost 4.5 tons per day of total hydrocarbons will be needed in the area impacted by the airport by 1995 to meet the 8.9 ppm* oxidant standard. Of this amount, almost 6 tons per day is attributable to the airport, therefore it will be necessary to offset this tonnage to assure the airport's construction and operation will not interfere with attaining and maintaining the oxidant standard."

"Our investigation has revealed the following examples of mitigation measures which might be used to reduce emissions:

- A transit service program which accommodates the estimated trips to PIA commensurate with the level of service planned.
- Restriction of motor vehicle parking at PIA.
- A program to tow aircraft, as feasible, to and from runways at PIA and LAX.
- A program to control evaporative emissions from gasoline-powered support vehicles utilized at PIA.
- A program to install and use vapor recovery systems at PIA during the refueling of all aircraft."

"The 'trade-off' concept permits new or modified sources to be approved if any increases in emissions therefrom will be more than offset by reductions from the same or other sources. This concept is in the Clean Air Act and the Federal Environmental Protection Agency is implementing it nationwide. Therefore, in addition to a mitigation program, there may be other activities in the area which are causing pollution that the Department of airports could aid in reducing and receive emissions reduction credits as trade-offs."

"Accordingly, to facilitate certification, I recommend that you submit a proposal containing mitigation measures and trade-offs which will produce 6 tons per day of hydrocarbon emissions reductions by 1995."

The DOA is presently negotiating a contract with AeroVironment Inc. to prepare a proposal containing mitigation measures in order to facilitate issuance of an air quality certificate by the ARB. It is expected that this process will take approximately a year before certification is obtained.

---

*In subsequent discussions with Gerry Schiebe (ARB, May 1980) the 11 tons/day appear to be in error and should be 8.9 tons/day of NMHC reduction. With the new .12 ppm hourly ozone standard, only 4.2 tons/day NMHC reduction would be necessary. This is less than 4.5 tons/day from PIA.

ATTACHMENT B

MODELING ASSUMPTIONS

4. Theoretical Model For Air Quality Predictions

In this section the two models used in the air quality forecasts are presented. From an air pollution standpoint the impact of a new source such as an airport is more likely to be felt in the immediate vicinity of the source rather than afar (Bastress 1973. Northrop 1973). Hence the inert pollutants (CO, HC, NO_x and particulates) are the ones of most concern close in. The required reaction time for photochemical smog (O_3) generation makes this a downwind problem whose severity is reduced in the study area due to the paucity of sensitive receptors. However, this is a problem not to be lightly dismissed in light of the O_3 exceedances in Lancaster primarily due to pollutant loading from the L. A. Basin.

For this study two models are used. The first, AVQUAL, is applicable for the inert pollutants; the second model -- a qualitative approach which attempts to forecast what the O_3 situation is likely to be on the basis of the known transport mechanisms operating in the study area and analogous transports in other areas where O_3 trends are better known.

a. AVQUAL Model

The AVQUAL model was developed by Dr. P. Lissaman and has been discussed in details elsewhere (Lissaman 1973); here we merely discuss its application to this study and its validation as an area model.

Application of AVQUAL to this Study

All elementary line/point source models can, in principle be integrated in space and time for complex emission geometries. This is frequently a laborious process. The AV model expressed results in a form so simple that this integration can readily be performed. AV

has programmed and run without difficulty on a minicomputer a 3-segment T shaped line source with time/space varying emissions and meteorology.

The model is particularly suitable when emissions are confined to a finite simple region, and where concentrations are required near this region, in an area of low background level. In this case the accurate near field of the Puff/Plume approach, with the valid parametrization of local roughness and stability, makes this method probably more accurate than Finite Difference Scheme, and certainly much simpler numerically.

For the present study, AVQUAL has been adapted relatively easily for area source application. The inversion base height has been incorporated into the model using conventional imaging techniques. The model has been applied in steady-state form and since long range diffusion is also of interest here Pasquill's formulation of plume dispersion is applied.

Dispersion Speed

The dispersion speed, a appears explicitly in the general model, and is of major importance. It is calculated according to the basic laws of turbulence generation by the convective and the shear production terms. Using the Monin-Obhukhov profiles for arbitrary momentum and thermal flux, an explicit equation for vertical and horizontal plume dispersion is given in terms of wind speed (at a given height), ground roughness, and convective heat flux. This expression asymptotes to the free convection values for zero wind speed and to the neutral profile turbulence levels for very strong winds. However, for the present application of the model, as has been previously mentioned, the plume dispersion was based on Pasquill's criteria at each downwind position.

Wind Shifts and Temporal and Spatial Variation

The model is capable of exactly treating the cases of wind shifts during release, varying release levels, and finite sources. Spatial changes in dispersion, due to local roughness variations, or due to elevated or depressed sources, can be readily represented.

Thus the practically important case of light varying winds in a near-stable atmosphere (which usually gives the most critical concentration levels) can readily be handled with this model. Note that this case cannot be treated by existing simple methods. Figure 4-1 shows the important effects of roughness and crosswind on concentrations downwind from a line source.

Sensitivity Analysis

Any theoretical model requires a sensitivity analysis to determine the significance of the various inputs and their relative importance. Here we discuss specifically the sensitivity of the area model treated by the analytic technique of the unsteady puff.

Because of the compactness of the AV model expressions, we can directly quote some of the major terms in the equation:

Emissions	-	the concentration is directly proportional
Receptor Distance	-	far from the source, the concentration depends inversely on the downwind distance; very near the source this dependence is weaker, increasing logarithmically with distance
Dispersion Speed	-	the concentration depends inversely on the vertical dispersion speed, with weak inverse type dependence on the lateral dispersions

The dispersion speed itself is a major variable in the equations, and the sensitivity of this has been extensively examined. This

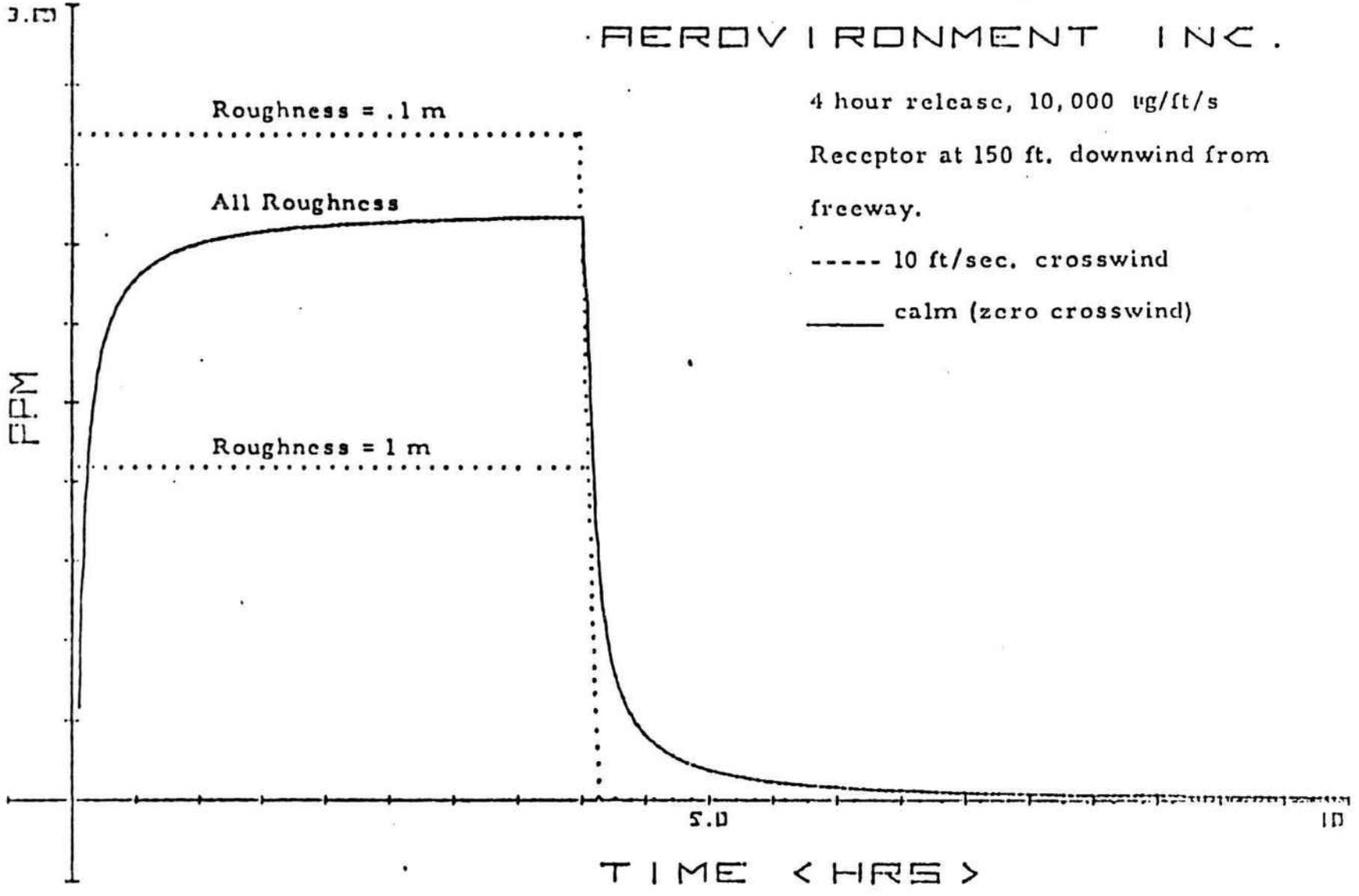


Figure 4-1. Temporal Effects of Wind and Roughness.

speed is a function of wind speed, insolation, and roughness. The general structure is that for strong winds (in excess of about 10 mph) the dispersion is linearly related to the wind speed. At lower speeds the atmospheric stability becomes significant and thermal influences contribute to the turbulence. For very low wind speeds in stable atmospheres, H, the heat flux from the earth dominates the turbulence and here we find that dispersion varies as $H^{1/3}$. The value of H must usually be estimated either from observations of cloud cover or from temperature profiles near the ground. This estimate is very important in the model and corresponds with the proper estimation of the Pasquill Stability Class in the classical methods.

The ground roughness also plays a significant role in affecting dispersion, especially at the higher wind speeds. The direct dependence varies as the logarithm of the roughness, and thus might appear mathematically to be rather small; however, in most cases the equivalent roughness must be estimated from other parameters and these estimates may vary widely.

The remaining term is the sensitivity of time effects, both in development and decay under steady meteorological conditions, and in the effects of wind shift. Many numerical experiments relating to this have already been conducted at AeroVironment, and while the sensitivity varies for receptor and wind conditions, the general conclusion is that under strong winds the temporal effects are negligible, but under light or calm conditions time scales up to the order of 1/2 hour will occur.

Model Validation

Considerable numerical experimentation has been done with the model, which performs properly and matches standard approaches (e.g., Pasquill) although it is much more general than these. Field

test validation during freeway impact studies in San Jose and Richmond, California, was carried out by AeroVironment both of the dispersion model and the concentration model with excellent correlation. Model validation for the present study using the model simulating an area source in order to represent the Palmdale Airport will now be discussed.

Not all the data taken during the Model Validation Exercise (described in Section 2-c) was useable for model validation. For example, it was difficult to process average winds in a rapidly varying wind field for use in a steady state model; most of the midmorning data taken when the winds were rapidly changing from a southerly to north-northwesterly was therefore unusable.

The results in the data measured and processed with confidence is shown in Figure 4-2. Both curves are for early morning data with winds (u) ranging from 186° to 240°. The inversion base height (H) ranged from 150 to 200 feet. On both days the stability as derived on the basis of surface temperatures at Palmdale from the Edwards temperature soundings was Pasquill D class. The total emissions, Q, (aircraft, and related activity) were estimated for both periods at 48 gms per second. Downwind distances were measured from the center of runway 7-25 which is that most frequently used. The CO measurements were corrected for background levels taken as upwind values.

It is obvious from the Figure that close to the Airport the CO concentrations fall off more rapidly (like distance $^{-1}$) than farther downwind where a lesser falloff is to be expected depending on source area, height of the mixing layer and the turbulence characteristics of the atmosphere. For the few data points available there appears to be good correlation between experiment and theory.

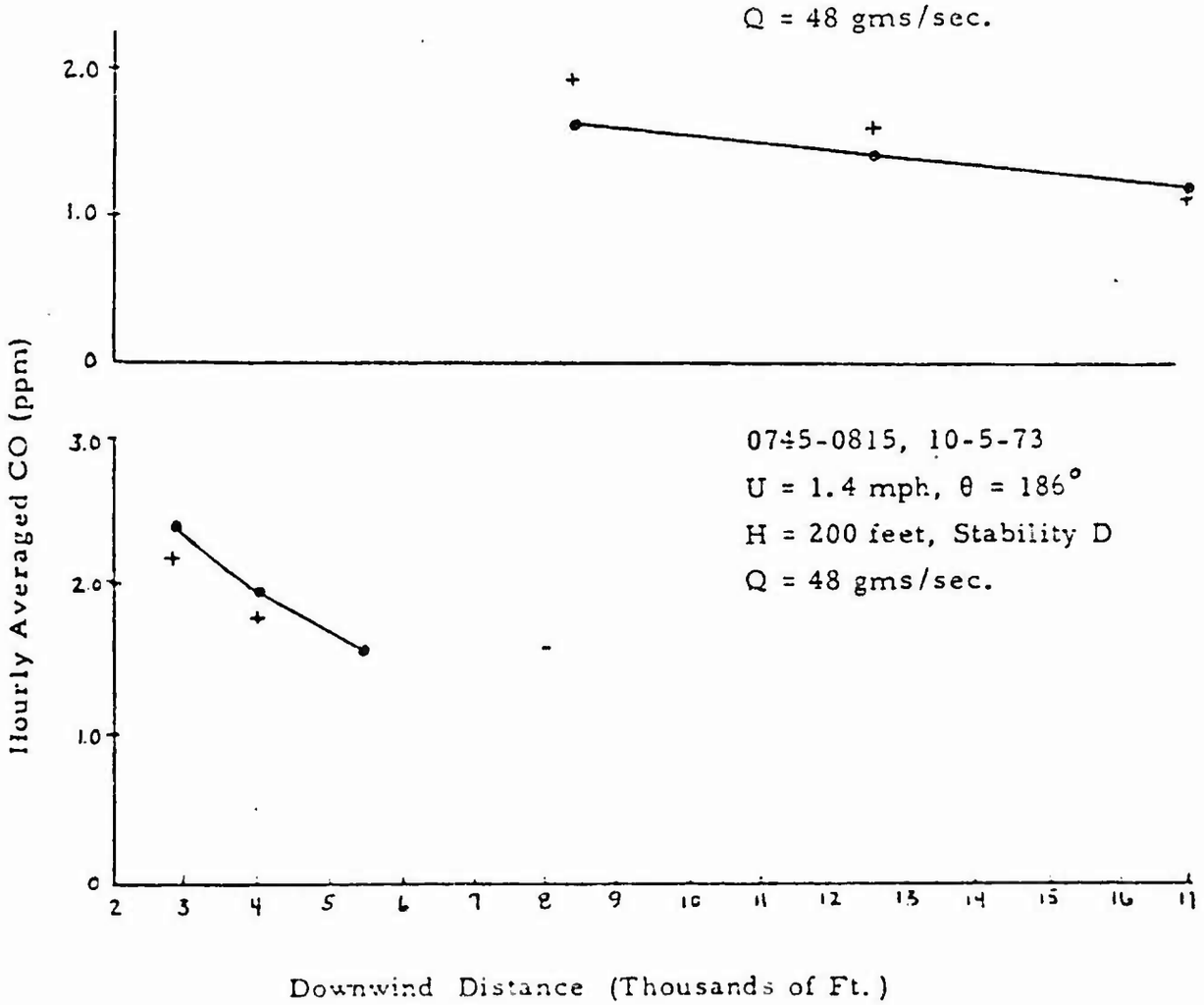


Figure 4-2. Hourly Averaged Measured (+) and Theoretical (•) CO Values as a Function of Downwind Distance from the Palmdale USAF Plant 42 Runway 7-25 Center

From receptor location and time of flight consideration the hourly averaged wind and stability used here were those for the hour beginning 30 minutes before that of sample measurements in order to ensure that the proper eddies were being sampled. The airport emissions turned out to be fairly uniform between 0715 to 1100 (PDT) based on aircraft activity; however, there was great uncertainty in the absolute value. In computing this the emissions factor for a long range jet engine (47.4 lb. CO/engine) was used (EPA, 1973). Aircraft activity made was mainly touch-and-go; this was assumed 10% of the emissions of an LTO cycle and was estimated from emissions proportions for the various modes during an LTO cycle of a Pratt and Whitney JT-3C engine. It was further assumed that ground operations (engine run ups, ground service vehicle activity) and the increased emissions due to altitude (Palmdale is 2655 feet MSL) contributed 50% of the total emissions.

ATTACHMENT C

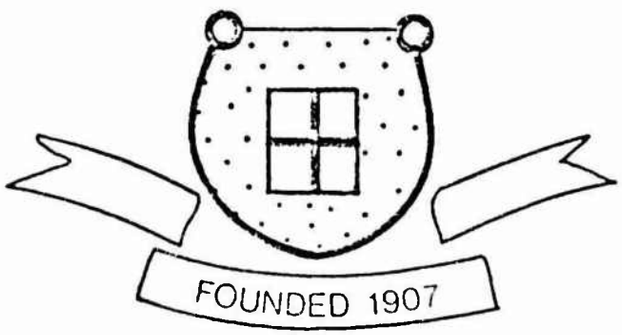
A SIMPLE UNSTEADY CONCENTRATION MODEL EXPLICITLY INCORPORATING GROUND ROUGHNESS AND HEAT FLUX

APCA #73-129

A SIMPLE UNSTEADY CONCENTRATION MODEL EXPLICITLY INCORPORATING GROUND ROUGHNESS AND HEAT FLUX

P. B. S. Lissaman

AeroVironment Inc.
Pasadena, California



For Presentation at the 66th Annual Meeting of the
Air Pollution Control Association
Chicago, Illinois June 24-28, 1973

Abstract

The paper is directed to groups concerned with modeling, predicting, and assessing pollutant concentrations due to line, point or area sources, the unsteady diurnal variations of these, and the effects on dispersion of ground roughness and heat flux. Simple equations, valid for all wind speeds including zero, are given for rapid estimation of these concentrations for unsteady line or point releases. A submodel for the diffusion constant is developed, derived from basic elements of turbulence production by shear and convection, and presented in a simple universal form, explicitly incorporating ground roughness and heat flux. It is shown that roughness has a major effect on pollutant dispersion, being as important as wind.

The model exactly treats the unsteady effects of wind shift (pollutant sloshing back and forth), which is particularly useful for the important high pollution case of light variable winds. It is shown that a light wind may frequently cause more severe concentrations than occur under calm conditions. The model can be adapted for the important cases of non-planar roadways and non-uniform spatial dispersion, situations typical of graded freeways. The elementary concentrations can be integrated to model finite width or length freeways, and the results summed for unsteady area concentrations due to an arrangement of line and point sources, without recourse to massive computer storage. An operational model of this has been programmed on a mini-computer with interactive input and graphical displays.

Both the dispersion submodel and the concentration model have been checked in controlled field tests and give excellent correlation with experiments.

Introduction

Many mathematical diffusion models exist, ranging from finite difference techniques incorporating many parameters (but with memory requirements necessitating large computers) to very simple hand-calculation methods. The method presented here lies between these extremes, and contains a proper representation of unsteady effects as well as a rational expression for dispersive effects of ground roughness and convective heat flux. Because of the choice of the dispersion law, the current method possesses many convenient closed form integrals.

Thus, the present method is believed to offer a compromise of simplicity and accuracy which makes it very suitable for predictions concerning the local effects of line or point sources, exemplified by highways or stacks. The model can be extended by further analytic or numerical integration to develop an area concentration model.

Basic Analysis

The Field Equations

Turbulent diffusion involves serious difficulties in selecting a transfer coefficient. A basic result in the theory of turbulent diffusion is that of Taylor[1] (1921) in which it is shown that the mean dispersion of a point source for short times, t, is given by $\bar{y} = at$ where $\bar{y}$ is the rms dispersion and a the dispersion speed. Ref. 1 shows that a may be taken as the rms turbulent fluctuation in

the direction of y , thus $a^2 = \overline{v'^2}$ while the statement time is "short" implies t is small compared with the Lagrangian time scale of the process.

In the following analysis we use the above hypothesis in the ground boundary layer, noting that the assumption is supported by the following observations:

(1) The time of flight of interest is usually less than 5 minutes, while the Lagrangian correlation time is believed to exceed 50 minutes (Pasquill[2], 1962).

(2) The rms vertical fluctuation velocity is constant with height for a neutral boundary layer and varies weakly for diabatic profiles.

We take the field equation for concentration C at a point in a flow of uniform velocity U is

$$\frac{\partial C}{\partial t} + U\frac{\partial C}{\partial x} = \frac{\partial}{\partial x}\left\{a_1\sigma_1\frac{\partial C}{\partial x}\right\} + \frac{\partial}{\partial y}\left\{a_2\sigma_2\frac{\partial C}{\partial y}\right\} + \frac{\partial}{\partial z}\left\{a_3\sigma_3\frac{\partial C}{\partial z}\right\} \qquad (1)$$

The x axis is oriented with the velocity U , z is the vertical coordinate and the dispersion speed in each direction is given by a_1, a_2, a_3 . The scale of dispersion at any instant is $\sigma_1, \sigma_2, \sigma_3$. Equation (1) is completely general, in that the transfer coefficient $K \sim a\sigma$ is simply replaced by terms containing the proper (and only) scales. In general $K \sim K(x, y, z, t)$ for turbulent flows, while it is a constant for the laminar case.

We now assume that in each direction a is invariant with

space and time, thus $a_1\sigma_1 = a_1^2 t$ etc. The transformations $\tau = t$, $\xi = x - Ut$, $\eta = y$, $\zeta = z$ reduce Eqn. (1) to

$$C_\tau = \tau \{a_1^2 C_{\xi\xi} + a_2^2 C_{\eta\eta} + a_3^2 C_{\zeta\zeta}\} \tag{2}$$

which is simply the field equation in a coordinate system moving with the wind, U. The further transformation $\nu = \tau^2/2$ gives

$$C_\nu = a_1^2 C_{\xi\xi} + a_2^2 C_{\eta\eta} + a_3^2 C_{\zeta\zeta} \tag{3}$$

Equation (3) is solved for boundary conditions $C(\xi, \eta, \zeta, \nu) = \delta(\xi, \eta, \zeta, \nu)$ where δ is the Dira delta function, and transformed into the original physical coordinates to give $C(x, y, z, t)$ as

$$(2\pi)^{3/2} a_1 a_2 a_3 t^3 C = \exp -\{(x-Ut)^2/2a_1^2 t^2 + y^2/2a_2^2 t^2 + z^2/2a_3^2 t^2\} \tag{4}$$

Equation (4) represents the concentration due to an instantaneous release at t=0, x=0, y=0, z=0 assuming fixed dispersion speeds.

Conservation is satisfied as implied by the condition $\int_{-\infty}^{\infty} C \, dx\, dy\, dz = 1$, $t > 0$. Equation (4) is the solution for an impulsive puff expanding at a constant rate and is properly behaved for all values of the velocity scales involved. The form of Eqn. (4) permits closed integration in various convenient forms.

The Unsteady Plume

For a point source of temporally varying strength, Q(t),

the concentration at time T may be written $C_p(x, y, z, T) = \int_o^T Q(t)\, C(x, y, z, t)\, dt$. For Q(t) constant, this integral is

$$a_1 a_2 a_3\, R^2 (2\pi)^{3/2}\, C_p(x, y, z, T) = a^2 \exp\{-\bar{R}^2/a^2 T^2\} + a\bar{X}\bar{U}/R$$

$$\times (\pi/2)^{1/2} \{1+\mathrm{erf}\, 2^{-1/2} (\bar{X}\bar{U}/aR - R/aT)\} \exp\{-1/2\, \bar{U}^2 (Y^2+Z^2)/a^2R^2\} \quad (5)$$

where the length and velocity scales have been transformed according to the dispersion speeds, $X = xa/a_1$, $Y = ya/a_2$, $Z = za/a_3$, $\bar{U} = Ua/a_1$; and the radial distances written as $R^2 = X^2 + Y^2 + Z^2$, $\bar{R}^2 = (X-\bar{U}T)^2 + Y^2 + Z^2$. This expression retains its significance as $\bar{U}$, a approach limits. It converges to a steady limit as $T \to \infty$, being the solution for a continuous release emitted for an infinite time.

The temporal and spatial behavior of this solution exhibits some interesting properties. To illustrate these, consider the line source, which has qualitatively the same behavior but is simpler algebraically.

The Unsteady Line Source

Integrating Eqn. (4) with respect to y gives the unsteady line puff. Then, integration with respect to time gives the general line solution C_L

$$a_1 a_3\, R^2 C_L(x, z, T) = a(\pi/2)^{1/2} \left[1+\mathrm{erf}\, \{2^{-1/2} (\bar{X}\bar{U}/aR - R/aT)\}\right]$$

$$\times \exp(-\bar{U}^2 Z^2 / 2a^2R^2) \quad (6)$$

Temporal and spatial properties of Eqn. (6) with respect to advection $\overline{U}$ and dispersion $\underline{a}$ are described below.

Effects of Advection and Dispersion

To demonstrate these effects, assume that under calm conditions (U = 0) there is an isotropic static dispersion speed $a_1 = a_3 = a_o$ which is a function of the convective turbulence. As wind increases, assume the dispersion speed becomes coupled to the wind speed through mechanically generated shear turbulence. Thus, for these calculations only, we take a dispersion model $a_1 = a_3 = a = a_o + \alpha U$.

We stress that this dispersion model is only for computational convenience, although it gives a good representation of a practical physical situation. In the next section a more rational expression for $\underline{a}$ is developed. The above assumption gives centerline concentration as

$$2\pi C_L = (\pi/2)^{1/2} \{1 + \mathrm{erf}\,[2^{-1/2}(U^*-1/T^*)/(1+\alpha U^*)]\}/x a_o(1+\alpha U^*) \quad (7)$$

where the dispersion speed is used to scale both advection speed and time; to give normalized values $U^* = U/a_o$ and $T^* = Ta_o/x$.

Defining $C^* = 2(2\pi)^{1/2}\, x a_o C_L$, a normalized measure of concentration at a fixed downstream distance gives Figure 1, which provides very interesting insights into the temporal concentration development. For example, for the receptor, x, about one km downwind, and a_o about 1/3 m/sec, T^* is in hours. Then, on a calm day (U = 0), it takes about 10 hours for full steady

concentration levels to reach the receptor; on the other hand, the steady level at 100m will be acheived in about an hour.

However, for a light breeze of a few meters per second, then a very much more rapid buildup occurs, with a time scale of about an hour 1 km downwind, and correspondingly shorter times for closer receptors. An interesting feature is that the light wind has <u>increased</u> the downwind concentration. This is because in the calm case only half the emission is dispersed on one side of the line source. However, with the wind, almost all the pollutant is advected downwind. The equations developed properly model upwind dispersion, so only a portion of the pollutant is convected downstream. The equations show that for small times ($T^* << 1$) there is <u>equal</u> dispersion up and downwind, but in the steady state as $T^* \to \infty$, the ratio of pollutant upwind to downwind is $\{1 - \text{erf}\ \frac{1}{\sqrt{2}} (\frac{U^*}{1+\alpha U^*})\} / \{1 + \text{erf}(\frac{1}{\sqrt{2}}\ \frac{U^*}{1+\alpha U^*})\}$. This ratio is close to zero for $U^* \sim 2$, $\alpha \sim .1$.

Thus maximum steady concentration at a given downwind point occurs for some light wind condition. Figure 2 shows steady state concentrations for various windspeeds. Although this figure is representative, it should not be taken to define the worst actual light wind case, since the linear dispersion law will not necessarily obtain. However, specific calculations using the dispersion model developed here have shown that for a fixed heat flux, worst conditions do occur with a light breeze. The basic concentration term for general downwind dispersions is $\{1 + \text{erf}\ 2^{-1/2}\ U/a_2\}/a_3$.

The maximum of this quantity gives the most severe concentration conditions. This ratio can be maximized for any functional variation of a_1, a_2 with U and other parameters.

The unsteady upwind behavior of the line solution is of interest. For x negative, the centerline concentration goes like $C_L \sim \frac{-1}{aX}\left[1 - \text{erf}\left\{2^{-1/2}\left(\overline{U}/a - X/aT\right)\right\}\right]$. For vanishingly small dispersion, $a \to 0$, Eqn. (6) gives $C_L \to 0$, $x > UT$; $C_L \to \infty$, $x < UT$. This describes the behavior of a very weakly diffusing slug advected by the wind. There is no pollutant at a point until the wind has blown it down to the receptor, then, because of negligible diffusion, the concentration immediately approaches source levels.

Dispersion Relations

To evaluate the dispersion we require the turbulence in the lower earth boundary layer. The simplest model consistent with our point of view is the similarity model of Monin and Obukhov[3] (1954) which states that a steady self-similar two-dimensional boundary layer can be fully described by the ground roughness, z_o, and temperature, T_o ; and the height invariant momentum and heat fluxes. These fluxes are characterized by u^*, the friction velocity, and H, the convective heat flux. The Monin-Obukhov length scale, L, is defined by $L = U^{*3} C_p \rho T_o/(kgH)$ where C_p is the specific heat at constant pressure, ρ the density, T_o the surface temperature, k Karman's constant, and g the

gravitational constant. On this basis all velocities, including turbulent fluctuations, must be expressible as $u_i/u^* = f_i(z/z_o, z/L)$ where z is the height and f_i is the function associated with the velocity u_i.

For a general self-similar diabatic profile, Lumley and Panofsky[4] (1964) express the mean horizontal speed as

$$U/u^* = \{\ln z/z_o + \Psi(z/L)\}/k \qquad (8)$$

where Ψ, the non-adiabatic part of the profile is plotted in reference 4. Thus, u^*, H, z_o, T_o completely specify the wind profile.

Neglecting molecular transport terms, the turbulent dissipation, ϵ, can be written

$$\epsilon = u^{*2} \frac{\partial U}{\partial z} + g \frac{H}{\rho C_p T_o} + \frac{\partial F}{\partial z}$$

The first term on the righthand side is the mechanical production due to shear, the second that due to buoyancy. The turbulent transport term, $\partial F/\partial z$, must be related in some way to the shear and buoyancy terms, which are the only production mechanisms. Noting that each component of fluctuating velocity at height z must be $\sim \epsilon^{1/3} z^{1/3}$ we postulate that the vertical fluctuation component, w', can be written

$$w' = 1.25(zu^{*2} \frac{\partial u}{\partial z} + 2.4\, zgH/\rho C_p T_o)^{1/3} \qquad (9)$$

where the constants have been propo ed in Ref. 4.

Equations (8) and (9) are used to eliminate u* and to express w' , U at any height for a given z_o, H, T_o . These calculations were made at z = 10m, eliminating the weak temperature dependence by using a mean value. This gives a two parameter family, expressing w' as a function of U for different values of H and z_o . The effects of roughness are large, but the curves can be collapsed to an excellent approximation by using a roughness reduced wind speed U_r , defined in a later paragraph. This universal curve is shown in Figure 3, drawn for mean and fluctuation speeds at 10 meters.

The effect of wind and heat flux on vertical turbulence can now be described. For the adiabatic case, H = 0 , turbulence is directly proportional to wind speed and invariant with height. For a positive heat flux (H > 0) the turbulence is principally convective at zero and low reduced wind speeds, rising slowly with speed unitl the mechanical shear terms dominate the turbulent production and the turbulence is almost adiabatic. For negative heat flux, turbulence is suppressed until the critical Richardson Number is reached and the wind is sufficiently strong for the mechanical terms again to develop near adiabatic turbulence.

The actual model used in this paper was expressed in an algorithm below which is very convenient for computer logic and which gives continuously varying w' for all values of parameters.

Roughness Reduced Speed $U_r = \frac{4.6}{U \ln(\frac{10}{z_o})}$

Vertical Turbulence

if $H < 0$ and $U_r < 13.2(-H)^{1/3}$ then $w' = 0$

if $H > 0$ and $U_r < 5.7\, H^{1/3}$ then $w' = .87\, H^{1/3}$

otherwise $w' = .125\, U_r$

Here U and w' are the wind speed and rms vertical turbulence at 10m in ms^{-1}, z_o the roughness in m , and H the heat flux in cals cm^{-2} min^{-1}. The horizontal fluctuation components theoretically obey the similar laws; however, the constants are poorly substantiated and because extraneous horizontal fluctuations are less damped, proper self-similarity is more seldom attained. Fortunately their effect on the equations is weak, and we used $a_1 = a_2 = \lambda a_3$ where λ is about 2.8 for H large and 1.3 for H small.

Some Special Cases

General

Equations (5) and (6) are used to compute unsteady concentration at any point providing we assume a mean convective velocity and dispersion speed. For the present calculations values at 10 meters were used, which gave excellent correlation with experiment. Here we discuss additional refinements made possible by the simple analytical forms of (5) and (6). Special cases are discussed below.

Temporal Variation in Wind Speed

This interesting situation is frequently of practical importance, when light varying wind shifts cause pollution to slosh back and forth across a particular receptor. To illustrate this consider a line source with varying wind and emissions. Initially, for $T < T_1$ there is a continuous release, Q_1, with a wind speed, U_1; followed by release, Q_2, with wind speed U_2. Assume the dispersion is isotropic and of magnitude $\bar{a}$ for all T considered.

During initial release, the concentration C_1 is given from Eqn. (6) by

$$C_1 = Q_1 C_L(x, z, T; U_1, \bar{a}) \qquad T < T_1$$

We require the wind shift solution, C_s, for $T > T_1$ with U_2, $\bar{a}$, Q_2. This is written

$$C_1 \qquad T < T_1 \quad ; \quad C_s : U_2, \bar{a}, Q_2 \qquad T > T_1$$

Consider first the problem

$$C_1 \qquad T < T_1 \quad ; \quad C_2 : U_1, \bar{a}, 0 \qquad T > T_1$$

where the notation means that we require the solution for source cutoff at T_1 with wind and dispersion U_1, $\bar{a}$; subject to the initial condition C_1 at $T = T_1$. Then C_2 becomes $C_2 = Q_1 \{C_L(x, z, T; U_1, \bar{a}) - C_L(x, z, T - T_1; U_1, \bar{a})\}$.

Now consider the problem

$$C_1 \qquad T < T_1 \quad ; \quad C_3(U_2, \bar{a}, 0) \qquad T > T_1$$

Since the source is removed for $T > T_1$, C_3 is equivalent to the standard solution for a moving receptor at a position $\bar{x} = x - (U_2-U_1) \times (T-T_1)$. Thus C_3 is given by

$$C_3 = Q_1\{C_L(\bar{x}, z, T; U_1, \bar{a}) - C_L(\bar{x}, z, T-T_1; U_1, \bar{a})\} .$$

Finally, for C_s we add the effect of Q_2 for $T > T_1$, thus obtaining

$$C_s = C_3 + Q_2\ C_L(x, z, T-T_1; U_2, \bar{a}) .$$

The above are exact solutions; subject only to the condition that $\bar{a}$, the dispersion speed is constant. For light winds, with moderate heat fluxes (a common situation) this is an excellent approximation, as shown by Figure 3. This exact solution C_1, C_s makes it possible to give exact unsteady solutions for any number of different periods of wind and source combinations by superposition. If $\bar{a}$ changes appreciably with time, then suitable approximations must be made, such as taking the mean $\bar{a}$ over each pair of steps. Usually the decay is sufficiently rapid that the most significant $\bar{a}$ is that during release.

Wind shift concentrations are shown in Figure 4, where a release for 4 hours under calm conditions is followed by $Q = 0$, $U = 1\ ms^{-1}$; and the case of release during wind with a calm following source cutoff. For the first case there is initially a slow buildup, then, when the wind occurs, a brief pulse as the pollutant is blown down onto the receptor, followed by a rapid

decay. In the second case, rapid development to the steady case is followed by a fairly slow decay in calm conditions after cutoff.

Spatial Variations in Dispersion

An important case occurs when there are distinct changes in ground roughness or geometry or in vehicular generated turbulence so that the dispersion varies with downwind distance. For example, near a freeway there may be greater dispersion due either to vehicular generated turbulence or to topographic turbulence caused by separations associated with roadway architecture. Consider the situation $a = a_1$, $x < x_1$; $a = a_2$, $x > x_1$; for the steady case this can approximately be incorporated into the line solution by taking $C_n \sim \frac{1}{xa_1} [1 + \text{erf } U/a_1]$, $x < x_1$; $C_d \sim \frac{1}{(x+\bar{x})a_2} (1 + \text{erf } U/a_2)$, $x > x_1$ where $\bar{x}$ is selected such that $C_n(x_1) = C_d(x_1)$.

This corresponds to displacing the effective source for $x > x_1$, so that at $x = x_1$ the ground level concentrations match. Matching of the vertical concentration distribution at x_1, z has been checked numerically and found to be in good agreement.

Effects of Non-planar Roadway

This effect can approximately be treated in the steady model by assuming that dispersion is a function of time of passage. Thus the altered velocity field due to the non-planar ground is computed then the time of passage from the source to the receptor.

An equivalent receptor distance is then used in the equations, being the distance covered in the times of passage at the unperturbed wind speed. It is believed that this is as accurate as inputs warrant.

Exact potential flow solutions exist for uniform flow over circular are bumps or hollows. Using these solutions and the above procedure, a few cases were computed showing that the effects were small. For a circular arc depression or bump of depth/width ratio of 1/20 maximum perturbations occurred near the edge of the bump and caused only 10% change in concentration. This is not to suggest that graded or depressed roadways will not affect concentration; in certain cases, the perturbation may be rather large. If the adverse pressure gradients (a combination of wind speed and geometry) associated with flow across the obstacle are sufficiently high, flow separation occurs, which greatly increases turbulence and even develops local back flows. Thus an attached flow type solution with standard transfer coefficients is useless. However, if the spatial distribution of dispersion is known, then the methods suggested earlier should be useful. On the other hand, if conditions are such that the flow remains attached (implying low velocity perturbations), then the method of time of passage described here should apply, and will probably indicate only small differences from the planar solution.

Thus it is suggested that laborious computer modeling of attached flow over detailed bumps and hollows is of very limited value since the only important cases involve flow separation.

Effects of Wind and Roughness

The present solutions illustrate the coupled effects of wind and roughness. Figure 5 shows concentrations for a 4-hour release for the cases of calm and a 3 ms^{-1} wind for two different roughnesses. This figure shows that the estimate of roughness is at least as important as that of wind speed, illustrating the difference in advective dispersion between open flat country (roughness .1m) and a representative suburban value (roughness 1m). The calm dispersion is independent of roughness. Note that for .1m roughness a 3 ms^{-1} wind causes more downwind pollution than a calm.

It is believed that roughness should be specifically incorporated into models to properly represent the dispersion effect.

Finite Length and Width Source with Skewed Wind

The unsteady instantaneous point release C , Eqn. (4), can be exactly integrated for a skewed line of finite length. For the continuous release, the expression must now be integrated with respect to time. No closed form for this could be found. Analytical approximations were made, as well as numerical evaluation of the integrals, resulting in convenient approximate formulations.

The effect of finite source width can be obtained by a further spatial integration. The present model, including both finite width and length, has been used as the basis for an operational unsteady area concentration model, involving a number of distinct freeway

legs and point sources with diurnal variation in wind and emissions. Because of the limited storage requirements, this model can be run on mini-computers or programmable calculators. These models have been run on the Hewlett-Packard 9820A with interactive inputs and graphical plotted output. Figures in this paper are typical subprograms.

Validation

Before showing experimental validation, theoretical aspects of the model should be discussed. For the line source, the concentration dependence with receptor distance is of the form $C \sim 1/x$. Comparing this with the well-known method of Pasquil[2], (1962), we find that Pasquill gives $C \sim 1/\sigma_z$. Graphs of σ_z in Ref. 2 show that for the first km $\sigma_z = ax$ is an excellent approximation for stability class, F through B, and is not seriously in error for the first 500m in Class A. Fortunately, A, the most unstable class, is of extreme dispersion and usually not a case of concern for severe meteorological/pollution conditions. Fickian models, of constant transfer coefficient, give $\sigma_z \sim x^{1/2}$. This is substantially different from the σ_z plots of Ref. 2, which even for the most stable class give $\sigma_z \simeq x^{.9}$. Thus the present model matches in character the experimentally verified model of Pasquill, but is much more general, treating unsteady cases, and containing a continuously variable dispersion which is a function not only of wind speed and heat flux but also of ground roughness.

For the magnitude of the dispersion, we cannot compare directly with Pasquill, since roughness does not enter into the determination of σ from stability class. However, for class C, neutral, Pasquill gives $C \sim 1/.07\ Ux$ while our model, for a roughness of 10 cm, gives $C \sim 1/.08Ux$.

On the subject of experimental correlation, it should be noted that field type highway validation of a model is frequently a very unsatisfactory test, because too few data points are taken, and the emissions are not measured, but usually estimated by counting vehicles, a procedure of unknown accuracy.

Thus, after background corrections if a few data points fall on a predicted curve, a model still cannot be considered validated. Two obvious loopholes may cause the model to appear "correct". It may contain theoretical inconsistencies which happen to compensate at the specific test conditions, or the input variables used may not be those actually occuring in the test.

The model presented here does incorporate the basic physical parameters in the proper fashion so that trends will be properly represented; also, as mentioned previously, the spatial dependence of the model is that occurring in practice.

A submodel of the present model, the dispersion relation, can be directly tested. During field validation tests the vertical turbulence and wind profile were measured for a fairly wide range of conditions. Heat flux was estimated from available solar radiation measurements, and roughness estimated from wind profile as well as

by comparison with similar sites. Measured vertical turbulent fluctuations were then compared with the theoretical model developed, with no adjustment of constants. Figure 6 shows these results. Good correlation was obtained for dispersion varying from .2 to .7 ms^{-1}. Thus one component of the model is validated.

We repeat the point made before, that if this intermediate correlation was poor, even if the final concentration correlations were excellent, one would be forced to assume that the model was incorrect.

For the final total model correlations we refer to Figure 7, which shows measured CO concentration near the Bay Shore Freeway, San Jose, California, in August and October 1972, compared with the present model. While these tests suffer from the previously mentioned inaccuracies of estimating emissions, it is believed that in other respects they are quite accurate. Each point represents an hourly sample, with the total experimental error band indicated.

No corrections or adjustments were made to the model constants to fit this data. Additional model validation tests, having similar correlations, together with a comprehensive description of the field tests and further operational applications of the model, is contained in the AeroVironment Inc. report to the California Division of Highways[5], (1972).

Conclusions

The paper describes a simple, flexible model for air quality estimates which rationally incorporates the important parameters of wind, heat flux, and surface roughnes. The constants and character of the model are consistent with basic diffusion laws and have been validated by field tests. The simple analytical form of the concentration equations make them particularly suitable for desk calculators or programmable mini-computers, and the same simplicity makes the model very suitable for construction of area pollution models for a freeway and point source networks.

References

1. Taylor, G. I., "Diffusion by Continuous Movements," Proc. London Mathematical Soc., Vol. 20, 1921, pp. 196-212.

2. Pasquill, F, "Atmospheric Diffusion," Van Nostrand, 1962.

3. Monin, A. S., and Obukhov, A. M., "Basic Laws of Turbulent Mixing in the Ground Layer of the Atmosphere," translated from Akademiia Nauk SSSR, Leningrad, Geofizicheskii Institut, Trudy, Vol. 151, No. 24, 1954, pp. 163-187.

4. Lumley, J. L., and Panofsky, H. A., "The Structure of Atmospheric Turbulence," Interscience Publishers, John Wiley and Sons, New York, 1964.

5. MacCready, P. B., Jr., Lissaman, P. B. S. L, Tombach, I., and Baboolal, L., "Air Quality Analysis and Impact Study Routes 85 and 87 in the San Jose Area," Final Report, prepared for State of California, Division of Highways, AV FR 232, November 30, 1972.

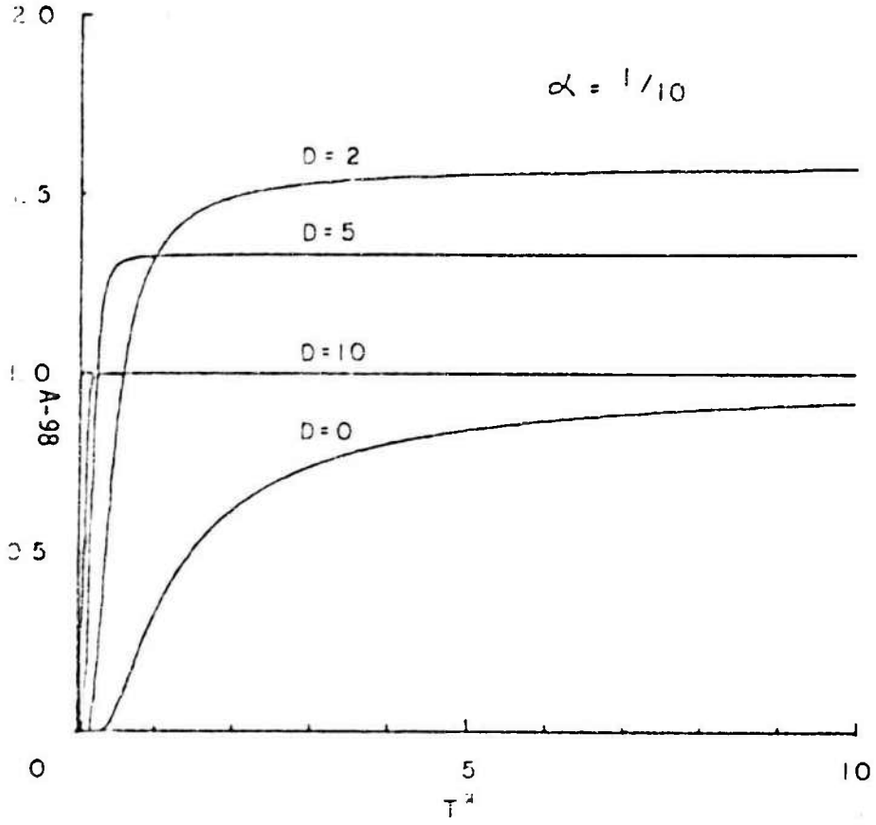


FIGURE 1. TEMPORAL DEVELOPMENT OF CONCENTRATION WITH WIND SPEED.

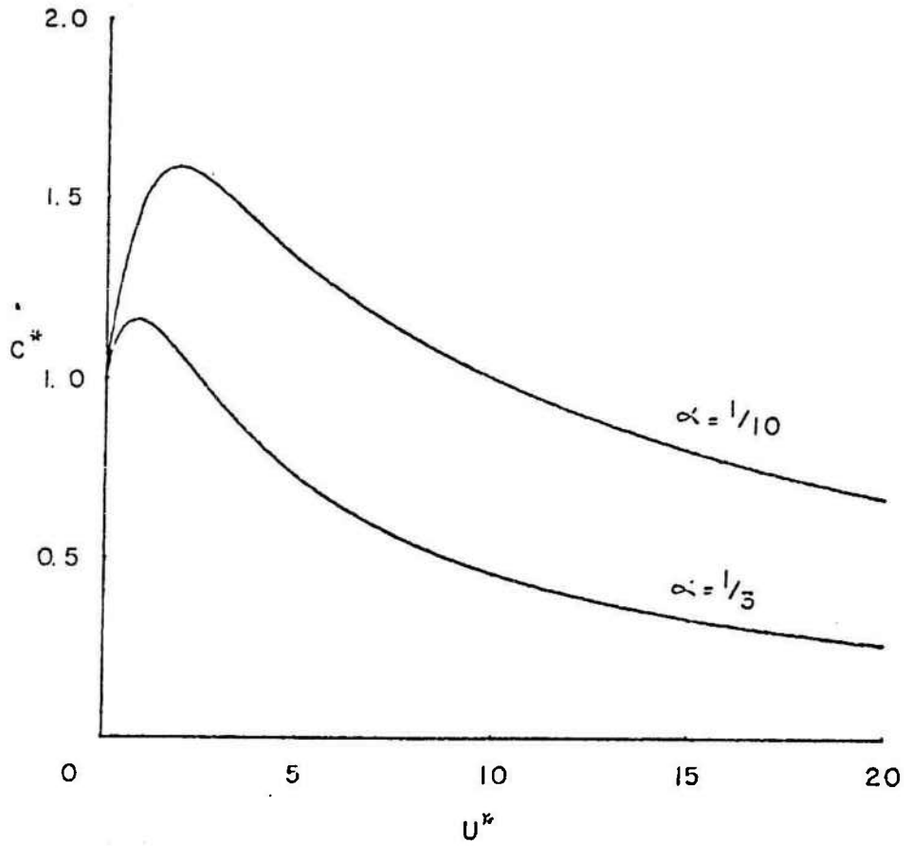


FIGURE 2. EFFECT OF WIND SPEED ON STEADY CONCENTRATION

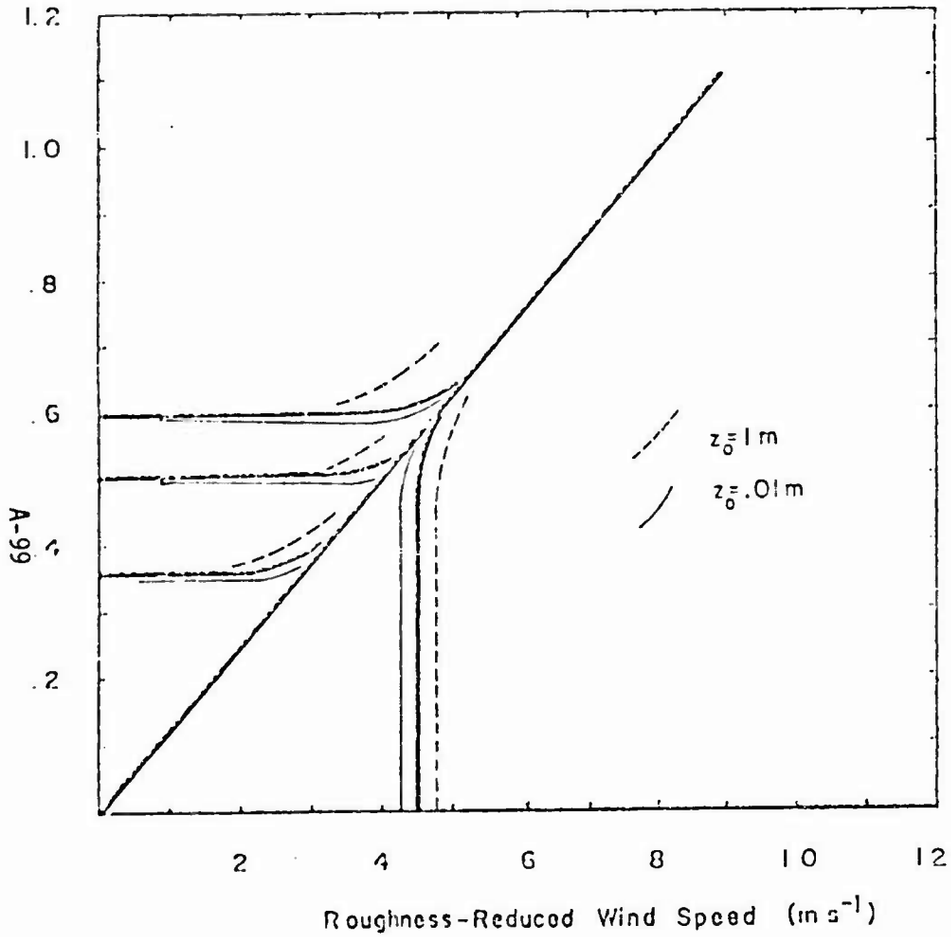


FIGURE 5. UNIVERSAL ROUGH REDUCED TURBULENCE CURVES.

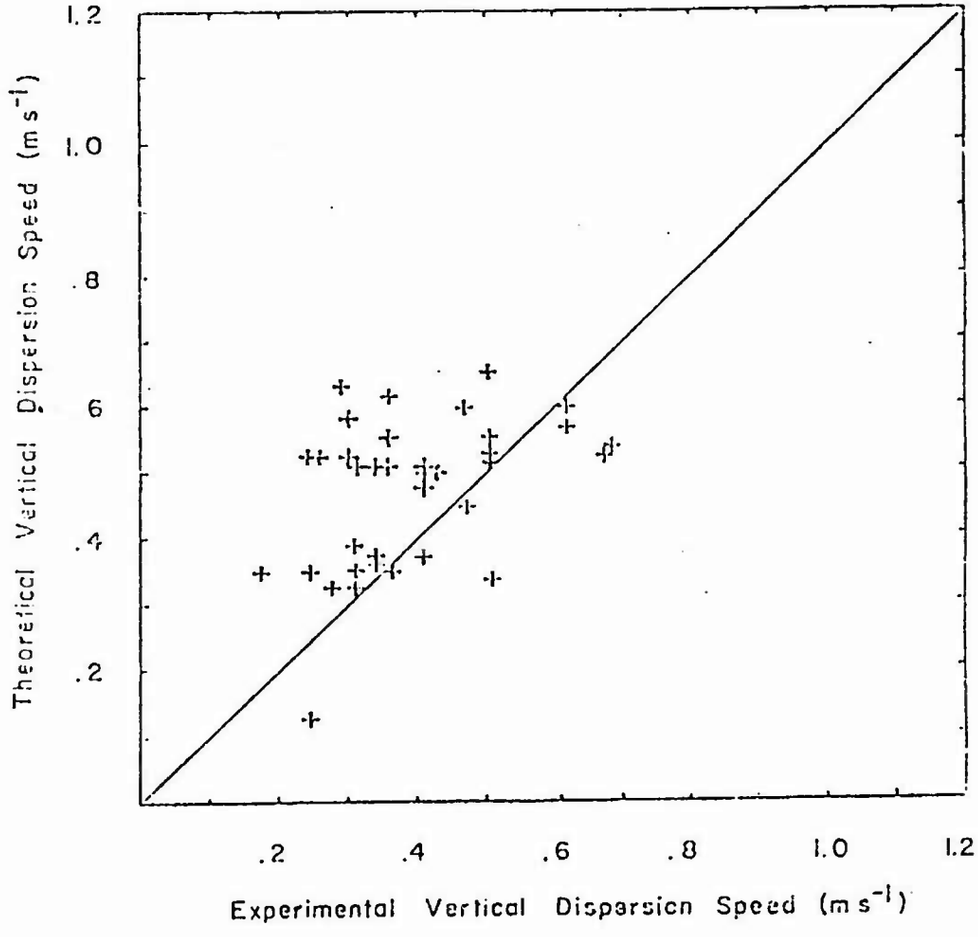


FIGURE 6. COMPARISON OF THEORETICAL AND EXPERIMENTAL DISPERSION SPEEDS.

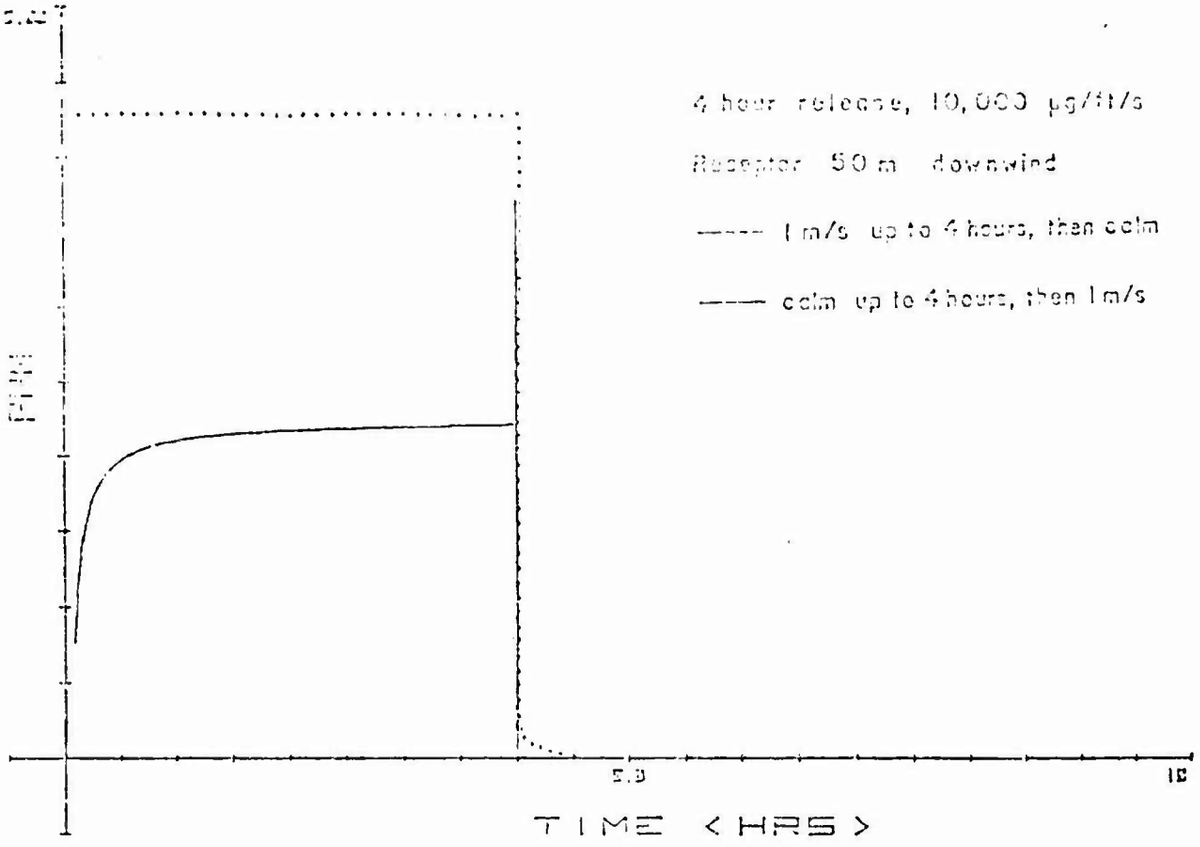
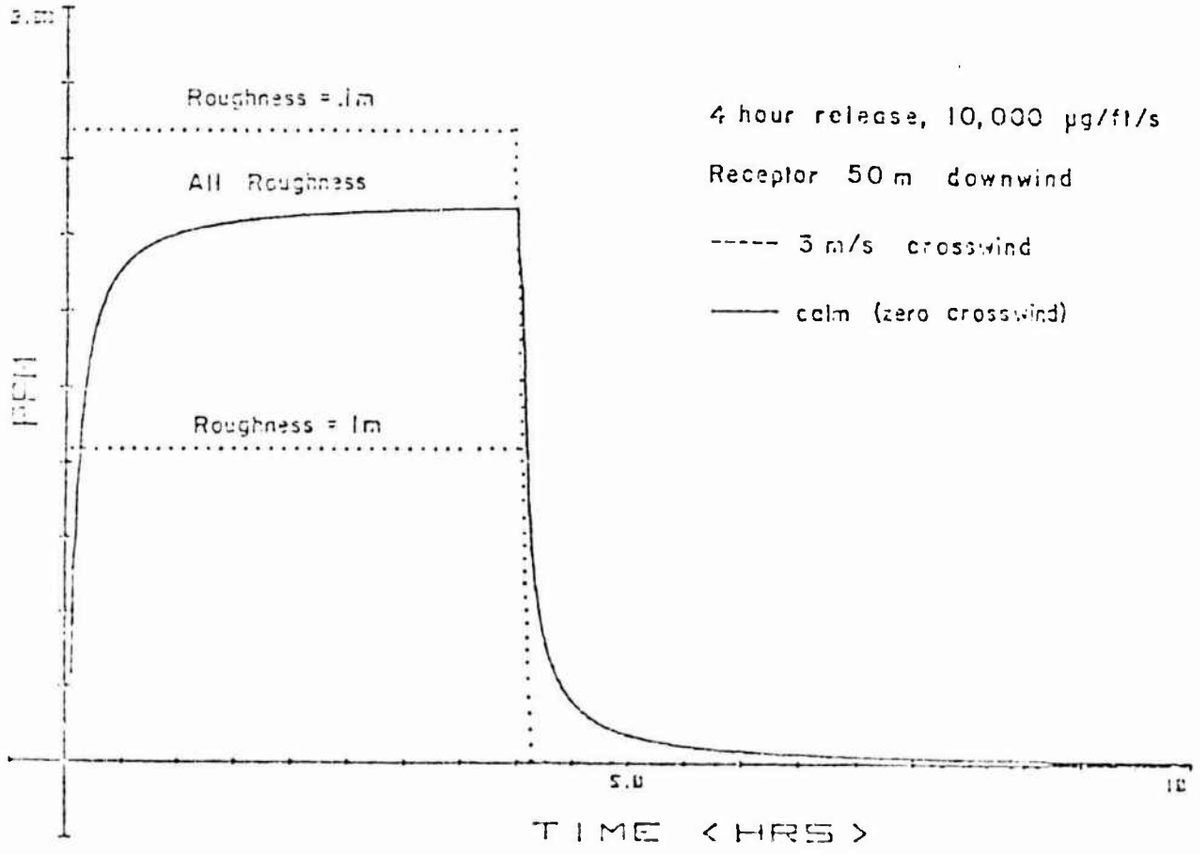


FIGURE 4. TEMPORAL EFFECTS OF WIND SHIFT.



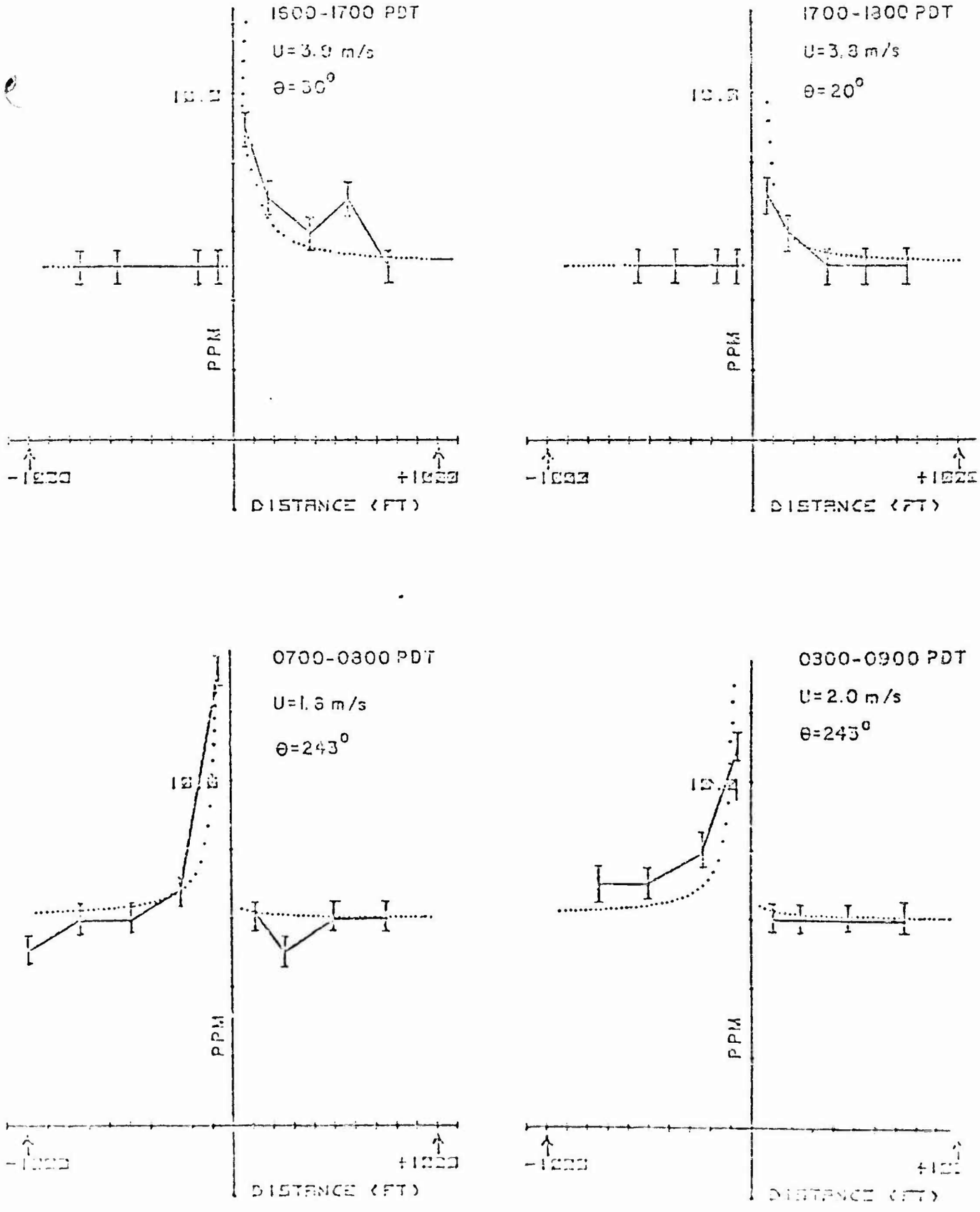


FIGURE 7. COMPARISON OF MODELED AND MEASURED CO CONCENTRATIONS. A-101

ATTACHMENT D

PIA TERMINAL MOTOR VEHICLE LOADING/
UNLOADING MICROSCALE ANALYSIS

ATTACHMENT D

Microscale Analysis of PIA Terminal Motor Vehicle Loading/Unloading

To assess the air quality impacts of motor vehicle emissions in the PIA terminal vicinity during passenger loading and unloading, we selected the AVQUAL pollutant dispersion model for predicting above-background concentrations in the microscale near PIA. (For a description of AVQUAL, see Attachment C.)

The scenario analyzed was severe meteorology for the time period 0600-0900 in the inert winter regime, coupled with severe-case (i.e., peak hour) vehicle-traffic-induced emissions at the terminal. The severe-case meteorology used for this analysis was similar to that defined in the Draft Environmental Impact Statement (DEIS). These conditions were low winds of 2.5 mph (1 m/sec) during a Pasquill atmospheric dispersion Class F (stable). However, a wind perpendicular to the roadway was used as a worst-case, because the actual orientation was unknown. The pollutant analyzed was carbon monoxide (CO). Peak hour traffic data was supplied by Arthur D. Little, Inc. (Attachment E) for each of the years 1985, 1990, and 1995. CO emissions were calculated from motor vehicle emission factors supplied by the California Air Resources Board, "Procedure and Basis for Estimating On-Road Vehicle Emissions" (1980). The same mix and relative amounts of cold start, hot start, and hot-stabilized operation were assumed as discussed in the DEIS. The ambient temperature was assumed to be 62° F.

Table D-1 tabulates the microscale scenario emissions factors. The layout of the PIA loading/unloading areas was assumed similar to the area currently existing at LAX -- one-way traffic around the terminal with parking (idling operation) lanes near the terminal and driving lanes on the outside. The circuit was assumed to be separated widely enough that concentrations from the outgoing traffic would have dropped to near background and would not increase observed concentrations from the incoming traffic.

The emissions in Table D-2 were calculated assuming that each vehicle idles for approximately two minutes somewhere along the terminal circuit, that the vehicle idling

TABLE D-1. Microscale CO emissions scenario.

Year	Peak Hour Vehicle Traffic	Average Speed (mph)	Idle Time per Vehicle (min)	Emissions Factors	
				Driving (g/mi)	Idling (g/min)
1985	99	20	2	26.96	4.53
1990	378	17	2	23.53	2.17
1995	760	15	2	24.02	1.78

TABLE D-2. Microscale CO emissions inventory.

Year	Driving Lane (µg/m/sec)	Idling Lane (µg/m/sec)
1985	463.3	155.7
1990	1544.1	284.8
1995	3169.3	469.7

emissions are distributed evenly along the circuit, and that each vehicle travels the remainder of its passage through the microscale area at the speed given in Table D-1.

Figure D-1 shows model simulation results of the terminal area CO concentrations (parking lane upwind of the driving lane), with the above-background CO concentrations shown as a function of distance from the curb. The maximum microscale CO impact during peak hour at the roadway edge in 1985 is 2.1 ppm above a mesoscale severe-case background of 2.1 ppm, for a total of 4.2 ppm, which is well below all state and federal standards. For a 1990 severe-inert scenario, the maximum microscale CO impact at the PIA terminal due to vehicle emissions is 5.4 ppm which, with a 2.2 ppm mesoscale background, gives a total of 7.6 ppm, again below all standards.

The 1995 maximum microscale impact due to terminal loading/unloading is projected to be 10.4 ppm. Added to a severe-case mesoscale background of 2.3 ppm gives a total of 12.7 ppm, well below all hourly standards (40 ppm for California, 35 ppm for federal). This one-hour concentration is greater than the eight-hour average federal standard of 9 ppm, but it is unlikely that the peak hour vehicle traffic would last for this time period (eight hours) with continued atmospheric stability Class F, since calm winds and low mixing heights over this time scale were not observed in existing meteorological records. Hence, it is possible, but not likely, that the eight-hour average federal standards may be occasionally violated during extremely stable, calm, highly cloud-covered winter days.

In conclusion, the microscale CO situation at the PIA terminal from vehicle loading- and unloading-related emissions is within all standards for 1985 and 1990. The hourly average standard is not exceeded in 1995, either; however, on an extremely calm, stable morning (such as has seldom, if ever, been observed in the area) during prolonged peak traffic, the eight-hour CO average standard of 9 ppm could occasionally be exceeded. In all years, the microscale impacts are negligible for distances over 100 m downwind of a roadway edge.

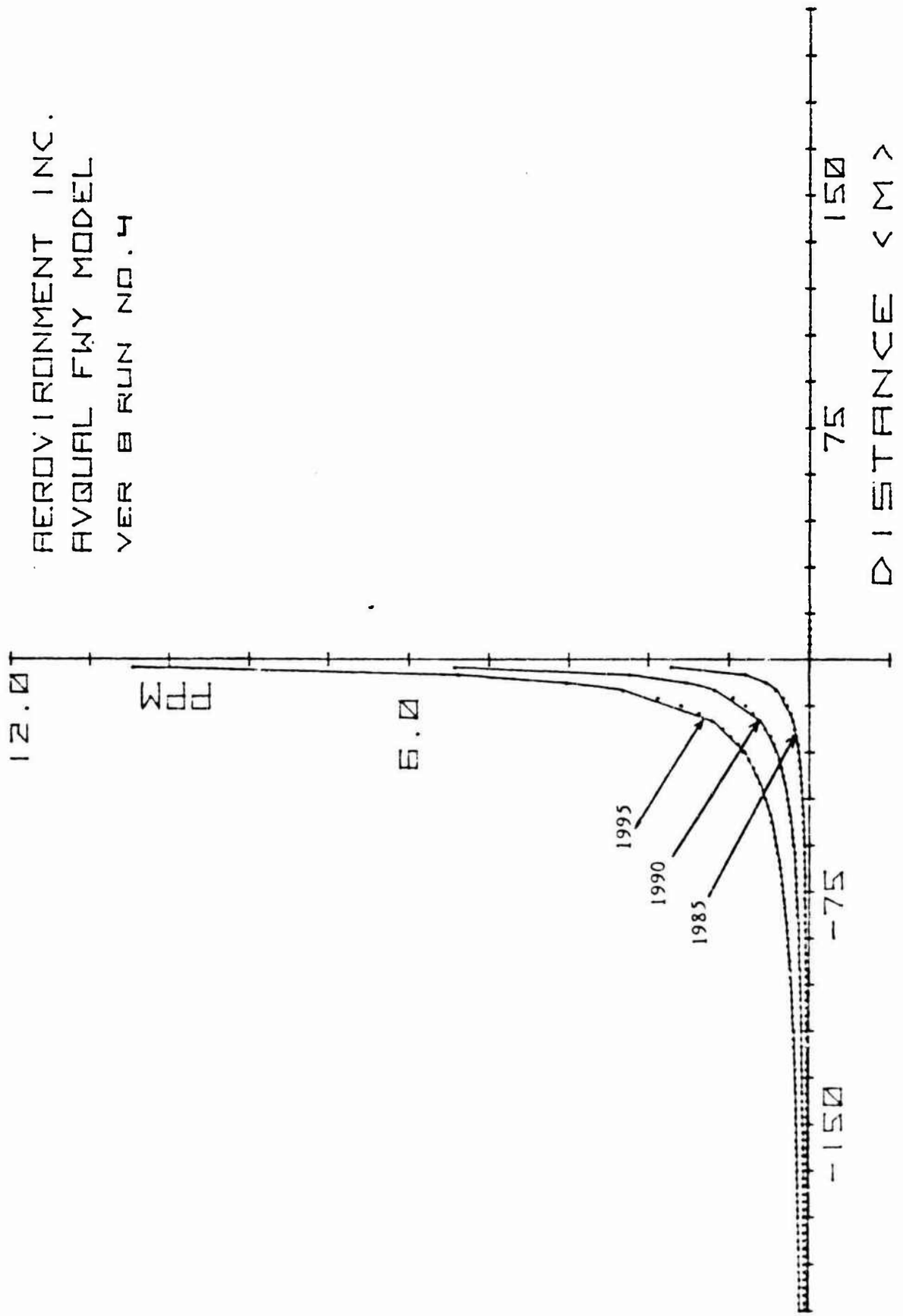


FIGURE D-1. PIA terminal loading/unloading severe-case microscale CO impacts.

ATTACHMENT E

WORKING MEMORANDUM #1, REVIEW OF PASSENGER DEMAND FORECASTS

WORKING MEMORANDUM #1

Review of Passenger Demand Forecasts

April 11, 1980

Review of Passenger Demand Forecasts

The proposed Palmdale International Airport is planned to serve approximately 12 MAP by 1995. Because of changes in the aviation industry and the environment in which it operates (the Airline Deregulation Act of 1978, continued increases in jet fuel prices), we have reviewed more recent demand forecasts to ensure that this planned capacity is still a reasonable basis for estimating impacts.

1. Division of Aeronautics Forecasts

The California Division of Aeronautics air carrier model forecasts passenger trip ends at each of the state's air carrier airports as a function of socioeconomic variables and system capacity. The forecasts made in 1975 (Forecast E) and contained in the EIS project total demand for the Greater Los Angeles area airports of 43.1 MAP in 1980. Actual demand in 1979 was 42.6 MAP. Actual 1979 passenger traffic was significantly higher than projected for each of the airports except Ontario. This may be due to the fact that medium- and long-haul service at this airport is still limited. Nevertheless, the total demand forecast appears somewhat low unless there is virtually no growth in 1980. This scenario projects PIA demand at 10.9 MAP in 1995.

The 1975 Forecast 2 was based on the Southern California Association of Governments D/E 2a population forecast. SCAG has revised its population projections twice since the D/E 2a series was adopted. The current series (SCAG-78) projects somewhat lower growth than the D/E 2a forecast. The SCAG-78 regional population projection for 1995 is about 2 percent below the D/E 2a projection. However, this relatively small change in projected population should not have a significant impact on air travel demand.

In October 1979, the Division of Aeronautics model was used to prepare two alternative forecasts for the Los Angeles area airports, including PIA. The first forecast assumed that at all airports except PIA passenger volume would be constrained to the levels used for regional planning purposes. Under this scenario, PIA local demand (trip ends) would be 13.9 MAP in 1995. Since we have assumed that interlining (transfers) would account for 20 percent of enplanements at PIA, total demand would be 17.4 MAP. The Division of Aeronautics has indicated that this scenario does not appear very likely because traffic at several of the airports is already at or above these planning limits.

The second forecast assumes demand will be constrained to planning limits for all airports except PIA and LAX. In this case, the passenger forecast for PIA drops to local demand of 6.9 MAP, or total demand of 8.6 MAP. Local demand at LAX would rise to 46.6 MAP, or total demand of more than 60 MAP (based on transfers accounting for 25 percent of total demand). This forecast is also highly unlikely because ground access constraints are expected to limit LAX passengers levels close to

the planning estimates.

Total local demand at the six Los Angeles area airports in 1995 is projected to be about 71 MAP under the first forecast (only PIA unconstrained) and 78 MAP when LAX is also unconstrained. The 1975 forecast projected local demand for these airports at 75 MAP, with total demand at 93 MAP.

Based on the range of forecasts resulting from these alternatives, it appears that the 12 MAP planning level assumed for PIA (9.6 MAP local demand) remains appropriate for estimating impacts.

2. FAA Hub and Terminal Area Forecast

The FAA prepares forecasts of air carrier and general aviation activities at the national level and also for the 25 principal air traffic hubs. These forecasts are based on a combination of "top down" disaggregation of national forecasts to regions and "bottom up" projections based on local socioeconomic trends. The FAA forecast for the Los Angeles hub was published in June 1978. In addition, the FAA prepares terminal area forecasts of enplanements and operations at almost 1000 air carrier and general aviation airports throughout the United States. The terminal area forecasts are based primarily on top down disaggregations of national forecasts, with forecasts for airports within the larger hubs adjusted to reflect the hub forecasts.

The FAA forecast of total passenger demand for the Los Angeles area airports, including PIA, is 72 MAP in FY 1991 (October 1990 - September 1991). The average annual growth rate for the 11-year projection period is 4.9 percent. If passenger demand continued to increase at this rate, total demand in 1995 would be 87.5 MAP, about 6 percent below the level forecast in the EIS. The forecast for Palmdale is total passenger demand of 11.1 MAP in FY 1991, with air carrier operations projected to begin in FY 1986.

The FAA terminal area forecast for PIA, which is derived from the Los Angeles hub forecast, projects passenger demand at the airport to build up more rapidly than does the EIS. However, the 11 MAP forecast for 1991 appears consistent with the 12 MAP demand level assumed for 1995 for assessing impacts.

3. Conclusions

Based on this review of state and FAA forecasts, 12 MAP is still a reasonable baseline demand level for PIA. These recent forecasts implicitly incorporate some of the changes in the air transportation system resulting from deregulation and competition. For example, the national passenger demand growth rates used in the terminal area forecasts were taken from the September 1979 FAA Aviation Forecasts and thus reflect the substantial 1978-79 growth resulting from the Airline Deregulation Act.

We consider the 12 MAP estimate the baseline demand level because it does incorporate the possibility of substantial real increases (i.e. exceeding the average inflation rate) in the price of crude oil and thus air fares. The effect of price on demand has not been incorporated into the underlying Division of Aeronautics forecasts, in part because future air fares are so difficult to predict. The state forecasting model relates passenger demand primarily to population, employment, and income. The issue of the effect of fuel price increases on the baseline demand level will be addressed in a separate working memorandum.

The EIS assumed that about 15 years would be required from the beginning of airport construction to the attainment of the 12 MAP traffic level. Although construction has not yet begun, we understand that land acquisition is almost complete and that construction could begin as soon as final approvals have been obtained. Therefore, we have not altered the airport activity planning used in the EIS--total planned demand of 1.5 MAP in 1985, 6 MAP in 1990, and 12 MAP in 1995.

ATTACHMENT F

WORKING MEMORANDUM #2, ESTIMATE OF PEAK HOUR TRAVEL AT PIA

WORKING MEMORANDUM #2

Estimate of Peak Hour Traffic

at the PIA Passenger Terminal

April 15, 1980

Estimate of Peak Hour Traffic at the PIA Passenger Terminal

In order to perform the microscale CO analysis for the passenger loading area, it is necessary to estimate the number of vehicles which would drop off or pick up passengers at the terminal rather than at outlying parking lots. In the EIS, passenger ground access was distributed among buses, cars carrying passengers with visitors, and cars carrying passengers without visitors. This last category would include private cars, rental cars, and taxis.

For purposes of this analysis, we have assumed that all buses, cars with visitors, and taxis or limousines will load and unload passengers at the terminal. In fact, some of the visitors will leave their cars in parking lots in order to accompany passengers to or meet them at the gate. However, a "worst case" assumption would be that all of these cars stop and idle at the passenger terminal. Passengers who travel to the airport in private or rental cars will be transported from parking lots to the terminal by mini-buses. Once again, this is a worst case assumption since, depending on the layout of the airport, passengers may walk from parking lots to the terminal.

The estimates of person-trips, vehicle distribution, and passengers per vehicle are those used in the EIS. Table 1 shows average daily person-trips by auto and bus for the three modal split alternatives described in the EIS. Passengers with visitors were assumed to travel by car only, with an average of one passenger per car. Passengers without visitors would travel by either car or bus, with 1.4 passengers per car and 50 passengers per bus.

These person-trips and vehicle distributions were converted into vehicles stopping at the passenger terminal based on the following assumptions:

- All automobiles carrying passengers with visitors would stop at the terminal.
- Fifty percent of the North County passengers without visitors would travel to the airport by taxi or limousine. This is a very conservative estimate; for most North County residents the cost of driving to and from parking at the airport would probably be lower than the cost of a taxi.
- Five percent of the remaining passengers (those from outside North County) would arrive by taxi or limousine.
- All of the buses would stop at the terminal.
- Passengers traveling by private or rental car would be transported to the terminal by mini-buses carrying an average of 10 passengers.
- Peak hour traffic would be 9% of average daily traffic.

Estimates of average daily and peak hour vehicles stopping at the terminal are shown in Table 2.

TABLE 1

PIA Person-trips by Vehicle Type
(000s)

	1985	1990	1995
Average Annual Person-trips	1,198.6	4,731.6	9,933.8
Average Daily Person-trips	3.3	13.0	27.2
20% with visitors	0.7	2.6	5.4
80% without visitors	2.6	10.4	21.8
Alternative I			
90% Auto	2.3	9.4	19.6
10% Bus	0.3	1.0	2.2
Alternative II			
85% Auto	2.2	8.8	18.5
15% Bus	0.4	1.6	3.3
Alternative III			
60% Auto	1.6	6.2	13.1
40% Bus	1.0	4.2	8.7

TABLE 2

Average Daily and Peak Hour Vehicles
at the Passenger Terminal

	Alternative I		Alternative II		Alternative III	
	Avg Daily	Peak Hour	Avg Daily	Peak Hour	Avg Daily	Peak Hour
1985						
Automobiles						
with visitors	700	63	700	63	700	63
without visitors	200	18	185	17	130	12
Total	900	81	885	80	830	75
Buses	5	1	8	1	21	2
Mini-buses	210	19	195	18	140	13
1990						
Automobiles						
with visitors	2,600	234	2,600	234	2,600	234
without visitors	845	76	795	72	560	50
Total	3,445	310	3,395	306	3,160	284
Buses	21	2	31	3	83	7
Mini-buses	815	73	770	69	545	49
1995						
Automobiles						
with visitors	5,400	486	5,400	486	5,400	486
without visitors	1,395	126	1,315	118	930	84
Total	6,795	612	6,715	604	6,330	570
Buses	44	4	66	6	175	16
Mini-buses	1,765	159	1,665	150	1,175	106

ATTACHMENT G

WORKING MEMORANDUM #3, THE EFFECT OF FUEL PRICES ON AIR TRAVEL DEMAND

WORKING MEMORANDUM #3

The Effect of Fuel Prices

on Air Travel Demand

May 13, 1980

The Effect of Fuel Prices on Air Travel Demand

As discussed in Working Memorandum #1, the passenger demand forecasts prepared by the California Division of Aeronautics and incorporated into the EIS were made before two major changes in the aviation environment took place. When the Division of Aeronautics forecasting models were developed (California Master Plan of Aviation, 1973), airline routes and fares were highly regulated and the "energy crisis" had not yet occurred, so the cost of air travel and the related effect of fuel prices were not explicitly incorporated into the forecasts. As a result, questions have been raised about the need for a new airport, particularly since air traffic is reported to be down 5-10% since the most recent OPEC price increases.

In order to answer these questions, it is necessary to consider several elements of the current environment which will determine the future influence of real oil price increases on air passenger traffic. These include:

- What are the factors that influence air traffic demand?
- How should the cost of air travel be measured when fares on competitive routes vary by 200% and more?
- To what extent has deregulation increased basic demand beyond the levels foreseen only a few years ago?

In addition, we have also considered the case of automobile transportation, where improved fuel efficiency in response to higher prices has allowed consumers to reduce gasoline consumption without significant reductions in travel.

1. The FAA Macro Air Carrier Forecasting Model

The FAA forecasts passenger enplanements using an econometric forecasting model derived from historical relationships between various measures of economic activity and air carrier demand. As might be expected, the macro model shows that demand increases as real disposable personal income increases and decreases as the unemployment rate rises. The model also shows that demand is negatively affected by the price of air travel, which is determined as a function of oil and gas prices and wage rates. However, air fares are not the only price variable used; as the price of private transportation (owning and operating a car) increases, the demand for air travel increases. In other words, the FAA macro model implicitly assumes that air carriers are part of a larger transportation system in which a consumer chooses among modes at least to some extent on the basis of price. This is borne out by reports that short-haul traffic increased significantly during the summer of 1979 in response to gasoline price increases and concerns about availability.

The forecasts of underlying economic variables used in the macro model are derived from the Wharton Long-Term Industry and Economic Forecasting Model. The FAA forecasts for fiscal years 1980-1991 were published in September 1979 and are based on economic forecasts issued the previous June. At

that time, the general inflation rate measured by the Consumer Price Index was projected to be 6.5% per year and the increase in oil and gas prices was projected to be 9.1% per year. As a result of large increases in crude oil prices in the second half of 1979, new forecasts were made in March 1980 using updated economic variables, including a CPI increase of 7.6% per year and an oil and gas price increase of 10.4% per year. The revised forecasts have not yet been officially released, but FAA Office of Aviation Policy staff report that differences in long-term forecasts are not significant. The revised forecast does include a decrease in demand for 1980, but this is due primarily to the expected recession.

2. Trends in Air Fares

Part of the difficulty in measuring the effect of price on demand for air travel is determining which price to use. Since the CAB began deregulating fares in 1978, discount and promotional fares have proliferated. A recent magazine article* on airline discounts found 10 different classes of service between New York and Los Angeles with round-trip fares ranging from $270-792. Fares between New York and London ranged from $363-2,380. Not only is there a broad range of fares on the most competitive and heavily traveled routes, but the various fares do not necessarily increase at the same rate in response to higher fuel and other costs. The same article reported that domestic first-class and coach fares had increased by 26% in the last eight months of 1979 but discount fares increased only 6.3%. It quoted a CAB fare specialist who said, "We now have a two-tier pricing system -- normal fares must rise with fuel costs, but airlines will continue to look for opportunities to fill seats."

If these recent trends continue, and published interviews with airline executives suggest they will, the availability of discount and promotional fares will moderate the negative impact of rising fuel costs on demand. Those consumers who have the flexibility to comply with discount fare restrictions, primarily pleasure travelers, will not experience the full impact of fuel price increases. Those who do not qualify for discounts, primarily business travelers, will pay much higher fares. The business segment of demand has not been very price sensitive in the past, although it does respond to recession. As mentioned above, the decrease in demand forecast by the FAA macro model for 1980 is due to projections of recession.

Another element of uncertainty in future air fares and demand is the rate at which underlying fuel prices will change. Most forecasters believe that real crude oil prices will increase at an average rate of about 3% per year over time. However, the Arthur D. Little Energy Economics group believes that future price increases will continue to occur in discrete steps. For example, crude petroleum prices actually declined in real terms between 1974 and 1979, and then increased some 50% in one year. While future OPEC increases are expected to be more frequent, this same stepwise pattern is likely to continue. If this pattern is passed through to airfares -- sharp increases followed by long periods of relative stability or even decrease, effects on demand are likely to be temporary. The description of the FAA macro model published in the September 1978 "FAA Aviation Forecasts, Fiscal Years 1979-1990" notes that the negative impact of price on demand is less than the positive impact of income.

*"Soaring Air Fares' Silver Lining," Money, April 1980.

Therefore, a sharp price increase should cause a decline in demand which will be reversed as real income catches up to and then passes price increases. Demand would then continue to grow until another round of price increases sets off the cycle again.

3. Impacts of Deregulation

The proliferation of discount fares is due to the Airline Deregulation Act of 1978, whose purpose is to gradually eliminate price and route regulation of airlines. As part of this process, the industry was allowed to offer discount fares beginning in mid-1978. The effect of increased competition has been a significant increase in demand, speeding the transformation of aviation from a luxury to mass transit.

One way to estimate the demand increase associated specifically with deregulation is to compare forecast and actual passenger enplanements. Table 1 shows the passenger forecasts published by the FAA in September 1976 and actual and forecast passenger demand published in 1979. The 23% difference between forecast and actual values for 1979 occurs in part because of the inclusion of additional carriers in the 1979 FAA statistics. However, the 9.5% difference in 1978 is due primarily to the beginning of discounting that summer. In addition, it is reported that passenger activity on the major carriers increased by about 10% in 1979, the United strike and DC-10 grounding notwithstanding.

It is unlikely that deregulation will double the annual growth in passenger demand from 5% to 10% over the long term. However, when growth returns to its "normal" level, projected to be about 4.5% per year for the 1979-91 period, the higher passenger base brought about by deregulation will result in a higher level of future demand as well.

4. Effects of Fuel Prices on Automobile Use

The effect of fuel price increases on automobile use is a consideration in the analysis of PIA ground access, which is expected to be primarily by car. In addition, the price elasticity of demand for auto travel is a plausible analog for the effect of higher fares on demand for air travel.

In the past several years, U.S. drivers have reduced their consumption of gasoline in response to rising prices. However, there has not been a parallel decrease in automobile travel; the decrease in consumption is the result of better average fuel economy of the U.S. automobile fleet. Short-term reductions in vehicle-miles traveled (VMT) have occurred in response to restrictions on the availability of gasoline (odd-even sales, weekend closings, etc.). However, the average consumer's longer-term response to higher prices is to purchase a more fuel-efficient car. As a result, imports which are perceived to get much better gas mileage than U.S.-made cars, currently account for about 30% of auto sales.

In 1979, the U.S. Congress Office of Technology Assessment released a study entitled "Technology Assessment of Changes in the Future Use and Characteristics of the Automobile Transportation System." The study's base case projections, which include the assumption that real gasoline prices will increase more rapidly than per capita disposable income,

TABLE 1

Comparison of Forecast and Actual

Passenger Enplanements

(millions)

	September 1976	September 1979
1970	171.4*	171.4*
1975	201.9*	201.9*
1976	211.8*	211.8*
1977	232.5	234.2*
1978	243.6	266.7*
1979	258.9	317.7*
1980	278.3	338.2
1985	369.8	428.4
1988	428.5	485.8

*Actual

Note: Passenger enplanements for 1979 and the following years shown in the 1979 forecast are not comparable with earlier years because of the addition of intrastate and other supplemental carriers to the air carrier network.

indicated that the number of automobiles and VMT would continue to rise but that total fuel consumption would peak in the early 1980s and then begin to fall as the average gas mileage of the fleet improves. A 25% increase in VMT between 1985 and 2000 could be accomplished with no increase in automobile fuel consumption.

The study also found that price factors would not significantly impact automobile use, except through demand for more fuel-efficiency. Specifically:

> "Stricter fuel-economy standards, reduced highway construction, and auto disincentives to conserve petroleum and improve urban air quality will have little effect on the amount of auto travel. Only a severe shortage requiring gasoline rationing or other allocation measures would produce major reductions in auto use."

The implications of these findings and conclusions for the proposed airport are twofold. First, unless there is rationing or similar restrictions on gas availability (e.g., a ban on driving on one or more days each week), the need to use private cars for ground access will not constrain use of PIA. It is probable, however, that higher fuel prices will increase public support for and use of bus rapid transit, thus reducing the airport-related vehicle load on access routes. Second, to the extent that demand for air travel is similar to demand for auto travel, price increases will not have long-term impact on demand. Rather, consumers will choose to make "sacrifices" to maintain mobility. Just as many consumers first accepted and then demanded smaller, less powerful, but more efficient cars, they are likely to be willing to travel in crowded planes and comply with restrictions placed on discount fares in order to continue to fly.

5. Conclusions

This working memorandum addresses several issues relating to fuel prices, air fares, and air passenger demand in order to answer the question, what is the effect of recent changes in the aviation environment on demand projections for PIA? It is apparent that two major factors which were not foreseen when the airport was initially planned -- oil price increases and airline deregulation -- have tended to push demand in opposite directions.

In the last two years, the initial round of fare deregulation has increased passenger demand to a level about 15% higher than it would have been otherwise. In the first few months of 1980, passenger traffic on major carriers is reported to be down 5-10% from the previous year's levels. In combination, these events result in an overall demand level roughly equivalent to what was projected before these changes occurred. Over the longer term, it is likely that the offsetting effects of higher fuel prices and greater competition will result in demand that is not significantly different from the levels projected a few years ago.

We do not mean to imply that the effects of oil prices and deregulation will cancel each other out, resulting in no changes in previously projected levels of demand. Future patterns of demand will depend on a number of different factors which are extremely difficult to foresee -- the pricing behavior of OPEC, the rate of introduction of newer fuel-efficient

aircraft, the financial condition of airlines, etc. However, the Wharton projections used by the FAA indicate that real disposable personal income will grow at about the same rate as real oil prices (i.e., the increase in the oil and gas deflator discounted by the CPI) over the long term, suggesting that the net effect on air travel demand will be positive.

APPENDIX B

OTHER COMMENTS AND RESPONSES

DEPARTMENT OF THE NAVY
NAVAL WEAPONS CENTER
CHINA LAKE, CALIFORNIA 93555

IN REPLY REFER TO:
064/DEH
Ser 2719
16 Apr 1979

From: Commander, Naval Weapons Center
To: Department of Transportation, Federal Aviation Administration Chief, Airports Planning Branch (AWE-610), Federal Aviation Administration, P.O. Box 92007, World Way Postal Center, Los Angeles, CA 90009

Subj: Palmdale International Airport Draft Environmental Impact Statement; response to

Ref: (a) Draft Environmental Impact Statement for Palmdale International Airport, Palmdale, California, Development Program dtd Feb 1979
(b) Draft Environmental Impact Statement Palmdale Intercontinental Airport, Los Angeles Department of Airports Jul 1978
(c) Palmdale International Airport Amended Draft Environmental Impact Statement, Jul 1976

Encl: (1) Antiship Missile Defense (ASMD) Launch Safety Zones & Target Drone Pattern.
(2) Typical Hazard Area and Flight Profile for Medium Altitude Launch of Air-to-Surface Missile.
(3) Typical Hazard Area & Flight Profile for High Altitude Launch of Air-to-Surface Missile.
(4) Typical Drone Pattern, Altitude Block of 4,000 to 35,000 ft MSL.
(5) Operating Safety Limits: Rocket Test Stand, Explosive & Toxic Ground Operation Area.
(6) Typical Flight Areas for Research, Development, Test & Engineering Work (Part A).
(7) Typical Flight Areas for Research, Development, Test & Engineering Work (Part B).
(8) Typical Flight Areas for Research, Development, Test & Engineering Work (Part C).
(9) Areas Affected by Research & Development Supersonic Flights.
(10) FAA Designated Areas for Routine Supersonic Flight.
(11) Ingress Routes to R-2524 Targets for Fleet Air Strikes.
(12) FAA Designated Low Altitude, High Speed Military Training Routes
(13) Potential Cruise Missile Low Level Routes-Data Link, Aircraft at Medium Altitude.
(14) Theoretical Hazard Area created by Unsuccessful Air-to-Air Missile Intercept.
(15) Theoretical Hazard Area created by Successful Air-to-Air Missile Intercept.
(16) Potentially Hazardous Area Recently Sanitized for Series of Missile Shoots.
(17) R-2524 Facilities & Guided Missile Hazard Profile on North Tactical Range.
(18) Approach & Retirement Patterns at New Superior Valley Impact Range.

Subj: Palmdale International Airport Draft Environmental Impact Statement; response to

1. In response to reference (a), the Naval Weapons Center (NAVWPNCEN) has followed the decision-making process on Palmdale International Airport (PIA) for over five years and after repeated attempts has been unable to obtain a written, factual assessment of potential airspace conflicts in EIS documentation. In 1974 (reference (b)) and again in 1976 (reference (c)), NAVWPNCEN submitted comments to the Los Angeles Department of Airports on their state-mandated Environmental Impact Report (EIR). The draft Environmental Impact Statement (DEIS) for PIA released by the Federal Aviation Administration (FAA) again dismisses the potential for airspace conflicts and impacts on existing military operation within the R-2508 Complex. On page 32 of the DEIS the FAA states, "The FAA has studied, and will continue to study, the situation relative to the proposed action. Based on their analysis, it is believed that there will be no major airspace conflict."

2. The new Council on Environmental Quality National Environmental Policy Act Regulations (issued 29 Nov 1978) states, "NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA." At no point in the FAA DEIS is accurate scientific analysis available to permit the Navy to comment on potential airspace conflicts or to permit the public to scrutinize the basis of the DEIS conclusions. In fact, the FAA DEIS provides no detailed assessment of departure and arrival routes and the operational conflicts or changes that may be required within the R-2508 airspace complex. The DEIS should be revised to address the potential airspace impacts and operational changes that will be required if even a modest amount of scheduled commercial air traffic operations are to be accommodated in the R-2508 Airspace Complex.

3. The primary concerns with the initiation from PIA of numerous commercial flights through the R-2508 airspace includes safety hazards; curtailment of mission capability at the Air Force Flight Test Center, Edwards Air Force Base; Air Force Plant 42 at Palmdale; the 35th Tactical Fighter Wing at George Air Force Base; and the Naval Weapons Center; and what future airspace options are foreclosed as a result of scheduling commercial flights through the area. It is considered unacceptable to draw conclusions such as made by the FAA in its DEIS without providing substantiating evidence for scrutiny by other agencies and the public. The controversial nature and significance of this issue are attested to by the continued expression of concern by the military activities that utilize the R-2508 airspace. It is also ironic that in the FAA DEIS discussion of alternatives, interference or air traffic within five miles of Edwards Air Force Base was used as a reason to reject Fox Air Field as an alternative site. Acnowledging differences in the two cases, the situation still exists that the Trona departure route would be that close (five miles) or possibly within NAVWPNCEN restricted airspace. We feel this potential conflict or "interference" should be investigated in detail not only for R-2524 and R-2505, but also the total R-2508 Complex.

Subj: Palmdale International Airport Draft Environmental Impact Statement; response to

4. It should be noted that the air corridors marked Mojave and Trona (figure 6, page 31 of DEIS) either go through restricted airspace or through Military Operation Areas (MOA's) and Air Traffic Control Assigned Airspace (ATCAA's). A restricted area is by definition, "that airspace designated under FAR, Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use, and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency." A Military Operating Area (MOA) is, "airspace established for the purpose of segregating certain military training activities from IFR aircraft and to identify for VFR traffic where these activities are conducted. Nonparticipating IFR traffic may be cleared through an active MOA if IFR separation can be provided by ATC." An ATCAA is, "that airspace of defined vertical and lateral limits assigned by FAA for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic." The sizes of R-2505, R-2506, R-2524, and R-2509 were delineated many years ago; however, current technology, airspeeds, and turning radii have made them too small.

5. The joint Department of Defense and FAA R-2508 Enhancement Program and the establishment of MOA's and ATCAA's, was and is, designed to enhance air safety without increasing the size of individual restricted areas. All actual weapons releases are made within restricted airspace, unless special arrangements have been completed with the FAA. The use of the aforementioned Trona and Mojave corridors and the concomitant reduction in the restricted areas along with the operational dilution of the MOA's and ATCAA's pose either a serious safety hazard or severe adverse operational impact to Edwards Air Force Base, George Air Force Base, the Naval Weapons Center, and all the naval air forces in the southwestern United States using R-2508.

6. The enclosures are illustrations of some of the operations which routinely take place in and around the Trona Corridor, as well as the location of the enlarged Superior Valley impact range in the southern part of R-2524, R-2509, and R-2515. Enclosure (1) is the anti-ship missile defense firing zones and drone pattern; enclosures (2) and (3) are typical air to ground missile launch safety zones and approach path; and enclosure (4) typical drone patterns that demonstrate the frequent high speed crossing normally involving multiple runs of the Trona corridor. Enclosure (5) delineates the explosive and toxic hazard areas within R-2505. Enclosures (6), (7), and (8) denote the flight areas and/or orbit patterns used for work on various ranges and targets. Enclosures (9) and (10) delineate both supersonic areas for Research, Development, Test, and evaluation (RDT&E) work as well as those for routine operational use extending from altitudes of one thousand feet above ground level to above thirty thousand feet. Enclosure (11) shows the typical terminal routes for major fleet attacks using upwards of 30 aircraft, high explosives and active electronic countermeasures. These attacks are normally opposed by aggressor aircraft

enroute to and through the restricted areas. These activities are difficult for airtrollers to manage without adding other commercial and civil aircraft in the area. A typical approach route is via Palmdale and Mojave from an aircraft carrier or carriers at sea. Enclosures (12) and (13) are the low level, high-speed training routes and air-launched cruise missile routes both of which may be accompanied by a higher altitude aircraft for data relay purposes. Enclosures (14) and (15) show typical theoretical successful and unsuccessful air-to-air missile firings; again note the approach and departure path through the Trona corridor. Enclosure (16) is a recent Notice to Airmen and a depiction of its geographic area concerning a hazardous missile firing during a 90 minute period. Enclosure (17) is a map depicting the facilities within R-2524 and a weapons profile safety area at the Mojave B Tactical Range. Enclosure (18) is a depiction of the approach and retirement patterns at the Superior Valley Impact Range.

7. It can be seen that to say there is no impact, a negligible impact or even a moderate impact on restricted airspace and military operations is to ignore the facts. The Trona Gap, R-2524, R-2515, R-2509 and MOA 4 are also used by the 35th Tactical Fighter Wing for high-speed transits and air combat training at altitudes of from two hundred to sixty thousand feet. None of the aforementioned flying is relaxed point to point navigation, but rather of precision, full attention, full systems, full manuevering capability, stretching man and machine to their limits. This flying is at times with student pilots, at other times with seasoned aviators exercising experimental or developmental systems.

8. The proposed Terminal Control Area (TCA), specified on page 102, although having a more direct effect on Edwards AFB operations, also potentially degrades many project and tactical flights utilizing the Naval Weapons Center. The VORTAC stations specified on page 31 will facilitate a tremendous increase in all categories of civil aircraft traffic, again having a major operational and safety impact. The effect of heavy traffic on the approach and departure routes to the Naval Weapons Center's airfield, as well as its TACAN approach during both VFR and IFR conditions again apparently has not been considered. Pages 120, 132, 149, and 150 through 152 show that Palmdale International Airport will have an adverse effect on air quality. The Naval Weapons Center relies heavily on photo-optic instrumentation, and any degradation whatsoever has a significant impact on our overall test and evaluation capabilities. The DEIS apparently gave no consideration to any impact greater than ten miles away from the proposed PIA site.

9. The analysis of compliance with the offset requirements of the 1977 Clean Air Act Amendments is adequate as far as it goes. NAVWPNCEN has recently been participating in hearings for siting of a Southern California Edison, 1,290 megawatt power plant in Antelope Valley. One of the analyses was an evaluation of hydrocarbon (hc) offsets. After examination it appears that less than 200 tons per year (about .55 tons per day) of hc offsets are available in all of the Southeast Desert Air Basin (SEDAB). Since hydro-

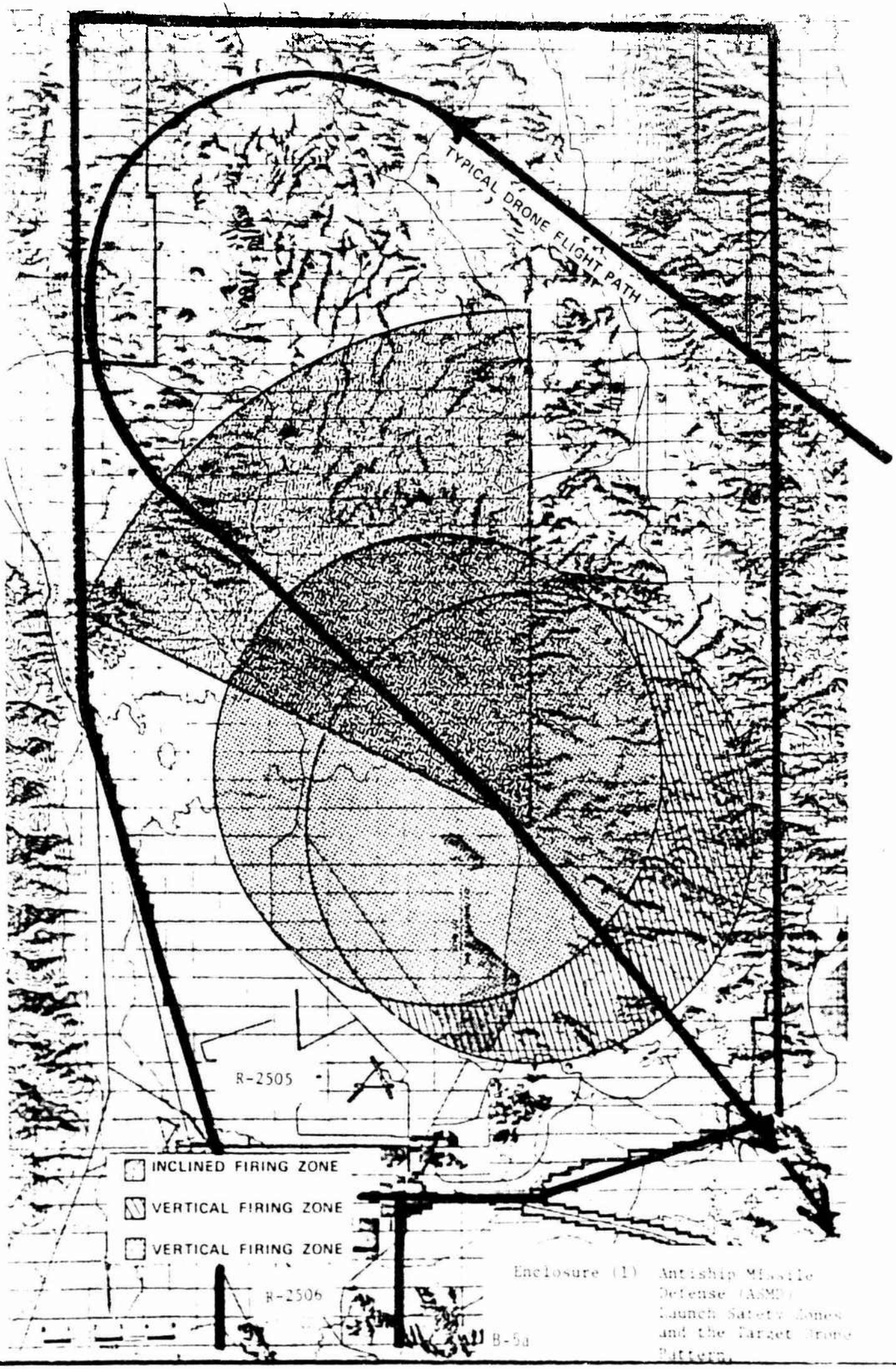
carbon offsets do not appear to be available in the amounts required, it is probable that PIA will not be able to obtain an air quality certificate from the Air Resources Board. An assessment should be made of the consequences to the future of the PIA under these conditions.

10. In conclusion, the Naval Weapons Center continues to be concerned about the future degradation of the military mission in the R-2508 upper Mojave desert area. Airspace impacts should be addressed in the DEIS and specifically dealt with. The addendum to the FAA letter of determination which was recently approved by the Joint Policy and Planning Board (JPPB) stipulates that .... "The FAA recognizes the military's needs concerning airspace requirements within the complex. Therefore, joint and shared use of airspace by civil and non-participating military aircraft will be on a non-interference basis." NAVWPNCEN would hope that this statement of policy will continue to be adhered to and specifically recognized in the DEIS. The Center appreciates the opportunity to continue dialogue on the PIA issues through the R-2508 Complex Control Board. FAA, Western Region, is invited to participate with us on matters of mutual concern.

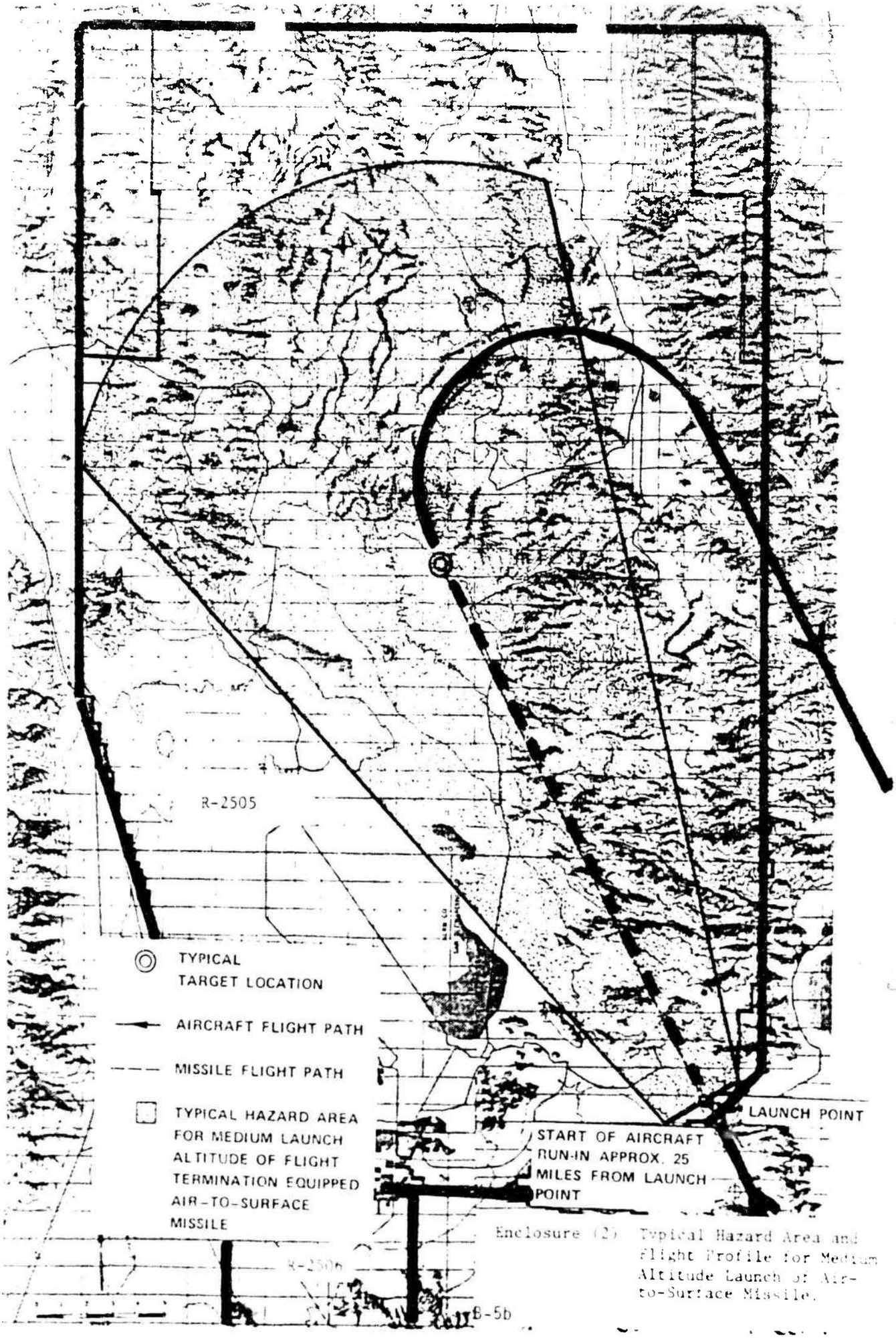
W. R. Hattabaugh

W. R. HATTABAUGH
By direction

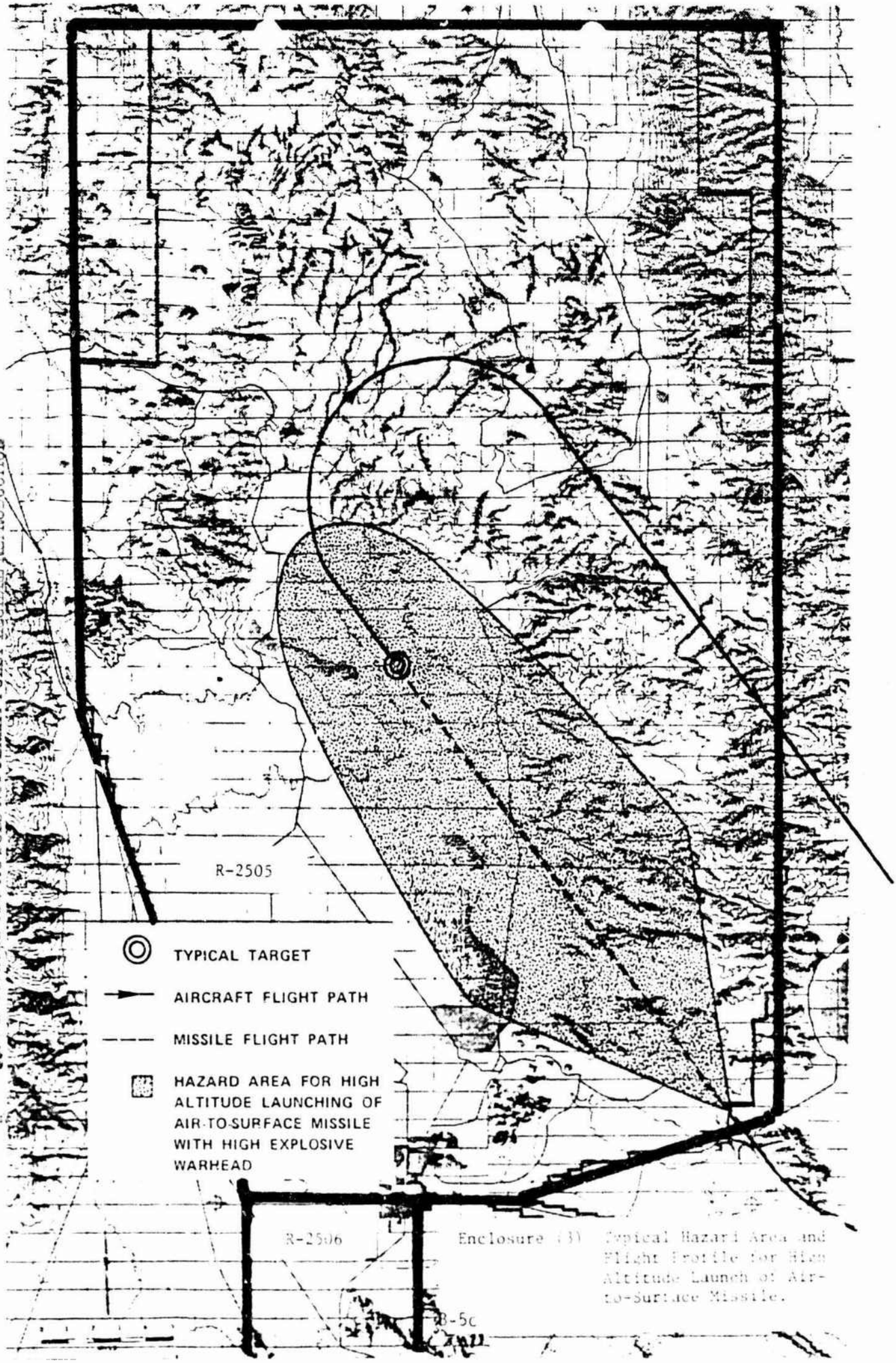
Copy to:
NAVREP FAA WESTERN REGION
FAA (AWE-535)
6510 TESTWING/DOCO, Edwards AFB
Edwards RAPCON



Enclosure (1) Antiship Missile Defense (ASMD) Launch Safety Zones and the Target Drone Pattern

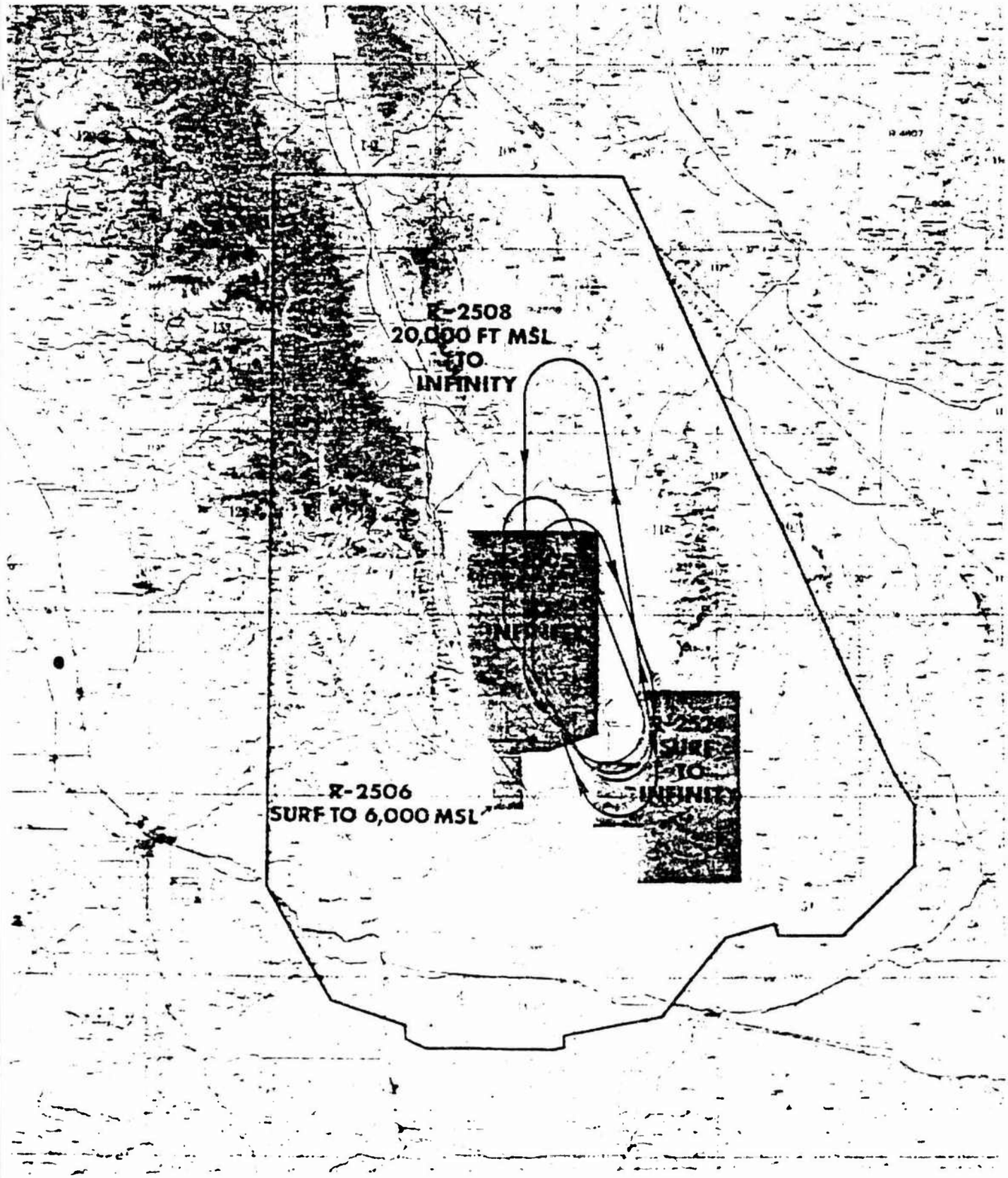


Enclosure (2) Typical Hazard Area and Flight Profile for Medium Altitude Launch of Air-to-Surface Missile.

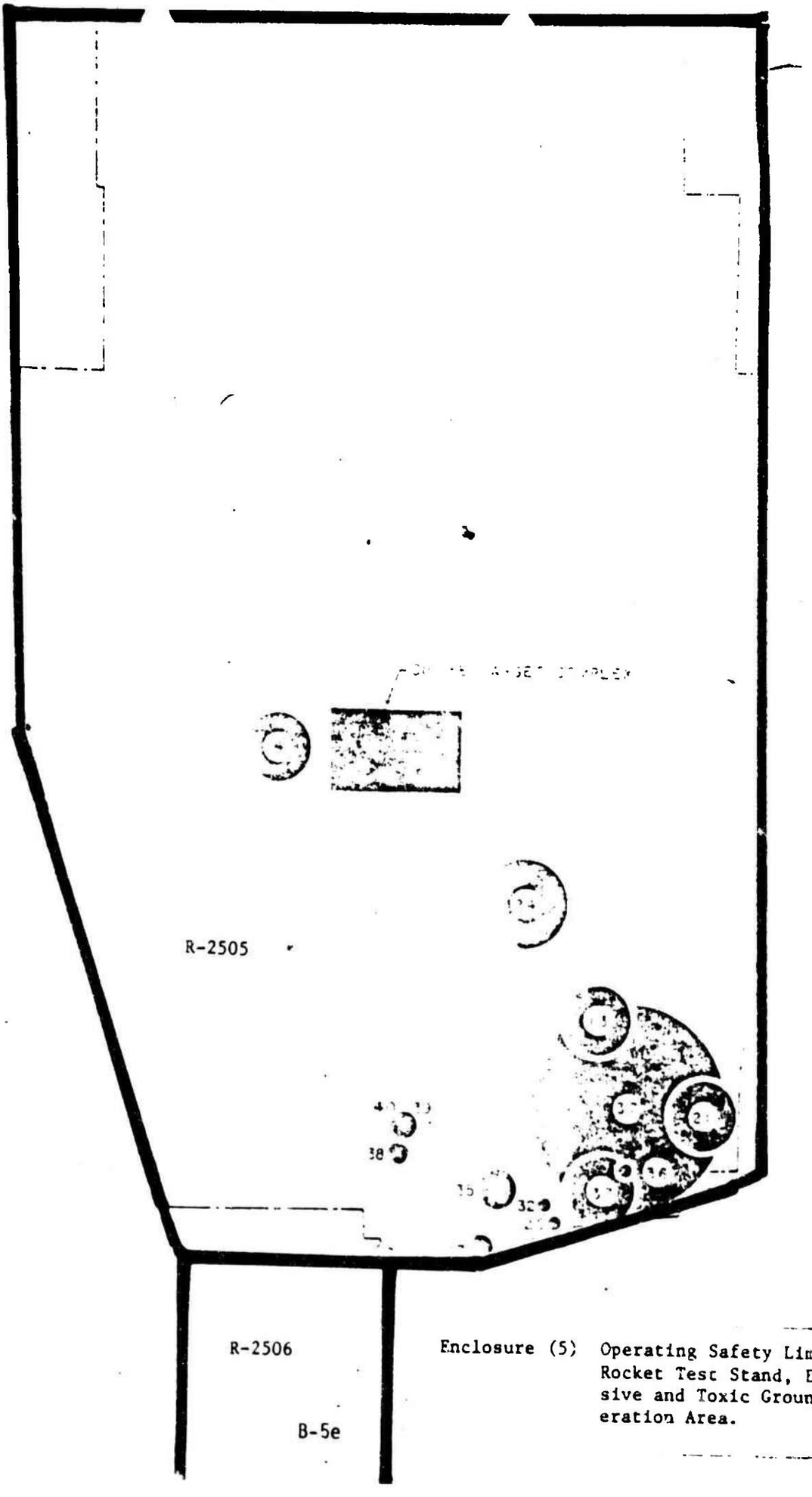


Enclosure (3) Typical Hazard Area and Flight Profile for High Altitude Launch of Air-to-Surface Missile.

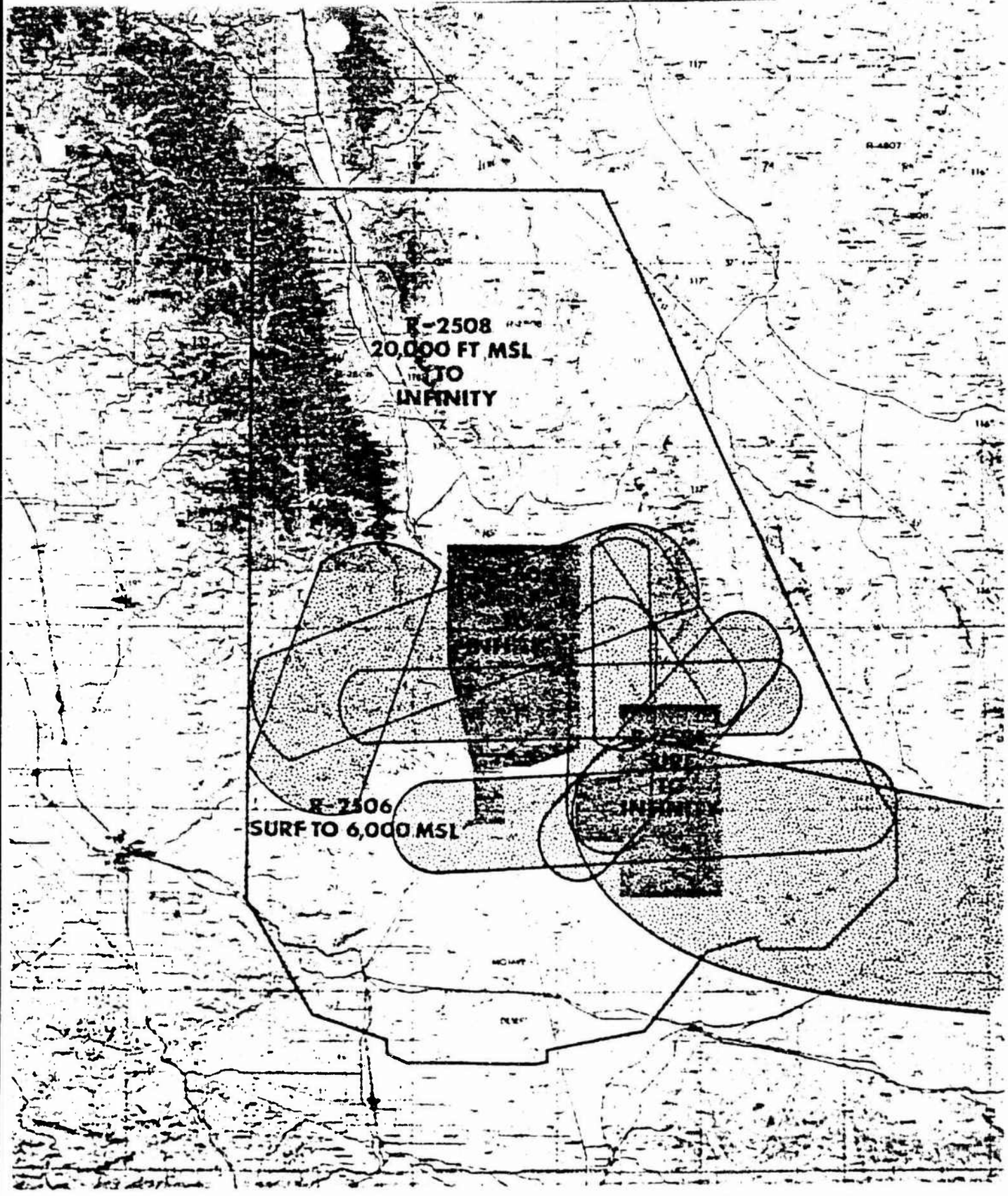
COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



Enclosure (4) Typical Drone Pattern, Altitude Block of 4,000 t 35,000 feet MSL.

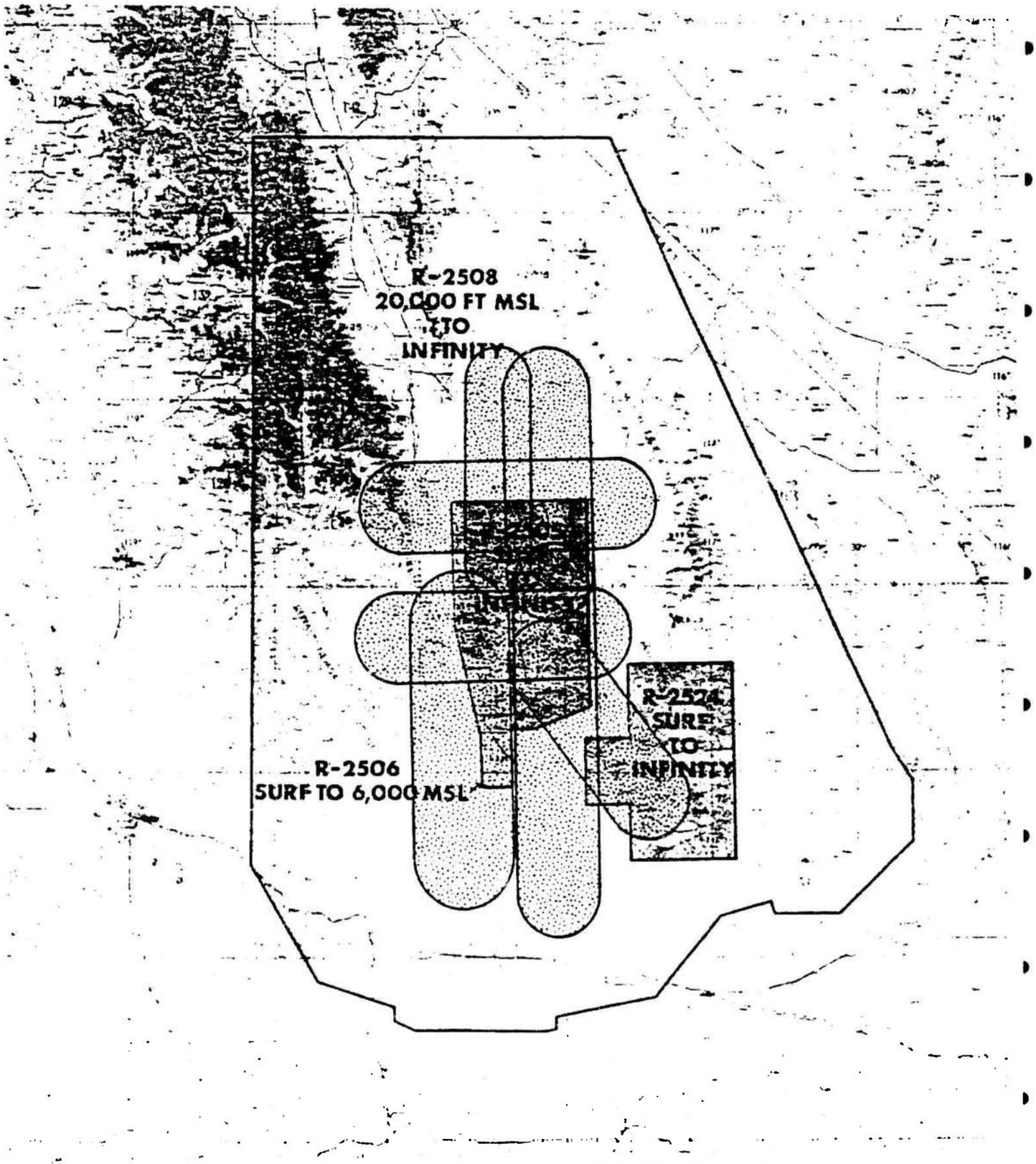


Enclosure (5) Operating Safety Limits: Rocket Test Stand, Explosive and Toxic Ground Operation Area.



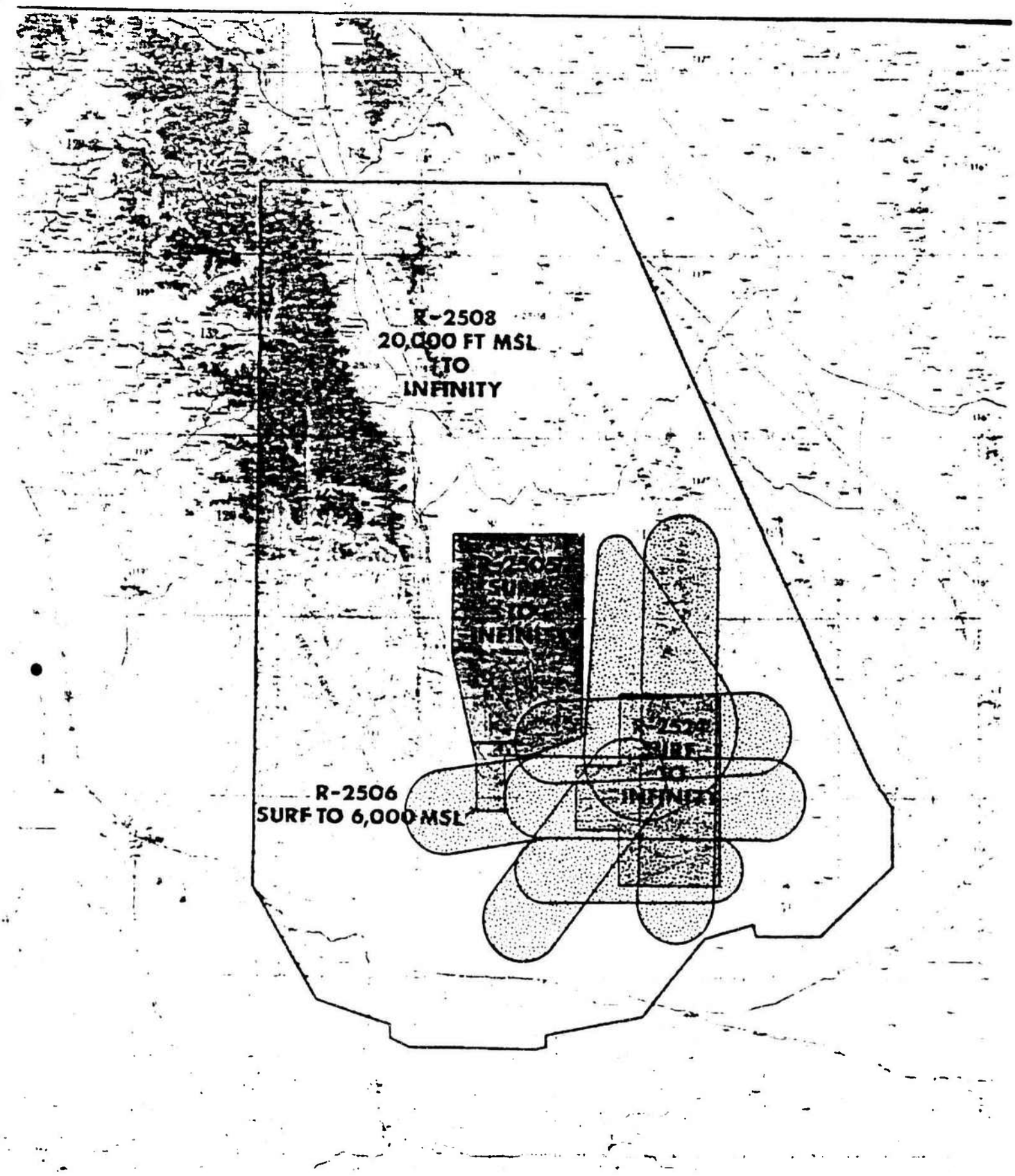
Enclosure (6) Typical Flight Areas for Research, Development, Test and Engineering Work (Part A).

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



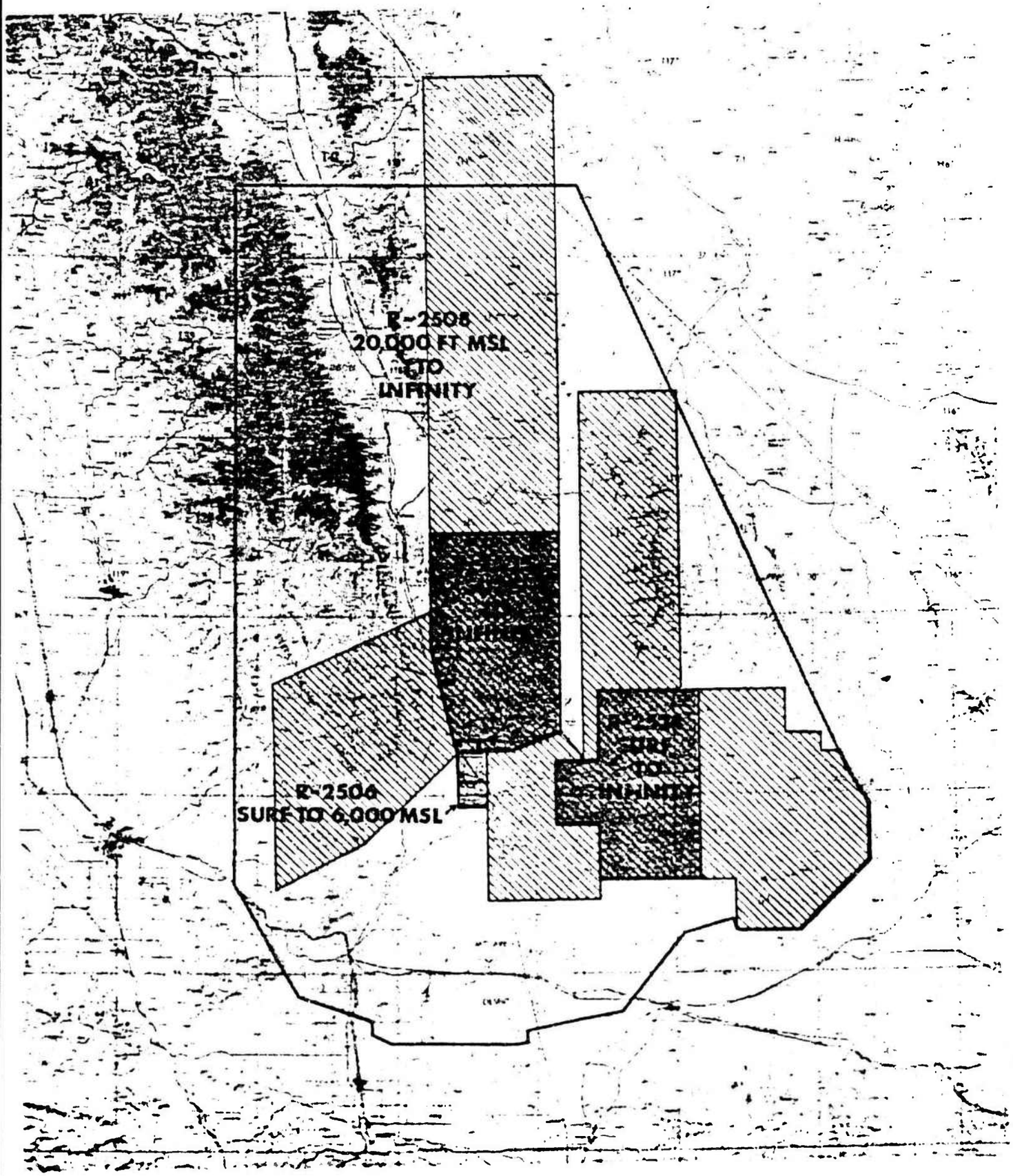
Enclosure (7) Typical Flight Areas for Research, Development, Test and Engineering Work (Part B).

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION
COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

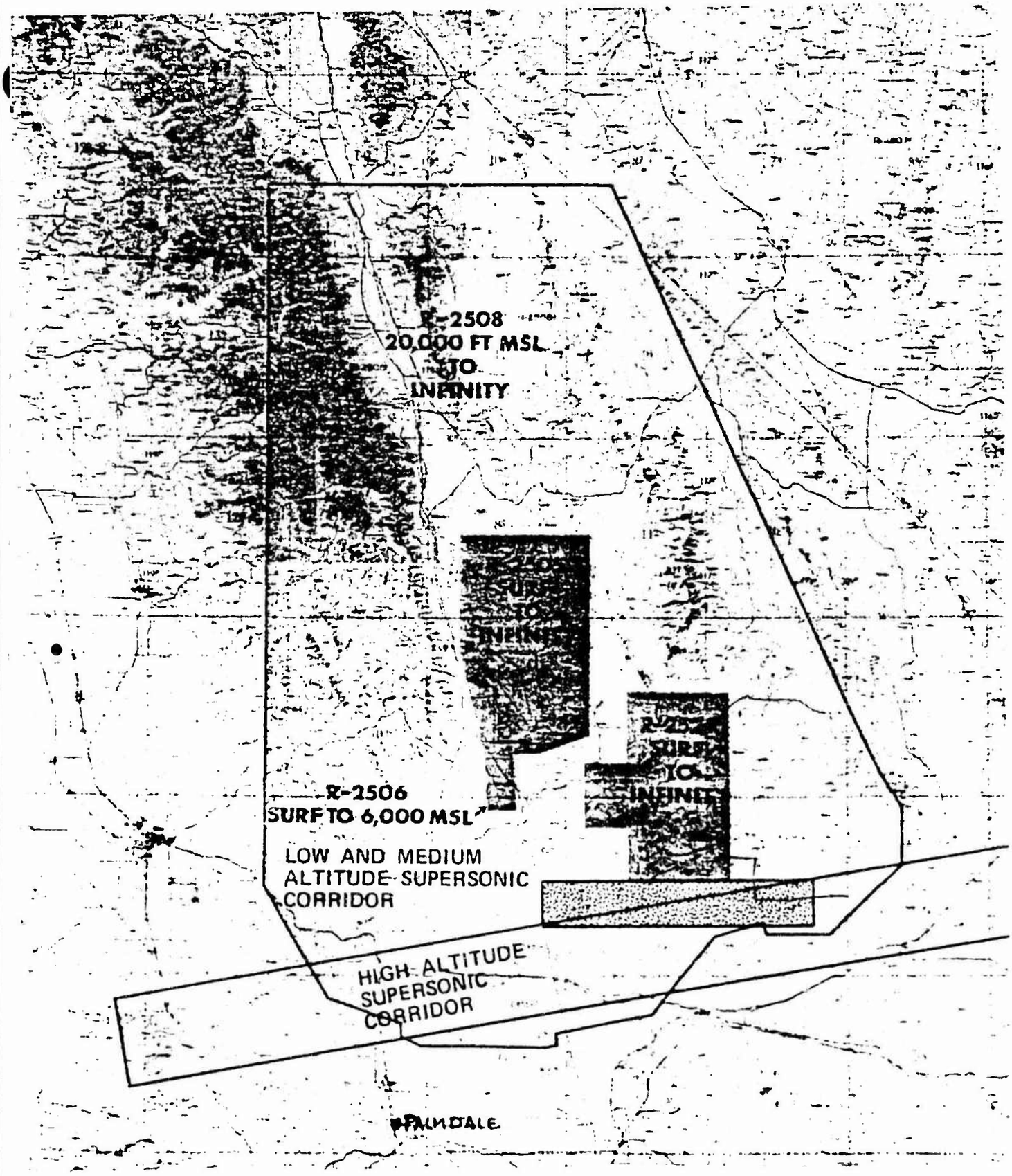


Enclosure (8) Typical Flight AReas for Research, Development, Test and Engineering Work (Part C).

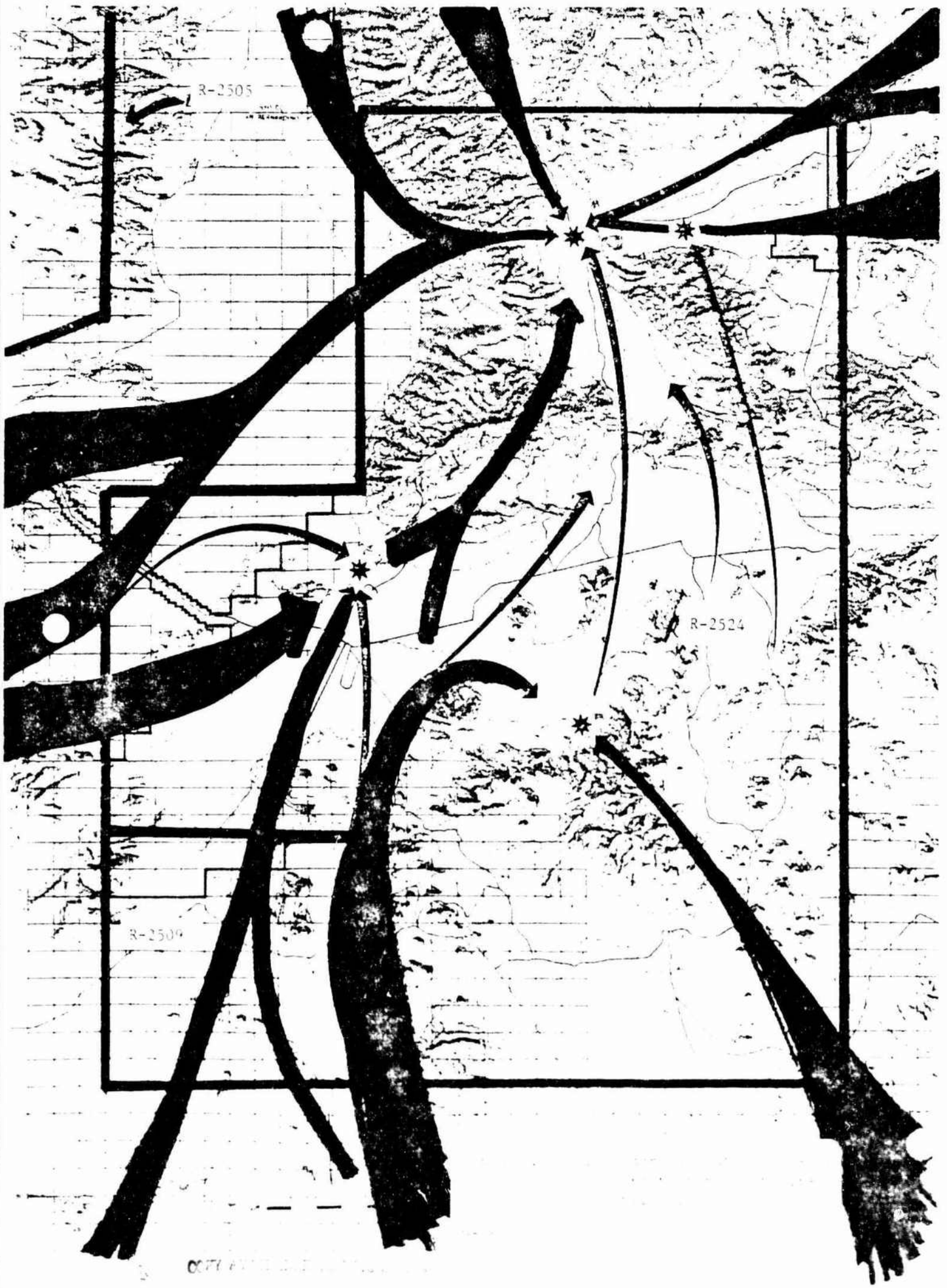
COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

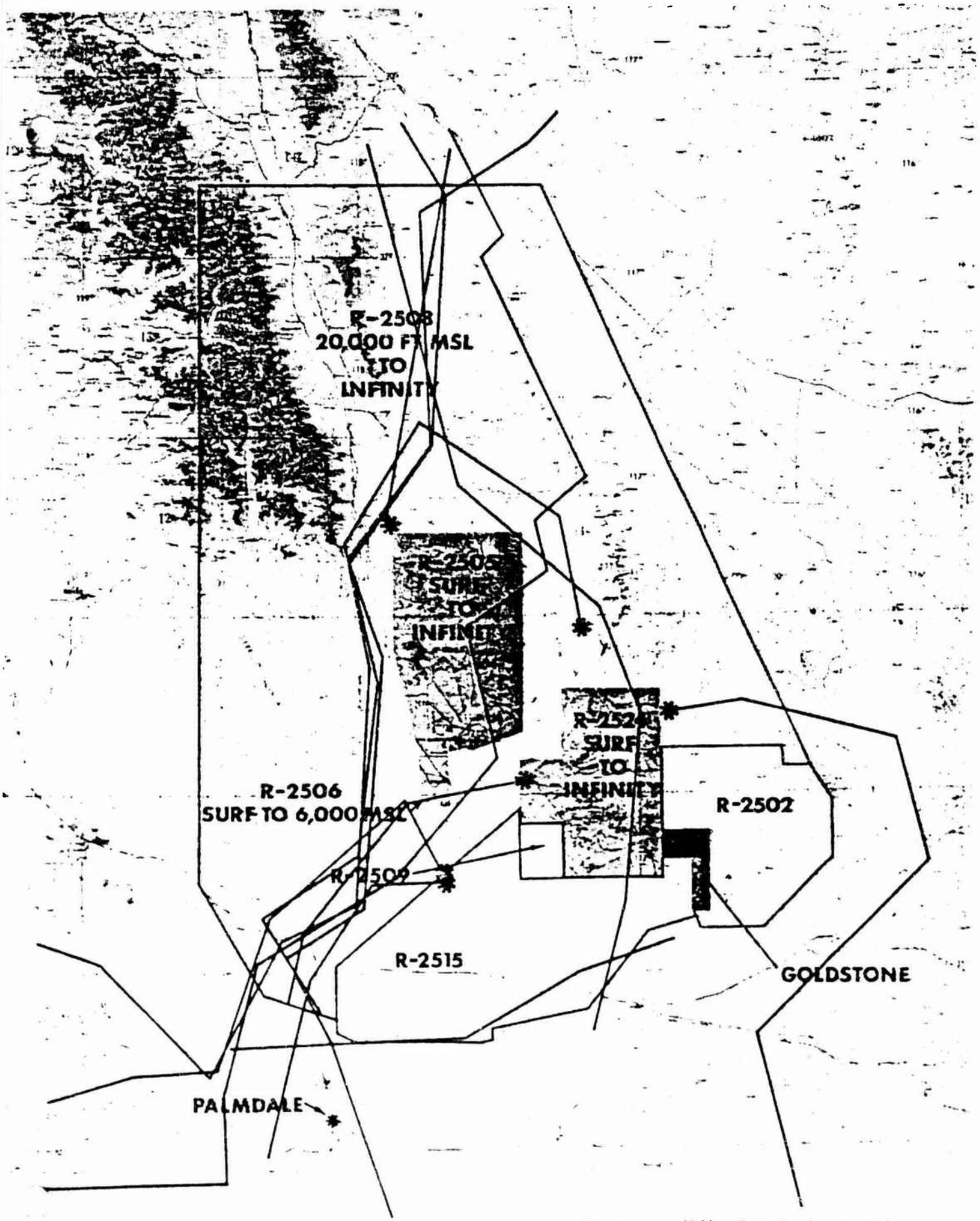


Enclosure (9) Areas Affected by
Research and Development
Supersonic Flights.



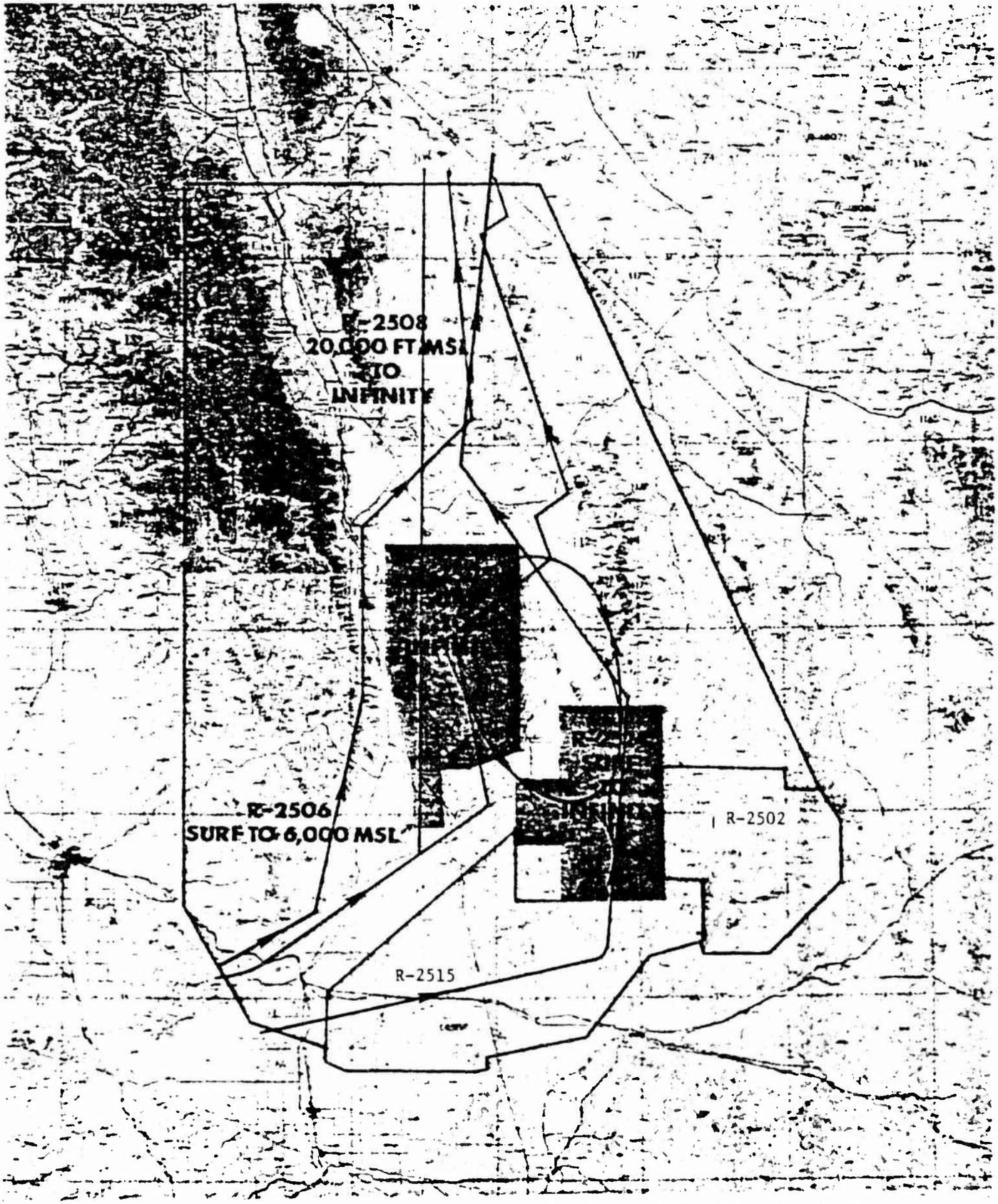
Enclosure (10) FAA Designated Areas for Routine Supersonic Flight


R-2505
R-2524
R-2509



Enclosure (12) FAA Designated Low Altitude, High Speed Military Training Routes

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE



Enclosure (13) Potential Cruise Missile Low Level Routes Data Link, Aircraft at Medium Altitude.

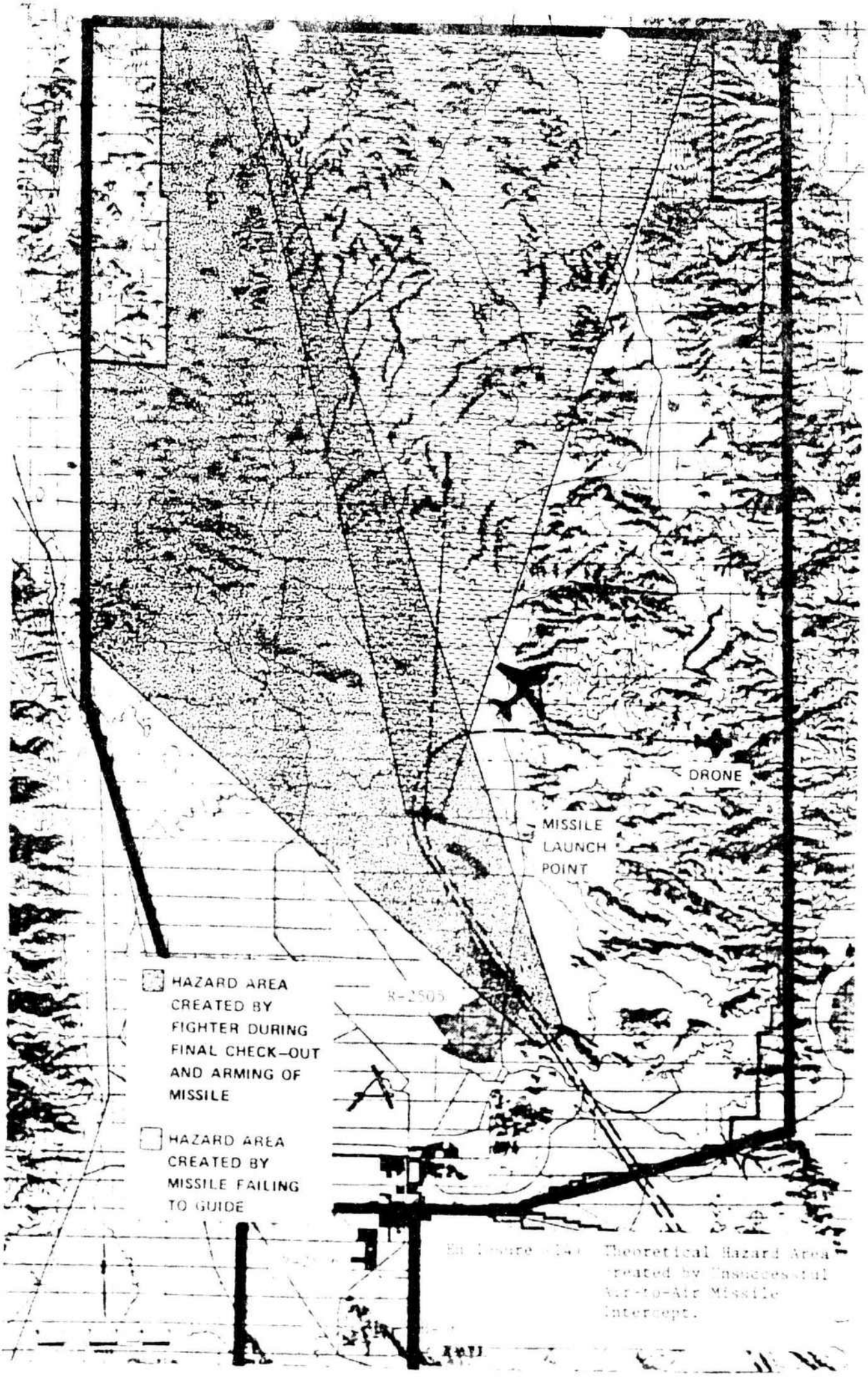
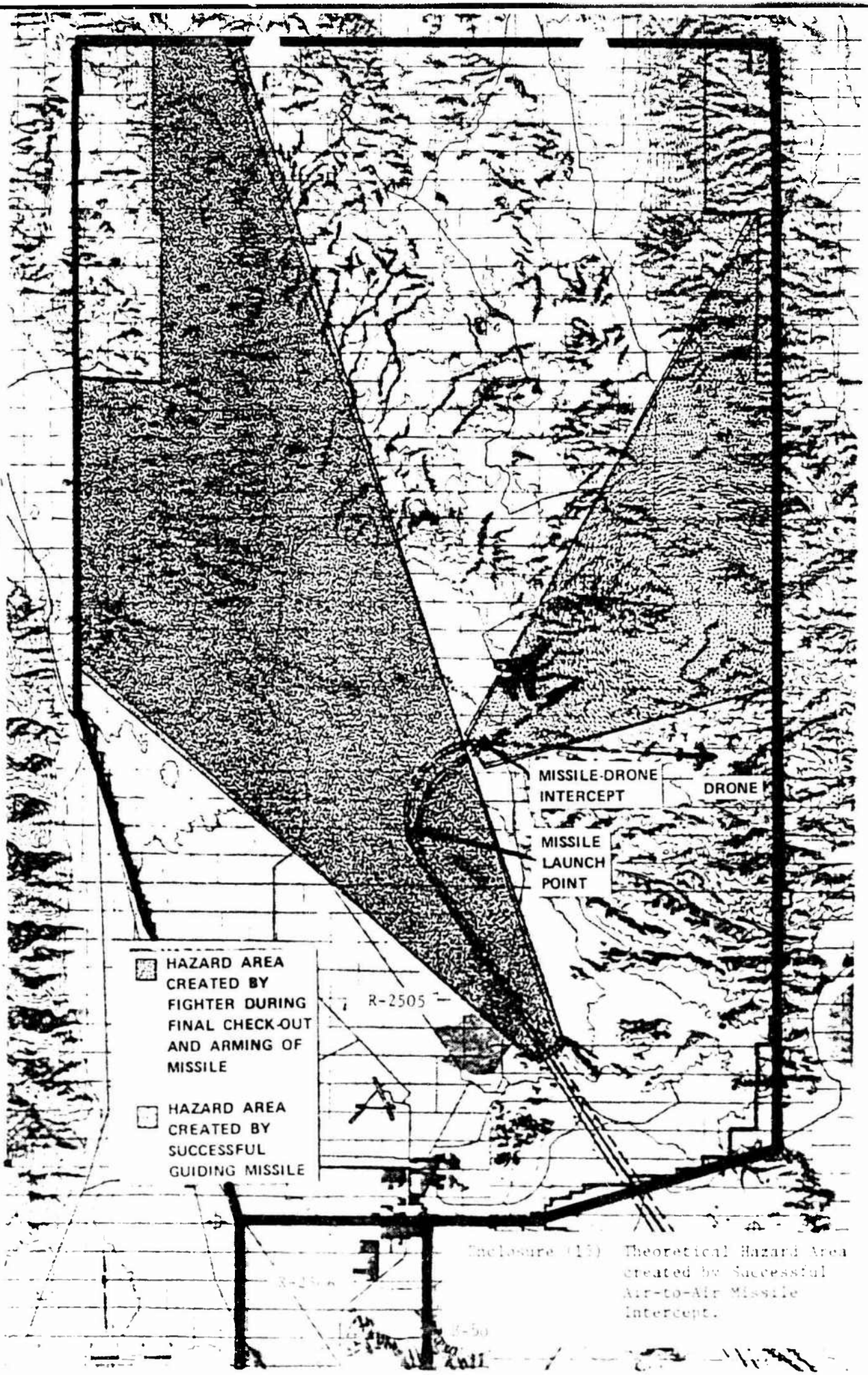
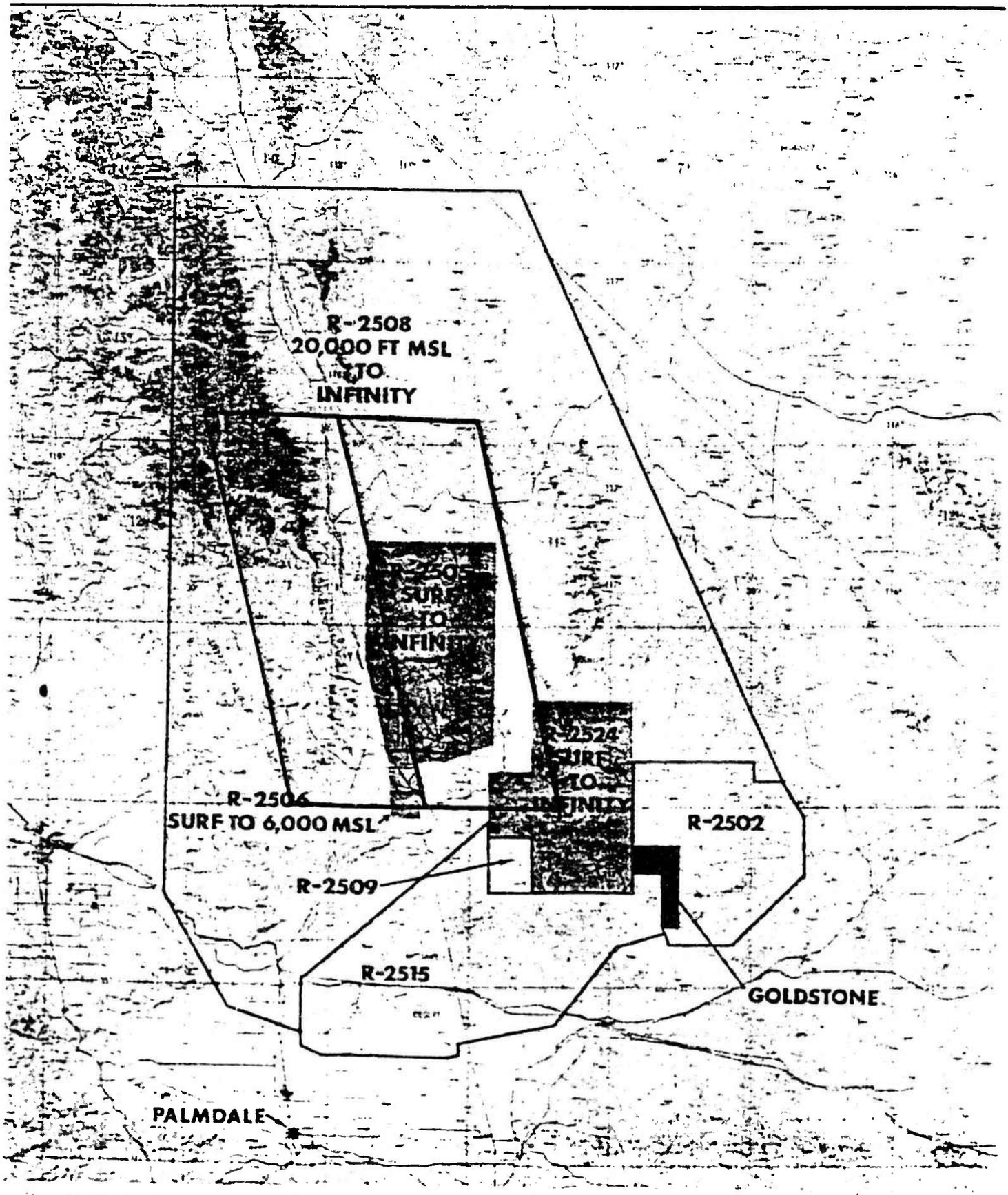


Figure 1. Theoretical Hazard Area Created by Unsuccessful Air-to-Air Missile Intercept.



Enclosure (1) Theoretical Hazard Area created by Successful Air-to-Air Missile Intercept.

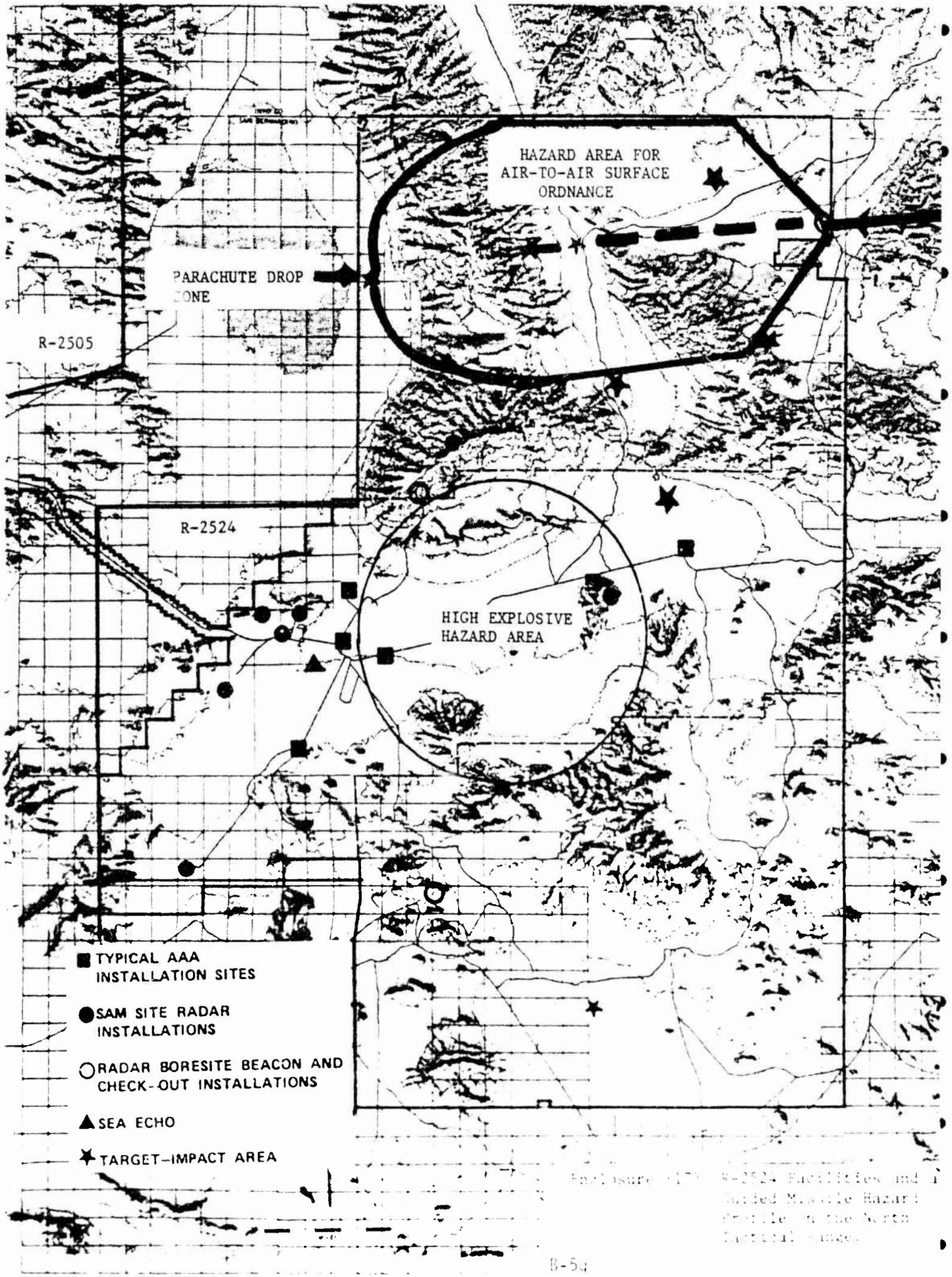
COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



Civil Notice to Airman (NOTAM) Geograph ic Description: 30 miles each side of a line from the northern part of Owens Lake to 15 miles south of China Lake for a 90 minute period.

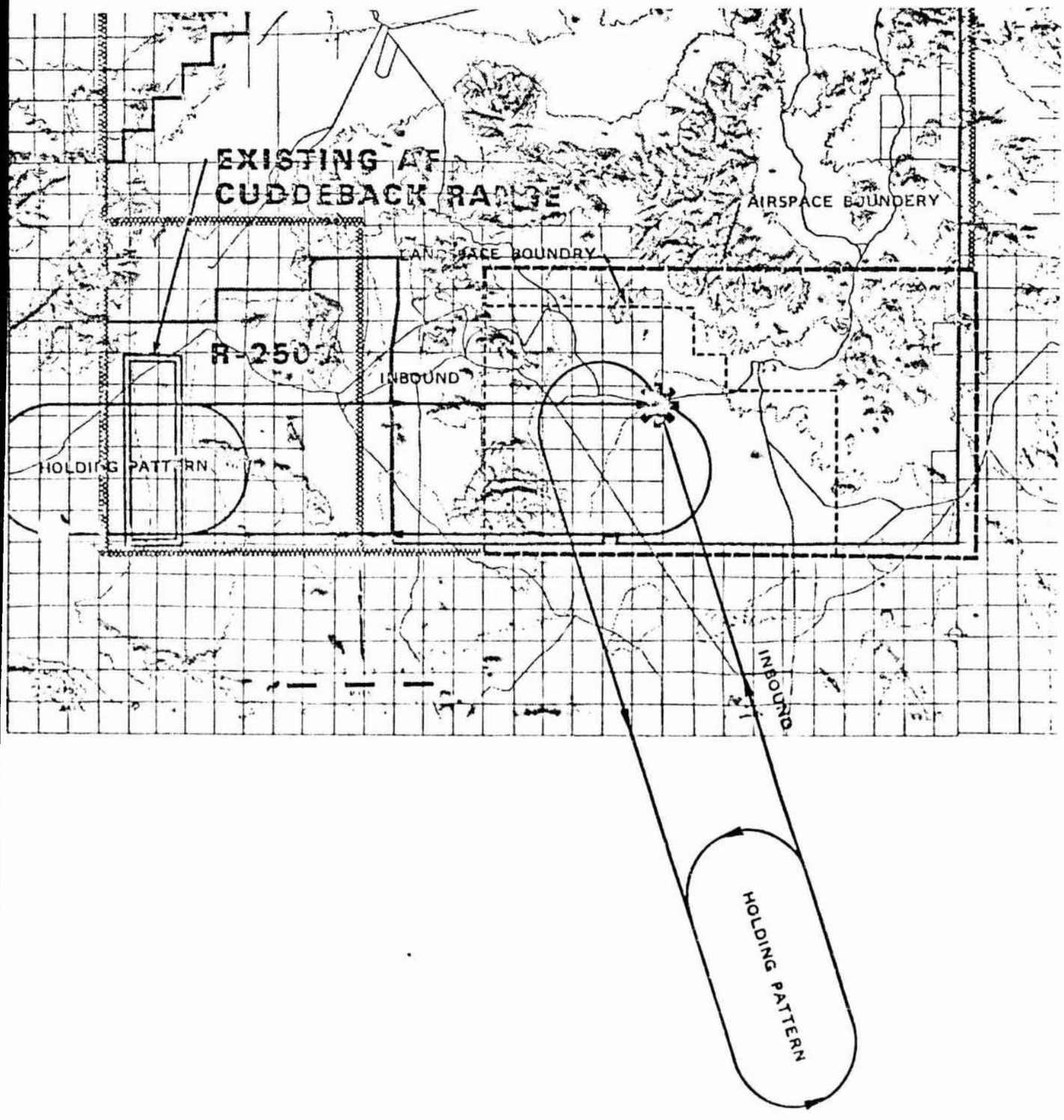
Enclosure (16) Potentially Hazardous Area Recently Sanitized for a Series of Missile Shoots.

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION



Enclosure (17) R-2524 Facilities and Guided Missile Hazard Profile on the North Portion Range

SUPERIOR VALLEY RANGE
GEORGE AFB



Enclosure (18) Approach and Retirement Patterns At New Superior Valley Impact Range

COPY AVAILABLE

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

30 MAY 1979

MEMORANDUM FOR DIRECTOR, FEDERAL AVIATION ADMINISTRATION, WESTERN REGION

SUBJECT: Draft Environmental Impact Statement (EIS) for the Proposed Palmdale International Airport Development Program

As you are aware, the Department of the Air Force is extremely interested in the potential development of Palmdale IAP, as it would have an impact on several major Air Force installations. As such, the draft EIS for the proposed project has been reviewed by the Air Force and the attached comments are forwarded for your consideration. These comments are in addition to those filed with the Los Angeles City Department of Airports on a Draft EIR on Palmdale Intercontinental Airport on March 19, 1975 and on the Amended Draft EIR on January 14, 1977. In these earlier reviews we were deeply concerned about the inconsistencies between certain operational and airspace matters as they are described in the Draft EIS and as they exist in current FAA policies and FAA/DOD formal agreements. These reservations remain. Further, we believe the Draft EIS must be revised to reflect these policies and agreements. Specific comments on our various areas of concern are provided in an attachment to this memorandum.

The development of Palmdale IAP will have a significant adverse impact on Air Force operations. At present, Plant 42, Edwards Air Force Base, George Air Force Base, and the R-2508 Air Space complex perform an integral role in the overall Air Force mission. Over the last several decades, the Air Force has invested heavily in time and equipment in this particular area of Southern California because of the easy access to major aerospace industry and likewise its remote location which facilitates the particular research and development requirements essential to the Air Force. The reproduction of this total environment with the relative meteorological, airspace, safety, and locational advantages would be virtually impossible anywhere else in the United States.

Development of Palmdale IAP could ultimately force the restriction on operations at the Air Force Flight Test Center at Edwards AFB, the closure of AF Plant 42 due to encroachment, and the curtailment of operations at George AFB. The potential air safety considerations imposed by commercial airline traffic in or

adjacent to restricted high performance military airspace is obvious. In addition, degradation of visibility in the R-2508 airspace complex will have an adverse impact on DOD flight operations. Further, the draft EIS assumes that the Air Force will close runway 04/22 at Plant 42 when Palmdale IAP is developed. The Air Force, however, has no plans to either reduce operations or close down that runway. Finally, the Draft EIS as presently written does not address the secondary potential environmental impacts resulting from relocation of any DOD operations which may become necessary.

The Air Force is seriously concerned about the projected development of Palmdale IAP in accordance with this Draft EIS. If the development proceeds as outlined, significant adverse impacts to future Air Force operations at a number of California sites will ensue. We therefore voice our serious reservations about the current plans set forth in the Draft EIS, and the apparent inadequate consideration of the impacts on Air Force operations.

Joe Meis

JOE F. MEIS
Acting Assistant Secretary
of the Air Force
(Manpower, Reserve Affairs
and Installations)

1 Atch
USAF Comments on Draft EIS,
Palmdale IAP

COMMENTS ON THE DRAFT EIS FOR THE PROPOSED PALMDALE IAP

I. GENERAL COMMENTS

1. In the Draft EIS (DEIS) for Palmdale IAP, it should be noted that Air Force Plant 42 was established in its present location, i.e., in the desert, to accommodate the southern California Aerospace contractors which were being forced out of Los Angeles because of air space congestion problems. The plant is available to the McDonnell Douglas, Lockheed, Northrop and Rockwell International companies in support of military and space programs for both final assembly and flight testing. This is one of a limited number of aerospace "pockets" of capability found in the United States. Constraints placed on activities at Plant 42 could seriously impact future military aircraft production and flight testing by:

(1) Creating a congested and densely populated area in the vicinity of the plant which is incompatible with the mission.

(2) Imposing a large, new commercial aircraft workload which could result in unacceptable restrictions on the average of 10,000 flight operations per month associated with Plant 42.

(3) Causing unacceptable noise levels inside the property of Plant 42.

2. The DEIS is very incomplete in its evaluation of the impact of Palmdale International Airport (PIA) on military air operations. It makes a broad conclusion that there is "no major airspace conflict" but provides inadequate data to substantiate this conclusion. The individuals preparing the DEIS did not contact the R-2508 Complex Control Board (CCB) for input. This board is comprised of representatives from each DOD installation that manages and/or uses airspace within the complex and is capable of providing accurate and current information on military operations within the complex. It is strongly suggested that FAA contact the CCB for such input prior to preparing the FEIS.

3. Additonally, statements contained within the DEIS conflict with present FAA/DOD agreements concerning use of airspace in

general as well as specific FAA policy concerning use of R-2508 airspace. These issues will be addressed in detail in following comments.

II. SPECIFIC COMMENTS

The following comments address specific items contained throughout the DEIS. Reference is made to the page on which the item may be found.

1. Page xii. The references reflect a DOA Draft EIS dated January 1978. We believe that the January 1978 DOA environmental document is a Final EIS, not Draft. Recommend the references refer to the "DOA Final EIS for Palmdale International Airport."

2. Page 17. The first paragraph states that "general aviation use of the airport is expected to increase slowly over time." If this is true, the increased midair potential between general aviation VFR aircraft and military aircraft operating in the Complex Military Operations Areas (MOAs) has not been addressed. This real problem must be assessed if the EIS is to be accurate.

3. Page 20. The list of navigational aids does not include any terminal radar. The first paragraph on page 200 alludes that terminal radar will be available. Recommend the precise type of terminal radar programmed for PIA be included on page 20 as well as page 200.

4. Page 26. Paragraph one states that "the flight patterns of the more distant George AFB to the East are important factors in the design of the proposed new airport operations." This is the only statement in the DEIS that addresses this critical issue. We do not feel such a "broad brush" treatment is adequate. Specific PIA patterns and their relationships to and impact on existing George AFB arrival/departure patterns must be assessed.

5. Page 27 - Airspace Utilization. The second paragraph mentions four of the six special purpose restricted areas that are within the R-2508 Complex, but does not consider R-2508, the Air Traffic Control Assigned Airspace (ATCAA) or Military Operations Areas (MOAs) contiguous to and underlying R-2508 which make up the R-2508 Complex.

On June 29, 1970, the Federal Aviation Administration completed an airport analysis airspace study of the proposed Palmdale International Airport. On April 19, 1979, an addendum to the study was issued to insure that all parties concerned were aware of the planned enhancement to the air traffic control system within the R-2508 complex airspace. In this addendum, the FAA recognizes the military's needs concerning airspace requirements within the R-2508 complex and that joint and shared use of airspace by civil and nonparticipating military aircraft will be on a noninterference basis. A copy of Addendum 2 is at Attachment 1.

The Final EIS prepared by FAA should clearly recognize the military priority in the R-2508 complex airspace as well as the restrictions to IFR operations through MOAs and ATCAAs.

The advent of cruise missile testing makes it imperative that the final EIS also address the use of low level IFR high speed routes, IR200 and IR425, specifically.

6. Page 29 and Figure 6. The SCAUC Task 9 Report and associated diagram (Figure 6) should be removed from the DEIS. The Task Report is inaccurate and outdated. The entire report uses the special-use airspace complex that existed in 1972. Since that time, two major FAA programs (MOA program and MTR program) have been developed and implemented within the R-2508 complex. Therefore, today's complex is very different, and impacts the PIA in a very different manner. For example, the almost continuous use of the Complex 1 and Complex 4 MOAs will render the Trona departure virtually unusable from sunrise to sunset. A HQ FAA/AAT-300 policy letter, dated November 7, 1978 (Attachment 2), clearly gives the military priority use of MOAs. Recommend this FAA policy, and its effect on PIA, be addressed and assessed in the EIS.

7. Page 32. The last paragraph references FAA studies that conclude that "there will be no major airspace conflict." It is essential that these studies be made a part of the EIS. Without such studies we are unable to assess the adequacy of the airspace conclusion. It should be noted that the Air Force concurred with the 1969 airspace proposal (69-LAX-7-NRA) only with favorable consideration of seven stipulations (Attachment 3). This Air Force input should be addressed in the EIS.

8. Page 34. Factors Affecting the Development of the Project. The availability of airspace is a factor that has been omitted in

this section. Existing letters of agreement between FAA and the R-2508 Complex Control Board release control of the MOAs, ATCAAs and restricted airspace of the R-2508 Complex to Edwards Radar Approach Control for military use daily from 0600 to 1830, from sunrise to noon on Saturdays, and other times as requested. During these times the airspace in the R-2508 complex is not available for civil or nonparticipating aircraft except on a noninterference basis with military operations.

Another factor that needs to be considered in the Final EIS is the effect of proposed arrival routes on operations from George AFB. George AFB and its airport control zone are situated directly below or adjacent to proposed PIA arrival/departure routes. Any route system established to service PIA must insure the integrity of GAFB airspace, allow uninhibited IFR and VFR arrival/departure in the vicinity of GAFB and provide suitable access between the base and training areas/ranges in the R-2508 complex, or other designated training areas.

Approaches to PIA commencing approximately 90 miles east, transit R-2501 airspace. This airspace provides George AFB its only area in which high speed (supersonic) maneuver training for air combat tactics is authorized between 5,000 feet AGL and FL350. Use of this route as the primary approach corridor would negate the use of this area for this training. Attempts have been made in the past to locate an area where supersonic ACM training can be accomplished; however, they have not been successful. Additionally, the air to ground tactical ranges located within R-2501 are utilized for conventional weapons delivery training. Capping of R-2501 at any altitude below FL200 to accommodate continuous overflight by civil air carriers would severely restrict the use of these ranges.

9. It is not clear from the discussion on page 71 whether all future military aircraft operations at Plant 42 are included in the noise contours. If this is not the case they should be included at approximately the same level of activity as is now experienced.

10. Reference discussion on pages 156-157 concerning reduction in hydrocarbon emissions necessary to meet the 0.08 ppm oxidant standard. We believe the Draft EIS is incomplete without a detailed discussion quantifying specifically how the required 6 ton/day reduction in hydrocarbons is to be achieved. The existing discussion is very general and ends with a statement that contract

is presently being negotiated to prepare a proposal on mitigating measures.

11. It is noted with satisfaction that our concerns regarding Palmdale IAP's potential impacts on drainage to Rosamond and Rogers Dry Lakes have been addressed on pages 164-67 of the DEIS. Continued attention must be directed to this area to insure proper ground-water recharge devices are constructed and other corrective actions are taken to prevent excessive runoff from reaching the lakebeds.

12. Page 200. The first paragraph states that a Terminal Control Area (TCA) is proposed for PIA. The establishment of a TCA may compromise air safety. Nonparticipating VFR civil aircraft circumnavigating the TCA will be forced to fly in close proximity to Edwards and George AFBs and/or in increasing numbers through our MOAs, thereby increasing the potential for military/civil midair collision.

13. Page 200. The second paragraph references "preliminary studies" that indicate that "there is sufficient airspace." These studies must be a part of the EIS so that their adequacy may be judged. It is doubtful that these studies include the Military Operations Areas and Military Training Routes contained within the R-2508 Complex. These airspaces are vital to the Air Force mission.

14. On page 241 it is estimated that the landfill capacity will be exhausted by 1985. On page 242 it is stated that both with and without the airport present dump capacities will be taxed in the 1990-2000 decade. The two statements appear inconsistent and need to be reconciled.

15. Page 351. Recommend that an additional paragraph (Para O) be added stating the FAA's policy on use of MOAs. The FAA policy on MOAs as stated in FAA AAT-300 letter to the Air Force on November of 1979 "is that MOAs are established to set aside certain airspace for use by military aircraft to perform various flight maneuvers necessary to accomplish their mission. Unless otherwise provided for in a letter of agreement, which was to be established with each military unit, the military should normally have first priority on the use of the MOA airspace. When developing the requirements and procedures for MOAs, it was not intended that ATC should deny or withdraw the use of an MOA or even a

portion of an MOA from the military unit for which the MOA was established. If it is necessary to share the MOA airspace, appropriate coordination/notification procedures should be included in the letter of agreement between the parties concerned to preclude any misunderstandings. It is important to note that the activities and attendant use of MOA airspace, IFR or VFR, by the military units or ATC facilities must be in accordance with defined terms as contained in letters of agreement."

3 Attachments
1. Addendum No. 2, April 19, 1979
2. HQ FAA/AAT-300 Policy Letter, Nov. 7, 1978
3. HQ USAF Ltr, 25 Nov 69

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WESTERN REGION
P O BOX 92007, WORLDWAY POSTAL CENTER
LOS ANGELES CALIFORNIA 90009

April 30, 1979

69-LAX-7-NRA

NOTICE TO ALL CONCERNED:

On June 29, 1970, the Federal Aviation Administration (FAA) completed an airport analysis airspace study of the proposed Palmdale International Airport. The study culminated in a determination of no objection issued to the Los Angeles Department of Airports. On August 26, 1976, the determination was extended until June 29, 1984.

The enclosed addendum dated April 19, 1979, is issued to ensure that all concerned parties are aware of the planned enhancement to the air traffic control system within the area.

Please add this addendum to the June 29, 1970, determination.

KENNETH C. PATTERSON
Chief, Air Traffic Division

Enclosure

April 19, 1979

ADDENDUM NO. 2

The military responses to the original proposal circulated May 16, 1979, expressed concern over possible impact on military operations. The June 29, 1970, determination stated that the military could within reasonable parameters, accept shared use airspace based on flexible navigation and an air traffic control system that could take advantage of available airspace, rather than depend completely on exclusive use. The shared use concept would recognize the sensitivity and complexity of the military mission. The need for specific areas and precise timing is necessary to establish priority for the military and ensure mission accomplishment without derogation. The following program will enable the Federal Aviation Administration (FAA) to implement such a concept by establishing a new method of realtime airspace management along with improved air traffic control capabilities.

The program is called the R-2508 Enhancement Plan. The plan covers a tri-service test complex within the upper Mojave Desert which is used by the Department of Defense (DOD) for the advancement of weapons system technology. R-2508 consists of a high altitude restricted area approximately 140 miles by 110 miles in size, commencing at 20,000 feet and extending to infinity. In addition, there are six independently managed, special purpose restricted areas that lie within the R-2508 borders for the primary use of military test activity. Use of this airspace by non-participating aircraft is subject to military discretion and approval on a non-interference basis. Aircraft, weapons systems, and electronic warfare systems are tested and operational training is conducted within these areas. The primary users of the complex are the Naval Weapons Center, China Lake, Air Force Flight Test Center, Edwards AFB, George AFB, Fort Irwin, Air Force Plant #42, Palmdale and other military and civil aviation interests operating under the sponsorship of a primary user.

The R-2508 Enhancement Plan, dated March 1, 1976, the Program Management Plan, dated December 30, 1977, and the associated letters of agreement provide a comprehensive joint FAA/DOD effort to upgrade air traffic control capabilities within the complex. The objective of the plan is to provide increased air safety by improving communications and radar surveillance. It will also provide a means of coordination for all known flight activities and optimize the joint use of all complex airspace for both DOD and civil aviation. This program will be implemented in the three phases listed below. Funds will be spread over a five-year period, beginning with FY-78.

PHASE I: A Central Coordinating Facility (CCF), an Air Traffic Control Facility (ATCF), a Mission Control Center (MCC) and a Space Positioning Facility (SPF) at Edwards AFB and Mission Control Facilities (MCF) at George AFB, the Naval Weapons Center (NWC), China Lake, and Fort Irwin will be integrated to provide a coordinated air traffic management capability. Data from existing radar facilities at Boron, Paso Robles and the radar facility now being installed at Laurel Mountain will be integrated for use at the ATCF, which will interface with the MCFs. Estimated completion date, September 30, 1979.

PHASE II: Five gap-filler surveillance radar systems will be installed at Panamint Valley, Owens Valley, Searles Valley, Fremont Valley, and Velvet Peak to provide low altitude coverage to fill in the surveillance void of other radar systems which provide coverage in the R-2508 Complex airspace.

Each installation will include the microwave and landline communications links needed to tie the facilities into the ATCF, CCF, and NWC MCF. The installation and integration of data processing systems will be initiated at Edwards AFB and NWC. Estimated completion date, September 30, 1982.

PHASE III: A sixth gap-filler radar system if needed is planned for installation at Indian Wells Valley and a new long-range radar system is planned to replace that now being installed at Laurel Mountain. The installation and integration of the data processing system will be completed giving the control facilities at the NWC and Edwards AFB the capability to display data from all sensors appropriate to their mission. At the completion of this phase, all the facilities within the Complex will have access to the radar and data information required to accomplish their missions. Estimated completion date, September 30, 1983.

The DOD and the FAA will jointly manage the implementation of this plan. Due to the constant and extreme variability in test operations and requirements, exact dimension of airspace and periods of time must be determined on a daily and oft-times hourly basis to ensure effective, optimum use of the airspa e. The FAA recognizes the military's needs concerning airspace requirements within the Complex. Therefore, joint and shared use of airspace by civil and non-participating military aircraft will be on a non-interference basis. Approach and departure changes, as may be necessary to support joint or independent requirements, including civil aviation, will be coordinated within the complex before implementation.

The above enhancements will improve the flow of both civil and military aircraft and will result in greater safety for all users.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591

NOV 7 [illegible]

Colonel Ward J. Baker, USAF
Chief, Airspace & ATS Division
Director of Operations and Readiness (XOODF)
United States Air Force
Washington, D.C. 20330

Dear Colonel Baker:

Thank you for your letter concerning military operations areas (MOAs). As you know, members of our respective staffs met on October 3 to further identify the problem areas and discuss possible resolutions. The group mutually agreed that the problem was the lack of more definitive FAA Headquarter's guidance concerning the management of MOA airspace and that the issuance of policy statements pertaining to waivers of FAR 91.70 to civil manufacturers and MOA use denial were necessary. To this end, we intend to issue the following position/policy statements on the above subject matters:

Waivers of FAR 91.70 To Civil Manufacturers

When the military authorizations were issued, it was our intent that high-speed operations by the military would be conducted in areas jointly developed and published. We had hoped that the military and civil manufacturers of military type aircraft could share established MOAs and MTRs which would make it simpler for everyone concerned. Although it would be desirable for all operations in excess of 250 knots be conducted in existing MOAs and MTRs, we recognized the fact that the civil manufacturers might require some additional airspace. Therefore, our regions were authorized to issue separate waivers to the speed rule for each civil manufacturer for conduct of test flights requiring speed in excess of 250 knots below 10,000 feet.

It is our policy that, where practicable, civil manufacturers should use existing restricted areas, MOAs, and military routes in coordination with the military. If existing MTRs, MOAs, and restricted areas

cannot accommodate the civil manufacturer's requirements, the region may develop areas/routes using the same criteria for establishment and use as prescribed for military areas/routes. Regions should review the proposals for the development of such areas/routes to determine if the proposed area location would conflict with the requirement of other airspace users. If a conflict exists, the region should either geographically alter the proposal to eliminate any conflict or overlap of airspace or develop coordination procedures for airspace use and/or separation responsibilities that are acceptable to each user group of the airspace in question.

MOA Use Denial

Our position on this matter is that MOAs are established to set aside certain airspace for use by military aircraft to perform various flight maneuvers necessary to accomplish their mission. Unless otherwise provided for in a letter of agreement, which was to be established with each military unit, the military should normally have first priority on the use of the MOA airspace. When developing the requirements and procedures for MOAs, it was not intended that ATC should deny or withdraw the use of an MOA or even a portion of an MOA from the military unit for which the MOA was established. If it is necessary to share the MOA airspace, appropriate coordination/notification procedures should be included in the letter of agreement between the parties concerned to preclude any misunderstandings. It is important to note that the activation and attendant use of MOA airspace, IFR or VFR, by the military units or ATC facilities must be in accordance with defined terms as contained in letters of agreement.

We regret that these apparent conflicts in the use of MOA airspace have arisen. Moreover, the competition for assigned airspace has become so intense that it is rapidly reaching a critical state. Accordingly, it is in the interest of all user groups to emphasize the need for the most effective use of the available navigable airspace. We are hopeful that the above policy statements will clarify our position on this matter.

Sincerely,

F. L. CUNNINGHAM
Chief, ATC Operations and Procedures
Division, AAT-300
Air Traffic Service

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

OFFICE OF THE AIR FORCE REPRESENTATIVE
FAA WESTERN REGION
[illegible]
LOS ANGELES, CALIFORNIA 90045

SUBJECT: Proposed Palmdale International Airport - Effect on Military Programs, 69-LAX-7-NRA

25 Nov 69

TO: Chief, Airspace and Programs Standards Branch, WE-520

1. On October 17, 1969, Military Representatives were briefed on proposed arrival and departure routes for Palmdale International Airport. As requested in your letter, 24 October 1969, subject as above, the proposal has been coordinated with affected Air Force commands.

2. The Department of the Air Force will find a determination of feasibility acceptable provided that favorable consideration is given the following stipulations:

a. That the services provided to military operations by Edwards RAPCON be retained and expanded as state-of-the-art improvements are realized. Further, that this requirement be considered a foremost factor in design of the system for terminal control in the Palmdale, Edwards, George area.

b. That the altitude of arrival routes crossing over George AFB be amended to read, "10,000 feet AMSL" in lieu of, "7,000 feet AMSL."

c. That provision be made for Air Force operations to and from runways 22 and 25 at AF Plant No. 42. If necessary, this should be accommodated on a one-for-one basis of traffic sequencing.

d. That all techniques for noise abatement be employed for protection of personnel and technical environments at AF Plant No. 42 to include, to the extent practicable, that arrivals be directed to the north two of the four main runways and departures limited to use of the south two main runways.

e. That some means for positive separation of all aircraft in the immediate terminal area be implemented concurrent with activation of the new airport.

Help Insure Your Country's Might - Buy U.S. Savings Bonds

Ltr to Chief, Asp and Prog. Stds. Br., WE-520, subj: Proposed Palmdale Int'l Aprt - Effect on Military Programs, 69-LAX-7-NRA, 25 Nov 69

f. That use of the "Trona Corridor" be limited to an altitude or altitudes selected to ensure freedom from conflict with Air Force operations in the area and that these be specified in a Letter of Agreement. Also, that an altitude below the floor of R-2508 be maintained until clear of the eastern edge except as improved RAPCON capabilities would permit continued climb into R-2508 without interference or conflict with military operations.

g. That "Trona Corridor" infringement on restricted areas be procedurally handled on a shared-use basis thereby eliminating any requirement for reconfiguration of restricted airspace.

3. It must be recognized that Air Force requirements and missions may change over a period of time. This office will keep you advised of significant changes as they occur.

LOUIS C. PERRY
Lt Col., USAF
Air Force Representative

Cys to: AFXOXYA
AFSC (SCCO)
TAC (DOPSSA)
12 AF (DOOSO)
AFFTC (FTCO)
AFCMD (CMJ)
831 Air Div (DO)
AF Plant 42
DARR, WE-591
NARASPO, WE-592

Fo- 1 DOT F 1320.1 (6-78)

DEPARTMENT OF TRANSPOR TATION
OFFICE OF THE SECRETARY

UNITED STATES GOVERNMENT

memorandum

Subject: Draft Environmental Impaet Statement for Proposed Airport at Palmdale, California

Date: MAY 11 1979

From: Direetor, Office of Environment and Safety

Reply to Attn. of:

To: Associate Administrator for Airports, FAA/ARP-1

This offiee has completed its review of the draft EIS for the proposed Palmdale International Airport (PIA) in North Los Angeles County, and we have comments to offer on several areas of potential concern. It appears that further discussion or doeumentation should be provided on the following issues:

1. Status of the Draft North Los Angeles County General Plan

The draft EIS indicates (on page 97) that the draft North Los Angeles County General Plan eontains speeifie plans for the City of Palmdale and that the land use element of those plans served as a guide for projecting 1995 land uses which might be affeeted by noise from PIA (see page 58). Areas near the airport site are designated for industrial use or other "buffer" land uses, because of the noise and other projected impaets from aireraft/airport operations (page 97). Although the City, County, and U.S. Air Foree "have attempted to reserve a buffer zone around the existing Air Foree Plant 42 and proposed faeilities", the NLAC General Plan appears to be more eomprehensive in this regard. Therefore, whether the Plan will have offieial status or not (it is refereneed as a draft document in the EIS) would assume considerable importanee, partieularly in eonneetion with the eompatible land use assuranees required by seetion 18(4) of the Airport Act. Definite information on this point would be essential in the final paekage.

2. Air Quality (Photochemieal Oxidants)

On pages 155 and 156 of the draft EIS, there is diseussion of the Los Angeles Department of Airports' (DOA) request for an air quality certifieate, pursuant to the Airport Aet, for the Palmdale Airport proposal. The California Air Resourees Board (ARB) rejeeted the request last October beeause it believed that a new major souree of pollutants such as PIA would exacerbate an already severe problem with photochemieal oxidants. ARB's letter notes that a "reduction of almost 11 tons per day of total hydrocarbons will be needed in the area impaeted by the airport by 1995 to meet the .08 ppm oxidant standard", and that the 6 tons contributed by PIA should be offset by mitigation measures. In other words, a "trade-off" would be acceptable. It is also stated (on page 347) that the DOA is in the process

SPEED LIMIT 55
It's a law we can live with.

of developing a proposal for achieving the required reductions in hydrocarbon emissions. This proposal and commitments to implement it should be detailed in the final EIS for the project, together with the results of further consultation between the DOA and ARB on this matter and the required air quality certificate (or a written indication from ARB that it will be issued).

3. Floodplain Management

The draft EIS describes the PIA site as being bisected from south to north by the Little Rock Creek and its floodplain, and it appears that the airport will encroach on the Creek's 100-year floodplain (see pages 250 and 164). If that is the case, DOT Order 5650.2, "Floodplain Management and Protection," applies to the project unless the final EIS is filed with the Environmental Protection Agency prior to April 26, 1980. In any event, every effort should be made to comply with the detailed policies set forth in DOT 5650.2 and the Executive Order on floodplains (E.O. 11988, May 24, 1977), which would apply in any event.

4. Water Supply

It is pointed out that there will be enough water to serve the potential growth in Antelope Valley, with or without PIA (page 161), due to allocations from the California State Water project. However, additional storage facilities are said to be required, as well as an adequate distribution system (page 162). Otherwise, a serious water deficit can be anticipated. The final EIS should address this concern with more specific information and assurances on the water supply issue. It is not sufficient to imply, as on page 358, that this concern will take care of itself because local water districts are contractually obligated to purchase their water allotments or to limit the consideration of mitigation measures to those pertaining directly to PIA's own water system (refer to page 349).

5. Air Passenger Forecasts and Energy

The discussions in various parts of the draft EIS are premised on two different sets of regional air passenger forecasts. Section I and section II of the document use the DOT/FAA Aviation Forecast for total annual passenger projections for the Los Angeles region through 1990. Section IV, "Alternatives to the Project," is based on higher passenger levels, which were apparently taken from Forecast E, California Department of Aeronautics, done in mid-1975 (see page 314). For 1990, the State figures come to 78 million annual passengers (MAP) versus 69 MAP from the FAA source; for 1995, the State total is 93 MAP. (Both sets of demand projections assume an allocation of 12 MAP to PIA.) If the FAA data are extended out to 1995, it appears that the total regional passenger demand would be somewhere in the 85 MAP range. We would suggest developing such a figure and clarifying the reasons for using demand projections from two separate and apparently incompatible sources.

On a related point, the assertion on page 9 that crude oil price increases are likely to keep pace with, but not exceed, the present rate of inflation is very questionable, particularly in light of recent events on the international markets. Passenger projections could therefore be exaggerated, even in light of air fare deregulation. The final EIS should include (possibly as an appendix) a forecast scenario, with data, on the assumption that aviation fuel price increases will exceed the overall rate of inflation by a factor of two. Such a scenario, when coupled with the FAA forecasts, might indicate that the level of activity slated for PIA would be reached in some later year well beyond 1995 or call the need for the project into question.

6. Airspace and Other Conflicts with the Military

Department of Defense (DOD) views with regard to the PIA proposal are not presented in any detail in the section on airspace utilization (beginning on page 27). The January 1978 executive summary suggests that there may still be substantial DOD opposition to PIA because of airspace and other conflicts with Edwards AFB, George AFB, and Plant 42. These concerns should be addressed and resolved before the final EIS is submitted for DOT/FAA action.

7. Measures to Minimize Harm

The draft EIS describes numerous steps which might be taken to mitigate adverse impacts stemming from the construction and operation of PIA. In many instances, however, no solid commitments are made to carry out the ameliorative steps discussed. This seems to be the case for a number of topics covered in section V and elsewhere, including air quality (see pages 154-156), aircraft noise (pages 74-77), energy (pages 279-282), water supply, etc. While we realize that some of those actions are under study, must be considered by other parties at a later stage, or would normally be addressed as part of the future master planning effort for PIA, further detail on mitigation measures and commitments to their actual implementation should be incorporated in the final EIS. Section V certainly contains some specifics on mitigation, but additional information (particularly on the impact categories listed above) responsive to this general concern would strengthen the final document.

As far as ground access requirements are concerned, we recognize that it may not be practicable to do a full-scale environmental analysis of the improvements that would be needed to the 14-S segment of the Antelope Valley Freeway and I-5 by 1995. However, additional information on those proposals and the major environmental impacts associated with them should be included in the final EIS.

Should you have any questions or concerns regarding the above comments, please let us know. We look forward to receiving the final environmental impact statement, including the responses submitted by other government agencies and the general public.

for Martin Convisser

UNITED STATES
DEPARTMENT OF THE INTERIOR

OFFICE OF THE SECRETARY

PACIFIC SOUTHWEST REGION
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200

LAX 00
APR 26 8 54 AM '79

ER-79/235

April 20, 1979

Mr. Gerald M. Dallas
Chief, Airports District Office
Federal Aviation Administration
P.O. Box 45018
Westchester Station
Los Angeles, CA 90045

Dear Mr. Dallas:

In response to your request, the Department of the Interior has reviewed the draft environmental statement for Palmdale International Airport, Los Angeles County, California.

The statement does not indicate that the State Historic Preservation Officer (SHPO) was consulted for advice on the design and extent of archeological survey work. In any case, the SHPO should be consulted in regard to further field examinations of the area cited on page 300 as being in proximity to known sites in the Big Rock Wash drainage. Since the literature survey prepared as part of the archeological investigation in 1973 is now six years old, the SHPO may be able to provide more up-to-date information on the potential for occurrence of cultural resources in the project area. The FAA should also consult the most recent edition of the National Register of Historic Places, dated February 6, 1979, as well as monthly updates in the Federal Register.

This draft environmental statement appears to recognize the possible effects of the proposed construction on the hydrologic environment. However, the dumping of "a certain amount" of chemicals, oils, and waste materials on the surface during construction (p. 162) is a rather ambiguous statement, especially in view of the following more ambiguous statement that "some preplanning and implementation" by the city, county, and airport would be necessary to avoid any detrimental effects from the construction activities. Presumably, the precautions alluded to in the sixth paragraph on page 343 are intended to elaborate on the "preplanning and implementation." Here again, the reader is left wondering what the "appropriate measures" are.

The impact statement contains a superabundance of detailed information on the water resources of Antelope Valley but a dearth of definite actions that will be taken to avoid damage to the ground water.

If you have any questions on these comments, please contact me.

Sincerely yours,

Patricia S. Port

Patricia Sanderson Port
Regional Environmental Officer

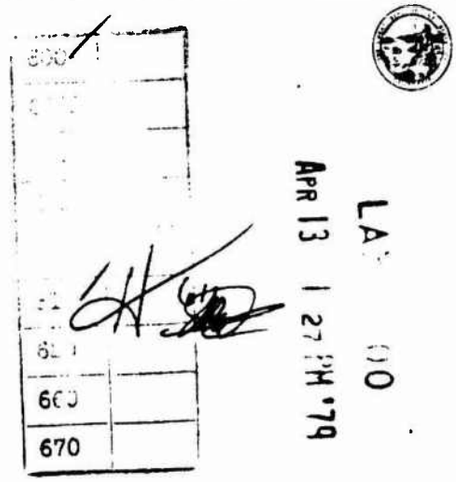
cc: Director, OEPR (w/copy incoming)
Director, Heritage Conservation & Recreation Service
Director, Fish and Wildlife Service
Director, Geological Survey
Director, Bureau of Land Management
Commissioner, Bureau of Reclamation
Reg. Dir., HCRS
Reg. Dir., FWS
Reg. Dir., GS
Reg. Dir., BLM
Reg. Dir., BR

ATE OF CALIFORNIA—THE RESOURCES AGENCY EDMUND G. BROWN JR., Governor

EPARTMENT OF PARKS AND RECREATION
O BOX 2390
CRAMENTO 95811

(916) 445-8006

APR 11 1979



Mr. Gerald M. Dallas
Chief, Airports District Office
Federal Aviation Administration
Airports District Office, LAX - 600
P.O. Box 45012, Westchester Station
Los Angeles, CA 90045

Dear Mr. Dallas:

Re: DEIS for Palmdale International Airport - Palmdale, California

I have reviewed the Draft Environmental Impact Statement for the proposed Palmdale International Airport Development Program. The document indicates that a records search and partial archeological reconnaissance of the airport area failed to locate any significant sites or features. It is further stated that construction will not disturb any cultural resources dating to within the past 2000 years.

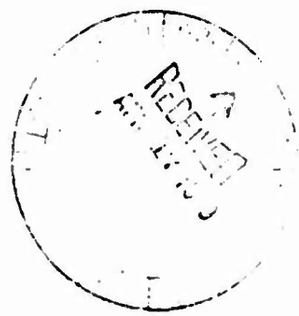
The DEIS is inadequate in that it fails to document these statements and it employs a fallacious 2000 year cutoff date for historical significance.

I recommend that the Federal Aviation Administration initiate the procedures outlined in 36 CFR 800.4 to ensure that the proposed undertaking is in compliance with the National Historic Preservation Act and Section 2 (b) of Executive Order 11593. The results of all special studies, plus specific impact determinations and mitigation measures should be integrated into the Final EIS.

Please feel free to contact Jeffery Bingham of my staff at (916) 322-8701, should you need further assistance.

Sincerely,

Dr. Knox Mellon
State Historic Preservation Officer
Office of Historic Preservation



EIS File

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
AREA OFFICE
2500 WILSHIRE BOULEVARD, LOS ANGELES, CALIFORNIA 90057

REGION IX
450 Golden Gate Avenue
P.O. Box 36003
San Francisco, California 94102

February 9, 1979

FEB 12 1979

IN REPLY REFER TO:
9.2SS

Mr. Gerald M. Dallas
Chief, Airports District Office
P.O. Box 45018
Westchester Station
Los Angeles, California 90045

Dear Mr Dallas:

Subject: Draft Environmental Impact Statement
Palmdale International Airport

This Area Office has completed a review of the captioned document and has the following comments:

1. Your discussion on page 45, paragraph 1, about HUD approvals for new construction in normally unacceptable noise zones (30-40 NEF or 65-75 CNEL) should be augmented. Such an approval would require the preparation of an Environmental Impact Statement or Special Environmental Clearance depending on the character and extent of adjacent land uses and the completion of other HUD regulatory steps. It is the policy of the Area Office not to accept new single family projects located in normally unacceptable areas due to the inability to mitigate adverse noise impacts on usable outdoor areas.

2. Figure 7 on page 41 is obsolete. The Department of The Air Force amended the May 1976 AICUZ Report in June 1978.This amendment contained a revised noise contour map. The revised map shows significant changes in the location of land adversely impacted by aircraft noise by aircraft operations from Plant 42.

Sincerely,

Roland E. Camfield, Jr.
Area Manager

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

2828 Chiles Road, Davis, CA 95616

April 12, 1979

Mr. Gerald M. Dallas
Chief, Airports District Office
LAX-600
P. O. Box 45018
Westchester Station
Los Angeles, California 90045

Dear Mr. Dallas:

We acknowledge receipt of the draft environmental impact statement for the proposed Palmdale International Airport, Palmdale, California Development Program. We have reviewed the document and have the following comments.

1. The draft statement does not adequately address the suitability of the soils for the proposed project nor make provisions for compensating for the limitations. We recommend the Soil Survey of the Antelope Valley Area, completed in 1969, for this information.

2. The draft statement does not adequately provide for erosion control and water management during construction. Wind erosion control during construction needs more consideration.

3. The draft statement does not adequately address the effects of disruption of natural drainage patterns nor the effects upon the floodplain. Little Rock Creek Wash passes directly through the project site, and there are many problems associated with this watershed and the water recharge areas of this drainage system.

4. The draft statement does not adequately address the project impact on existing conservation systems. Provisions for future agricultural use of the buffer zone should be specifically spelled out.

5. The draft statement does not adequately address the loss of nor impact upon prime land within the project area. Including Plant 42, there are approximately 21,760 acres of prime land when irrigated in the project area.

6. The draft statement does not adequately address the need for and supply of water for the project. A specific commitment for California Aqueduct water is needed. Ground water cannot satisfy the needs.

LAX 600
Apr 12 1 01 PM '79

Gerald M. Dallas 4/13/79

We appreciate the opportunity to review and comment on this proposed project.

Sincerely,

Francis C. H. Lem

FRANCIS C. H. LEM
State Conservationist

cc: R. M. Davis, Administrator, USDA, SCS, Washington, D. C. 20013
Director, Office of Federal Activities (Mail Code A-104),
Environmental Protection Agency, Room 537, West Tower,
401 M Street, S. W., Washington, D. C. 20460

U "ITED STATES DEPARTMENT OF AGRICUL' RE
FOREST SERVICE

Angeles National Forest

REPLY TO 1950 Environmental Statement Process

February 22, 1979

SUBJECT Draft Environmental Impact Statement for the Proposed Palmdale International Airport Development Program

TO Department of Transportation
Federal Aviation Administration
Airports District Office, LAX-600
P.O. Box 45018, Westchester Station
Los Angeles, CA 90045
ATTN: Gerald M. Dallas

I wish to thank you for the opportunity to review your draft Environmental Impact Statement concerning the development program for Palmdale International Airport. I have several concerns about the project that I wish to share with you and to make part of the record of input to your draft statement.

FOREST HIGHWAY

The draft E.I.S. makes several references to an Angeles Forest freeway over the San Gabriel Mountains to provide more direct access from the Los Angeles area to the proposed airport. The most favorable route mentioned in the draft statement would be via the Angeles Forest Highway and the Angeles Crest Highway (State Route 2) from the Pasadena area. This would reduce the freeway mileage from the Los Angeles central business district from approximately 61 to 45 miles. The impacts of such an action should be analyzed in detail and presented in the final E.I.S.

The assumption that new transportation routes will be provided through the Angeles National Forest may not be correct. The success of the airport is predicated on this assumption. The impacts of such a proposal and alternatives on the National Forest must be fully analyzed before any decision can be made that they will or will not be authorized. Proceeding with the airport construction on the basis of the assumption carries considerable risks.

The draft Statement gives the reader the impression that in order for the airport to function as envisioned in the report, the freeway must be built.

As I expressed in earlier letters or responses to draft Impact Statements written by the City of Los Angeles, Dept. of Airports, concerning this project, the new freeway would cause severe and costly environmental damage. I do not believe the freeway link through the San Gabriels is essential to the operation of the proposed Palmdale International Airport.

ELECTRONIC SITES

I feel the Statement does not adequately deal with navigational and communicational needs. Electronic sites in the Angeles National Forest are few in number. The Statement should have attempted to identify the need for and location of these important facilites, so the Angeles National Forest can identify this need in their land use plan.

FLOOD CONTROL

The most obvious omission in the Statement is an adequate description of the environmental impact on the Angeles National Forest of a flood control system for the tributaries draining across the proposed Palmdale International Airport.

We consider flood control a critical issue. The headwaters and much of the tributaries to the Antelope Valley are located within the boundaries of the Angeles National Forest.

The 1976 Statement by the City of Los Angeles briefly dealt with flood control and the Littlerock Dam issue (IV, pages 212-219). However, we suggest a more intensive look at this issue, including a top-to-bottom approach to determine the flood prevention and flood control needs. The environmental impact caused by the system should be identified. We urge you to include the concepts of enhanced environment, recreation opportunity, wildlife and water conservation in the final Statement. We would be happy to work with you.

FIRE PROTECTION

The Statement failed to mention the inevitable added fire incidents to the Angeles National Forest. Heavier use of the Forest by additional people from the Antelope Valley will likely increase the number of fires significantly.

An increased Antelope Valley population will increase the fire potential on the desert front and Saugus areas adjacent to Antelope Valley.

The Statement should identify the need for additional firebreaks and fuelbreaks, improved accessibility, development and planting of less flammable plant cover, change of certain vegetative cover, additional fire stations, and more fire prevention personnel.

We want to point out that fire prevention and flood control are closely linked. The watershed area above the proposed airport has a highly flammable plant cover, and fire danger is very high much of the year. A major fire in a watershed area can result in the production of eroded debris on downstream development. A major portion of the proposed Palmdale International Airport is in the Littlerock drainage. Effective fire

control on the upper watersheds is a principal key to the effective operation and maintenance of flood control works downstream. We recommend this fact be identified in the Statement and that intensified fire protection be made an integral part of any flood control plan.

RECREATION

With the projected large numbers of people that will use the proposed Palmdale International Airport - the impact on the Angeles National Forest will be considerable. This fact, coupled with new industry and housing resulting from P.I.A., will have significant environmental and recreational impact on the Angeles National Forest. Additional family and group campgrounds, hiking trails, water recreation, snow play areas, and parking, to name just a few, will have to be planned for to meet this added recreational demand. This should be identified in the Statement.

WILDERNESS

It is apparent, from the location of the Airport, that aircraft flying in a holding pattern may cause considerable noise at relatively low altitudes over the Forest areas.

Wilderness values must be considered in the design of any airport this close to existing or potential wilderness areas. This should be discussed in terms of noise and loss of solitude.

GENERAL

This Statement needs to discuss alternative modes of transporting people from Palmdale to Los Angeles. I would see an increase in small local commuter flights flying over the Forest. This has a potential for more plane crashes and resultant fires.

No mention is made of the location of flight patterns for large planes such as a 747, when in a holding pattern over the proposed Palmdale International Airport. This would likely impact wilderness values and user enjoyment.

The construction of a freeway across the Angeles National Forest would constitute a major Federal action. Therefore, an Environmental Statement would be necessary under the requirements of the National Environmental Policy Act in addition to any report prepared in accordance with the California Environmental Quality Act. The U. S. Forest Service would play a major role in assessing impacts on National Forest Lands in the preparation of this Statement.

The Angeles National Forest is willing to assist the Federal Aviation Administration to further identify and evaluate these environmental impacts. We appreciate the opportunity to comment on your draft and would appreciate being informed on any significant changes in the status of this project.

Sincerely,

for William Mercer

WILLIAM T. DRESSER
Forest Supervisor

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

- Room 423

Phone: (415) 556-6651

March 16, 1979

Mr. Gerald M. Dallas
Chief, Airports District Offices
P.O. Box 45018
Westchester Station
Los Angeles, CA 90045

Dear Mr. Dallas:

The Department of Health, Education and Welfare, Region IX has received and reviewed the Draft Environmental Impact Statement for the Palmdale International Airport.

We find the environmental items within HEW's jurisdiction by law or special expertise have been given adequate consideration. HEW Region IX therefore has no comment.

We appreciate the opportunity to review this draft statement.

Thank you

James D. Knochenhauer, Chief
Real Estate Planning and
Management Branch

MAR 19 1979

600

670

U. S. Navy on Page B1-B5

The comments by the U. S. Navy are primarily concerned with the potential conflicts between military operations conducted in and around Military Operations Area R-2508. These comments are addressed with similar comments by the U. S. Air Force. Comments No. 8 and No. 9 on air quality are addressed in Appendix A on pages A12-A15.

U. S. Air Force on Page B6-B20

Air Force comments regarding potential airspace conflicts and related operational matters are addressed following FAA responses to non-airspace comments.

1. The comment concerns possible degradation of visibility and its effect on DOD flight operations. This has been addressed on page A-12 of Appendix A under Air Quality.

2. The comment suggests that the Final EIS should analyze secondary environmental (presumably socioeconomic) impacts which would occur due to relocation of DOD operations. The commentor apparently assumes that operations at Palmdale International Airport and the associated increase in local civil air traffic would so impair DOD operational capabilities as to force the relocation of some or all of the military components now located in the vicinity of Palmdale. The FAA does not agree.

First, over ten years of airspace planning, coordination, and system development have been invested to insure that military and civil operations can co-exist in the Palmdale/R-2508 Complex area. Second, any relocation which may be caused would occur only after development of civil facilities equal to or greater than those abandoned by DOD, thereby preventing severe adverse local economic shocks. Third, any DOD relocation which may be caused by civil operations would occur gradually, rather than precipitously, and would be compensated for by gradual increases in development stimulated by the civil airport. And last, if the comment is meant to include effects on the natural environment, the decrease in noise, air, and water pollutant emissions resulting from DOD relocations would mitigate in large part those increases caused by the advent of civil operations at Palmdale.

3. The comment states that development of civil aviation facilities at Palmdale could seriously impact the usefulness of Plant 42 due to population density and congestion, air traffic workload, and excessive noise levels inside Plant 42. The FAA acknowledges this possibility, but considers the probability of such an effort to be low. Airport development at Palmdale is not expected to encroach on DOD interests to any significant extent. The County of Los Angeles, the governmental entity with zoning and land use planning for the surrounding area, has recently prepared the North County General Plan which accommodates civil as well as military operations at Palmdale. Inasmuch as growth stimulated by airport development is expected to be gradual, control of that growth should be within the capability of local governments. Nor is aircraft workload expected to be a constraining factor due to the ability of air traffic control facilities to expand as requirements dictate. Finally,

industrial facilities such as Plant 42 are not considered sensitive to noise levels associated with airports, and may actually be among the most compatible uses for airport property not needed for aviation activity. Abundant examples of industrial activities on airports can be found at both military and civil facilities.

4. The Draft EIS cited was the final environmental document (Environmental Impact Report - EIR) prepared by the DOA pursuant to the requirements of the California Environmental Quality Act. It was the document adopted by the FAA as the original Draft EIS in the federal environmental process. The comment responds to a second Draft EIS which used the earlier Draft EIS as a reference.

5. The noise contours shown in Figure 6 are based on current military aircraft operations at Plant 42.

6. This has been addressed in Appendix A under Air Quality.

7. No response necessary.

8. The section in question has been revised accordingly.

AIRSPACE AND OPERATIONAL CONSIDERATIONS.

It is clear from their comments that both the Navy and the Air Force are concerned about the effect that development at Palmdale will have on important testing and training facilities in an area known collectively as the R-2508 complex. These are significant issues for, as pointed out in the Air Force comments, the aerospace capability associated with this area would be nearly impossible to replicate at any other location. The concerns are generally expressed in terms of airspace conflicts and operational constraints, safety, and doubt regarding the consistency of FAA policy regarding military prerogatives in the R-2508 complex.

The FAA has coordinated with the Navy, Air Force, and Army for over ten years to maintain and improve the capabilities of the R-2508 complex. All parties have agreed, since the original determination of feasibility issued in a Notice to All Concerned, June 29, 1970 (see page B-46), that the establishment of a major air carrier airport at Palmdale would not threaten the safe and efficient use of airspace in the local area. On August 26, 1976, that determination was extended until June 29, 1984. The military services registered concern regarding this determination, but concurred subject to certain stipulations and assurances of continued utilization by the military contained within the April 19, 1979 addendum on page B-47. The military letters of concurrence are found on pages B-49 to B-52.

An important step toward this assurance was realized with the development of the R-2508 Enhancement Plan dated March 1, 1976, the Operational Plan dated September 17, 1977. The primary emphasis of these efforts is to improve the surveillance and communication environments in Upper Mojave Desert, thereby permitting the continuation of military activities and the safe passage of civil aircraft. The task was never assumed to be simple, but the accomplishment of the stated goal was judged feasible by all concerned parties. The FAA has pursued the regulatory, capital investment, and staffing requirements contemplated in the program, and remains convinced that joint use of this critical airspace facility can be achieved. This position is supported by the technical expertise of FAA personnel and by the statutory mandate under which the FAA performs its role.

One concept, questioned by both the Navy and the Air Force, which has been proposed is the establishment of a terminal control area (TCA) around Palmdale. A TCA would provide positive separation between all flights within that designated airspace. Comments by the military services suggest that establishment of such a TCA would encourage large numbers of general aviation pilots to circumnavigate the controlled airspace, thereby penetrating restricted airspace undetected and increasing the risk of midair collisions with military aircraft. The FAA considers this concern to be unwarranted for three reasons. First, equipment and pilot qualifications necessary to enter a TCA need not cause an undue burden on general aviation. A Group II TCA, for example, requires only two-way radio and VOR or TACAN equipment and does not require the operator to have a private pilot rating. Second, it is assumed that the airspace in question is now restricted to some degree by military authority and that a TCA, if adopted, would include very little airspace that is not currently designated as restricted or as an MOA. The change in affected airspace would therefore involve the establishment of positive control in airspace currently under partial control rather than the conversion of uncontrolled airspace to positive control. Non-military traffic would, therefore, be more readily detected than is currently the case, and traffic separation could be provided more easily than now. Last, the effectiveness of TCAs has been demonstrated at numerous locations throughout the country. This point is described in more detail in the following FAA letter dated June 19, 1979 on page B-43.

With regard to the consistency of FAA's policy on the importance of military access to and utilization of the R-2508 complex, we can state that the FAA has in the past and will continue to make every effort to protect the operational interests of the DOD. This commitment is documented by references cited by the Navy and the Air Force, and in the FAA letter on page B-43. The unescapable reality, however, is that the national airspace system is subject to increasing air traffic density and that every effort must be made to increase airspace productivity whenever possible. Forecasts of airtravel demand in Southern California clearly indicate a trend of more air traffic. Restricting this traffic to established airports and approach/departure corridors will soon lead to system saturation at peak activity periods. Diversion of portions of this traffic volume to facilities and airspace with available capacity must be

encouraged. The FAA has consistently stated that military operations can coexist with civil air traffic in the R-2508 complex, and that joint use can be effected safely and efficiently. This policy is reaffirmed in Addendum No. 2 to the FAA's airspace determination and in the FAA's letter to Colonel Baker (Attachments 1 and 2, respectively, to the Air Force comments, pages B-14 to B-18). We anticipate no forseeable change in the FAA's policy of protecting military prerogatives in the R-2508 complex.

Finally, in response to the Navy's comment No. 2, which suggests that the FAA's Draft EIS did not observe the spirit of the NEPA regulations published by CEQ, we offer the following. The language of both NEPA and the CEQ regulations emphasize that an EIS is to address impacts to the natural environment, and that these environmental effects and values shall be identified "in adequate detail so they can be compared to economic and technical analyses." (40 CFR 1501.2 (b)). The CEQ regulations also state that an EIS "shall be used.... in conjuction with other relevant material to plan actions and make decisions." (40 CFR 1502.1) Therefore, even though the matter of airspace utilization is mentioned in the EIS, discussions of the feasibility of joint use of the R-2508 complex is essentially a technical matter and should appropriately be resolved outside the framework of the EIS process.

U. S. Department of Transportation Page B21-B24

1. The North Los Angeles County General Plan is still in draft form as stated on page 64 of the FEIS. It is also stated on page 64 that the Los Angeles County General Plan was approved on November 20, 1980. The North County Plan is part of the County General Plan and is expected to be approved with few if any changes from the draft plan.

2. Responses to EPA comments on Air Quality were coordinated with EPA in order that the necessary corrections could be made for EPA acceptance of the FEIS and the eventual issuance of the Air Quality Certificate by the Air Resources Board (ARB). Page 98 of the FEIS states that the Los Angeles Department of Airports (DOA) is working on the necessary mitigation measures plus reference to a letter from the DOA giving assurances that the necessary Air Quality Certificate can be obtained with reasonable expectancy from the ARB, see Appendix F, Assurances. Measures for mitigation as prepared by the DOA are only as detailed as that presented on page 97 of the Final EIS and we would presume that the DOA's proposal will follow those suggested by the ARB in their October 10, 1978 letter on the subject.

3. A discussion on "Floodplain Management and Protection" has been included in the FEIS on page 105 to conform with DOT Order 5650.2 and Executive Order 11988 on floodplains.

4. Pages 100-102 of the FEIS reflect their comment and show that more than an adequate water supply is available for Antelope Valley growth with or without Palmdale International Airport being built.

5. The comment on Air Passenger Forecasts has been corrected throughout the FEIS by using only FAA forecasted data which reflects a 85 MAP demand by 1995.

The energy comment is addressed on page A-15 (comment B.a.1.) of Appendix A of this FEIS.

6. An extensive discussion of DOD (Air Force-Navy) and FAA concerns and views on "Airspace and Other Conflicts" is contained on pages B36-B39 of this Appendix.

7. Their comment is noted and we have included where possible more detail throughout the FEIS.

8. This comment has been responded to on page A-23 of Appendix A of this FEIS.

U. S. Department of the Interior (DOi) page B25-B26

1. Action on these recommendations have been accomplished. A detailed archaeological survey has been completed (see Appendix D) and the State Historic Preservation Office consulted (see Appendix E).

2. Page 102 of this FEIS shows the corrected ambiguity. The sixth paragraph of Page 343 of the DEIS (page 222 of this FEIS), does not "allude" to precautions but is a summary paragraph. Specific precautions for protection of water quality during construction are delineated in preceding paragraphs.

State of California Department of Parks and Recreation page B-27

1. See DOI response 1 above.

U. S. Department of Housing and Urban Development (HUD) page B-28

1. Page 37 of FEIS was altered in the interest of brevity. The addition of HUD's actual policy would add nothing to the text and purpose of the FEIS.

2. Revised noise contour map was substituted for Figure 7 and appears on page 41 of the FEIS.

U. S. Soil Conservation Service Page B29-B30

1. An analysis of soil impacts is presented in Volume IV of the DOA Draft EIS. The 1969 soil survey was used in the analysis. The impacts are insignificant and therefore are not included.

2. The impacts mentioned are considered in the DOA EIS. Erosion control measures will be considered during master planning.

3. Floodplain Management is discussed on page 105 of FEIS.

4. The impact of the airport on land uses is discussed in Section III. Some of the buffer zone uses are indicated on page 69 of FEIS. Specific provisions will be spelled out during master planning.

5. Land uses are discussed on pages 60-72 of FEIS.

6. A thorough discussion of water sources and needs are discussed on pages 99-102 of the FEIS and show a water surplus with or without PIA being built.

U. S. Forest Service, Angeles National Forest pages B31-B34

1. The DEIS only mentions the possibility of constructing the Angeles Forest Highway (Rt 249) and the Angeles Crest Highway (Rt 2). The success of the airport is not predicated on these highways. It is not absolutely necessary that these highways be built in order for the airport to function.

2. Navigational and communication needs will be detailed at the time of master planning and EIS's prepared at time of construction.

3. The floodway and floodplain of Little Rock Creek would be designated as a Floodplains Management Area facilitating development only in accordance with designated standards, see page 105 of FEIS.

4. No data presently exists to forecast the presumption of added fire incidents with Palmdale International.

5. The environmental impacts from an increased population in the Antelope Valley have been addressed in the FEIS. See page 71 and 72 of FEIS and the DOA EIR chapter III-7.

6. The aircraft noise impacts have been addressed. Such impacts over forest areas are considered to be insignificant.

7. Other modes of transportation have been discussed in the FEIS and the DOA EIR III-6-6, pages III-204 to III-217.

U. S. Department of Health, Education and Welfare page B-35

1. No response necessary.

U. S. Environmental Protection Agency page A-iii

Water Comments

1. These figures are consistent with the SCAG data projections.

2. The comment is not germaine to the EIS in that it addresses impacts and requests remedies beyond any knowledge presently available. The increased flows and waste characteristics from LACSD#'s 14, 20, 26 and 32 are from purely hypothetical secondary resources and cannot be computed with any degree of accuracy. In any event, the Regional Water Quality Control and Solid Waste Management Boards reviewed and commented on the January 1974 EIS and the July 1976 DEIS without concern to the above. This type of detail will be accomplished as the secondary growth occurs.

AWE-610

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WESTERN REGION
P O BOX 92007 WORLDWAY POSTAL CENTER
LOS ANGELES CALIFORNIA 90009

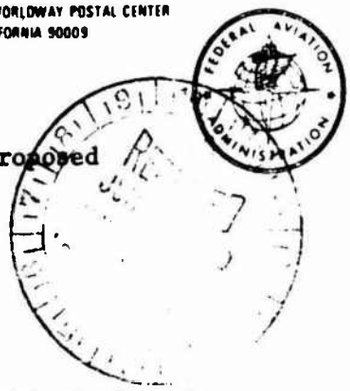
DATE June 19, 1979

IN REPLY REFER TO AWE-530

SUBJECT Palmdale International Airport Lancaster California Proposed Environmental Impact Statement (EIS)

FROM Actg Chief, Airspace and Procedures Branch, AWE-530

TO Chief, Planning Branch, AWE-610



The enclosed information is provided concerning the subject airport, your letter dated May 15, 1979 and the June 15, 1979 meeting between Ed Custer AWE-535, Ray Desai AWE-612, Elliott Perrett AAP-410 and Gene Kisling AWE-590.

The addendum dated April 19, 1979 is a direct result of a joint services request to reaffirm military priorities and to outline how the proposed Palmdale International Airport would be accommodated. The addendum was coordinated and subsequently approved by the R-2508 joint Logistics Commanders on January 29, 1979. The policy is consistant with the Operational Plan dated September 17, 1977.

In addition the following is the current philosophy concerning TCA establishment, Plan for Enhanced Safety in the National Airspace System, Notice of Proposed Rule Making, 78-19.

Terminal Control Areas

A Terminal Control Area (TCA) is a volume of airspace around a major airport (s) that is designated and charted for the pilot in which certain airborne equipments and operational requirements must be met. A pilot must receive authorization from air traffic control before flight into this airspace may be conducted. The purpose of the TCA is to provide positive separation between all flights within that designated airspace.

Preceding the establishment of the first TCA at the Atlanta Airport in June of 1970 this agency had conducted extensive studies on the near midair and actual midair collision problem. These efforts culminated with the publication of our Near Midair Collision Study (1968). On September 30, 1969, a Notice of Proposed Rulemaking was issued which proposed 22 TCA's at locations determined most prone to terminal area hazard. Subsequently, a series of public meetings were held throughout the country to discuss the proposal and obtain user input. Significant objections were voiced and a modified proposal which categorized the classification of TCAs into groups was issued on March 11, 1970.

During the ensuing 5 years a total of 9 Group I and 12 Group II TCAs were established individually following extensive public involvement in planning and supplemental rulemaking. The last TCA established was at the Kansas City, Missouri, Airport on August 1, 1975.

Today these 21 TCA locations provide a positive control environment around a total of 23 of our busiest airports serving approximately 67 percent of all air carrier passengers. These 23 airports are:

GROUP I	GROUP II
Atlanta, Georgia	Cleveland, Ohio
Boston, Massachusetts	Denver, Colorado
Chicago, Illinois	Detroit, Michigan
Dallas-Fort Worth, Texas	Houston, Texas
Los Angeles, California	Kansas City, Missouri
Miami, Florida	Las Vegas, Nevada
New York (Kennedy, LaGuardia	Minneapolis, Minnesota
Newark)	New Orleans, Louisiana
San Francisco, California	Philadelphia, Pennsylvania
Washington, D.C.	Pittsburgh, Pennsylvania
	Seattle, Washington
	St. Louis, Missouri

The basic difference in the groups of TCAs for the operators are equipment and operational requirements. A Group I TCA requires two-way radio, VOR or TACAN, altitude encoding transponder, and a private pilot rating or better. The Group II requires all of the above except the altitude encoder and the private pilot rating. There are no Group III TCAs although provisions for this category are contained in the Federal Aviation Regulations.

The existing criteria for the two groupings is as follows:

Group I -	3.5 million enplaned passengers
	300,000 instrument operations count
	60 percent of all operations must be air carrier
Group II	1 percent of the nationally enplaned passengers

The effectiveness of TCAs is readily evident, particularly from a safety standpoint. During a 2-year period prior to their establishment (1968-69) there were 376 reported near midair collisions within the 9 Group I TCA airspace. Following implementation of these TCAs, during the 1975-76 period, there were 23 reported. At the 12 Group II TCA locations, there was also a substantial reduction in reported near midair collisions after implementation of the TCAs. More important, there has never been a fatal air carrier collision in TCA airspace.

Now, in the interest of increased safety, particularly fo e airline passenger, and with due consideration of system capabil d the growth of aviation activity, a Notice of Proposed Rulemak has been prepared extending the Group II TCA establishment criteria to include those airports accommodating at least .25 percent of the total passenger enplanements (approximately 650, 000 passengers each year).

Each proposed TCA will be coordinated on an individual basis through normal rulemaking action.

We can provide any additional material or background information you deem necessary.

CHARLES E. STAFFORD

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WESTERN REGION
P O BOX 92007 WORLDWAY POSTAL CENTER
LOS ANGELES CALIFORNIA 90009

April 30, 1979

69-LAX-7-NRA

NOTICE TO ALL CONCERNED:

On June 29, 1970, the Federal Aviation Administration (FAA) completed an airport analysis airspace study of the proposed Palmdale International Airport. The study culminated in a determination of no objection issued to the Los Angeles Department of Airports. On August 26, 1976, the determination was extended until June 29, 1984.

The enclosed addendum dated April 19, 1979, is issued to ensure that all concerned parties are aware of the planned enhancement to the air traffic control system within the area.

Please add this addendum to the June 29, 1970, determination.

KENNETH C. PATTERSON
Chief, Air Traffic Division

Enclosure

Now, in the interest of increased safety, particularly for the airline passenger, and with due consideration of system capability and the growth of aviation activity, a Notice of Proposed Rulemaking has been prepared extending the Group II TCA establishment criteria to include those airports accommodating at least .25 percent of the total passenger enplanements (approximately 650, 000 passengers each year).

Each proposed TCA will be coordinated on an individual basis through normal rulemaking action.

We can provide any additional material or background information you deem necessary.

CHARLES E. STAFFORD

April 19, 1979

ADDENDUM NO. 2

The military responses to the original proposal circulated May 16, 1979, expressed concern over possible impact on military operations. The June 29, 1970, determination stated that the military could within reasonable parameters, accept shared use airspace based on flexible navigation and an air traffic control system that could take advantage of available airspace, rather than depend completely on exclusive use. The shared use concept would recognize the sensitivity and complexity of the military mission. The need for specific areas and precise timing is necessary to establish priority for the military and ensure mission accomplishment without derogation. The following program will enable the Federal Aviation Administration (FAA) to implement such a concept by establishing a new method of realtime airspace management along with improved air traffic control capabilities.

The program is called the R-2508 Enhancement Plan. The plan covers a tri-service test complex within the upper Mojave Desert which is used by the Department of Defense (DOD) for the advancement of weapons system technology. R-2508 consists of a high altitude restricted area approximately 140 miles by 110 miles in size, commencing at 20,000 feet and extending to infinity. In addition, there are six independently managed, special purpose restricted areas that lie within the R-2508 borders for the primary use of military test activity. Use of this airspace by non-participating aircraft is subject to military discretion and approval on a non-interference basis. Aircraft, weapons systems, and electronic warfare systems are tested and operational training is conducted within these areas. The primary users of the complex are the Naval Weapons Center, China Lake, Air Force Flight Test Center, Edwards AFB, George AFB, Fort Irwin, Air Force Plant #42, Palmdale and other military and civil aviation interests operating under the sponsorship of a primary user.

The R-2508 Enhancement Plan, dated March 1, 1976, the Program Management Plan, dated December 30, 1977, and the associated letters of agreement provide a comprehensive joint FAA/DOD effort to upgrade air traffic control capabilities within the complex. The objective of the plan is to provide increased air safety by improving communications and radar surveillance. It will also provide a means of coordination for all known flight activities and optimize the joint use of all complex airspace for both DOD and civil aviation. This program will be implemented in the three phases listed below. Funds will be spread over a five-year period, beginning with FY-78.

PHASE I: A Central Coordinating Facility (CCF), an Air Traffic Control Facility (ATCF), a Mission Control Center (MCC) and a Space Positioning Facility (SPF) at Edwards AFB and Mission Control Facilities (MCF) at George AFB, the Naval Weapons Center (NWC), China Lake, and Fort Irwin will be integrated to provide a coordinated air traffic management capability. Data from existing radar facilities at Boron, Paso Robles and the radar facility now being installed at Laurel Mountain will be integrated for use at the ATCF, which will interface with the MCFs. Estimated completion date, September 30, 1979.

PHASE II: Five gap-filler surveillance radar systems will be installed at Panamint Valley, Owens Valley, Searles Valley, Fremont Valley, and Velvet Peak to provide low altitude coverage to fill in the surveillance void of other radar systems which provide coverage in the R-2508 Complex airspace.

Each installation will include the microwave and landline communications links needed to tie the facilities into the ATCF, CCF, and NWC MCF. The installation and integration of data processing systems will be initiated at Edwards AFB and NWC. Estimated completion date, September 30, 1982.

PHASE III: A sixth gap-filler radar system if needed is planned for installation at Indian Wells Valley and a new long-range radar system is planned to replace that now being installed at Laurel Mountain. The installation and integration of the data processing system will be completed giving the control facilities at the NWC and Edwards AFB the capability to display data from all sensors appropriate to their mission. At the completion of this phase, all the facilities within the Complex will have access to the radar and data information required to accomplish their missions. Estimated completion date, September 30, 1983.

The DOD and the FAA will jointly manage the implementation of this plan. Due to the constant and extreme variability in test operations and requirements, exact dimension of airspace and periods of time must be determined on a daily and oft-times hourly basis to ensure effective, optimum use of the airspace. The FAA recognizes the military's needs concerning airspace requirements within the Complex. Therefore, joint and shared use of airspace by civil and non-participating military aircraft will be on a non-interference basis. Approach and departure changes, as may be necessary to support joint or independent requirements, including civil aviation, will be coordinated within the complex before implementation.

The above enhancements will improve the flow of both civil and military aircraft and will result in greater safety for all users.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER(AFSC)
EDWARDS AIR FORCE BASE, CALIFORNIA 93523

DEPARTMENT OF THE NAVY
NAVAL WEAPONS CENTER
CHINA LAKE, CALIFORNIA 93555

DEPARTMENT OF THE ARMY
HEADQUARTERS RESERVE COMPONENTS TRAINING CENTER
CALIFORNIA NATIONAL GUARD
FORT IRWIN, CALIFORNIA 92311

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 35TH TACTICAL FIGHTER WING (TAC)
GEORGE AIR FORCE BASE, CALIFORNIA 92392

To: Secretariat for the Joint DARCOM/NMC/AFLC/AFSC Commanders

Subj: Report on the Palmdale International Airport Encroachment Issue

Encl: (1) Proposed Addendum to FAA Letter of Determination dated 29 June 1970

1. On 22 March 1978 at Andrews Air Force Base, Maryland, the Palmdale International Airport Encroachment Issue was briefed by RADM W. I. Harris, who represented the R-2508 Joint Policy Planning Board (JPPB). During the briefing it was stated that in order to affirm that military operations have priority within and below the R-2508 Complex and to outline how the proposed airport will be accommodated, a draft Memorandum of Understanding (MOU) would be negotiated between the Department of Defense (DOD) and the Federal Aviation Administration (FAA) at the local level, and forwarded to the Joint Logistic Commanders (JLC) for review and approval. Subsequently the MOU was to be forwarded to DOD and FAA for their final concurrence.

2. A draft MOU concurred in by the R-2508 Complex Control Board was submitted to the FAA (Western Region) containing the major elements as briefed to the JLC.

3. The FAA submitted a counterproposal in the form of an addendum to an existing Letter of Determination concerning the Palmdale International Airport. Enclosure (1) is a draft copy of the addendum.

4. It is the FAA's position that since the Letter of Determination and its addendums is a matter of public record, it has a greater visibility and importance than an MOU. Further, the FAA considers it a policy statement which they will stand behind. Also FAA (Western Region) has full authority to issue the proposed addendum, without prior approval from FAA Headquarters.

5. The FAA counterproposal has been staffed and concurred in by the Joint Policy and Planning Board. This document is considered satisfactory and contains the protection of military airspace primacy desired. Further, the FAA will not print and distribute the document until final JPPB approval is given.

Subj: Report on the Palmdale International Airport Encroachment Issue

6. It is requested that the Joint Logistic Commanders concur in the action proposed by the Commanders of the R-2508 Complex JPPB. If concurrence is forthcoming, the JPPB will provide FAA (Western Region) with a formal concurrence to their proposed addendum to the Letter of Determination.

PHILIP G. CONLEY, JR.
Brigadier General, USAF
Commander, AFFTC

W. L. HARRIS
Rear Admiral, U. S. Navy
Commander, Naval Weapons Center

IRVING J. TAYLOR
COL, ARMOR CAL ARNG
Commander, Fort Irwin

CECIL D. CRABB
Brigadier General, USAF
Commander, HQ Tac Trg, George

NWC Serial 7132
DATE: 13 October 1978

DEPARTMENT OF THE NAVY
HEADQUARTERS NAVAL MATERIAL COMMAND
WASHINGTON, D C 20360

IN REPLY REFER TO
09E1/JHM
8 January 1979

From: Special Assistant for Interservice Matters (MAT 09E)
To: Commander, Naval Weapons Center

Subj: Palmdale International Airport

Ref: (a) R-2508 Joint Policy Planning Board (JPPB) ltr of 13 Oct 1978, same subject

1. The Joint Logistics Commanders (JLC) have concurred with the proposed addendum to the Letter of Determination as cited in reference (a). Accordingly, it is requested that you provide the FAA (Western Region) with the JPPB formal concurrence.

2. It is requested that you provide this office, as Lead Secretariat any significant correspondence that relates to R-2508.

Very respectfully,

J. W. CONBOY
Captain, USN

Copy to:
NWC (Code 06)

DEPARTMENT OF THE NAVY
NAVAL WEAPONS CENTER
CHINA LAKE, CALIFORNIA 93555

29 January 1979

Mr. Leon C. Daugherty
Administrator, Western Region,
FAA, P.O. Box 92007, Worldway
Postal Center, Los Angeles, CA 90009

Dear Leon,

As discussed with you a couple of weeks ago, the R-2508 Commanders had their meeting on 25 January at George Air Force Base. They approved the attached L.O.D. Addendum and it is forwarded for your information and release action.

I also brought up your suggestion of a "press" type release with members of the JPPB. They all said it was okay with them and suggested you take the lead.

Either RADM Harris or BGEN Conley (or both) would be willing to have their picture taken with you. Suggest you call RADM Harris direct on this, and suggest to him a plan for P.R. If I can help, please call.

Sincerely yours,

Bill

W. R. HATTABAUGH
Test & Evaluation Director

Copy to:
FAA Navy Rep
(CDR J. Hamilton)

APPENDIX C

CIRCULATION LIST FOR DEIS AND FEIS

CIRCULATION LIST FOR DEIS AND FEIS

FEDERAL AGENCIES

Environmental Protection Agency, A-104
Room 537, West Tower
401 M. Street, S.W.
Washington, D.C. 20460

Regional Coordinator
U.S. Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105
Attn: Ms. Betty Jankus

Office of the Secretary
Attn: Coordinator, Environmental Quality Activities
U.S. Department of Agriculture
Washington, D.C. 20205

Office of the Deputy Assistant Secretary for Environmental Affairs
U.S. Department of Commerce
Washington, D.C. 20230

Office of the Assistant Secretary for Defense (Health and Environment)
U.S. Department of Defense
Room 3E172, The Pentagon
Washington, D.C. 20301

Region IX: Regional Environmental Officer
U.S. Department of Health, Education and Welfare
50 Fulton Street
San Francisco, CA 94102

Regional Administrator IX:
Environmental Clearance Officer
U.S. Department of Housing and Urban Development
450 Golden Gate Avenue
P. O. Box 36003
San Francisco, CA 94102

Assistant Secretary-Program Policy
Attn: Director, Environmental Project Review
Department of the Interior
Washington, D.C. 20240

Office of Program Operations
Urban Mass Transportation Administration
400 7th Street, S.W.
Washington, D.C. 20590

Acting Director
Division of NEPA Affairs
Department of Energy
Mail Station E-201, GTN
Washington, D.C. 20545

Mr. Steve Rothenberg
Office of the General Counsel
Civil Aeronautics Board
1825 Connecticut Avenue, N.W.
Washington, D.C. 20428

Deputy for Environment and Safety
Office of the Assistant Secretary
Department of the Air Force
Washington, D.C. 20330

Department of the Navy
Naval Weapons Center
China Lake, CA 93555

Forest Supervisor
Angeles National Forest
U.S. Department of Agriculture
150 S. Los Robles Avenue
Pasadena, CA 91101

Mr. Alford L. Hoak
Environmental Specialist
U.S. Department of Housing and Urban Development
2500 Wilshi. Boulevard
Los Angeles, CA 90057

REGIONAL, COUNTY, AND LOCAL AGENCIES

Executive Director
Southern California Association
of Governments
Suite 1000
600 S. Commonwealth Avenue
Los Angeles, CA 90005

Administrator
Environmental Improvement Agency
County of San Bernardino
316 Mt. View Avenue
San Bernardino, CA 92415

Air Pollution Control Officer
County of Los Angeles
Air Pollution Control District
434 S. San Pedro Street
Los Angeles, CA 90013

Division Engineer
Los Angeles County Flood Control
District
P. O. Box 2418, Terminal Annex
Los Angeles, CA 90051

Chief Engineer and General Manager
County Sanitation Districts of
Los Angeles County
P. O. Box 4998
Whittier, CA 90607

County Engineer and Director
of Aviation
County of Los Angeles
550 S. Vermont
Los Angeles, CA 90020

Manager
Palmdale Water District
2005 E. Avenue Q
Palmdale, CA 93550

General Manager
Department of Environmental Quality
City of Los Angeles
Room 550, City Hall East
Los Angeles, CA 90012

Mr. Chris Rope
Administrative Officer
City of Palmdale
708 E. Avenue Q-9
Palmdale, CA 93550

Mr. Norman Murdoch
Planning Director
Los Angeles County Planning
Commission
320 W. Temple Street
Los Angeles, CA 90012

General Manager
Antelope Valley - East Kern
Water Agency
554 W. Lancaster Boulevard
Lancaster, CA 93534

STATE AGENCIES

Chief, Planning Division
State Air Resources Board
1709 Eleventh Street
Sacramento, CA 95814

Chief, Division of Aeronautics
Department of Transportation
1120 "N" Street
Sacramento, CA 95814

Chief, District 7
Department of Transportation
P. O. Box 2304
Los Angeles, CA 90051

Director, Department of Fish and Game
State Resources Agency
1416 Ninth Street
Sacramento, CA 95814

Chief, Department of Parks
and Recreation
State Resources Agency
P. O. Box 2390
Sacramento, CA 95811

Executive Officer
California Regional Water
Quality Control Board
Lahontan Region
P. O. Box 14367
South Lake Tahoe, CA 95702

Executive Officer
State Solid Waste Management Board
1416 Ninth Street
Sacramento, CA 95814

Chief, Office of Planning and Research
State Clearinghouse
1400 Tenth Street
Sacramento, CA 95814

PRIVATE INSTITUTIONS AND INDIVIDUALS

Regional Vice President
Western Regional Office
Air Transport Association of America
8939 S. Sepulveda Blvd., Suite 408
Los Angeles, CA 90045

Chairman, Transportation Committee
Sierra Club - Angeles Chapter
2410 W. Beverly Boulevard
Los Angeles, CA 90057

Sierra Club
Center for Law in the
Public Interest
10203 Santa Monica Boulevard
Los Angeles, CA 90067

Quinton-Redgate
100 Oceangate
Long Beach, CA 90802

Palmdale Chamber of Commerce
708 E. Avenue Q-9
Palmdale, CA 93550

Mr. Louis H. Mayo, Jr.
Airport Operators Council
International
1700 K. Street, N.W.
Washington, D.C. 20006

APPENDIX D

ARCHAEOLOGY SURVEY

APPENDIX D

MUSEUM OF NORTHERN ARIZONA
DEPARTMENT OF ANTHROPOLOGY

ARCHAEOLOGICAL INVESTIGATIONS

ARTHUR D. LITTLE, INC., SAN FRANCISCO

ARCHAEOLOGICAL SURVEY OF THE PROPOSED

PALMDALE INTERNATIONAL AIRPORT

LOS ANGELES COUNTY, CALIFORNIA

Final Report

for

Archaeological Survey of the Proposed
Palmdale International Airport
Los Angeles County, California

A-79-122

Prepared by:

Steven G. Dosh
Assistant Supervisory Archaeologist

and

Donald E. Weaver, Jr.

Submitted by:

Donald E. Weaver, Jr.
Director, Archaeological Contract Section

January 20, 1981

TABLE OF CONTENTS

	PAGE
LIST OF FIGURES	iii
LIST OF PLATES	iii
ABSTRACT	1
INTRODUCTION	1
ENVIRONMENTAL SETTING	1
PREHISTORY AND HISTORY OF ANTELOPE VALLEY	7
OBJECTIVES	12
METHODOLOGY	12
RESULTS	14
CONCLUSIONS AND RECOMMENDATIONS	15
POSSIBLE IMPACTS FROM THE PROPOSED ACTION	17
MITIGATING ACTIONS	17
REFERENCES CITED	18
APPENDIX I: Site Description	21
APPENDIX II: Isolated Find Descriptions	24

LIST OF FIGURES

		PAGE
Figure 1.	Project area location and historic tribal territories	2
Figure 2.	Proposed Palmdale International Airport showing areas surveyed in 1973, archaeological sites and isolated finds located in 1980 survey, and disturbed areas	3
Figure 3.	Site NA16,333 (LAn-1062)	23

LIST OF PLATES

Plate 1.	Joshua tree woodland community	6
Plate 2.	Shadscale scrub community	6
Plate 3.	View NNW of NA16,333 site area. Lithic concentration located on either side of creosote bush (left), cobble mano located in front of tallest joshua tree on horizon, and corral area located to right of joshua tree in foreground.	22
Plate 4.	Isolated granitic cobble grinding slab (IF-1) located 125 m south of NA16,333 (pencil for scale).	25
Plate 5.	Isolated bifacial mano and mano fragment (IF-6) (pen for scale).	25

ABSTRACT: In January of 1980, the Museum of Northern Arizona conducted an archaeological survey of portions of the proposed Palmdale International Airport site near Palmdale, California. This project is a follow-up of a previous archaeological survey conducted by Eggers, Robinson, and Forbes in July of 1973. The 1973 survey was responsible for the coverage of 24% (ca. 4,108 acres) of the proposed airport site. The remaining 76% (ca. 13,142 acres) of the site was investigated during the 1980 survey, in compliance with the request of the Federal Aviation Administration, the Advisory Council on Historic Preservation, and the Office of Historic Preservation, State of California.

Objectives and methods are outlined and results are discussed in this report. The survey revealed that few prehistoric remains or historic properties exist within the proposed airport site, and those that do occur do not meet the criteria for inclusion or nomination to the National Register of Historic Places. Further, the archaeological resources located during the 1980 survey will not be directly impacted by the proposed airport construction.

INTRODUCTION

The proposed Palmdale International Airport site is located in the western Mohave Dersert, in the southeastern portion of Antelope Valley, directly northeast of Palmdale, California (Figure 1). The study described in this report deals primarily with areas surrounding the zones of primary impact (see Figure 2) previously investigated (Eggers, Robinson and Forbes 1973).

At the request of Arthur D. Little, Inc., San Francisco, the Museum of Northern Arizona (MNA) initiated archaeological investigations of portions of the proposed airport site in January of 1980. The survey project was initiated by a letter from William Ollinger, Arthur D. Little, Inc., dated January 2, 1980. The project was administered by Donald E. Weaver, Jr., Director, Archaeological Contract Section, MNA, and Ollinger. The actual field investigations were conducted by Steven G. Dosh with the assistance of Carl Halbirt, Deborah Pechin, Jim Huff, Clara Gualtieri, and Deborah Dobbs.

ENVIRONMENTAL SETTING

The proposed Palmdale International Airport site, covering approximately 17,250 acres, is located directly northeast of the city of Palmdale, Los Angeles County, California. The project area lies within the extreme western portion of the Mohave Desert, part of the Basin and Range Province (Hunt 1967:6-9, 310-311, 318-319; Jaeger 1951:123-141).

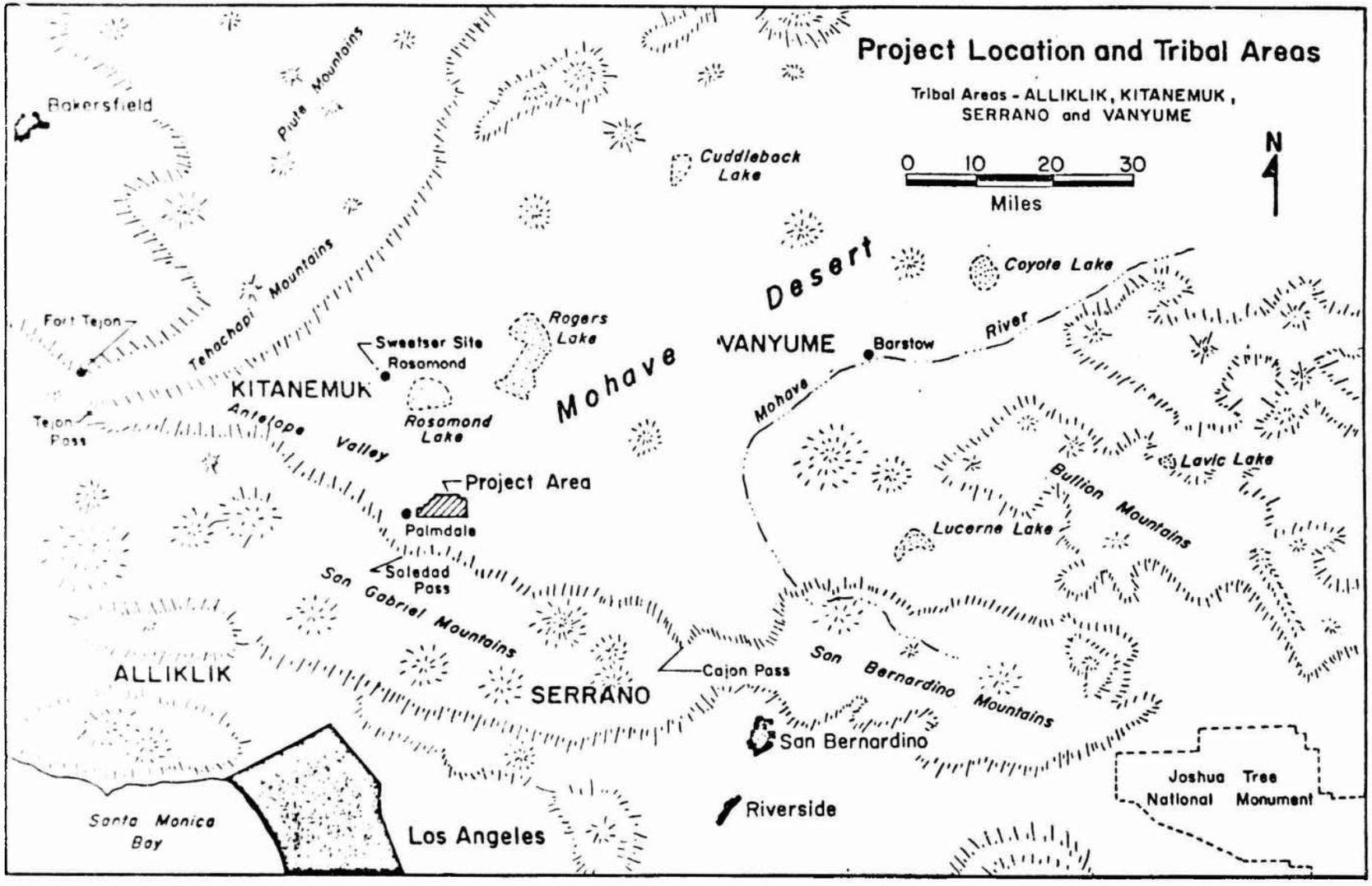


Figure 1. Project area location and historic tribal territories.

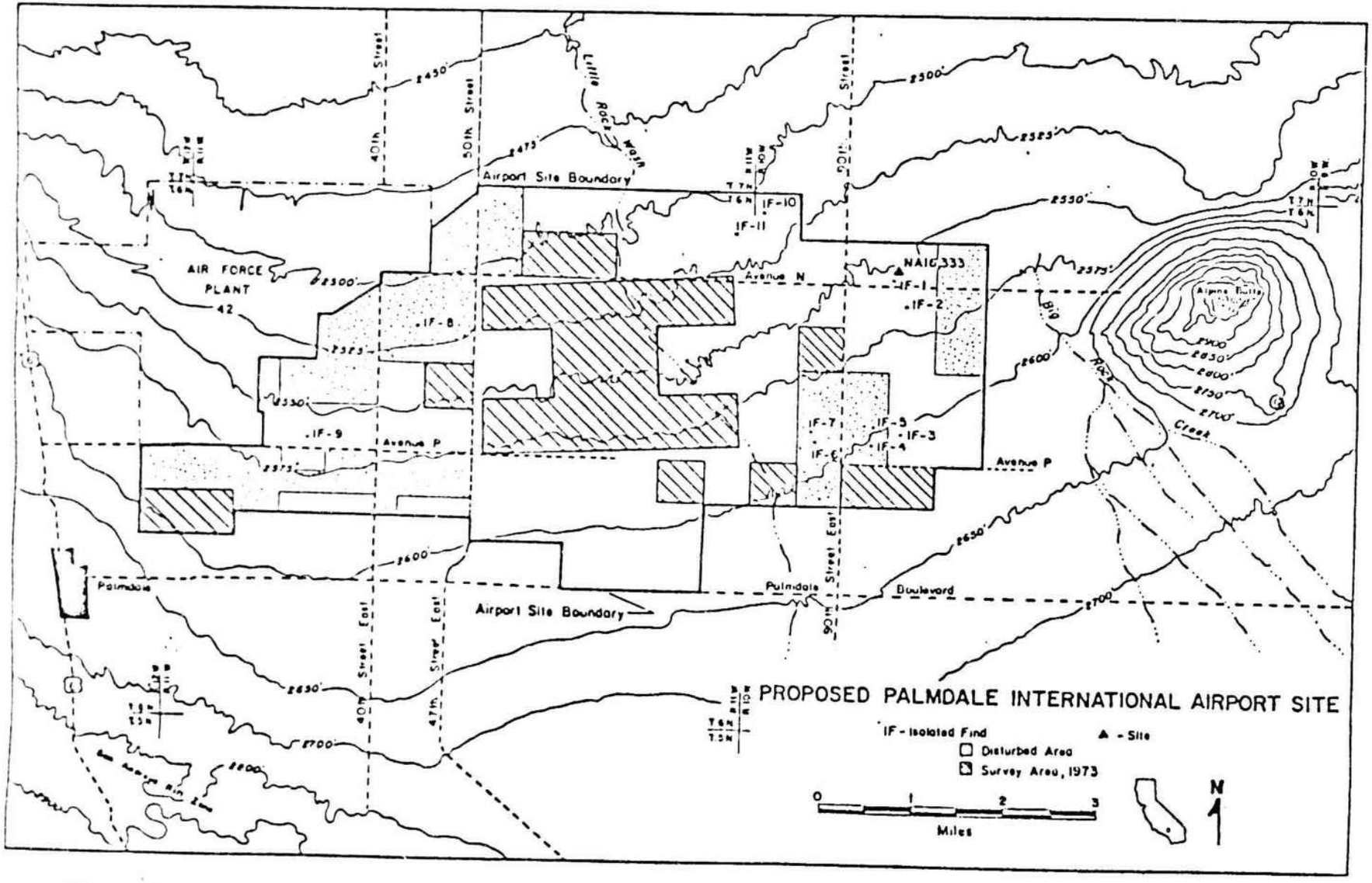


Figure 2. Proposed Palmdale International Airport showing areas surveyed in 1973, archaeological sites and isolated finds located in 1980 survey, and disturbed area.

Geology

The proposed airport site is situated on the gently sloping but relatively flat piedmont bajada, of Cenozoic age, formed by the overlapping alluvial fans derived from the northern slopes of the San Gabriel Mountains, an intrusive granitic landform of Mesozoic origin. These alluvial deposits occur throughout the proposed airport site as fine to moderate grained sands mixed with fine to coarse grained granitic gravels. The major drainages responsible for the transport of these sediments into the project area include Armagosa Creek to the west, Little Rock Wash, and Big Rock Creek to the east. It has been suggested that tectonic uplift, like that which occurs along the San Adreas Rift Zone, at the foot of the San Gabriel Mountains, might be responsible for channel incision of alluvial fans in addition to changes in the loci of deposition (Cooke and Warren 1973:184-5). This may be the case for the project area. On top of the alluvium, aeolian deposited silty-sands occur as small to moderate-sized transverse and tied dunes (Butzer 1964:191-192), the latter of which develop in the lee of obstacles such as vegetation. Dunes occur primarily adjacent to drainages, particularly east of Little Rock Wash.

It is evident that the project area has undergone several geological changes, particularly with respect to erosional and depositional processes that have acted on the area, and quite possibly the archaeological record, for several millennia. Although such long-term affects are difficult to evaluate, one recent process had dramatically altered much of the projecc area surface. Numerous large areas within the proposed project boundaries have undergone relatively recent (1900-1970) intensive modification related to agricultural activities. These disturbed areas, approximately 1/3 of the total acreage surveyed in 1980 (see Figure 2) have been partially leveled, ripped, and plowed. The original surface characteristics of the land have thus been substantially altered, and the archaeological record has also undoubtedly been affected.

Climate

Climatic conditions within the project area are typical of the southwestern deserts. Extreme fluctuations in temperature with very high summer temperatures (up to 118°F in August), an excess of potential evaporation over precipitation, and the limited availability of surface water characterize the general project area.

Although located close to the Pacific Ocean, Antelope Valley receives very little precipitation (mean annual precipitation less than 10 in) because high mountains (San Gabriel, Piute and Tehachapi Mountains) block the moisture laden ocean air currents. What little precipitation

does fall rapidly sinks into the ground or collects in the numerous dry lakes which occur in the lower parts of the valley. No perennial streams occur within Antelope Valley, but several, including Big Rock Creek and Little Rock Creek, are perennial in the mountain foothills (Settle 1967:7-9).

Precipitation is variable in frequency, intensity and duration. The precipitation record in the Mohave Desert (Cooke and Warren 1973:18-22) reveals that runoff is more likely in winter because most heavy rainfalls occur during that season, when temperatures and evaporation are lower. Winter precipitation usually affects a large area due to its origin from Pacific air masses. Heavy summer precipitation, in contrast not only occurs more infrequently, but is also more localized.

Prevailing winds are westerly but there is a locally important spatial and temporal variation, the "Mohave Low", which produces distinct winter wind circulations (Cooke and Warren 1973:17).

Vegetation

Two principal plant communities of southern California (Munz 1974:4) are represented within the project area, the Joshua Tree Woodland (Plate 1) and the Shadscale Scrub (Plate 2). Plant species characteristic of the former community consist of Joshua Tree (Yucca brevifolia), creosote bush (Larrea tridentata), Silver Cholla (Opuntia echinocarpa), rabbitbrush (Chrysothamnus mohavensis) and Indian rice grass (Oryzopsis hymenoides). This community occurs primarily in aeolian dune areas, adjacent to drainages. Species characteristic of the latter community include: sagebrush (Artemisia tridentata), four-wing saltbush (Atriplex canescens), jointfir (Ephedra fasciculata), snakeweed (Gutierrezia microcephala), and fescue grass (Festuca sp). The Shadscale Scrub occurs in lower regions adjacent to the Joshua Tree Woodland community and away from drainages. Often, both communities are represented in a single area.

Intrusive plant species which occur scattered throughout the project area and concentrated in old and recently plowed fields include Russian Thistle (Salsola iberrica), tansy mustard (Sophia incisa) and tumble mustard (Norta altissima).

Modern Fauna

Species of animals observed within the project area are typical fauna of desert environments. Mammals include jackrabbits (Lepus californicus), cottontails (Sylvilagus sp.), gray fox (Urocyon cinereoargenteus), coyotes (Canis latrans), ground squirrels (Citellus sp.), and kangaroo rats (Dipodomys sp.). Species of the Class Aves

Plate 1. Joshua tree woodland community.

(birds) include burrowing owls (Spetyto cunicularia), song sparrows (Melospiza, melodia), roadrunners (Geococcyx californianus), redtail hawks (Buteo borrealis), gambel quail, robins and ravens. Few reptiles were observed during the daylight hours, those being lizards and gopher snakes (Pituophis catenifer).

It is difficult to relate the modern environmental setting to the conditions of the distant past since the paleoenvironment of Antelope Valley, and the southern California desert areas in general (King 1975: 17-18), are little known. However, the presence of numerous dry lakes (Rosamond, Rogers, Mirage, etc.) within the valley indicates a more moist, and perhaps cooler, climate at some time in the past. The dry lake origins, generally associated with widespread glaciation to the north, probably predate man's arrival in southern California; but there is evidence to suggest that the lakes were still in existence during the earliest periods of human occupation. Extinct megafauna, including bison, horse, camel, and mammoths, inhabited the lakeshores and were probably hunted by early man. Obviously, the environment has changed dramatically from that early period, but we only have a vague general outline of the changes which produced today's arid and relatively inhospitable situation. Until more specific studies provide the data required to reconstruct a reliable paleoenvironmental sequence, it will be extremely difficult to relate prehistoric cultural manifestations to their associated environments.

PREHISTORY AND HISTORY OF ANTELOPE VALLEY

Introduction

As discussed elsewhere (Eggers, Robinson and Forbes 1973:13-17), archaeological research into the prehistory of Antelope Valley is just beginning. Even though only a relatively small portion of the valley, approximately 15%, has been surveyed for prehistoric sites, a number of general tendencies have already emerged. Large settlements, long-term campsites, and heavily used special activity sites seem to be primarily located in the foothills of the Tehachapi Mountains to the northwest and the foothills of the San Gabriel Mountains to the south. Small short-term campsites and special activity sites occur scattered throughout the valley, but are primarily located along dry lake margins, on the lower slopes of valley buttes, and along the larger valley drainages (Eggers, Robinson and Forbes 1973:25-26). Interestingly, this pattern is similar to the pattern exhibited by the early historic aboriginal occupants of Antelope Valley. Unfortunately, even though a broad general pattern is emerging, chronological control is sadly lacking at most Antelope Valley prehistoric sites (Glennan 1971:28).

Only one important Antelope Valley site has been reported in detail. The Sweetser site (KER-302) occupation has been tentatively placed some time between 2,000 and 4,000 years B.C. Located about 3 mi

northwest of Rosamond and approximately 20 mi north of Palmdale, the site was probably a semi-permanent camp from which small groups of hunters and gatherers exploited the surrounding countryside. Its strategic location allowed easy access to both the Tehachapi Mountain foothills and canyons to the northwest and the desert lowlands to the south and east (Glennan 1971:28-30).

On a broader regional scale, as recently as the 1930s practically nothing was known of the prehistory of the southern California deserts. Since that time several significant discoveries have been made and a relatively large body of data has been accumulated (King 1975:30-41). However, archaeological investigations of these deserts have been largely confined to survey work, thus chronological sequences have been established primarily from typological studies of artifacts collected from the surface of archaeological sites. Wallace (1962:173-178) has proposed four broad time periods, associated with climatic changes and characterized by specific cultural assemblages. Although other sequences have been developed and Wallace's proposed dates have been revised by King (1975: 34), Wallace's general scheme seems to be the most useful for this study.

Period I: Lake Mohave

The earliest certain remains attesting to human occupation in the southern California deserts date from postglacial times and come from the shorelines of ancient Lake Mohave, in the center of the Mohave Desert (Campbell, et al 1937).

At this time small bands occupied the margins of Lake Mohave and other late Pleistocene lakes of the Mohave Desert, such as Owens Lake (Antevs 1952:38), Little Lake (Harrington 1957:54), and more locally, Rosamond and Rogers Lakes (Glennan 1971:5). Material culture recovered from sites dating to the Lake Mohave period reveal that stone assemblages consisted of a varied assortment of flake scrapers and crude perforators, choppers, pebble hammers, abraders, and heavy, well-flaked Lake Mohave projectile points (Amsden 1937:80-88). There is also a noticeable lack of pecked and ground stone implements.

As the Lake Mohave implements are predominantly those designed for hunting and associated activities, such as butchering and scraping hides, it can be surmised that hunting was the major subsistence emphasis. The near absence of food processing implements suggests that the gathering of wild vegetable foods played a minor role in the day to day life of these desert dwellers.

On the basis of fairly conclusive evidence, it is generally agreed that Lake Mohave period sites date from the time when Lake Mohave had

reached its maximum size and stood at its highest level (Brainerd 1953). This is assumed by Wallace (1962:174) to have occurred during the closing phase of the last glaciation lasting apprxomately from 7000 to 5000 B.C.

Period II: Pinto Basin

An apparent gap in the archaeological record exists following the Lake Mohave period, according to Wallace (1962:175-176). During this time interval, between 5000 and 3000 (or 2500) B.C. hot, dry conditions prevailed which directly affected the inhabitants of the land surrounding the drying Pleistocene lakes. No cultural remains have been found which clearly demonstrate that human habitation continued in the deserts during this prolonged drought.

Following this arid phase, climatic conditions reversed and increased rainfall once again attracted prehistoric settlement in the area. Apparently the area supported a heavier population than during earlier periods, since numerous large campsites have been discovered. The best documented finds of this period come from Pinto Basin (Campbell and Campbell 1935) located in the southeastern portion of the Mohave Desert. The most abundant and distinctive artifacts recovered from the surface of these sites are the Pinto projectile points, marked by narrow shoulders and concave bases. Implements related to wild vegetable food processing occur in relatively small numbers. Assemblages of tools showing a typological affinity to Pinto Basin forms occur over practically the entire desert country of southern California.

Evidently subsistence during this time period, tentatively dated from 3000 or 2500 to 1 B.C., was derived from a combination of hunting and gathering activities, forcing frequent movement on the inhabitants.

Period III: Amargosa

Little is known of the inhabitants of the southern California deserts for the interval between the end of the Pinto Basin occupation (ca. A.D. 1) and the time of the appearance of the ancestors of the modern Yuman and Shoshonean-speaking Indians (ca. A.D. 1000). Archaeological remains attributable to this period are either few in number or, for some reason, have eluded discovery.

Two poorly defined phases have been assigned to this period (Wallace 1962:176-177). Only a few details concerning Phase I are known. Projectile points characteristically are broad, corner-notched dart tips with squared bases, similar to Basketmaker points from the Southwest.

Habitation sites during this initial phase of the Amargosa period are described as being situated on the margins or bottoms of dry lakes or on low rises of land near waterholes.

More is known of the second phase of the Amargosa period. Distinctive assemblage characteristics include long slender, corner-notched projectile points which later give rise to arrowheads, superseding the dart points characteristic of Phase I. Grinding implements associated with wild vegetable food processing became more abundant during Phase II. Campsites are situated on sandy terrain in the vicinity of waterholes or around playas where water could still be obtained by digging.

Period IV: Prehistoric Shoshonean and Yuman

Habitation sites dating from this period occur in relative abundance throughout the entire desert region of southern California and frequently contain a variety of cultural materials. Distinctive artifacts of this period include triangular arrowpoints, milling stones, and locally manufactured pottery. Local pottery of this time period includes two distinct traditions. The northern, rough-textured wares (Owens Valley Brown) of the Mohave Desert region and the southern, thinner, smooth-textured wares (Tizon Brown) of the Colorado Desert. The latter tradition exhibits close similarities to ceramic wares of the Colorado River Valley and upland northern Arizona.

The late desert artifact assemblage reflects an economy centering around wild plant food gathering. Aside from sherds, grinding implements constitute the most common artifacts on sites dating to this period. Artifacts associated with hunting activities are comparatively rare and those that are found exhibit an emphasis on the hunting of small game, such as rabbits. This subsistence pattern required a highly mobile existence, small bands traveling from one locale to the next to harvest ripening wild crops.

Late prehistoric settlements are generally situated among sand dunes, around boulder clusters, beneath rock overhangs, or in other spots protected from the wind and at a convenient distance from springs or waterholes.

Historic Period

Historically the project area and the surrounding region were occupied by Shoshonean speaking Indians; specifically the Kitanemuk in the Palmdale area and to the northwest, the Vanyume to the northeast, the Serrano to the southeast, and the Alliklik to the southwest.

Kroeber (1976:611-619) included all four groups in the northern section of the southern California Shoshoneans or the Serrano Group. Although they were all hunters and gatherers, the Vanyume were desert dwellers, while the Kitanemuk, Alliklik, and Serrano were primarily foothill dwellers who occasionally utilized the desert.

Since their aboriginal cultural patterns were largely disrupted before they could be studied by trained observers, the early Kitanemuk and Vanyume are primarily known through their presumed similarities to other southern California desert and foothill Indian groups. The culture of southern California Indian groups has been described in considerable detail by Underhill (n.d.), Strong (1929), and others (Heizer 1978).

Groups were subdivided into small bands, usually consisting of less than 100 people. Bands occupied specific territory within which they hunted and gathered on a relatively stable repetative seasonal round, moving frequently to take advantage of ripening wild plant foods and locally abundant game. In the foothills pinyon nuts and acorns were the staples, while in desert areas mesquite beans were of primary importance. Material possessions tended to emphasize efficiency and portability. Large items, such as milling stones, were often left at a favorite camping spot for use during the next visit. Social and political organization was based almost exclusively on kinship ties.

Prior to 1769 there are no records of European or anglo visits to the general region of Antelope Valley. However, with the establishment of the first California Spanish mission at San Diego, travel in and around the area increased dramatically, with European, Mexican and American groups passing through the general project area between 1769 and the late 1840s (Settle 1967:6-7). The early sporadic visits had little direct affect on the native populations but by the mid 1800s most of the Indians had been removed to nearby missions or were concentrated around the few nearby permanent anglo settlements, including Fort Tejon (1854-1863) near present day Lebec.

The first settlers came into the area in the 1860s and chose the Elizabeth Lake region and the southern foothills of the Tehachapi mountains for their ranching activities. In 1876 the Southern Pacific Railroad Company completed a line through Antelope Valley. After this date the towns of Lancaster, Palmdale and Rosamond grew along the railroad (Settle 1967:16). The first settlement of Palmdale was about 2 mi east of the present town. New Palmdale started when the Southern Pacific Railroad line came through (Settle 1963:61-2).

From 1880 to 1910 the cattle industry in Antelope Valley had reached its peak and many thousands of head of cattle roamed the valley.

During the early 1880s the valley lost almost half of its approximately 30,000 head of antelope due to unusually heavy snows in the surrounding mountains and valley floor and the disruption of normal herd patterns by the construction of the Southern Pacific Railroad (Settle 1963:62).

For years farmers had relied on water from artesian wells to water their crops. After the turn of the century the farming industry picked up with the advent of the gasoline-powered water pump. This marked the beginning of the great alfalfa industry which was to make Antelope Valley one of the biggest producers of alfalfa in California. During Theodore Roosevelt's Reclamation Period, 1905-1913, the Los Angeles-Inyo Aqueduct was constructed across the Valley. In 1914 the Pacific Light and Power Company brought the first electric power lines into the Valley and since that time Antelope Valley has undergone a steadily increasing urbanization process.

OBJECTIVES

The primary management objective of this study was to conduct an intensive on-the-ground, non-exclusive deployed survey (King 1978:36-37) of the remaining unsurveyed area of the proposed Palmdale International Airport site. The survey was to be augmented by background research and documented with a final report recounting the results of that field study. During the survey both prehistoric and historic cultural resources were to be considered and where appropriate, recorded resources were to be evaluated for eligibility for nomination to the National Register of Historic Places. The report was to provide basic background data for an environmental evaluation of the proposed project.

From an archaeological perspective, the survey was designed primarily to provide basic data related to prehistoric and historic settlement patterns, i.e. the nature and function of sites and the distributional patterns of those sites. Since the survey was accomplished under a no-collection policy and large portions of the project area had previously been highly disturbed, site function was to be determined by field examination of surface artifacts and observable features. Expectations related to site distributions were derived from the ethnographic models for both aboriginal sites (both prehistoric and historic) and non-aboriginal sites (historic).

METHODOLOGY

For the purpose of this study, sites were defined as those cultural manifestations which displayed attributes of patterned human behavior (i.e. tool manufacturing, food processing, habitation, etc.) discerned through the interpretation of artifact and/or feature density, distribution, and patterning. In order to make this definition operational, a

manifestation dominated or exclusively consisting of artifacts must have a maximum density of at least 5 artifacts within one square meter within the larger artifact containing area to be classified as a site. Excluded from this definition, are those manifestations that are considered to be isolated finds (i.e. one mano, one grinding slab, two flakes, three sherds, etc.), generally in areas less than one square meter. Isolated finds were to be recorded, mapped, and listed in the final report. In addition some cultural manifestations without artifacts exhibit very definite patterned behavior, and these manifestations (petroglyphs, bedrock mortars and metates, trails, etc.) were also to be designated as sites.

The site definition discussed above is only one of many that could have been used (King 1978:2-3). It should be noted here that the definition appears to be workable in the study area and, like all definitions, was subject to modification if specific situations demanded modifications.

The archaeological field investigations of the remaining unsurveyed 13,142 acres of the proposed Palmdale International Airport was conducted from January 18 through 28, 1980. It was accomplished by walking contiguous transects across sections of the proposed site. Limits of the survey area were defined from Figure 6 of the Eggers, Robinson and Forbes report (1973:32). These boundaries were plotted on USGS, 7½ minute series, quadrangle maps utilized by the survey crew during the investigations.

The entire project area encompasses portions of Sections 4 through 9 and 16 through 20, T6N, R10W, Sections 1 through 4 and 8 through 26, T6N, R11W, and Section 24, T6N, R12W, as shown on the USGS, 7½ minute, quadrangles, Alpine Butte, Littlerock, Palmdale, Lancaster East, Calif., and Figure 2. Since the areas to be surveyed occurred outside of the direct impact area, less stringent survey methods than those used for the direct impact area were warranted. Crew members therefore were deployed at roughly even intervals 30 to 60 m apart depending on the density of vegetative cover in particular areas. Recommendations for future research in the area (Eggers, Robinson and Forbes 1973) suggested that the areas between 75th and 105th streets, north of Avenue P, in close proximity to known sites at the Big Rock Creek drainage, be intensively surveyed prior to construction activities. Within these areas crew members were spaced at 25 to 30 m intervals.

The six crew members maintained parallel, contiguous transects with the aid of compasses set at north/south or east/west bearings. Streets and avenues located within the survey area served as reference markers. In order to avoid overlapping of sweeps or gaps between sweeps, the crew member on the outside position (furthest from the point of origin) was responsible for guiding the crew, from the inside position, on the

following sweep. Approximately 1200 acres (ca. 2 sq mi) were surveyed per day, equivalent to 60 transects or 10 sweeps, one mile in length.

When archaeological materials were encountered, crew members noted their positions, then all crew members investigated the area around the archaeological materials in order to determine the extent of the find. If the finds (artifacts and/or features) were determined to exhibit some patterned behavior (i.e. met the site criteria discussed previously) they were designated as sites. Isolated materials were designated as isolated finds. These were photographed, described and plotted on the USGS, 7½ minute series, quadrangle maps. Archaeological sites on the other hand were documented on the standard MNA Site Survey Record-Extended Form where logistics, site type, geology, and vegetation were described. Furthermore sites were photographed and site sketch maps prepared.

RESULTS

This survey project revealed that few archaeological materials and/or features and no historic properties dating to 1930 or earlier occur within the 1980 survey portion of the proposed airport site. Only one site, designated as NA16,333 (Figure 2 and Appendix I), was recorded during the investigation. This site is a sparse lithic scatter including less than fifteen chert and chalcedonic secondary decortication and interior flakes (artifacts associated with secondary reduction in tool manufacturing) in addition to one unmodified unifacial, cobble mano of granite. An isolated granitic grinding slab (metate), designated as Isolated Find (IF) 1, was encountered approximately 125 m south of the site. This, along with the cobble mano suggest that food processing, as well as minimal amounts of tool manufacturing may have been conducted in the area. Adjacent to the site are the remnants of a house foundation and corral area containing trash dating to the 1940s and 1950s. No discoloration of the soil or features were observed in association with the lithic component. Since the site occurs outside of the direct impact area of the proposed airport site and, there were no indications whatsoever of subsurface features or cultural deposits, it was decided that subsurface testing was not warranted. The site appears to be the sparse remnants of a few brief chipping incidents.

Other isolated finds recorded during the survey (Figure 1 and Appendix II) are primarily grinding implements (manos and slab metates). Isolated percussion flakes (concoidally fractured) and cores from which flakes had been removed were also recorded but in fewer numbers.

With the exception of one grinding slab fragment and one core (IF-8 and IF-9), observed in areas west of Little Rock Wash, archaeological materials appear concentrated in the dune regions east of Little Rock Wash and west of Big Rock Creek, particularly between Avenues N and P.

Isolated finds recorded during the previous survey (Eggers, Robinson and Forbes 1973) of the proposed airport site, in contrast, are concentrated west of Little Rock Wash.

Records and site file searches (Eggers, Robinson and Forbes 1973: 26-29) and literature reviews (Heizer 1976; Heizer, Elsasser and Clewlow 1970) pertaining to the general project area revealed that no previously record archaeological materials or sites are known to exist within the project boundaries. Furthermore, this area does not contain any historical landmarks* and no sites listed in or nominated to the National Register of Historic Places occur within the project area.

CONCLUSIONS AND RECOMMENDATIONS

Upon completion of the archaeological survey of the proposed Palmdale International Airport site two general areas were considered potentially archaeologically important. These areas, centered around Avenue N and 90th Street, and Avenue P and 90th Street, contain the highest concentrations of archaeological materials observed within the study area. It should be noted that these concentrations are dominated by widely spaced isolated finds and not sites.

The former concentration, centered around Avenue N and 90th Street contains the only archaeological site encountered during the investigations. The site, designated as NA16,333 (Appendix I), contains less than 15 pieces of chipped stone debitage and an unmodified cobble mano. Isolated Finds (IF) 1 and 2, grinding slabs, recorded just south of NA16,333 may be associated with the brief occupation of the site. Two other isolated finds (10,11) were recorded downslope from NA16,333 approximately 1¼ mi West-Northwest. These finds, a core and three flakes, and a single flake, may not be associated with the occupation of NA16,333, however they do occur, like NA16,333 and IF 1 and 2, along the same intermittent drainage. Archaeological sites are known to occur around Alpine Butte (Eggers, Robinson and Forbes 1973:Figure 5) so the archaeological material recorded during this survey, including NA16,333, may represent the peripheral area of the Alpine Butte "archaeological district".

The second concentration defined by the survey occurs in areas which have been altered by agricultural activities (i.e. plowing and

*Letter of correspondence, dated June 4, 1976, from Barbara L. Wight, Chairman, County of Los Angeles Historical Landmarks Committee to William Ollinger, A.D. Little, Inc.

ripping). Since the isolated finds (all grinding implements) are not in situ, little can be inferred about their relationships to one another. It seems safe to assume however, that the artifacts were in the area prior to the disturbances of the ground surface, but whether they were once part of a site or a site cluster, or isolated artifacts left behind in special activity areas utilized for wild food processing by the inhabitants of Alpine Butte sites is not demonstrable.

The settlement pattern data recorded during this project suggests that aboriginal occupation of the area was limited to small groups primarily involved in gathering and processing wild plant foods. Use of the area was probably seasonal, of very short duration, and possibly directly related to more permanent occupations which have been reported in nearby areas around the base of Alpine Butte and in the foothills of the San Gabriel Mountains. The general pattern appears to be very similar to that of the historic Indian tribes of the general vicinity. Non-aboriginal occupation prior to 1900 was apparently limited to activities which left no evidence. Farming activities subsequently modified much of the project area, but intensive long-term occupation occurred in only a few locales and evidently only after 1940.

In summary, the cultural resources recorded during both archaeological surveys indicate a pattern of scattered occupations, in both the prehistoric and historic periods. Whether this is the case for areas surrounding the proposed airport site is uncertain, however it is certain that few cultural resources occur within the proposed airport site.

Based on the established criteria (36 CFR 60.6) the site recorded during the survey does not appear to qualify for National Register nomination. The potential data content of the site is so low that recovery or potential recovery of important information relevant to the history or prehistory of California is extremely unlikely at the site. No diagnostic materials either cultural or chronological were observed at the site. The low number of total surface artifacts (fewer than 15) and the complete lack of indications of subsurface cultural material suggests that any cultural patterns will be extremely difficult to detect and of little scientific value.

Several recent studies (i.e. Tainter 1979) have emphasized the importance of "light, ephemeral scatters of non-architectural debris" and NAl6,333 was evaluated with that development in mind. It should be noted here that Tainter's study dealt with two sites which not only contained culturally and chronologically diagnostic materials, as well as subsurface material, but also a very large number (1570 at one site) of morphologically variable artifacts which could be analyzed in some apparently meaningful way. NAl6,333, by comparison, is virtually devoid of any archaeological data content.

In summary NA16,333 does not qualify for nomination to the National Register of Historic Places since it does not meet the established criteria. In addition the site does not appear to be relevant to either current problem orientations (Raab and Klinger 1977) or have the potential for incorporation into future problem orientations (Sharrock and Grayson 1979:327).

POSSIBLE IMPACTS FROM THE PROPOSED ACTION

On the basis of the 1973 survey (Eggers, Robinson and Forbes) and the work reported here, construction of the proposed airport and related ancillary facilities will not directly disturb archaeological features (prehistoric or historic) of significance. The site designated NA16,333 is located in an area not proposed for airport development as noted in the 1978 EIS, IVF4, pg. IV2A6 (east of 80th Street East between Avenues M-8 and P-8). Similarly all of the isolated finds except Numbers 8 and 9 are outside the area of actual airport development.

Other areas, outside the proposed airport boundary, containing recorded sites (Figure III-16, 1978 EIS) could be adversely impacted if not properly protected at the time of development. It is noted, however, that most of the future development is expected to occur either west of Lancaster and Palmdale, or east of Lancaster and north of Palmdale on a more limited basis, and generally away from these sites. Similarly, some development will occur in the foothill areas west of Palmdale and near or in the locations identified as sensitive areas in the North Los Angeles County General Plan.

MITIGATION ACTIONS

A set of mitigating actions were proposed in the 1978 EIS for the Palmdale International Airport. These actions, described in Section IIIB4(e) would still apply other than the recommendation for a more extensive field survey of the proposed site. That recommendation has already been carried out, as described in this report.

Areas outside the airport are proposed to be protected as stated in the North County Plan and included in the 1978 EIS, Section IIIB3f(3).

REFERENCES CITED

Antevs, Ernst
1952 Climatic history and the antiquity of man in California. In "Symposirum on the antiquity of man in California". Reports of the University of California Archaeological Survey, No. 16, pp. 23-9. Berkeley.

Brainerd, G.W.
1953 A re-examination of the dating evidence for the Lake Mohave artifact assemblage. American Antiquity, Vol. 8, No. 3, pp. 270-1, Salt Lake City.

Butzer, Karl W.
1964 Environment and archaeology, an introduction to Pleistocene geography. Aldine Publishing Company, Chicago.

Campbell, Elizabeth W.D.; and William H. Campbell
1935 The Pinto Basin site. Southwest Museum Papers, No. 9, Los Angeles.

Campbell, Elizabeth W.C., et al
1937 The archaeology of Pleistocene Lake Mohave. Southwest Museum Papers, No. 11. Los Angeles.

Cooke, Ronald U., and Andrew Warren
1973 Geomorphology in deserts. University of California Press, Berkeley and Los Angeles, California.

Eggers, A. Van Dusen; Roger W. Robinson; and Charles F. Forbes
1973 A preliminary archaeological investigation of the proposed site for the Palmdale International Airport, Los Angeles County, California. Unpublished Ms. submitted to Arthur D. Little, Inc., San Francisco.

Glennan, William Stuart
1971 A glimpse at the prehistory of Antelope Valley. Archaeological investigations at the Sweetser site (KER-302), the Kern Antelope Historical Society, Rosamond, California.

Harrington, Mark R.
1957 A Pinto site at Little Lake, California. Southwest Museum Papers, No. 17. Los Angeles.

Heizer, Robert F.
1976 The Indians of California, a critical bibliography. Indiana University Press, Bloomington.

1978 California Handbook of Northern American Indians, Vol. 8, Smithsonian Institution, Washington, D.C.

Heizer, Robert F.; Abert B. Elsasser, and C. William Clewlow, Jr.
1970 A bibliography of California archaeology. Contributions of the University of California Archaeological Research Facility, No. 6, Berkeley.

Hunt, Charles B.
1967 Physiography of the United States. W.H. Freeman, San Francisco.

Jaeger, Edmund C.
1957 The North American deserts. Stanford, California.

King, Thomas F.
1975 Fifty years of archaeology in the California Desert: an archaeological overview of Joshua Tree National Monument. Western Archaeological Center, National Park Service, Tucson, Arizona.

1978 The archaeological survey: methods and uses. Heritage conservation and recreation Service. U.S. Department of the Interior, Washington D.C.

Kroeber, A.L.
1976 Handbook of the Indians of California. Dover Publications, New York.

Munz, Philip A.
1974 A flora of southern California. University of California Press, Berkeley and Los Angeles, California.

Raab, L. Mark and Timothy C. Klinger
1977 A critical appraisal of "Significance" in Contract Archaeology. American Antiquity 42:4:629-634.

Settle, Glen A., ed.
1963 Here roamed the antelope. The Kern Antelope Historical Society, Inc., Rosamond, California.

1967 Along the rails from Lancaster to Mojave. Kern-Antelope Historical Society, Lancaster, California.

Sharrock, Floyd W. and Donald K. Grayson
1979 "Significance" in Contract Archaeology. American Antiquity 44:2:327-328.

Strong, William Duncan
1929 Aboriginal Society in southern California. University of California Publications in American Archaeology and Ethnology, Vol. 26, Berkeley.

Tainter, Joseph A.
1979 The Mountainair lithic scatters: settlement patterns and significance evaluation of low density surface sites. Journal of Field Archaeology 6:4:463-469.

Underhill, Ruth
n.d. Indians of southern California. Sherman Pamphlets, No. 2, Haskell Institute, Lawrence, Kansas.

Wallace, W.J.
1962 Prehistoric cultural developments in the southern California deserts. American Antiquity, 28:172-180.

APPENDIX I

SITE DESCRIPTION

NA16,333 - Calif.QQ:5:1(MNA) (LAn 1062)

Location: NW¼ of the SW¼ of the SE¼ of Section 5, T6N, R10W, Los Angeles County, California. UTM 3832740 m N 412145 m E. Site is situated in a dune area on the western edge of a small intermittent drainage between Little Rock Wash and Big Rock Creek, north of Avenue N and east of 90th Street.

Elevation: 2552 ft (839 m).

Cultural Affinity: No unambiguous culturally diagnostic features or artifacts were observed on the site. The mano is similar to manos reported from the Sweetser site (Glennan 1971:7-8) but it also is similar to manos reported for ethnographic groups.

Temporal Placement: No unambiguous temporally diagnostic features or artifacts were observed on the site. The lithic debitage is not patinated, a characteristic which often suggests a very early occupation, pre-5000 B.C. The mano observed is unifacial, roughly oval and made from an unmodified granitic cobble, however these characteristics are not temporally diagnostic. Virtually the entire time span after A.D. 1 is characterized by use of such artifacts and they occur, admittedly in small numbers, even in the periods between 5000 B.C. and A.D. 1.

Description: Site consists of a fairly small, 40 m by 50 m, sparse chipped stone and ground stone scatter (Plate 3 and Figure 3). Lithic debitage consists of fewer than 15 interior and secondary decortication flakes, none of which appear to have been utilized. Raw materials represented in the chipped stone assemblage include white and beige cherts, white chalcedonies and jasper. One unmodified, granitic cobble, unifacial mano was observed ca. 40 m NW of the lithic debitage concentration. An unmodified, granitic cobble, grinding slab (metate), designated as IF 1, was observed approximately 125 m south of the debitage concentration. Just NE of the concentration, a house foundation and the remnants of a fence (chicken wire) corral associated with 1940s/50s trash were observed.

Recommendations: Site does not meet the criteria set forth for nomination to the National Register of Historic Places. Site should be avoided during all construction within the proposed airport site. If the site is to be impacted, it should be mapped in detail and the surface material collected. Subsurface tests could be conducted but the probability of subsurface material is extremely low.

Plate 3. View NNW of NA16,333 site area. Lithic concentration located on either side of creosote bush (left), cobble mano located in front of tallest joshua tree on horizon, and corral area located to right of joshua tree in foreground.

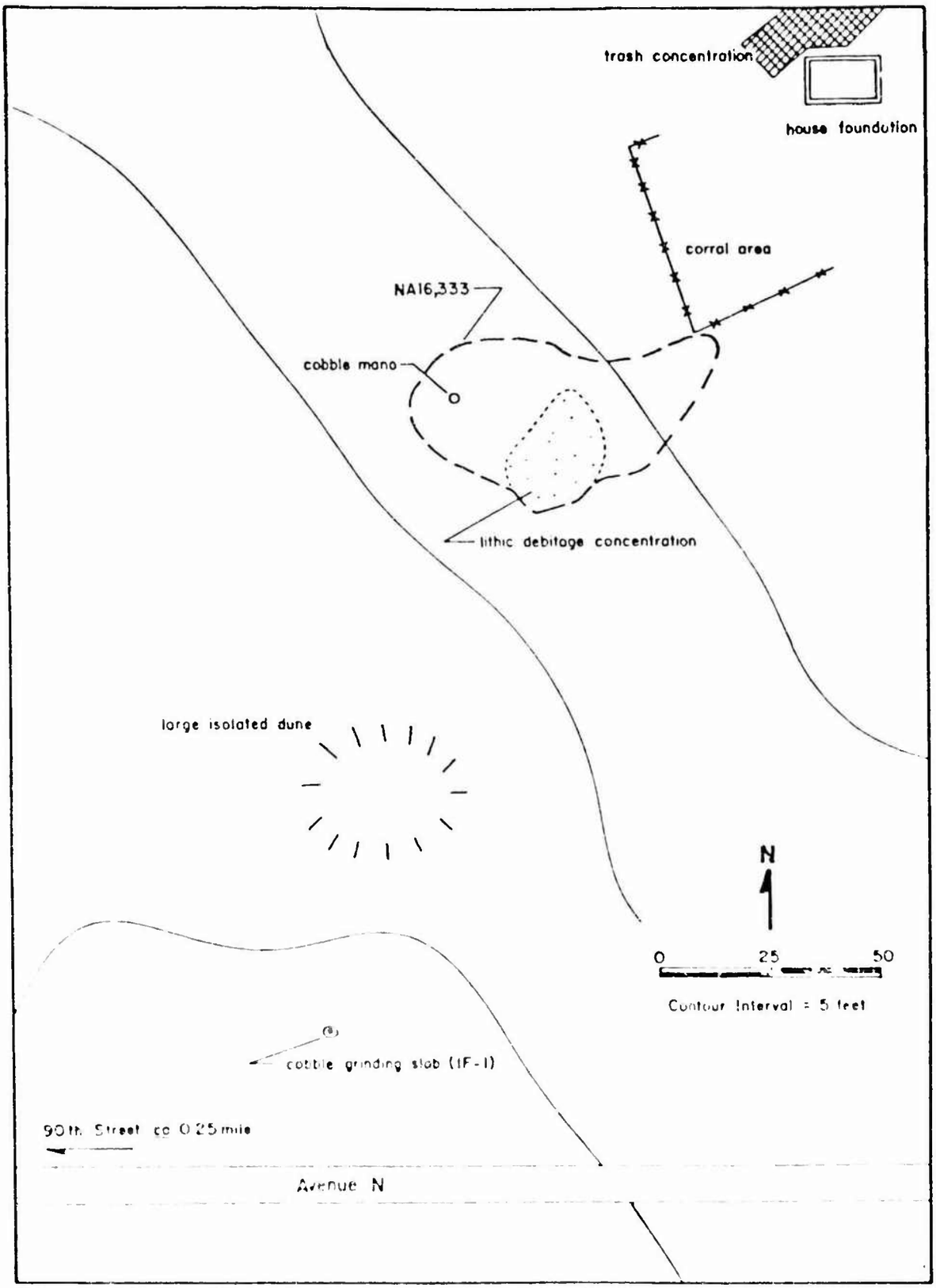


Figure 3. Site NA16,333 (LAn-1062).

APPENDIX II

ISOLATED FIND DESCRIPTIONS

Isolated Find 1: Grinding slab (metate), unifacial, granitic, unmodified cobble, ca. 25 cm by 20 cm (Plate 4). Located in the SW¼ of the SW¼ of the SE¼ of Section 5, T6N, R10W, approximately 125 m south of NA16,333.

Isolated Find 2: Grinding slab (metate) fragment, unifacial, granitic, unmodified cobble; white chalcedonic secondary decortication flake. Located in the SE¼ of the NW¼ of the NE¼ of Section 8, T6N, R10W, approximately ½ mi south of NA16,333.

Isolated Find 3: Mano, unifacial, quartzite sandstone, unmodified cobble, ca. 10 cm in diameter. Located in the SE¼ of the NW¼ of the SE¼ of Section 17, T6N, R10W.

Isolated Find 4: Grinding slab (metate) fragment, unifacial, granitic, unmodified cobble. Located in the NW¼ of the SE¼ of the SW¼ of Section 17, T6N, T10W.

Isolated Find 5: Pestle, granitic, unmodified cobble. Located in the NW¼ of the NE¼ of the SW¼ of Section 17, T6N, R10W.

Isolated Find 6: Mano, bifacial, granitic, may have been roughly shaped, subrectangular; mano fragment, bifacial, medium grained sandstone (Plate 5). Located in the NE¼ of the SW¼ of the SE¼ of Section 18, T6N, R10W.

Isolated Find 7: Three grinding slab (metate) fragments, unifacial, schist. Located in plowed field in the SE¼ of the NW¼ of the SE¼ of Section 18, T6N, R10W.

Isolated Find 8: Grinding slab (metate) fragment, unifacial, schist. Located in plowed field in the SE¼ of the SE¼ of the NW¼ of Section 9, T6N, R11W.

Isolated Find 9: Core, white chalcedony, ca. 7 cm by 5 cm. Located in the NW¼ of the SE¼ of the SW¼ of Section 17, T6N, R11W.

Isolated Find 10: Core and three flakes, cloudy quartz. Located in the SW¼ of the NW¼ of the NW¼ of Section 6, T6N, R10W.

Isolated Find 11: Flake, rhyolitic, secondary debitage. Located in the SW¼ of the SE¼ of the NE¼ of Section 1, T6N, R11W.

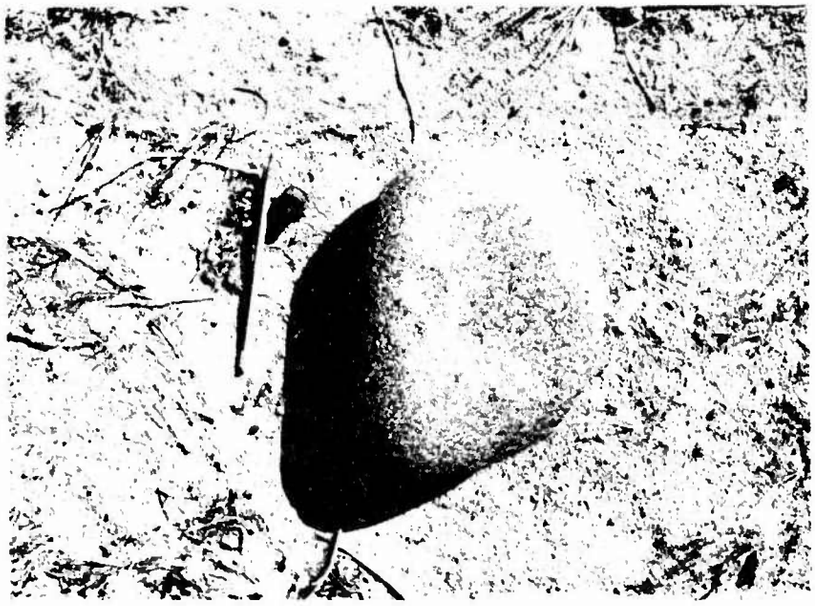


Plate 4. Isolated granite cobble grinding slab (IF-1) located 125m. south of NAlo,333. (pencil for scale).

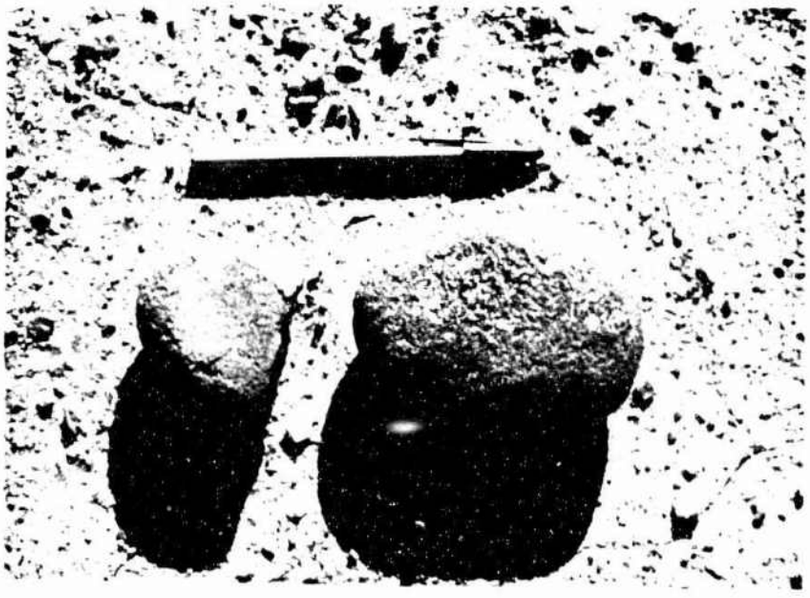


Plate 5. [illegible] (IF-2) [illegible].

DONALD E. WEAVER, JR.

Resume

POSITION Director, Archaeological Contracts Section

EDUCATION

Ph.D. Anthropology, Archaeology major, Arizona State University, 1978

M.A. Anthropology, Archaeology major, Arizona State University, 1972

B.S. Aeronautical Engineering, Tri-State College, Angola, Indiana, 1961

PROFESSIONAL EXPERIENCE

Director of the Archaeological Contract Section, Department of Anthropology, Museum of Northern Arizona, Flagstaff.
Responsible for coordinating and supervising all contract archaeology projects. 1977-present

Director of the Office of Cultural Resource Management, Department of Anthropology, Arizona State University.
Responsible for coordinating and supervising all contract archaeology projects. 1974-1977

Supervisor archaeologist for various projects, Department of Anthropology, Arizona State University. 1974

Field Supervisor of excavations in the Moche Valley on the north coast of Peru, South America, and Research Associate for the Chan Chan-Moche Valley Project of the Peabody Museum, Harvard University, funded by the National Geographic Society and the National Science Foundation. 1973-1974

Field Supervisor of excavations at Arizona T:7:27 (ASU), Hohokam site on the Agua Fria River. 1973

Organized and directed first Hohokam Symposium, co-sponsored by Arizona State University and Heard Museum, Phoenix, Arizona. 1973

Laboratory Director for large research project to investigate archaeological resources of Williams A.F.B., Arizona. 1972

Field supervisor of text excavations at Arizona U:10:24 (ASU), Hohokam site at Williams A.F.B., Arizona. (December 1972)

Teaching Assistant for AN231, Archaeological Field Methods, Arizona State University. Directed excavations at Mesa Grande, Classic Period Hohokam site in Mesa, Arizona. 1972-1973

Directed site survey and excavation of Anasazi and Navajo sites west of Gallup, New Mexico. Research conducted through Arizona State University. 1972

Field Supervisor of salvage excavations at Arizona U:9:73 (ASU), Hohokam site on A.S.U. Campus. 1971-1972

Crew chief for excavations and survey of Anasazi and Navajo sites south of Window Rock. Research conducted through Arizona State University. 1971

Participated in excavations at late prehistoric site and early man site on the Snake River. Research conducted through Washington State University. 1970

Participated in excavations at Arizona U:9:39 (ASU), Classic Period Hohokam site near Tempe, Arizona. Research conducted through Arizona State University. 1970

PUBLICATIONS

1978 (with Bettina Rosenberg)
Petroglyphs of the Southern Sierra Estrella, A Locational Interpretation in American Indian Rock Art, Volume IV, Papers presented at the Fourth Annual A.R.A.R.A. Symposium ed. Ernest Snyder, A.J. Bock, and Frank Bock, El Toro, California, pp. 108-123.

1978 (with Susan S. Burton and Minabell Laughlin)
Proceedings of the 1973 Hohokam Conference. Occasional Papers in Archaeology and Ethnohistory, No. 2, Center for Anthropological Studies, Albuquerque.

1977 Investigations Concerning the Hohokam Classic Period in the Lower Salt River Valley, Arizona. The Arizona Archaeologist, No. 9.

1976 Salado Influences in the Lower Salt River Valley. The Kiva, 42:17-26.

1974 (with James B. Rodgers)
An Archaeological Survey of the Cave Buttes Dam Alternative Site and Reservoir, Arizona. Arizona State University Anthropological Research Papers, No. 8.

1974 Archaeological Investigations at the Westwing Site, AZ T:7:27 (ASU), Agua Fria River Valley, Arizona. Arizona State University Anthropological Research Papers, No. 7.

1973 (with James Schoenwetter and Sylvia W. Gaines)
Definition and Preliminary Study of the Midvale Site. Arizona State University Anthropological Research Papers, No. 6.

PUBLICATIONS (cont.)

1973 Excavations at Pueblo del Monte and the Classic Period Hohokam Problem. The Kiva, 39:75-87.

1972 A Cultural-Ecological Model for the Classic Hohokam Period in the Lower Salt River Valley, Arizona. The Kiva, 38:43-52.

PAPERS PRESENTED

1978 The Northern Frontier, Hohokam Regional Diversity as Seen From the Lower Salt River Valley.
43rd Annual Meeting of the Society for American Archaeology, Tucson

1977 (with Bettina Rosenberg)
Petroglyphs of the Southern Sierra Estrella, A Locations Interpretation. 4th Annual Symposium of American Rock Art Research Association, Tempe.

1976 Salado Influences in the Lower Salt River Valley. The 1976 Salado Conference, Tucson.

1976 (with James B. Rodgers)
Hohokam Subsistence in Marginal Environmental Zones, A Case Study in Buckeye Hills East. 20th Annual Meeting, Arizona Academy of Science, Tucson.

1976 The Impact of the Archaeological Conservation Act on Universities in the Western United States. 41st Annual Meeting of the Society for American Archaeology, St. Louis.

1975 The Initial Period on the North Coast of Peru, A Re-examination. 19th Annual Meeting, Arizona Academy of Science, Tempe.

1972 A Preliminary Cultural Inventory of Manuelito Canyon, Northwestern New Mexico. 16th Annual Meeting, Arizona Academy of Science, Prescott.

1972 A Cultural-Ecological Model for the Classic Hohokam Period in the Lower Salt River Valley, Arizona. Annual Meeting, S.W. Anthropological Association and the Society for California Archaeology, Long Beach.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

Society of Professional Archaeologists
Society for American Archaeology
American Society for Conservation Archaeology
Arizona Academy of Science
Arizona Archaeological Council
Arizona Archaeological and Historic Society
American Association for State and Local History
The Society for Historical Archaeology

STEVEN G. DOSH

Resume

POSITION Assistant Supervisory Archaeologist

EDUCATION Bachelor of Science, Anthropology, Northern Arizona University, 1977

PROFESSIONAL EXPERIENCE

Assistant Supervisory Archaeologist, Museum of Northern Arizona.
Supervisory position on survey, analysis, and reports for SOHIO transmission line and pump station surveys, BIA Hopi transmission line and houselots survey, BIA Hualapai houselots survey, buried telephone cable surveys, manhole surveys, Devers-Palo Verde transmission line tower locations and access roads survey, Coronado Generating Station ash disposal survey, City of Show Low sanitation facilities survey, Marsland/Coconino National Forest Land Exchange test excavation, and file search for the N.P.S. San Juan Basin Archaeological Data Base project.
Assistant Supervisory position for field phase and analysis phase on Coronado Generating Station Coal Haul Railroad; Coronado-Dinosaur Transmission Line construction monitoring program. 1977-present

Student participant, Northern Arizona University - Mapping project, Camp Lincoln historic site, Camp Verde, Arizona. 1977

Student participant, Northern Arizona University. Excavation and mapping of a preceramic site on Hall Ranch, Springerville, Arizona and St. Michaels Pueblo, St. Michaels, Arizona. 1976 and 1977

PUBLICATIONS AND REPORTS (Ms. on file at MNA unless otherwise noted)

1978 "Archaeological Survey of the Proposed Show Low Effluent Disposal and Northwest Interceptor Sewer Lines and Pump Stations, Navajo County, Arizona".

1978 "An Archaeological Survey of the Proposed Redington Transmission Line and Pump Station, Cochise County, Arizona".

1978 "Archaeological Surveys of the Proposed Coolidge and Black Mountain Transmission Lines and Pump Stations, Pinal County, Arizona".

1978 "An Archaeological Survey of Proposed Houselots near Keams Canyon, Polacca, and Moenkopi, Arizona".

PUBLICATIONS AND REPORTS (cont'd)

1978 "An Archaeological Survey of the Low Mountain Well and the Hopi Civic Center Powerlines".

1978 "Archaeological Surveys of 20 Test Drilling Locations in the Ash Disposal Area of the Coronado Generating Station, Apache County, Arizona".

1978 "Archaeological Surveys of the Proposed Mountain Bell Manhole Sites near Sedona, Arizona, Coconino County, Arizona".

1978 "An Archaeological Survey of the Proposed Underground Telephone Cable #A-8-5WHM near Page Springs, Arizona".

1978 "An Archaeological Survey of the Proposed Underground Telephone Cable #A-8-5WHA near Page Springs, Arizona".

1978 "An Archaeological Survey of the Proposed Housing Subdivision in Peach Springs, Arizona".

1978 "An Archaeological Survey of Proposed Devers-Palo Verde Transmission Line Towers Locations and Access Road, Yuma County, Arizona".

1978 "An Archaeological Investigations at the Marsland Site, Yavapai County, Arizona".

In preparation: Contribution to the ground stone analysis section and methodology and chronology sections of the final report for the mitigation project of the Coronado Generating Station Coal Haul Railroad project.

APPENDIX E

ENDANGERED SPECIES AND

HISTORIC PRESERVATION COORDINATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE

AREA OFFICE
2800 Cottage Way, Room E-2740
Sacramento, California 95825

JAN 2 9 1981

In reply refer to: SESO

Mr. Gerald M. Dallas
Chief, Program Support Branch
Department of Transportation
Federal Aviation Administration
Western Region
P.O. Box 92007, Worldway Postal Center
Los Angeles, California 90009

Subject: Species List Request, Palmdale International Airport, Los Angeles, County, 1-1-81-SP-99

Dear Mr. Dallas:

This responds to the letter from your agency dated December 22, 1980, requesting a list of endangered and threatened species and those proposed for listing in either category that may be present within the subject project area. This fulfills the requirement of the Fish and Wildlife Service to provide information on listed species pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended.

To the best of our knowledge, there are no listed or proposed threatened or endangered species within the project area. However, we are attaching a list of candidates which might, within the foreseeable future, be proposed and then undergo a final rulemaking. We urge that you consider informal consultation to avoid any conflicts at a later date should the species become listed and be present within the area of the proposal. Informal consultation should be requested of our Area Office at the letterhead address.

Should you have additional questions regarding this list or your responsibilities under the Act, please contact Mr. Ralph Swanson at (FTS) 448-2791 or (916) 440-2791. Thank you for your interest in endangered species.

Sincerely yours,

Area Manager

Attachments

LISTED AND PROPOSED ENDANGERED AND THREATENED
SPECIES, AND CANDIDATE SPECIES THAT MAY OCCUR
IN THE AREA OF THE PROPOSED
PALMDALE INTERNATIONAL AIRPORT
LOS ANGELES COUNTY
1-1-81-SP-99

LISTED SPECIES

None

PROPOSED SPECIES

None

CANDIDATE SPECIES

None

Plants

Alkali mariposa, *Calochortus striatus*
Mojave spineflower, *Chorizanthe spinosa*

STATE OF CALIFORNIA—THE RESOURCES AGENCY EDMUND G. BROWN JR., Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
OST OFFICE BOX 2390
SACRAMENTO, CALIFORNIA 95811

3 1981

January 30, 1981

Mr. William Ollinger
Aurther D. Little, Inc.
One Maritime Plaza
San Francisco, CA 94111

RE: Final Report, Archeological Investigations, Palmdale International Airport

Dear Mr. Ollinger:

We are in receipt of the above referenced undertaking(s). Thank you for the opportunity to comment pursuant to 36 CFR 800.

Based on the information provided in the report(s) noted above I have determined that no properties included in or eligible for inclusion in the National Register of Historic Places should be affected by the proposed undertaking(s).

It should be remembered that compliance with 36 CFR 800.7 is required if presently unknown cultural resources should be discovered during subsequent work.

If there are any questions, please feel free to contact Michael Rondeau, Staff Archeologist, at (916) 445-6766.

Sincerely,

Knox Mellon

Dr. Knox Mellon
State Historic Preservation Officer
Office of Historic Preservation

Arthur D Little Inc ONE MARITIME PLAZA SAN FRANCISCO, CALIFORNIA 94111 (415) 981-2500

600	
600A	
601	
602	
660	
670	
680	

6121

February 4, 1981

Mr. Herb Hyatt
Airports District Office
P.O. Box 92007
Worldway Postal Center
Los Angeles, CA 90009

Dear Herb:

Finally the SHPO has given the appropriate clearance. The attached is for your records. I will also send a copy of this and the final report to the Advisory Counsel for the record.

Very truly yours,

Bill

William Ollinger

WO/rf

Arthur D. Little, Inc. ONE MARITIME PLAZA · SAN FRANCISCO, CALIFORNIA 94111 (415) 981-2500

February 4, 1981

Mr. Charles M. Niquette
Advisory Counsel on Historic Preservation
Lake Plaza-South
Suite 616
44 Union Blvd.
Lakewood, Colorado 80228

Dear Mr. Niquette:

The attached letter and final report are for your records.

Sincerely,

William Ollinger

WO/rf

cc: Herb Hyatt, FAA

Advisory Council on Historic Preservation

1522 K Street NW.
Washington D.C.
20005

Reply to: P. O. Box 25085
Denver, Colorado 80225

September 28, 1979

Mr. Leon Dougherty
Regional Administrator
Federal Aviation Administration
P. O. Box 92007
Los Angeles, California 90009

Dear Mr. Dougherty:

By letter of May 29, 1979, the Council requested that the Federal Aviation Administration investigate the applicability of Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320), to the development plan for the Palmdale Airport, Los Angeles County, California, an undertaking by the FAA that may have an effect upon archeological and historic resources, properties that may be eligible for inclusion in the National Register of Historic Places. A copy of that letter is enclosed.

We have not yet received a reply. We would appreciate it if you would look into this matter and let us have a reply as soon as possible. If you have any questions, please call Mrs. Jane King of the Council's Western Office at (303) 234-4946, an FTS number.

Sincerely,

Louis S. Wall
Chief, Western Division
of Project Review

Enclosure

cc: Mr. Robert Crecco, DOT-FLO

10/3 2:35
Advised Mrs. King that we are in the process of doing a complete archeological survey for Palmdale by contract. Response to ACHP concerns will be provided in the Final EIS. Advised her that we will not send a reply to her letter. She did not raise any objection.

Advisory Council on Historic Preservation

~~1522 K Street NW.~~
~~Washington D.C.~~
~~20005~~

Reply to: P. O. Box 25085
Denver, Colorado 80225

600	HQS
602	
603	
610	
620	
650	
670	

May 29, 1979

Federal Aviation Administration
Western Region
P. O. Box 92007
World-Way Postal Center
Los Angeles, California 90009

Gentlemen:

This letter concerns the development plan for the Palmdale Airport, Los Angeles County, California. We have received a copy of two pages from the draft environment statement (DES) discussing archaeological and historical resources. While we have not had an opportunity to review the complete DES, we find that the section relating to cultural resources is inadequate.

The DES states that a records search and partial survey (18%) of the area reveals no sites of "major significance," and further, that construction of runways and passenger terminals will not disturb "significant archaeological or historical features dating to within the past 2000 years." These statements are not clear. A survey of only 18% of the impact area, and an arbitrary cutoff date of 2000 years cannot be considered sufficient to determine the presence or absence of prehistoric and historic properties. While no sites of "major significance" have been found by the limited survey, were historic or archaeological sites found, and if so, do they meet the criteria for inclusion in the National Register of Historic Places? Will more detailed surveys be done for those areas that will be directly affected to identify extant cultural features?

Circulation of a draft environmental impact statement does not fulfill FAA's responsibilities under Section 106 of the National Historic Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320). Prior to the approval of the expenditure of any Federal funds or prior to the granting of any license, permit, or other approval for the undertaking, Federal agencies are required to afford the Council an opportunity to comment on the effect of

the undertaking on properties included in or eligible for inclusion in the National Register in accordance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800) (enclosed). Until these requirements are met, the Council considers the draft environmental statement incomplete in its treatment of historical, archaeological, architectural, and cultural resources.

The FAA should examine the material collected to date by the cultural surveys and consult with the California State Historic Preservation Officer as to the eligibility of any of the sites found for inclusion in the National Register. Further, FAA should consult with the California SHPO to determine what additional survey work may be required to assure that all cultural properties meeting the National Register criteria have been identified. If this further analysis reveals that sites eligible for inclusion in the National Register will be affected, then FAA is required to afford the Council an opportunity to comment before approving the undertaking.

Should you have questions or require assistance in preparing the necessary documentation for requesting Council comment, please contact Mrs. Jane King of the Council's Western Office, P. O. Box 25085, Denver, Colorado 80225, or (303) 234-4946, an FTS number.

Sincerely,

for Louis S. Wall
Chief, Western Office
of Review and Compliance

Enclosure

APPENDIX F

ASSURANCES

City of Los Angeles Department of Airports 1 World Way, Los Angeles, California 90009 • (213) 646-5252 Telex 65-3413
Tom Bradley, Mayor

Board of
Airport Commissioners
Mary Lou Cunningham
President
Robert E. Collins
Vice President
Elizabeth K. Armstrong
Samuel Greenberg
Emmett C. McGaughey
Clifton A. Moore
General Manager

February 19, 1981

Mr. Robert Bloom, Chief
Southern Airports Field Office
Federal Aviation Administration
Western Region, AWE-680
P. O. Box 92007, World Way Postal Center
Los Angeles, CA 90009

Dear Mr. Bloom:

Your letter of January 27, 1981, requested information on the status of negotiations between the City of Los Angeles Department of Airports and the California Air Resources Board (ARB) regarding issuance of an air quality certificate for the construction of Palmdale International Airport. These discussions have been conducted over several years, during which time the participants have grappled with changing air quality standards and with evolving, sometimes contradictory, interpretations of how best to accommodate the anticipated effects of the new Palmdale International Airport. We wish to assure you that the Los Angeles Department of Airports will use its best efforts to reach an accord with the California Air Resources Board (ARB) which will result in the issuance of an air quality permit well in advance of a Department request for federal assistance for planned construction.

One course toward such agreement involves the participation of the Department in mitigating six tons per day of future non-airport related hydrocarbon emissions to offset those caused by airport related activities. While the existing level of development in the Southeast Desert Air Basin affords little opportunity for achieving that offset at the present time, the emissions increment, and therefore, the mitigation opportunities, are forecast to materialize rapidly between now and 1995, the date by which the required amount of mitigation or offset must be achieved. We are actively pursuing this strategy and anticipate a favorable review by the ARB on specific measures by which mitigation opportunities may be identified and acted upon.

We have also proposed to the ARB that, because of low emissions in the Palmdale vicinity, and the limited opportunities for immediate hydrocarbon reductions there, the Southeast Desert and the South Coast Air Basins be considered together and that mitigation measures realized in the South Coast be credited toward those needed in the Southeast Desert Air Basin. The merits of this proposal are currently being evaluated by the ARB.

As a corollary to the above proposal, we have conducted studies which show that total air pollution emissions in the combined air basins is less with the construction of Palmdale than without. With these findings in hand, we have approached the Board to request that the requirement for further mitigation measures be waived. Although this approach is not viewed as having a high probability of success, we consider the demonstrated air quality benefits to weigh in our favor and to further the efforts to reach a timely agreement.

Finally, in reviewing changes in air quality standards and technology over the past 14 years, it is evident that there will be many factors which will affect future emissions, and that most of these cannot be anticipated with a high degree of certainty at this time. Economics, technological change, urban growth and development, travel behavior, and regulatory standards and strategies are but some of the forces that will change the approach to and achievement of needed environmental improvements. We are confident that the City and the ARB can reach agreement to incorporate these dynamic factors in a flexible mitigation plan for the Southeast Desert Air Basin.

In closing, I wish to acknowledge the necessity of acquiring the air quality certificate as a prerequisite to receiving any new federal grants for airport construction.

Sincerely,

Clifton A. Moore

CLIFTON A. MOORE
General Manager

CAM:lc