Quarterly Noise Monitoring Report

October – December 2010

Metropolitan Oakland International Airport

HMMH Report No. 302550.011/004
March 2011

Prepared for:

Port of Oakland
Oakland, California

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Prepared for:

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Executive Summary

The California Airport Noise Regulation (California Code of Regulations, Title 21, Section 50025, County Report) requires the quarterly report include use of a standard information format provided by the California Department of Transportation "Department" (form DOA 617, dated 10/89). The information below fulfills this requirement.

CALIFORNIA FORM DOA 617

Summary of Statistical Information

For

California Department of Transportation

Oakland International Airport

Calendar Year 2010: Fourth Quarter 2010

1. Size of Noise Impact Area as defined in the Noise Standards (California Code of Regulations, Title 21, Chapter 2.5, Subchapter 6): 0 sq. miles
2. Estimated number of dwelling units included in the Noise Impact Area as defined by the Noise Standards: 0 dwelling units
3. Estimated number of people residing within the Noise Impact Area as defined by the Noise Standards: 0 people
4. Identification of aircraft type having highest takeoff noise level operating at this airport together with estimated number of operations by this aircraft type during the calendar quarter reporting period: GLF3 aircraft; SEL 114.1 dB; Estimated Operations: 77.
5. Total number of aircraft operations during the calendar quarter: 42,976 aircraft operations
6. Number of Air Carrier operations during the calendar quarter (not mandatory): 26,776 Air Carrier operations
7. Percentage of Air Carrier operations by aircraft certified under Federal Aviation Regulation (FAR) Part 36, Stage III (not mandatory): 100% of air carrier/air cargo operations Stage III
8. Estimated number of operations by General Aviation aircraft during the calendar quarter (not mandatory): 10,546 General Aviation aircraft operations estimated from FAA tower counts
9. Estimated number of operations by Military aircraft during the calendar quarter (not mandatory): 13 Military aircraft operations

Per Title 21 requirements, the report must also include a map illustrating the location of the noise impact boundary, as validated by measurement, and the location of the measurement points, in the four preceding calendar quarters (Figure 1 satisfies this requirement) and the daily measured CNEL values at each of the noise monitoring sites (Tables 1 through 3 satisfy this requirement).

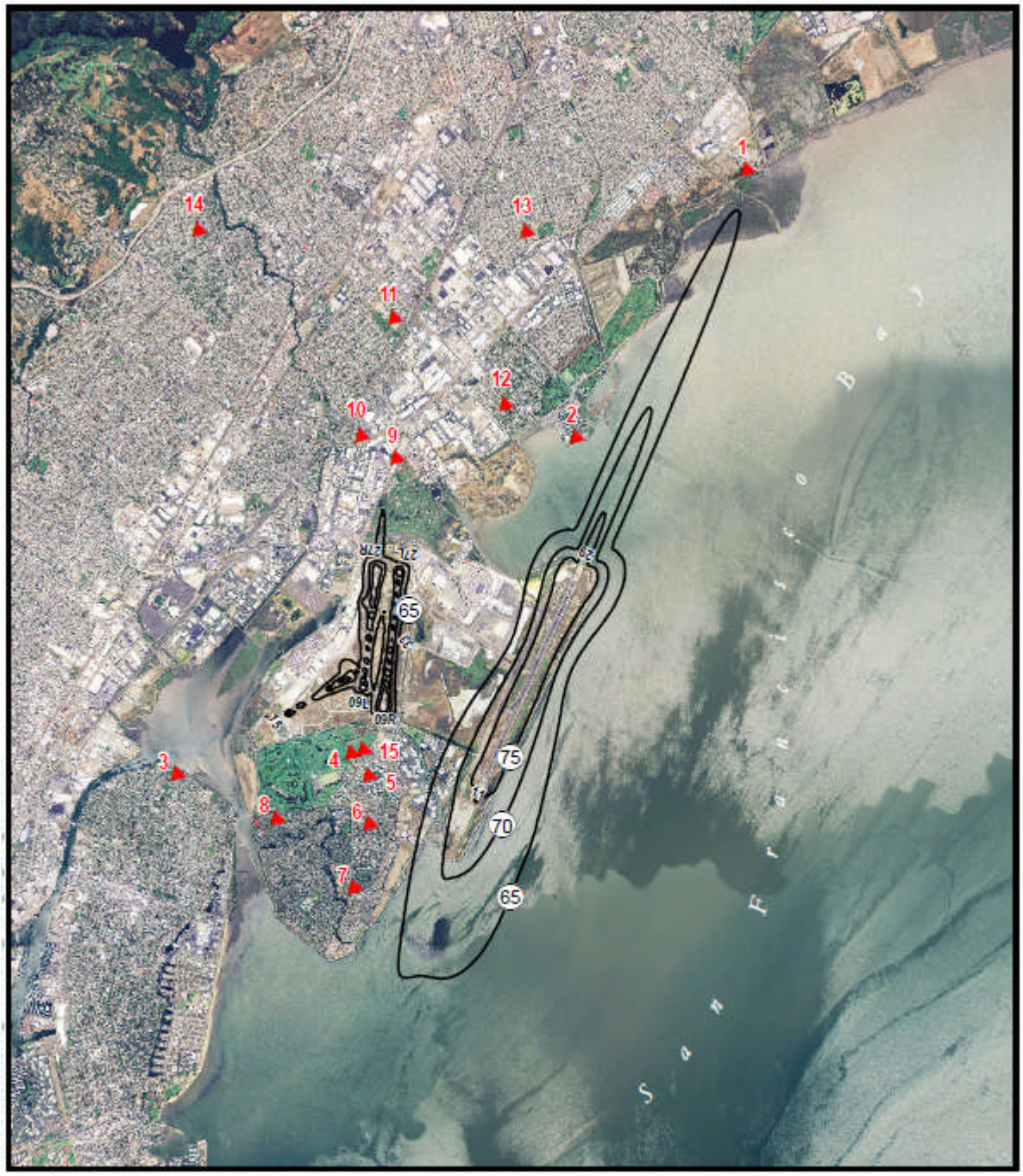

Figure 1 Noise Impact Boundary: 12-Month CNEL Contours for January 2010 – December 2010

Table 1 Measured CNEL values, October 2010

October	RMT Location Number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	65	55	39	55	58	59	60	53	62	50	53	49	30	0	56
2	60	51	40	53	55	57	59	47	58	43	50	38	23	0	54
3	62	53	35	53	56	59	60	55	57	43	49	38	0	0	53
4	63	55	42	59	62	61	62	54	58	47	50	45	27	0	63
5	65	55	46	59	60	61	62	56	62	51	52	53	31	0	58
6	65	55	43	59	61	62	62	57	63	54	52	54	35	34	58
7	65	60	42	58	60	61	63	55	62	57	54	51	28	48	57
8	62	55	44	58	59	60	61	56	59	46	49	51	22	0	57
9	62	52	43	54	56	58	59	51	57	49	50	42	25	0	53
10	61	50	42	53	55	58	59	49	52	40	43	45	25	0	51
11	62	55	33	55	54	56	58	50	57	41	48	41	39	0	52
12	63	57	45	55	55	57	59	55	55	43	47	49	30	0	52
13	64	56	43	57	58	59	60	56	59	49	50	48	0	0	56
14	65	57	43	65	59	61	61	54	59	51	51	49	35	35	58
15	65	57	43	59	60	61	61	58	60	51	51	53	36	0	57
16	61	51	42	74	69	68	63	56	53	38	44	36	0	25	72
17	62	52	40	55	56	58	60	49	59	45	52	33	32	0	53
18	64	0	44	55	57	59	61	0	60	48	50	45	41	0	55
19	65	56	47	58	59	61	61	56	62	52	51	48	39	0	56
20	65	57	42	57	59	60	61	56	61	53	54	50	41	0	56
21	66	56	44	56	59	61	62	55	59	48	51	49	34	0	55
22	65	55	40	58	59	61	62	57	59	44	49	44	39	32	57
23	59	60	34	57	57	57	56	50	52	48	43	51	34	0	55
24	64	0	35	54	57	57	57	53	60	50	52	53	40	0	54
25	64	58	38	58	57	59	61	55	60	53	53	49	32	0	55
26	63	57	50	56	59	60	60	55	60	49	53	49	37	0	56
27	61	56	45	57	58	60	61	51	59	49	52	48	30	0	56
28	61	60	39	57	60	60	60	55	58	48	47	50	41	0	57
29	64	63	44	54	53	56	58	0	59	50	51	54	45	32	50
30	61	58	39	58	55	57	57	47	58	50	50	50	40	0	55
31	60	49	40	52	55	58	59	45	57	45	48	38	31	0	52
Average	63	57	43	61	59	60	60	54	59	50	51	49	37	41	60
No. Day	31	29	31	31	31	31	31	29	31	31	31	31	28	6	31

Note: Values reported are total measured CNEL values at each monitor.
Source: ANOMS™ October 1, 2010 through December 31, 2010

Table 2 Measured CNEL values, November 2010

November	RMT Location Number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	58	56	40	58	60	59	59	53	62	50	56	47	30	33	61
2	63	58	45	58	59	60	60	54	58	48	50	48	36	27	57
3	62	54	39	57	59	60	61	52	69	58	59	53	55	0	56
4	63	54	40	58	58	60	61	53	59	49	48	51	32	0	55
5	64	55	46	57	59	60	61	54	62	50	54	51	26	0	57
6	62	53	40	55	58	59	60	50	54	37	45	40	28	27	55
7	65	61	33	54	56	58	61	52	60	52	57	51	46	0	55
8	0	54	41	61	59	60	60	58	59	49	52	48	39	28	60
9	65	55	45	59	59	62	63	57	62	51	53	47	31	0	58
10	66	59	43	57	59	61	61	56	59	46	51	51	45	34	57
11	64	60	43	57	60	61	60	53	60	61	51	52	49	0	57
12	64	57	47	56	59	60	60	54	60	50	52	48	37	0	56
13	61	51	39	53	56	57	58	46	55	50	47	49	0	0	56
14	61	55	35	55	54	56	57	46	54	42	47	50	31	37	55
15	64	56	46	54	56	57	58	52	57	47	47	48	31	0	53
16	64	57	45	56	59	60	61	54	61	53	50	50	45	40	56
17	64	59	44	59	61	61	62	54	61	52	53	50	19	0	57
18	66	59	46	57	59	61	62	57	64	53	55	50	31	0	56
19	66	60	43	58	60	61	62	58	62	50	54	49	31	0	57
20	63	61	41	57	59	60	60	53	58	55	51	53	46	0	56
21	63	55	28	53	57	60	61	50	57	39	50	45	22	0	53
22	64	54	41	56	58	60	62	55	61	50	53	45	26	0	56
23	66	60	44	58	60	62	62	54	63	56	56	48	29	0	54
24	65	59	43	58	59	61	60	55	60	50	52	49	38	23	57
25	59	55	38	50	55	57	58	46	56	44	46	50	0	0	51
26	63	53	47	58	57	58	59	53	55	47	45	39	0	0	57
27	63	60	35	55	57	59	59	51	59	50	48	50	44	0	55
28	63	58	43	54	57	59	59	50	58	46	52	49	28	0	54
29	63	52	51	54	56	58	59	54	60	51	52	48	38	40	54
30	65	55	47	59	60	61	61	57	60	52	52	46	39	0	58
Average	64	57	44	57	58	60	60	54	61	52	53	49	43	35	56
No. Day	29	30	30	30	30	30	30	30	30	30	30	30	27	9	30

Note: Values reported are total measured CNEL values at each monitor.
Source: ANOMS™ October 1, 2010 through December 31, 2010

Table 3 Measured CNEL values, December 2010

December	RMT Location Number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	65	56	43	58	60	61	61	56	59	52	51	50	32	36	58
2	65	55	48	58	60	61	62	55	59	49	50	47	31	0	58
3	63	57	46	60	60	60	61	56	61	52	53	55	40	0	58
4	61	53	45	55	57	59	60	47	56	46	50	47	36	0	55
5	59	61	31	55	59	58	57	55	54	50	45	52	42	0	54
6	64	0	0	0	0	48	0	0	0	0	0	0	0	0	50
7	65	55	45	59	60	61	62	56	62	53	55	46	29	38	56
8	63	65	38	61	62	61	59	59	59	56	51	58	49	0	60
9	66	61	45	61	60	62	62	56	61	49	53	51	30	38	59
10	66	60	41	58	60	61	62	55	61	49	53	50	35	26	58
11	61	52	38	55	0	58	58	53	55	41	47	45	24	0	56
12	62	53	40	54	56	57	58	50	60	46	52	43	0	26	55
13	64	53	22	56	57	58	59	54	62	51	56	44	0	38	56
14	67	65	44	56	59	61	61	56	61	53	54	54	41	0	55
15	66	56	40	57	60	62	62	56	60	49	52	47	34	38	59
16	65	57	50	58	60	61	62	57	61	50	52	49	32	38	58
17	64	66	37	60	60	60	58	58	63	56	52	59	50	41	57
18	62	62	35	57	61	61	60	55	60	53	50	53	49	47	59
19	57	59	33	55	59	61	62	52	55	47	48	50	37	33	55
20	62	64	38	55	56	54	54	48	58	54	51	56	46	40	55
21	62	66	49	60	60	58	55	57	57	56	50	57	46	43	57
22	65	62	43	58	61	61	63	56	63	53	57	52	42	35	57
23	66	58	47	60	61	63	63	56	61	48	52	49	45	39	60
24	62	60	45	57	58	60	60	53	56	49	46	49	39	41	55
25	58	57	0	45	51	53	54	50	51	39	40	46	32	0	46
26	63	58	36	54	58	58	58	48	56	49	48	54	43	36	54
27	64	54	43	55	56	58	60	55	61	51	50	39	0	36	54
28	62	58	48	60	61	61	60	60	58	48	49	54	44	40	59
29	64	58	46	55	60	61	61	52	58	47	53	50	33	43	58
30	65	60	41	57	60	61	61	53	59	52	51	44	41	40	57
31	63	56	41	57	58	59	59	54	58	48	48	51	0	40	57
Average	64	60	44	58	59	60	60	55	60	51	52	52	43	40	57
No. Day	31	30	29	30	29	31	30	30	30	30	30	30	26	22	31

Note: Values reported are total measured CNEL values at each monitor.
Source: ANOMS™ October 1, 2010 through December 31, 2010

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Tables

1 Introduction

Harris Miller Miller and Hanson, Inc (HMMH) and PK Consultants, Inc. (PK) prepared the Fourth Quarter of 2010 (4Q2010) Noise Monitoring Report. This quarterly noise monitoring report provides the aircraft noise levels and airport operations at Metropolitan Oakland International Airport (OAK) for the periods from January 1, 2010 to December 31, 2010 and satisfies the California Division of Aeronautics Noise Standards[1], Section 5025 requirements. California's Division of Aeronautics and Alameda County received copies of this report.

According to the California Noise Standards, hereinafter Title 21, a county may declare an airport within its boundaries to have a noise problem and shall enforce Title 21 requirements. Alameda County has declared OAK a "noise problem" airport. In as such, the County must provide quarterly to the California Department of Transportation "the department" a report containing at least the following information:

- A map illustrating the noise impact boundary for the preceding four quarters; see Figure 1 in the Executive Summary
- The annual noise impact area and the estimated number of dwelling units and people residing with the noise impact area; see Form DOA 617 in the Executive Summary
- Daily CNEL measurements, number of aircraft operations, and estimated number of operations of the highest noise level aircraft type during the calendar quarter; see Form DOA 617 in the Executive Summary
- Form DOA 617; see the Executive Summary

This report meets and exceeds Title 21's reporting requirements for 4Q2010. The following sections provide the methodology used to obtain the information reported and further details illustrating the aircraft operations and noise exposure from those operations in the OAK environs. This report is organized as follows:

Section 2: Aircraft Noise and Operations Measurements

Section 3: Airport Operations

Section 4: Preparation of Annual CNEL Contours

Section 5: Single-Event Aircraft Noise Levels

[1] State of California Department of Transportation Division of Aeronautics, Title 21, Subchapter 6, Noise Standards, Register 90, No. 10—3-10-90.

2 Aircraft Noise and Operations Measurements

On September 14, 1990 the Port of Oakland (Port), as the airport proprietor, installed a state-of-the-art noise and operations monitoring system (NOMS)[2], which automatically collects flight track data and flight identification data for a majority of all operations at the airport as well as measure and report noise levels at specific locations. In 2006, the Port received an upgrade to their NOMS with ANOMS8 software in order to maintain the most up-to-date technologically advanced NOMS.

OAK's NOMS is currently configured with fifteen (15) Remote Monitoring Terminals (RMTs) dispersed in the communities surrounding OAK to assist in evaluating compliance with OAK's established flight pattern and aircraft noise abatement procedures, and to assess the noise impact in residential areas from OAK aircraft operations. ANOMS™ correlates recorded noise events at each RMT with aircraft flight track records obtained from the Automated Radar Terminal System (ARTS) Gateway System located at the Northern California TRACON[3] (NCT) in Sacramento, California.

The ARTS data is used to separate aircraft and non-aircraft noise events recorded at the RMT's. ANOMS™ also excludes noise events due to aircraft overflights from other airports (such as San Francisco International) using the aircraft identification information included in the ARTS data. Figure 1 shows the RMT locations.

The 15 RMTs located in the community are Larson Davis Laboratories Model 870 (LD870) Precision Integrating Sound Level Meters fitted with LDL Model 2100 outdoor microphone assemblies. The meters are housed in weatherproof cabinets, and the microphones are placed on booms at least 20 feet above the ground surface or at least 10 feet above neighboring roof tops, whichever is higher and has a clear line of sight to the path of aircraft in flight. The meters report the maximum A-weighted sound level (L_{max}), the duration of a noise event at a pre-programmed measurement threshold level, and the Single Event Noise Exposure Level (SENEL) for single noise events. The RMT's pre-programmed parameters were determined from previous field observations of aircraft and background noise levels at each measurement site. ANOMS™ also reports the Hourly Noise Level (HNL) and Community Noise Equivalent Level (CNEL) based on both overall noise levels and single noise events exceeding the selected measurement threshold levels.

The sound level meters' internal calibration system performs daily checks using an acoustic actuator. The meters are externally calibrated periodically using an acoustical calibrator certified to be consistent with National Bureau of Standards (NBS) reference levels. The measurement systems meet all pertinent specifications of the American National Standards Institute (ANSI) and the International Electrotechnical Commission (IEC) for Type 1 Precision sound level meters and microphones, and comply with all applicable requirements of Title 21.

[2] The OAK system utilizes ANOMS™, which is a product of the Lochard Corporation.
[3] TRACON or Terminal Radar Approach Control Facility's main function is to control airspace around airports for which it serves. The NCT handles flight operations for a 21,000-square mile area that stretches from Santa Rosa in the north to Big Sur in the south and is bordered by the Pacific Ocean to the west and the Sierra Nevada mountains to the east. The 95,000-square foot facility is home to more than 350 air traffic controllers and technicians and provides flight approach control services to 19 airports in the northern California area.

3 Airport Operations

Title 21 requires the reporting of the total number of airport operations during the calendar quarter. Table 4 provides a summary of the monthly activity for October through December 2010 as captured in ANOMS™, along with the previous quarter totals. Table 4 indicates a substantial decrease in regional jets and propeller activity with a slight decrease in carrier jets. There is a substantial increase in unknown aircraft activity with slight increase in activity for all other aircraft categories for a total decrease in operations of approximately 6% during the fourth quarter of 2010 compared to the third quarter of 2010.

Table 4 Monthly Aircraft Operational Activity – Fourth Quarter 2010

Aircraft Category	Monthly Arrivals and Departures					Percent Change
	October	November	December	Total	3Q2010	
Carrier Jets	8899	8576	9301	26776	27277	-1.8%
Regional Jets	372	371	405	1148	1776	-35.4%
Corporate Jets	1357	1292	1407	4056	3664	10.7%
Turboprops	1285	1166	1380	3831	3488	9.8%
Propeller	2183	2225	1617	6025	8940	-32.6%
Military	8	5	0	13	11	18.2%
Unknown	538	323	266	1127	487	131.4%
Total	14,642	13,958	14,376	42,976	45,643	-5.8%

Note: "Unknown" aircraft category implies ANOMS™ did not have aircraft type associated with flight track.

Source: Port of Oakland ANOMS™ October 1, 2010 through December 31, 2010.

Aircraft operating at OAK are arranged in one of seven categories; carrier jets, regional jets, corporate jets, turbo-propeller (turboprops), propeller, military, and unknown. Carrier jets are primarily large jets consisting of both commercial carriers and freight operators as defined in FAA Order 7210.3. Regional jets are primarily small commercial jets while corporate jets have fewer seats and passengers are typically flown as charter operations. Commuter and charter operators use turboprops for air taxi services but, may also use regional or corporate jets for these services. The military category contains both propeller and jet aircraft. The general aviation category contains the remaining operations. General aviation operations include jets, single- and twin-engine propeller driven aircraft.

Airport operations determine noise exposure in the OAK environs as described by the CNEL metric, which by definition is a daily noise exposure. To determine the average daily noise exposure from OAK operations, additional information is required for determining aircraft fleet mix, runway use, and time of day of the operations as CNEL weights evening (7pm to 10pm) and night (10pm to 7am) noise levels.

4 Preparation of Annual CNEL Contours

CNEL can be measured or estimated through modeling. Most airport noise studies use computer-generated CNEL estimates, in terms of equal-exposure noise contours (much as topographic maps present equal-elevation contours). Title 21, Section 5012, Airport Noise Standard, indicates that the "noise impact area" is based on the standard of 65 dB CNEL.

The FAA Integrated Noise Model (INM) incorporates a comprehensive set of computer routines for calculating airport noise exposure contours. HMMH used the most current release of the model, INM Version 7.0b, to prepare the 12-month contours ending with the fourth quarter 2010.

HMMH used the Port of Oakland's flight track files and noise level measurement data collected by ANOMS™ as the basis for predicting aircraft noise at OAK using the INM. Data for aircraft activity, aircraft fleet mix including helicopters, and airport configuration used in the noise modeling process were obtained from ANOMS™ for the time period of January 1, 2010 through December 31, 2010. The following sections provide the summary of the data, methods and assumptions used to prepare the Annual CNEL noise exposure map.

4.1 INM Required Data

The INM requires data in three principal categories: (1) aircraft noise and performance data, (2) airport layout, and (3) aircraft operational data.

4.1.1 Aircraft noise and performance data

The INM includes a database of noise and performance data for a broad range of representative aircraft types. Noise data cover a range of distances (from 200 feet to 25,000 feet) for specific thrust levels. Performance data include thrust, speed, and altitude profiles for takeoff and landing operations. The INM database contains standard noise and performance data for more than one hundred different fixed-wing civilian aircraft types. The program automatically accesses the applicable noise and performance data for departure and approach operations by those aircraft. For aircraft not included in the database, the FAA maintains a list of acceptable "substitutes".

Airfield elevation and average temperature have effect aircraft performance; these are accounted for in INM 7.0b. Aircraft departing a high altitude and/or high temperature airport must use more thrust than at lower temperatures and elevations. The performance data used by the INM define the length of the takeoff roll (based on aircraft takeoff weight), the climb rate, and speeds for each flight segment.

4.1.2 Airport layout

The INM requires the following airfield layout related inputs:

- Runway orientations
- Runway lengths
- Runway end elevations
- Start-of-takeoff-roll points on each runway
- Landing touchdown points on each runway
- Runway threshold crossing heights
- Runway approach slopes
- Annual average temperature, pressure, relative humidity, and runway-specific headwinds

4.1.3 Aircraft operational data

The INM requires the following aircraft operational inputs:

- Number of aircraft operations
- Aircraft fleet mix
- Day-night split of operations
- Runway utilization
- Flight track geometry and utilization

For accurate determination of daily noise exposure using actual aircraft operations for modeling purposes, the ANOMS™ database provided complete and accurate information for approximately 178,606 operations on 365 days[4]. These operations represent the majority of all aircraft operations at OAK and are a large "sample" with an extremely high statistical reliability.

4.2 Preparation of INM-input Files

As directed by the Port, HMMH prepared the INM input files through the use of our proprietary INM pre-processor, "RealContours"™, which takes maximum possible advantage of both the INM's capabilities and the investment that the Port has made in operations monitoring with ANOMS™. RealContours automates the process of preparing the INM inputs directly from the flight operations monitoring results, to permit airports to model the full diversity of activity as precisely as possible. Rather than modeling a single annual-average day, RealContours allowed the determination of daily noise exposure from actual OAK flight operations for a total of 365 days. The following subsections summarize the noise modeling inputs for January 1, 2010 through December 31, 2010 operations at OAK.

4.2.1 Annual-average airport operations, aircraft fleet mix and time of day

RealContours assigned INM types based on the FAA code associated with each flight. For commercial operations, selection of the specific INM aircraft type was accomplished by using the fleet mix of each airline. This information permits a rational and representative selection of INM aircraft types. In cases where multiple INM types are available for a single FAA code, RealContours chooses the INM type using a random process, with weightings corresponding to the number of each aircraft type operated by that particular airline.

To take into account the penalties applied to evening and nighttime operations, all INM input must be coded as occurring either in the day, evening or at night. RealContours used the time recorded in the operations data for calculating sound exposure. Operations between 7 a.m. and 7 p.m. are un-weighted. When the time of the operation is between 7 p.m. and 10p.m., the operation is considered to be an evening operation and a weighting factor of 3 times the noise energy is added in the computation of CNEL by the INM. When the time of the operation is between 10 p.m. and 7 a.m., the operation is considered to be a nighttime operation and a weighting factor of 10 is added in the computation of CNEL by the INM.

[4] RealContours™, an Integrated Noise Model (INM) preprocessor, successfully processed 365 days of complete and accurate flight track data to determine the average daily noise exposure. Traditional modeling techniques determine daily noise exposure from a single day of "annual-average" activity.

4.2.2 Annual runway utilization

Runway use was determined from the actual flight track data acquired in ANOMS™. Table 5 summarizes the observed runway utilization rates, collapsed into major aircraft type categories: (1) air carrier/ large jet, (2) regional jet, (3) corporate jet, (4) turbo-propeller, (5) piston propeller aircraft, and (6) military, respectively. RealContours modeled each aircraft operation on the individual flight track found in the ANOMS™ sample, thus each aircraft type has unique runway utilization.

Table 5 summarizes the annual arrival and departure activity during January 1, 2010 through December 31, 2010.

Table 5 Annual Aircraft Operational Activity – January 1, 2010 through December 31, 2010

Aircraft Category	RWY 29	RWY 11	South Field Total	RWY 27R/L	RWY 33	RWY 09R/L	RWY 15	North Field Total	Grand Total
Aircraft Landings									
Carrier Jets	48,565	4,825	**53,390**	268	4	8	0	**280**	**53,670**
Regional Jets	2,622	337	**2,959**	566	2	3	0	**571**	**3,530**
Corporate Jets	360	608	**968**	6621	4	263	0	**6888**	**7,856**
Turboprops	1,125	68	**1,193**	5127	30	517	54	**5728**	**6,921**
Propeller	39	30	**69**	14822	672	346	576	**16416**	**16,478**
Military	23	0	**23**	2	1	0	2	**5**	**28**
Unknown	12	4	**16**	1463	148	38	129	**1778**	**1,793**
Total	**52,745**	**5,872**	**58,617**	**28,862**	**861**	**1,175**	**761**	**31659**	**90,276**
Aircraft Departures									
Carrier Jets	48,459	4,966	**53,425**	22	12	33	0	**67**	**53,492**
Regional Jets	3,177	285	**3,462**	7	2	47	0	**56**	**3,518**
Corporate Jets	6,392	135	**6,527**	390	55	905	0	**1350**	**7,877**
Turboprops	703	105	**808**	4465	368	1234	0	**6067**	**6,875**
Propeller	285	34	**319**	8838	4605	1141	71	**14655**	**14,966**
Military	25	1	**26**	1	1	0	0	**2**	**28**
Unknown	175	32	**207**	763	370	211	7	**1351**	**1,557**
Total	**59,215**	**5,558**	**64,773**	**14,478**	**5,413**	**3,571**	**78**	**23540**	**88,313**
Total Operations	**111,962**	**11,430**	**123,392**	**43,355**	**6,274**	**4,746**	**839**	**55214**	**178,606**

Note: "Unknown" aircraft category implies ANOMS™ did not have aircraft type associated with the flight track
Source: Port of Oakland ANOMS™ January 1, 2010 through December 31, 2010

4.2.3 Flight track geometry and utilization

The RealContours approach used every available flight track in the radar sample. As discussed in Section 4.1.3, the OAK ANOMS database includes flight tracks with associated flight identification data for 178,606 operations from a total of 365 days modeled. RealContours modeled operations on 171,181 tracks which is approximately 96% of the tracks.

4.2.4 Annual-average weather conditions

Weather data were obtained from the National Oceanic and Atmospheric Administration; National Climatic Data Center for a 1-year period for OAK and these values were used in the INM for computing the annual noise exposure map.

4.3 Annual Noise Exposure Map

The INM was used to prepare the OAK 12-month CNEL noise exposure map shown in Figure 1 based on the aircraft noise level and airport operational factors described in the previous sections. RealContours developed INM input files for each day of radar data, 365 total modeled days. These input files were run through the INM and then the results are stored for use by the system.

The predicted 65 dB CNEL contour was plotted on an ArcView map of the area surrounding the airport, as shown by Figure 1. The CNEL contours prepared for current annual average operations at OAK describe the airport noise environment within the requirements of the California Airport Noise Regulations.

The contour map was used to determine the number of dwelling units included within the Noise Impact Boundary defined by the California Airport Noise Regulations. For this analysis, it was assumed that a parcel was affected if it included an incompatible land use, and if any portion of the parcel was included in the 65 dB CNEL contour. Land use was determined from the AutoCAD parcel map prepared by the Port of Oakland, which was imported into ArcView. Based upon these data and in congruence with the previous reports, no incompatible residences exist within the current Noise Impact Boundary.

4.4 Validation of Noise Exposure Map

The INM calculated the predicted CNEL values at each of the current noise monitoring sites. Table 6 compares the measured and predicted CNEL values at each RMT location.

Since only one location is within proximity to the 65 dB CNEL contour (RMT 1), it is difficult to determine the validity of the noise impact boundary with only the RMTs measuring an annual CNEL of 65 dB. Therefore, we also reviewed results at RMT 2, 5, 6, 7, 9, and 15 to assist with the assessment of the noise impact boundary as modeled using INM 7.0b. RMT 1 measured an annual CNEL of 62 dB whereas the INM predicted an annual-average day of 64 dB.

Table 6 Measured and Predicted Aircraft Annual CNEL Values

RMT No.	RMT Name	Measured CNEL (A)	Modeled[1] CNEL (B)	Difference (B-A)
1	Oro Loma San. Dist[2]	62	64	2.4
2	San Leandro Marina[3]	55	57	1.3
3	Fernside	46	51	4.8
4	Godfrey Park	57	58	1.5
5	Garden Isle[3]	57	59	1.5
6	Wake Lane[3]	58	59	1.5
7	Fire Station[3]	59	59	0.4
8	Earhart School	54	54	-0.4
9	Doolittle Drive[3]	58	61	3.4
10	Tudor Court	50	54	3.8
11	John Muir School	51	56	5.3
12	Garfield School	49	52	2.7
13	SLUSD Admin Office	46	47	0.8
14	Washington School	37	44	7.1
15	Beach Road[3]	56	59	3.2

Notes: 1 Modeled using INM 7.0b
2 Location within 65 dB CNEL contour
3 Location within 60 dB CNEL contour
Source: Port of Oakland ANOMS™ January 1, 2010 through December 31, 2010 and RealContours™ 4Q2010 Model.

4.4.1 South Field Contour Validation

RMT 1 measured an annual CNEL that was 2.4 dB less than the modeled CNEL at that location. Therefore, the lobe extending to the east southeast (predominant south runway arrival lobe) is slightly larger than measured. RMT 2 measured an annual CNEL 1.3 dB below the modeled CNEL at that location, but is well beyond the 65 dB CNEL contour location with a measured level of 57 dB. These comparisons (near the 65 dB CNEL extent) imply that the contours are slightly larger than reflected in the aircraft CNEL values measured to the east of OAK.

Since no RMT's exist within the 65 dB CNEL contour on the opposite side of the airport (the predominant departure end of the south runway), we used only the 60 dB contour to compare to measured levels at RMT 5, 6, and 7 to validate the shape and size of the predominant departure lobe. As noted in Table 6, the measured noise level was within 1.5 dB of the modeled levels at each of these RMT locations.

Based on the measured CNEL values, adjustment to the 65 dB CNEL noise impact boundary is not required for the South Field since the contour may be slightly larger than the measurements indicate and there is no dwelling units or people within the Noise Impact Boundary.

North Field Contour Validation

Due to the relatively small noise impact boundary associated with North Field operations, only RMT locations 9 and 15 were used to validate the 65 dB contour for North Field. RMT 9 and 15 are to the east and west, respectively, of North Field and have measured annual noise levels of around 60 dB. The modeled annual noise level was about 3 dB higher than the measured level at RMT 9 and RMT 15 for which we have no understanding at this time. Since the modeling produces a noise impact boundary that is slightly larger than the measurements would dictate in this area and since the larger boundary still includes no noise sensitive properties, OAK opts to report the larger boundary.

5 Single-Event Aircraft Noise Levels

ANOMS™ enables the airport to monitor the highest measured single-event noise levels for aircraft operations at all 15 permanent noise monitors. The highest measured single-event noise levels for operations for the calendar quarter from October 1, 2010 through December 31, 2010 is presented below in Table 7. The loudest measured single-event noise level (114.1 dB SEL) was produced by the Gulfstream 3 aircraft at RMT No. 4.

Table 7 Highest Takeoff Noise Levels by Aircraft Type

Aircraft Type	Total Operations[1]	Highest Measured SEL (dB)[1]	Correlated RMT No.
GLF3	77	114.1	4
LJ25	10	113.1	4
F16	1	108.6	1
F18	2	104.8	1
MD83	242	104.1	5

Note: Information is based on 4th Quarter 2010 data.
Source: 1. Port of Oakland ANOMS™ October 1, 2010 through December 31, 2010.