Community-Scale Air Toxics Monitoring – Sun Valley Neighborhood and General Aviation Airports

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Project Overview

• U.S. EPA Community-Scale Air Toxics Grant: Three Components

1. Monitoring in communities around general aviation airports

2. Neighborhood scale monitoring in Sun Valley, CA – industrial area interspersed with residences

3. Review of hexavalent chrome data and sources
General Aviation Airports
Study Objectives

• Characterize air toxics levels in the communities around GA airports
• Compare data to other air toxics studies such as SCAQMD’s Multiple Air Toxics Exposure Study (MATES-III)
• Determine potential impact of airport emissions on measured pollutant levels
• Provide baseline data for future studies
Advisory Committee of Stakeholders

- **Membership**
  - Airport Management
  - Community Groups
  - Cities of Los Angeles and Santa Monica (Airport Authorities)
  - Aviation Industry
  - State and Federal Congressional Representatives

- **Role**
  - Provide Initial Input on Specific Issues
  - Comment on Sampling Locations
  - Coordinate Information Outreach
Measurements

- TSP Lead and Hexavalent Chromium
- PM10 Mass and Carbon
- PM2.5 Mass & Components
- Continuous Particle Count (ultrafine)
- Volatile Organic Compounds (3 x 8 hour periods)
- Carbonyls (acetaldehyde, etc.)
- Continuous Carbon Monoxide
Van Nuys Airport

• Largest Number of General Aviation Operations in the Country

VOR Site #2
Van Nuys Airport Sampling Sites

- Complete Sampling Array (Site 1, 2, 3, 4)
- Lead & CO Monitoring (Site 5, 6, 7)
Santa Monica Airport

- Runways adjacent to neighborhoods
- Increased Number of Private Jet Traffic
Santa Monica Airport Sampling Sites

Residence Site #2

East Tarmac Site #3
Sampling Schedule

- Approximately 12 months of sampling beginning November 2005
- Three months at each airport in two different seasons
- Sampling Completed March 2007
Key Questions

• Can lead found in GA fuel be measured in surrounding communities?
• What are PM and air toxic levels in neighborhoods near GA airports?
• What are the ultrafine particle count concentrations in the surrounding communities?
• Are aircraft emissions distinguishable from other emissions sources?
Santa Monica Airport PM2.5 Mass (\(\mu g/m^3\))

Phase I - Apr 06 - Jul 06

Annual Basin Average: 18.1

- Site #1: West Tarmac (15.2)
- Site #2: Residence site #3 (17.4)
- Site #4: Richland Elem (14.9)
- Site #5: Maintenance facility (15.8)
- Site #6: Walgrove Elem.
- Site #7: Marine Park (15.8)

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Santa Monica Airport PM2.5 Mass ($\mu g/m^3$)
Phase II - Oct 06 - Feb 07

Annual Basin Average 18.1
Santa Monica Airport PM2.5 Elemental Carbon (μg/m³)
Phase II - Oct 06 - Feb 07

Annual Basin Average 2.2
Santa Monica Airport TSP Lead (ng/m³)
Phase I - Apr 06 - Jun 06

Downtown LA – Average: 13.1
Annual Basin Average: 8.6
Santa Monica Airport TSP Lead (ng/m$^3$)
Phase II - Nov 06 - Feb 07

Downtown LA – Average: 13.1
Annual Basin Average: 8.6
Van Nuys Airport TSP Lead (ng/m$^3$)
Phase I – Nov 05 - Feb 06

Annual Basin Average 8.6
Santa Monica Airport Benzene (ppb)
Phase I - Apr 06 - Jul 06

0:00-8:00, 8:00-16:00, 16:00-24:00

0.21, 0.21, 0.18

0.39, 0.27, 0.16

0.42, 0.28, 0.20

0.37, 0.17, 0.18

0.34, 0.15, 0.12

Annual Basin Average 0.42
Santa Monica Continuous Number Concentrations

July 17, 2006

Red numbers correspond to aircraft take-offs

Note Scale Change
GA Airport Results

- Lead levels in communities and near runways below federal and state standards, but elevated at near runway sites
- Airport influence on PM2.5 concentrations may not be distinguishable, but appears to be minor
- Ultrafine particles (measured by number concentration) significantly elevated near runways during aircraft operations
Potential Future Air Toxics Monitoring at Airports

- More continuous instrumentation
- Mobile sampling platforms
- Coordinate with health studies
- Large commercial airports
Sun Valley Air Quality

Background

• Previous Projects
  – Landfills
  – Chrome Plating
  – Schools

• Current Project
  – Community Concerns
  – Concurrent with MATES III
MATES III

- Multiple Air Toxics Exposure Study III
  - Level of Toxics in the Basin
  - 2 Year Study
  - 10 Fixed Sites
  - Microscale Sites Include Fernangeles School – Sun Valley
Measurements

- Lead, Hexavalent Chromium, and Air Toxic Metals
- Air Toxic Gases
- PM10 Mass and Carbon
- Wind Speed and Direction
- One year duration
  - 24 hours samples
  - Every 3rd day
- Locations
  - Based on Community Concerns
Sampling Locations

Feb 2006

Burbank
PM10 Mass ($\mu g/m^3$)
10/28/05 – 6/25/06
PM10 Mass ($\mu g/m^3$)
8/23/05 – 6/25/06

Burbank 35
PM10 Mass ($\mu g/m^3$)
2/13/06 – 6/25/06

Burbank 31
PM10 Mass (μg/m³)
8/23/05 – 2/7/06

Burbank 37
Hexavalent Chromium (ng/m$^3$) Averages over Various Time Periods

Burbank 0.13
Hexavalent Chromium (ng/m$^3$) June, July 2006

- LAUSD Maintenance: 0.17 ng/m$^3$
- Plating Facility: 0.51 ng/m$^3$
- LA Fire Station #77: 0.51 ng/m$^3$
Review of Hexavalent Chrome Sources and Ambient Data

- Ambient levels from MATES sites do not show enough consistent variability to identify “hot spots”
- Monitoring near fence-line at known sources (metal plating) continues at several locations on a 1-in-6 day basis
- Concentrations of 1 ng/m$^3$ Cr$^{6+}$ or higher considered significant
- Vast majority of samples show less than 1 ng/m$^3$
- A few samples per year at active facilities contain higher than 1 and 4 ng/m$^3$
- High measured levels followed up with enhanced source testing and inspection activities
Example: Chrome Plating Facility

ng/m³ Cr6+

Date of Sample

Jul-04  Sep-04  Oct-04  Dec-04  Feb-05  Mar-05  May-05  Jul-05  Aug-05  Oct-05  Dec-05  Jan-06