URBAN 2000 Post Deployment Briefing

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NOAA/FRD Deployment Tasks

- $\text{SF}_6$ Release
- Mobile $\text{SF}_6$ Analysis
- Stationary $\text{SF}_6$ Analysis
- Radar Profiler and SODAR
- 3-D Sonic Anemometers
$\text{SF}_6$ Experiment Domain—$1,2,4,6$ km Arcs
SF₆ Release

- 1 pretest, 5 regular tests, 1 SF₆ only test, and 1 perfluorocarbon only test
- Pretest release characteristics:
  - 2-one hour releases at 0100 and 0300 MDT
  - Release rates: 2 g s⁻¹ and 1 g s⁻¹, respectively
  - Line release
- First 4 regular tests
  - 3-one hour releases at 0100, 0300, and 0500 MDT
  - Release rate: 1 g s⁻¹
  - Line release
  - Simultaneous with perfluorocarbon tracers
SF$_6$ Release (cont.)

- **Fifth test**
  - Regular sampling time
  - Perfluorocarbon tracer only

- **Sixth test**
  - 3-one hour releases at 2200, 0000, and 0200 MDT
  - Release rate: 2 g s$^{-1}$
  - Point source release
  - No perfluorocarbon tracers

- **Seventh test**
  - 3-one hour releases at 0100, 0300, and 0500 MDT
  - Release rate: 1 g s$^{-1}$
  - Point source release
  - Simultaneous with perfluorocarbon tracers
$\text{SF}_6$ Release RV
$\text{SF}_6$ Line Release
$\text{SF}_6$ Line Release
SF₆ Point Source Release
SF₆ Release RV (inside)
Typical SF₆ Release Rate

Test 1 SF6 Release - October 7, 2000

Release Rate (g s⁻¹)

Time (HH:MM, MDT)
Mobile $\text{SF}_6$ Analysis

- **TGA-4000 from Scientech**
  - Electron capture detector
  - Range: 20 pptv to 20 ppbv
  - Recorded at 4 Hz
  - Combined with GPS for position
  - Concentrations displayed in strip chart fashion

- **Real-time reporting of plume position and concentration**
  - On-the-fly repositioning of detection equipment
Mobile SF₆ Analysis (cont.)

- Both mobile and stationary
  - Stationary for plume concentration fluctuations
  - Mobile for plume centerline locations
- 4 mobile analyzers
  - Operator and driver
    - Drivers from NOAA, LANL and PNNL
- 2 stationary analyzers
  - Operator only
Mobile $\text{SF}_6$ Analyzer—TGA & Computer
Mobile SF$_6$ Analyzer in Van
Mobile SF$_6$ Analyzer Fleet
Typical $\text{SF}_6$ Plume Track from Vans
Stationary SF$_6$ Analysis

- Programmable air sampler
- One-liter Tedlar® bags housed in a cartridge
- Twelve consecutive, integrated samples before the cartridge must be changed
- Bag fill time periods ranged from 15 minutes to 1 hour
- Powered by a single "D" cell (sufficient capacity for all 7 tests)
Air Sampler, Sample Cartridge, and Barcode Reader
Air Sampler Modified for CATS

CATS Manifold with color-coding

Red = Permanent CATS
Green = Position #1 of Sampling CATS
Air Sampler Modified for CATS
Stationary SF$_6$ Analysis

- 40 SF$_6$ + perfluorocarbon samplers
- 60 SF$_6$ only samplers
- 10 duplicate SF$_6$ samplers
- 10 blank SF$_6$ samplers
- 10 control (spike) samplers
- Placed on every street corner downtown
- Mid-block locations near release
- Three building tops
- Arranged in 2, 4, and 6 km arcs in suburbs
Automated Analytical System

- **Gas Chromatography**
  - automated sampling
  - electron capture detection

- **For SF$_6$:**
  - range: 1 pptv to 200 ppbv
  - limit of detection: 20 pptv
  - limit of quantitation: 70 pptv

- **Throughput with four GC’s:**
  - 16 cartridges/hr or
  - 200 samples/hr
Automated Analytical System
Stationary Sampling Results

- Analysis completed on tests 1-4
  - Concentrations range up to 300 ppbv
  - Only one sample > 200 ppbv

- 85% of highest concentrations were measured at sampler site just north of Wells Building

- Roof-top samples indicate concentrations as high as 7500 pptv (Test 3, Wells Fargo)

- Upwind samples on 2 and 4 km arcs as high as 250 pptv (Test 3, 1200 MDT)
Radar Profiler and SODAR

- Located at Raging Waters (1700 S 1200 W, 3 km SW of release site)
- 915 MHz Radar Profiler (Radian)
- 3000 Hz SODAR (Radian)
- 10-m Meteorological Tower
  - Wind speed and direction
  - Air temperature
  - Relative Humidity
Radar Profiler and SODAR
Remote Sensor Results

- Operated without a glitch for entire experiment
- SODAR vector averages indicate a distinct diurnal flow reversal
SODAR Wind Vector Averages
Sonic Anemometers

- 3-D 10 Hz Gill and ATI anemometers
- Mounted on mobile tower in City Centre parking lot west of release site
- Heights: Approximately 21 and 30 ft. AGL
Mounted Sonic Anemometers
Problems Encounters

• Vandalism to Radar Profiler
  – Windows shattered by rocks
• Bomb squad disposal of stationary sampler
Work To Be Completed

- GC Analysis of stationary samples Tests 5-6
- QC of stationary samples
- QC of mobile analyzers
- QC of sonic anemometer data
- Preparation of data report and CD-ROMs