

**ASSESSMENT OF AIRCRAFT NOISE CONDITIONS
AT MOFFETT FEDERAL AIRFIELD
(1999-2010)**

Prepared for

DMJM
A/E/C Services at Ames Research Center
(Contract No. NAS2-14211)

Prepared by

P&D Consultants, Inc.
&
Michael R. McClintock & Co.
2205 Bridgepointe Parkway, #105
San Mateo, CA 94404-5015
(650) 341-7331

August 28, 2000

Table of Contents

<u>Heading</u>	<u>Page</u>
Introduction	2
Noise Assessment Methodology and Operational Factors	3
Cumulative Noise Analyses	4
Findings	4

List of Tables

Table 1—1999 Moffett Federal Airfield Operations and Noise Modeling Assumptions
by Aircraft Type

Table 2—2010 Moffett Federal Airfield Operations and Noise Modeling Assumptions
by Aircraft Type

List of Figures

Moffett Federal Airfield Aircraft and Helicopter Flight Tracks

Moffett Federal Airfield CNEL Noise Exposure: Year 1999

Moffett Federal Airfield CNEL Noise Exposure: Year 2010

Moffett Federal Airfield CNEL Noise Exposure: Years 1999-2010 Comparison

INTRODUCTION

This report sets forth the methodologies, assumptions, and findings used by P& D Consultants, Inc. to assess the aircraft noise impacts from current (1999) and projected (2010) aircraft operations at Moffett Federal Airfield.

Background

In 1994, NASA prepared a Comprehensive Use Plan (CUP)¹ to assist in the orderly transfer of NAS Moffett Field from the U.S. Navy to NASA. The CUP considered future development projects by NASA and provided information on proposed future uses at Moffett Field by NASA and Resident Agencies (RAs) up to the year 2010.² The CUP forecast a total of 80,000 annual aircraft operations for Moffett Field in 2010.³

Of these projected operations for 2010, some 20,000 operations were considered to be overflights by aircraft transiting Moffett's airspace at or above an altitude of 3,000 feet,⁴ and subject to flight directions by the Moffett Air Traffic Control Tower (but not actually landing or taking off at the facility). The remaining 60,000 operations were considered to be actual landings and takeoffs at Moffett Field. An Environmental Assessment (EA) prepared under the National Environmental Policy Act (NEPA) of 1969 was completed for the CUP, and was finalized in August 1994.⁵

Since the CUP was completed, and the facility transferred to NASA, a number of events have transpired which have served to reduce the number of aircraft based at Moffett Field, and hence a reduction in the total numbers of operations. These events include the transfer of NASA research aircraft to NASA's Dryden Research Center at Edwards Air Force Base, the phase-out of active-duty and Naval Reserve P-3 squadrons, and a marked decline in overall flight operations. In 1996, total aviation activity at Moffett Field was about 54,850 operations.⁶ Of these operations, only about 24,850 actually took place at the field.⁷ The remainder were overflights. This was the equivalent of approximately 68 operations per day on average.

By 1999, aircraft operations at Moffett Field (not including overflights) had declined slightly to around 23,551 annual operations. This is approximately 64.5 operations per day on average. The attached Table 1 sets forth the 1999 operations and noise modeling assumptions by the aircraft types used in this report.

¹ National Aeronautics and Space Administration (NASA), Ames research Center, Moffett Field, CA, "*Moffett Field Comprehensive Use Plan*," September 1994.

² Brady and Associates, Inc. Administrative Draft Environmental Impact Report, "*Civil Reserve Air Fleet at Moffett Federal Airfield*." May 20, 1996.

³ An aircraft operation is *either* a takeoff or a landing. One landing and one takeoff are two operations.

⁴ For noise and air quality assessment purposes, aircraft operating above 3,000 feet are not considered significant and are not included in impact assessments.

⁵ Brady and Associates, Inc. "*Moffett Field Comprehensive Use Plan Final Environmental Assessment*," prepared for NASA Ames Research Center, Moffett Field, CA. August 1994.

⁶ P&D Aviation, "*Assessment of Aircraft Noise Impacts for the Planned Operation of the NASA 'SOFIA' B-747SP*." October 15, 1997.

⁷ Ibid.

NOISE ASSESSMENT METHODOLOGY AND OPERATIONAL FACTORS

Cumulative Noise Metrics

People respond more to individual aircraft noise events, but the long-term effects of prolonged exposure to noise best correlate with cumulative noise exposure metrics. A cumulative noise metric is one that provides a single number that is equivalent to the total noise exposure over a specified period of time. Thus cumulative noise metrics are based on both time (duration) and level (intensity).

The Community Noise Equivalent Level (CNEL) is the cumulative noise metric adopted by the State of California for assessing aircraft noise impacts. A similar metric, the Day-Night Average Sound Level (DNL) is the adopted Federal cumulative noise metric. Both are expressed in decibels and are representative of the average noise level during a 24-hour day. CNEL is adjusted to account for people's lower tolerance for noise intrusions during the evening and nighttime periods relative to the daytime period.⁸ DNL is similar to CNEL, but does not incorporate the penalty on evening operations. However, for purposes of comparison, CNEL and DNL are identical. For this reason, and the fact that in California the State Airport Noise Standards⁹ identify a noise level of CNEL 65dB as being the level of noise "acceptable to a reasonable person," the CNEL metric is used herein for the assessment of aircraft noise impacts at Moffett Federal Airfield.

Airport Noise Standards

The Federal government has not established noise standards for Federally owned airports. Nor has it established any such standards for civilian airports. Part 150 of the Federal Aviation Regulations (FAR Part 150) comes closest to this with the establishment of the DNL metric as the approved means for the analysis and characterization of multiple aircraft noise events and for determining the cumulative exposure of individuals to noise.¹⁰ FAR Part 150 also identifies land uses that are considered to be compatible with various exposures of individuals to noise around airports. Noise exposure levels of CNEL/DNL 65dB and above are considered incompatible with residential land uses, schools, and other public facilities.¹¹

Under the California Airport Noise Standards, residential areas subject to aircraft noise levels of CNEL 65dB and above are considered to be noise impacted. This means that any existing residential uses without special acoustical insulation, or those not subject to specific noise easements, located in such an area are considered noncompatible uses. The CNEL 65dB criterion for establishing the state's noise impact criterion was based on the noise sensitive nature of residential land uses, including single- and multiple-family dwellings, trailer parks, and schools of standard construction. The CNEL 65dB criterion level was selected with reference to

⁸ CNEL adds a 3dB penalty to all aircraft operations occurring during the evening hours (7:00 p.m. to 10:00 p.m.) and a 10db penalty for nighttime operations (10:00 p.m. to 7:00 a.m.).

⁹ State of California, "Airport Noise Standards." Public Utilities Code, Section 21674 (a), as amended.

¹⁰ U.S. Dept. of Transportation, Federal Aviation Administration, Federal Aviation Regulations, Part 150, "Airport Noise Compatibility Planning." January 1985, as amended.

¹¹ The land use designations in FAR Part 150 do not constitute a determination by the Federal government that any land uses covered by the program are acceptable or unacceptable under Federal, state or local laws.

speech, sleep, and community reaction. The stated purpose of these regulations is to provide a basis for resolving existing noise problems in communities surrounding civil airports and to prevent the development of new noise problems. All existing and future civil airports in California are subject to the regulation.¹²

CUMULATIVE NOISE ANALYSES

This section sets forth the analytical methodology and results of noise assessment analyses conducted in the preparation of this report. Noise contours were prepared for the cumulative effects of calendar year 1999 operations and for 2010 forecast operations. The current version of the FAA's Integrated Noise Model (INM) was used to perform calculations of noise exposure for this study.

The credibility of the noise modeling conducted for this study was supported by the inventory, use and documentation of key variables which influence aircraft noise generation. Specific variables in the noise modeling effort included aircraft activity levels, aircraft types, type and time of day of operations, flight tracks, and flight procedures currently in effect at Moffett federal Airfield. P&D staff worked with the Airfield Management Office to collect, review and update aviation activity data and information for Moffett Field. Information collected and evaluated focused on calendar year 1999 airfield operations and included the number and types of aircraft using the airfield during 1999, the number and types of flight operations conducted by each aircraft type, the time of day of such operations, and the runways and flight tracks utilized. Future activity levels for 2010 were projected for military and government aircraft activities also. The attached tables, entitled "*Table 1—1999 Moffett Federal Airfield Operations and Noise Modeling Assumptions by Aircraft Type*" and "*Table 2—2010 Moffett Federal Airfield Operations and Noise Modeling Assumptions by Aircraft Type*" depict this information.

Data describing these variables were formatted and input to the computer model to produce contours of equal cumulative noise levels as expressed by the CNEL metric. Supporting tables for 1999 and 2010 airfield operations and noise modeling assumptions by aircraft type are attached at the end of this report. The analyses included operations by the majority of NASA's aircraft, including some of its more esoteric models (e.g., AV-8 Harrier). However, because the INM did not include some of these aircraft in its database, it was necessary to define substitute aircraft. In these cases every effort was made to select a comparable substitute aircraft in terms of number and type of engines. The computer noise model was also set up to accommodate training (i.e., touch-and-go) operations by helicopters and other military aircraft (see attached exhibit entitled "*Moffett Federal Airfield Aircraft and Helicopter Flight Tracks*").

FINDINGS

The attached exhibit entitled, "*Moffett Federal Airfield CNEL Noise Exposure: Year 1999*," depicts the CNEL noise contours for 1999 base year operational activities at Moffett Federal Airfield. Similarly, the exhibit entitled, "*Moffett Federal Airfield CNEL Noise Exposure: Year 2010*," depicts projected 2010 noise exposure conditions. The principal difference between the

¹² Note that Federal or military airports are not subject to the regulation and military aircraft operations are not counted when making a statutory determination of whether or not an airport is a "noise problem" airport.

1999 and 2010 contours can be found in the addition of 256 annual operations by NASA's SOFIA aerial astronomy aircraft (a Boeing 747), 96 annual operations by a civilian contract Canberra (RB57) aircraft and an estimated 365 annual operations by corporate jet aircraft represented by the Gulfstream V (G-V) aircraft. The net result of these additional aircraft operations in 2010 would be to increase the number of average daily aircraft operations in 1999 from 64.5 to approximately 66.5 in 2010. This would still be less than the 1996 level of 68 average daily operations.

The marginal difference in flight operations and fleet mix for 2010 resulted in the following increases in the size of the noise contours:

	<u>Total Area</u>	<u>Area South of Highway 101</u>
CNEL 60dB	65.0 acres	11.4 acres
CNEL 65dB	26.8 acres	4.2 acres
CNEL 70dB	10.8 acres	(Not applicable--on airfield)
CNEL 75dB	6.3 acres	(Not applicable--on airfield)

The area shaded in red on the attached exhibit entitled, "*Moffett Federal Airfield CNEL Noise Exposure: Years 1999-2010 Comparison*," highlights the area south of Highway 101 that would be affected. P&D Consultants was not directed to assess the impacts of the 2010 noise contours on the land area south of Highway 101 and, hence, cannot render an opinion as to whether or not any noise sensitive land uses (i.e., residential, schools, etc.) would be affected.

Table 1-- 1999 MOFFETT FEDERAL AIRFIELD

OPERATIONS AND NOISE MODELING ASSUMPTIONS BY AIRCRAFT TYPE

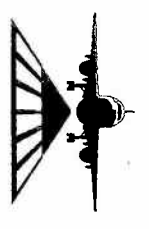
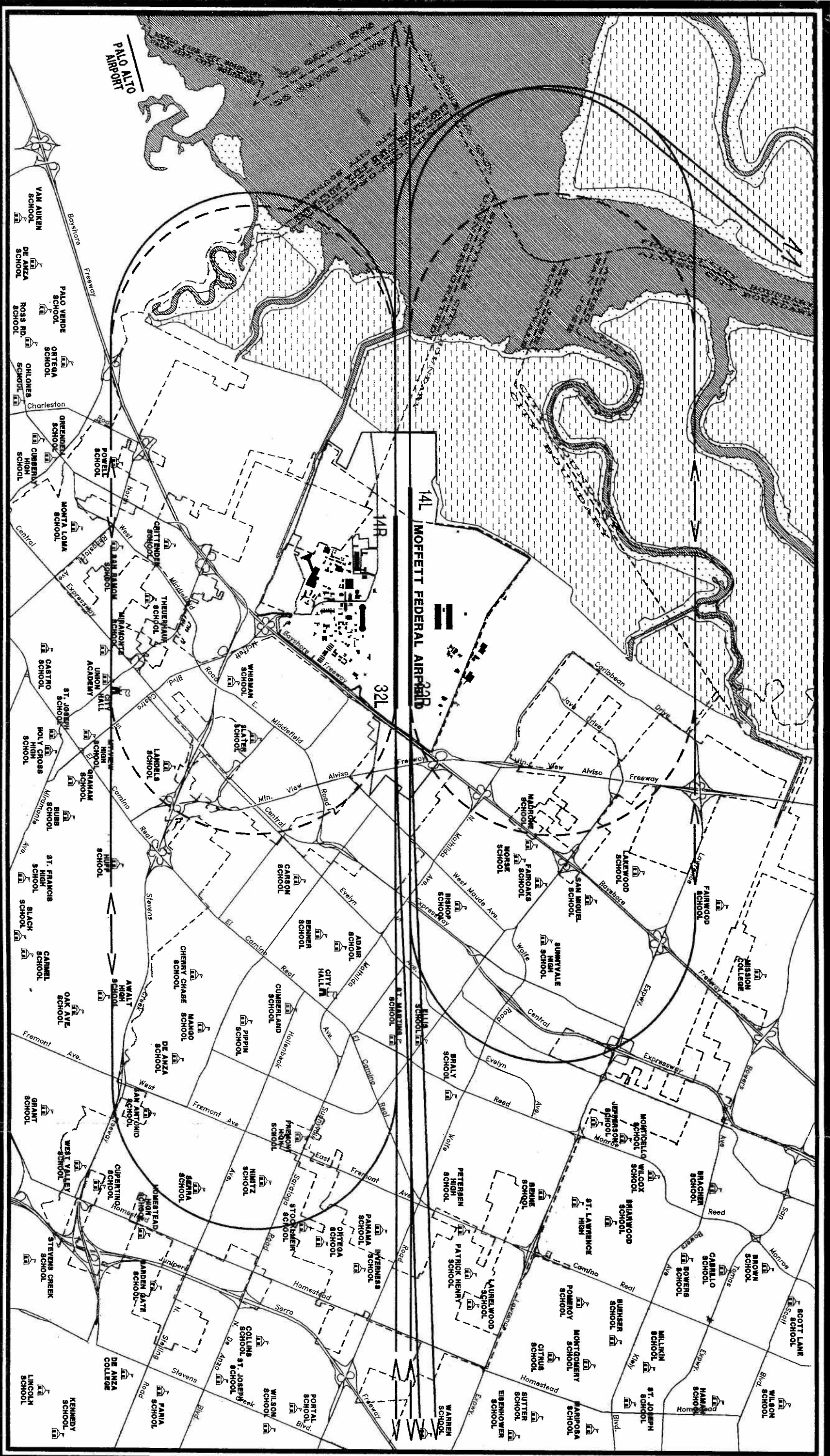
A/C Type	Annual Opns.	Avg. Day Opns.	% Arrivals	% Departures	% T&G	% Day	% Eve	% Nite
B747	6.0	0.016	0.50	0.50	0.00	0.80	0.10	0.10
C5/C17	44.0	0.121	0.50	0.50	0.00	0.95	0.05	0.00
AN-124	26.0	0.071	0.50	0.50	0.00	0.95	0.05	0.00
C9/DC9	76.0	0.208	0.50	0.50	0.00	0.95	0.05	0.00
C12/RC12	5347.0	14.649	0.46	0.46	0.08	0.90	0.09	0.01
C130	5066.0	13.879	0.30	0.30	0.40	0.20	0.75	0.05
C141	46.0	0.126	0.50	0.50	0.00	0.95	0.04	0.01
F18	352.0	0.964	0.33	0.33	0.34	0.95	0.05	0.00
P3	294.0	0.805	0.45	0.45	0.10	0.95	0.05	0.00
S3	54.0	0.148	0.50	0.50	0.00	0.90	0.10	0.00
T34	82.0	0.225	0.45	0.45	0.10	0.95	0.03	0.02
T38/F5	240.0	0.658	0.45	0.45	0.10	0.95	0.04	0.01
AV8	80.0	0.219	0.45	0.45	0.10	0.90	0.09	0.01
BE20	300.0	0.822	0.45	0.45	0.10	0.90	0.09	0.01
MilJet (1-eng)	267.0	0.732	0.40	0.40	0.20	0.90	0.09	0.01
MilJet (2-eng)	74.0	0.203	0.40	0.40	0.20	0.90	0.09	0.01
ComJet (2-eng)	4.0	0.011	0.50	0.50	0.00	0.93	0.05	0.02
ComJet (3-eng)	8.0	0.022	0.50	0.50	0.00	0.93	0.05	0.02
ComJet (4-eng)	12.0	0.033	0.50	0.50	0.00	0.93	0.05	0.02
BusJet (2-eng)	220.0	0.603	0.50	0.50	0.00	0.93	0.05	0.02
TTP	202.0	0.553	0.40	0.40	0.20	0.93	0.05	0.02
TEP	226.0	0.619	0.10	0.10	0.80	0.93	0.05	0.02
SEP	580.0	1.589	0.05	0.05	0.90	0.93	0.05	0.02
CH53	20.0	0.055	0.50	0.50	0.00	0.90	0.09	0.01
HH60	4414.0	12.093	0.05	0.05	0.90	0.20	0.75	0.05
Helo (1-eng)	37.0	0.101	0.40	0.40	0.20	0.90	0.09	0.01
Helo (2-eng)	14.0	0.038	0.40	0.40	0.20	0.90	0.09	0.01
BK117	162.0	0.444	0.50	0.50	0.00	0.90	0.05	0.05
AH1	280.0	0.767	0.05	0.05	0.90	0.90	0.09	0.01
H65 (CG)	4750.0	13.014	0.00	0.00	1.00	0.50	0.50	0.00
CH46	28.0	0.077	0.50	0.50	0.00	0.90	0.05	0.05
OH58	240.0	0.658	0.05	0.05	0.90	0.90	0.09	0.01
Other		0.000						
Totals	23551.0	64.523						

Table 2-- 2010 MOFFETT FEDERAL AIRFIELD

OPERATIONS AND NOISE MODELING ASSUMPTIONS BY AIRCRAFT TYPE

	Annual	Avg. Day	%	%	%	%	%	%
A/C Type	Opns.	Opns.	Arrivals	Departures	T&G	Day	Eve	Nite
B747	6.0	0.016	0.50	0.50	0.00	0.80	0.10	0.10
C5/C17	44.0	0.121	0.50	0.50	0.00	0.95	0.05	0.00
AN-124	26.0	0.071	0.50	0.50	0.00	0.95	0.05	0.00
C9/DC9	76.0	0.208	0.50	0.50	0.00	0.95	0.05	0.00
C12/RC12	5347.0	14.649	0.46	0.46	0.08	0.90	0.09	0.01
C130	5066.0	13.879	0.30	0.30	0.40	0.20	0.75	0.05
C141	46.0	0.126	0.50	0.50	0.00	0.95	0.04	0.01
F18	352.0	0.964	0.33	0.33	0.34	0.95	0.05	0.00
P3	294.0	0.805	0.45	0.45	0.10	0.95	0.05	0.00
S3	54.0	0.148	0.50	0.50	0.00	0.90	0.10	0.00
T34	82.0	0.225	0.45	0.45	0.10	0.95	0.03	0.02
T38/F5	240.0	0.658	0.45	0.45	0.10	0.95	0.04	0.01
AV8	80.0	0.219	0.45	0.45	0.10	0.90	0.09	0.01
BE20	300.0	0.822	0.45	0.45	0.10	0.90	0.09	0.01
MilJet (1-eng)	267.0	0.732	0.40	0.40	0.20	0.90	0.09	0.01
MilJet (2-eng)	74.0	0.203	0.40	0.40	0.20	0.90	0.09	0.01
ComJet (2-eng)	4.0	0.011	0.50	0.50	0.00	0.93	0.05	0.02
ComJet (3-eng)	8.0	0.022	0.50	0.50	0.00	0.93	0.05	0.02
ComJet (4-eng)	12.0	0.033	0.50	0.50	0.00	0.93	0.05	0.02
BusJet (2-eng)	220.0	0.603	0.50	0.50	0.00	0.93	0.05	0.02
TTP	202.0	0.553	0.40	0.40	0.20	0.93	0.05	0.02
TEP	226.0	0.619	0.10	0.10	0.80	0.93	0.05	0.02
SEP	580.0	1.589	0.05	0.05	0.90	0.93	0.05	0.02
CH53	20.0	0.055	0.50	0.50	0.00	0.90	0.09	0.01
HH60	4414.0	12.093	0.05	0.05	0.90	0.20	0.75	0.05
Helo (1-eng)	37.0	0.101	0.40	0.40	0.20	0.90	0.09	0.01
Helo (2-eng)	14.0	0.038	0.40	0.40	0.20	0.90	0.09	0.01
BK117	162.0	0.444	0.50	0.50	0.00	0.90	0.05	0.05
AH1	280.0	0.767	0.05	0.05	0.90	0.90	0.09	0.01
H65 (CG)	4750.0	13.014	0.00	0.00	1.00	0.50	0.50	0.00
CH46	28.0	0.077	0.50	0.50	0.00	0.90	0.05	0.05
OH58	240.0	0.658	0.05	0.05	0.90	0.90	0.09	0.01
B747 (SOFIA)	25 6.0	70 0.016	0.50	0.50	0.00	0.80	0.10	0.10
RB77	96 44.0	263 0.121	0.50	0.50	0.00	0.95	0.05	0.00
G-V	365 26.0	1 0.071	0.50	0.50	0.00	0.95	0.05	0.00
Totals	23627.0	64.732						

24,268 66,488

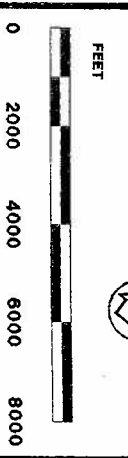


P&D Aviation
 A Division of
PA&D Consultants
 1000 Broadway Suite 390
 Oakland, CA 94607

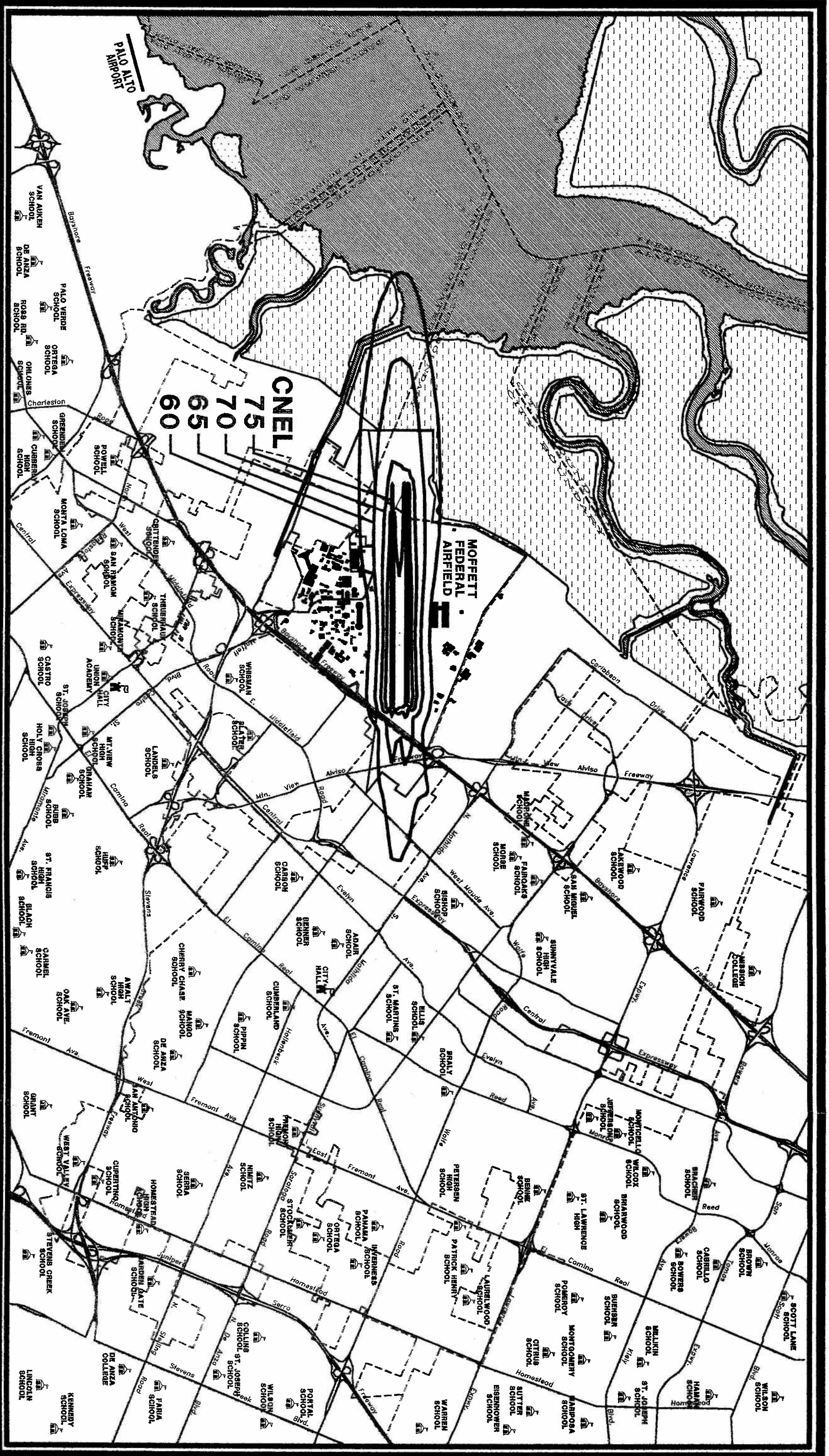
LEGEND

-  AIRCRAFT FLIGHT PATTERN
-  HELICOPTER LOCAL PATTERN

SCALE



MOFFETT FEDERAL AIRFIELD
AIRCRAFT AND HELICOPTER FLIGHT TRACKS



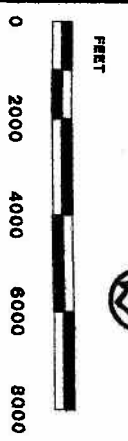
P&D Aviation

A Division of
P&D Consultants
 2205 Bridgepointe Parkway #105
 San Mateo, CA 94404-5015

LEGEND

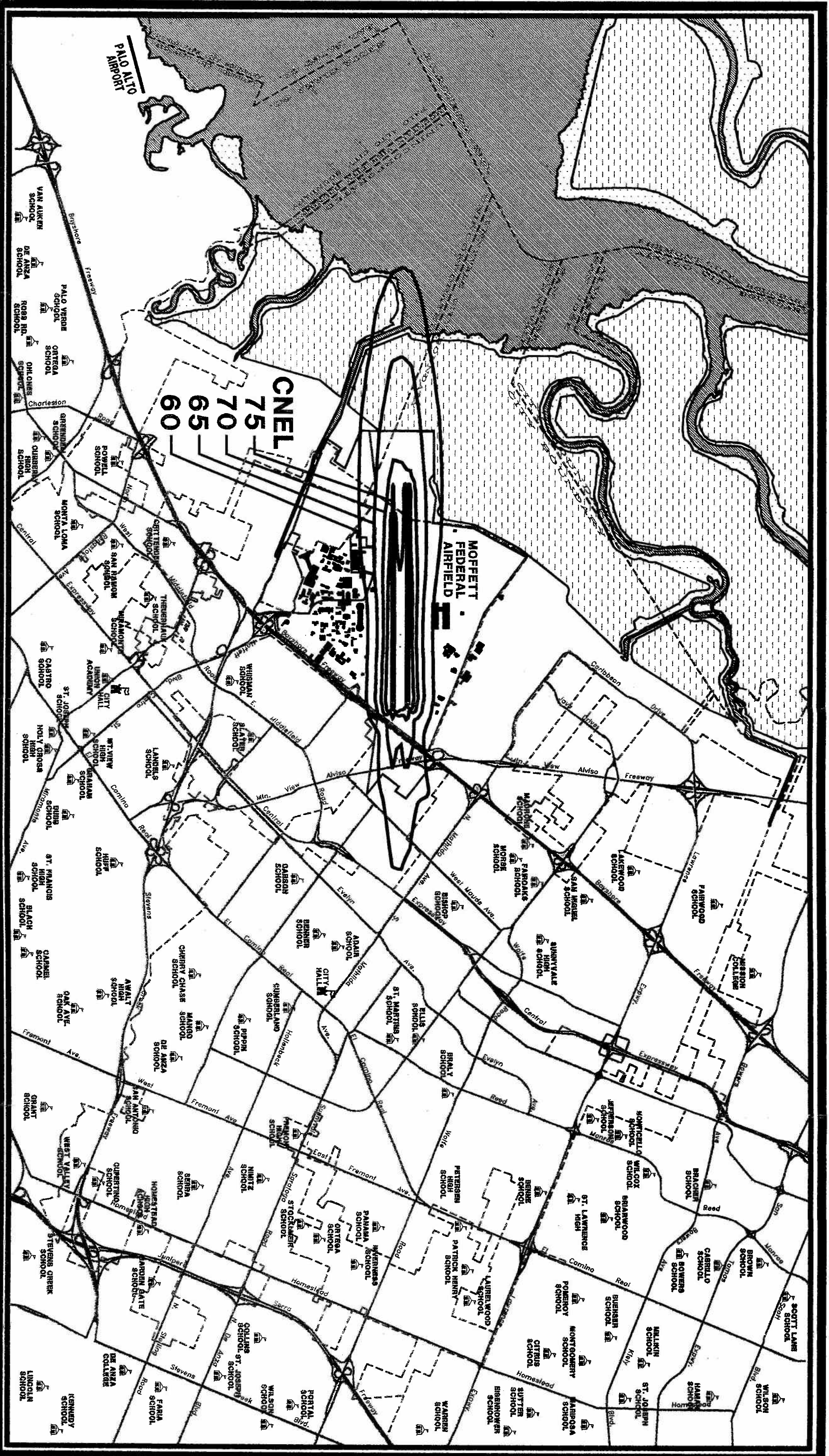
YEAR 1999 CNEL CONTOUR

SCALE



**MOFFETT FEDERAL AIRFIELD
 CNEL NOISE EXPOSURE,
 YEAR 1999**

MAY 23, 2000

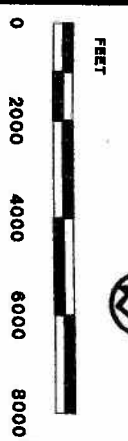


P&D Aviation
 A Division of
P&D Consultants
 2205 Bridgepointe Parkway #105
 San Mateo, CA 94404-5015

LEGEND

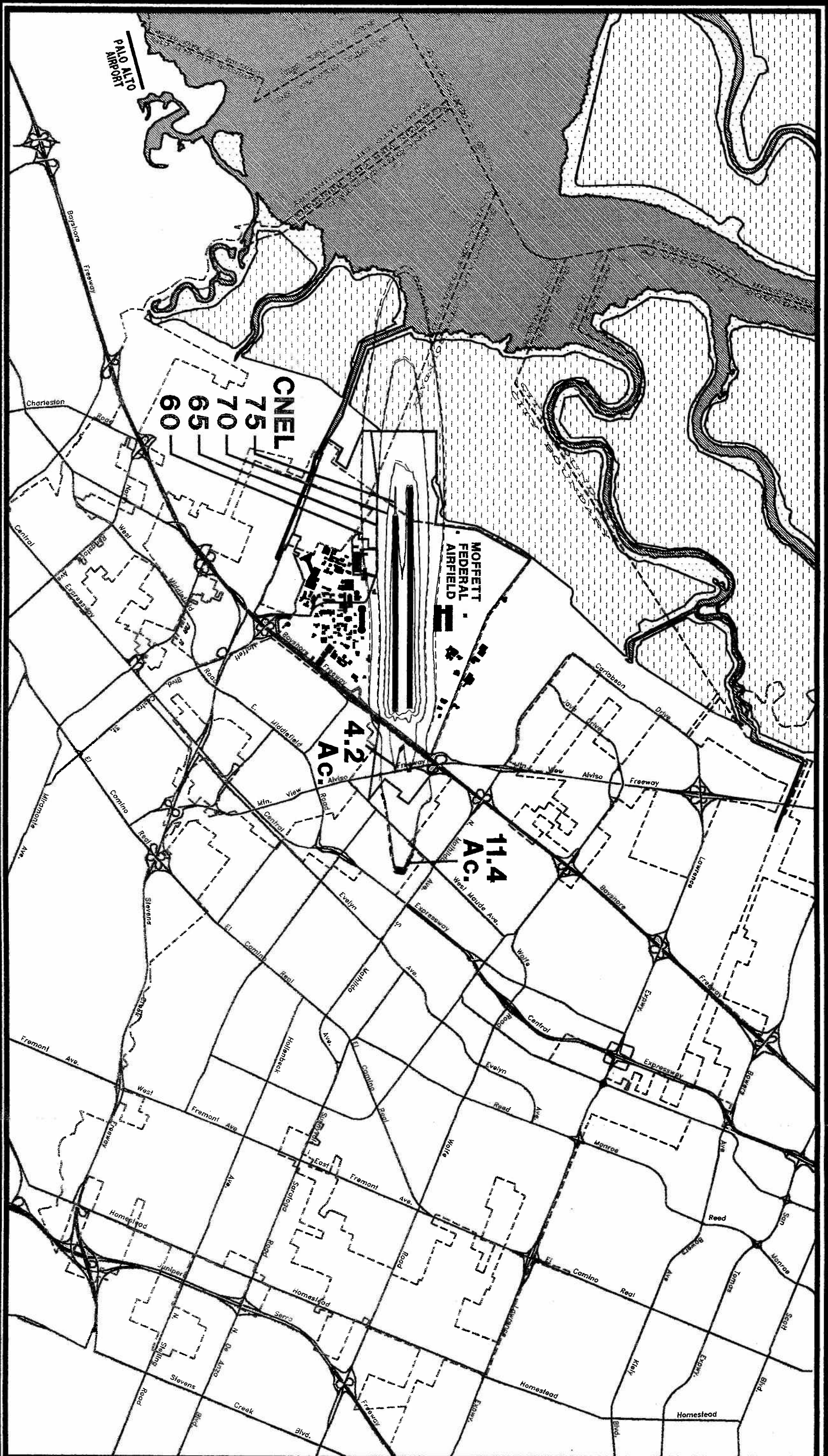
YEAR 2010 CNEL CONTOUR

SCALE



**MOFFETT FEDERAL AIRFIELD
 CNEL NOISE EXPOSURE,
 YEAR 2010**

JUNE 20, 2000

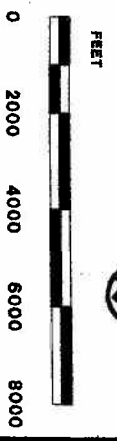


P&D Aviation
 A Division of
P&D Consultants
 2205 Bridgepointe Parkway #105
 San Mateo, CA 94404-5015

LEGEND

- YEAR 1999 CNEL CONTOUR
- - - YEAR 2010 CNEL CONTOUR

SCALE



**MOFFETT FEDERAL AIRFIELD
 CNEL NOISE EXPOSURE,
 YEARS 1999-2010 COMPARISON**

JUNE 26, 2000