Hot Mix Asphalt Test Results
Mid Review Period Briefing

Ron Myers
Emissions Measurement Center
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, NC

for

Coalition Against the Asphalt Plant
State Environmental and Public Health Agencies
Industry Hot Mix Asphalt Associations

Boston, Massachusetts

July 14, 1999

Meeting Purpose

- Review the Program Goals and Purpose
- Improve Reviewer Understanding of Test Programs Conducted
- Respond to Questions on the Content of the Reports
- Improve the Comments Received

Presentation Overview

- Facility Characteristics
- Asphalt Properties
- Project Goals
- Pollutant Definitions
- Test Programs
- QA Issues
- Emissions

Facility Characteristics

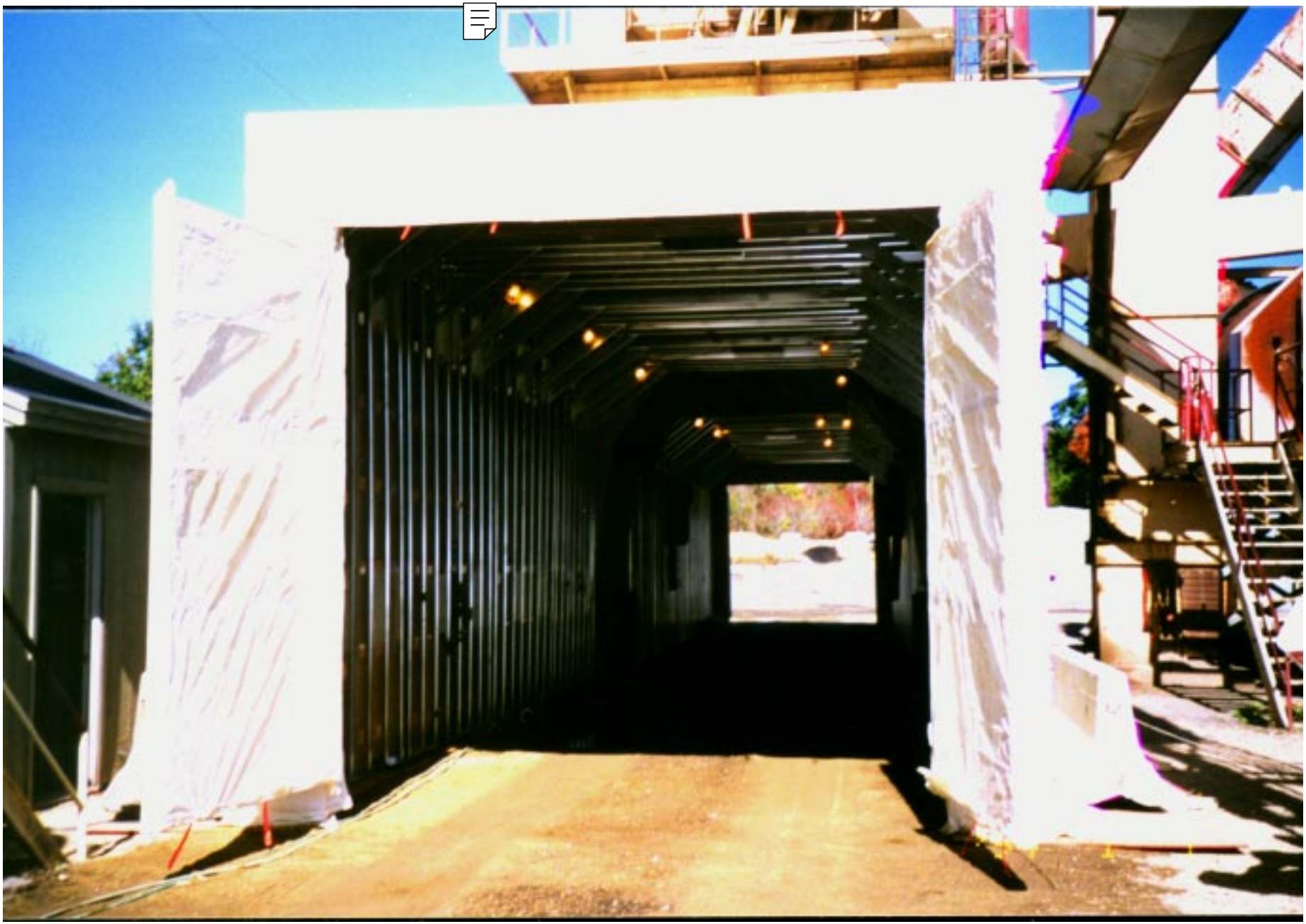
- Production Method and rate
  - California Facility
    - Drum Mix Plant - 395 tph
    - Single Drop - 15 to 30 sec
    - Load Out Interval - 1 Truck per min
  - Massachusetts Facility
    - Batch Mix Plant - 142 tph
    - Multiple drops - 3 to 4 min
    - Load Out Interval - 1 Truck per 7 min

Hot Mix Asphalt Properties

- Asphalt binder content of Product
  - Binder loss on heating properties
    - CA plant - 0.169 (TFOT)
    - MA plant - 0.126 (TFOT)
  - RAP usage
    - CA plant - 20%
    - MA plant - 5%
  - Asphalt temp in truck
    - CA plant - 310°F (327°F silo)
    - MA plant - 320°F

Load Out Bay Configuration

- ➪CA plant - Permanent enclosure
- ➪MA plant - Temporary enclosure

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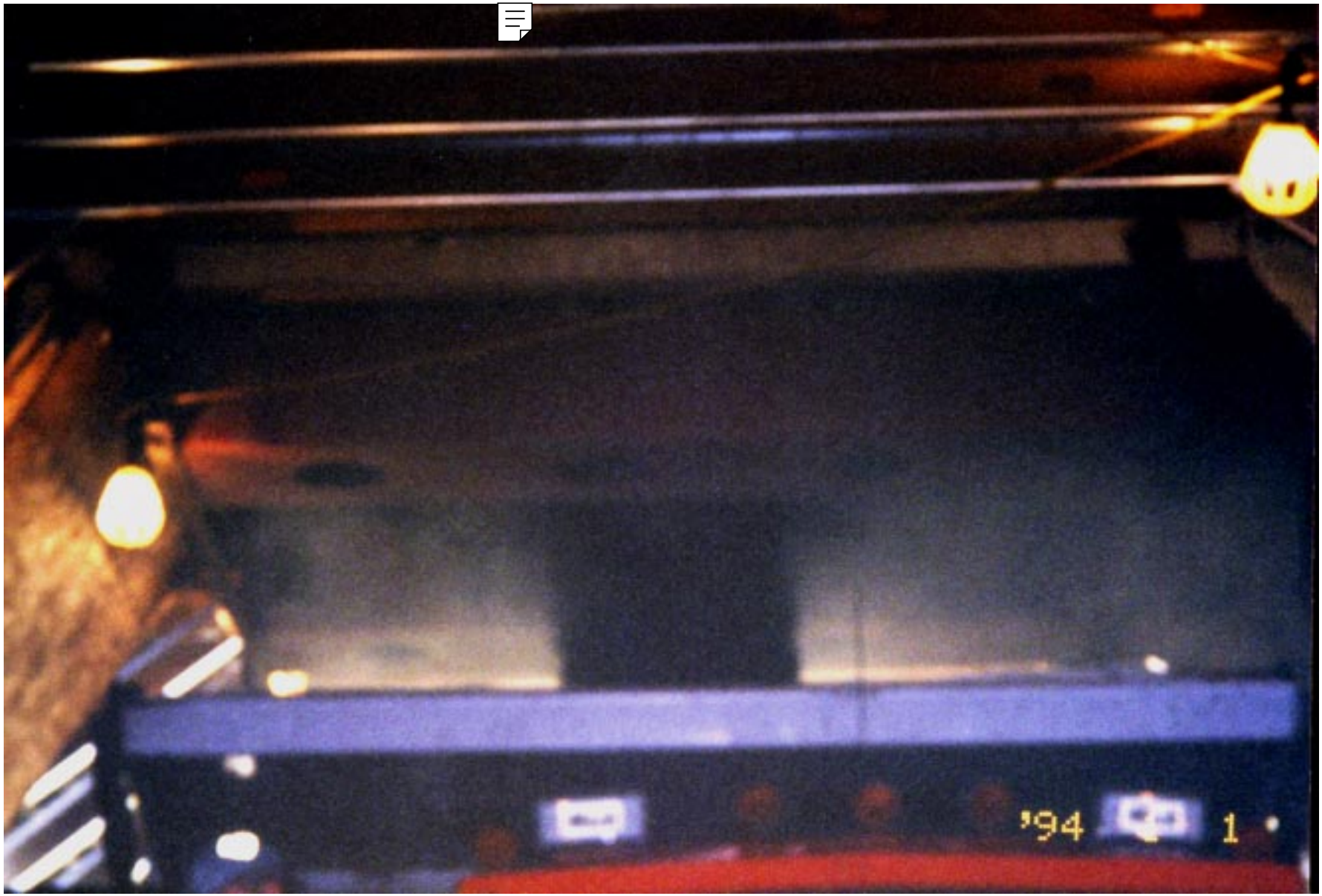
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Project Goals

- Quantify the totality of emissions
  - truck loading operations
  - silo filling operations

Pollutant Definitions

- Particulate Species
  - PM - Particulate Matter
  - MCEM- Methylene Chloride Extractable Matter is the Organic Portion of PM.
- Vaporous Species
  - THC - Total Hydrocarbons are all compounds containing Carbon and Hydrogen.

Pollutant Definitions (cont)

⇨ SVOHAP

Semi-Volatile Organic Hazardous Air Pollutants are those Clean Air Act Hazardous Air Pollutants with boiling point over 100°C. These compounds can exist as both particulate and vapors at room temperature and pressure. SVOHAP are the subset of MCEM.

⇨VOHAP

Volatile Organic Hazardous Air Pollutants are those Clean Air Act Hazardous Air Pollutants with boiling point under 100°C. These compounds exist only as a vapor at room temperature. VOHAP are a subset of THC.

Definitions of the Pollutants (cont)

⇨ PAH

Poly-cyclic Aromatic Hydrocarbons are a class of about 100 organic compounds that includes a number of carcinogens. PAH are a subset of SVOHAP.

Test Programs Conducted

- California (Plant C)
  - Truck Loading and Silo Filling
    - Particulate Emissions
    - Organic Particulate
      - SVOHAP
      - PAH
    - Particulate Deposition
    - Vaporous Emissions
      - THC
      - VOHAP
    - Metals

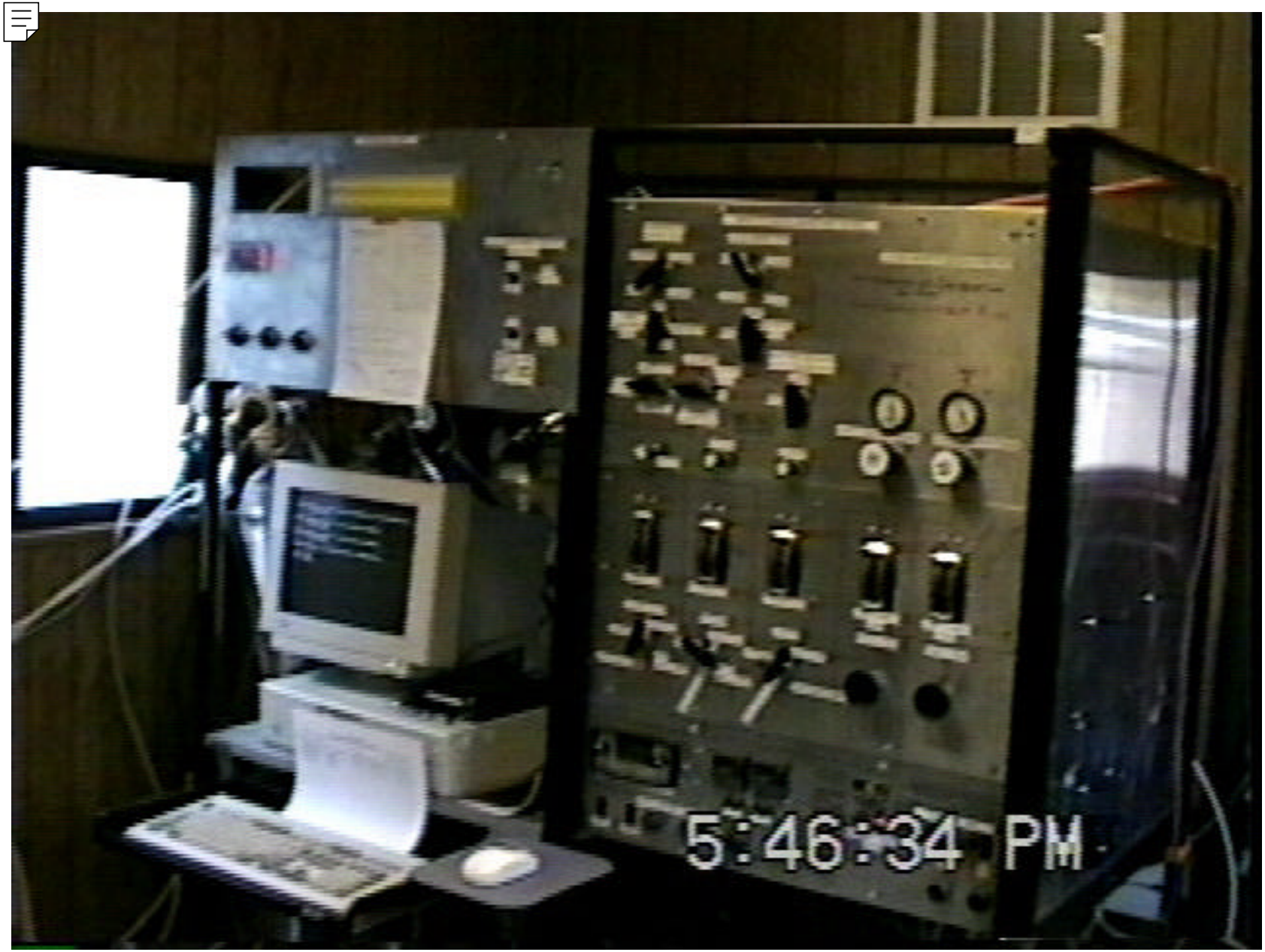
Test Programs Conducted (cont)

- Massachusetts (Plant D)
  - Particulate Emissions
    - Total
    - Organic
  - Particulate Deposition
  - Vaporous Emissions
    - THC

Testing Methods Used

- Particulate emissions
  - EPA Method 315 - PM & MCEM
  - EPA Method 0010 - PAH & SVOHAP
- Vaporous emissions
  - EPA Method 25a - THC
  - EPA Method 18 - VOHAP
  - EPA Method 0030 - VOHAP
  - FTIR - VOHAP
  - Portable GC/MS - VOHAP
- Enclosure Evaluation
- Capture Efficiency Evaluation
- Deposition


Rollins
Rollins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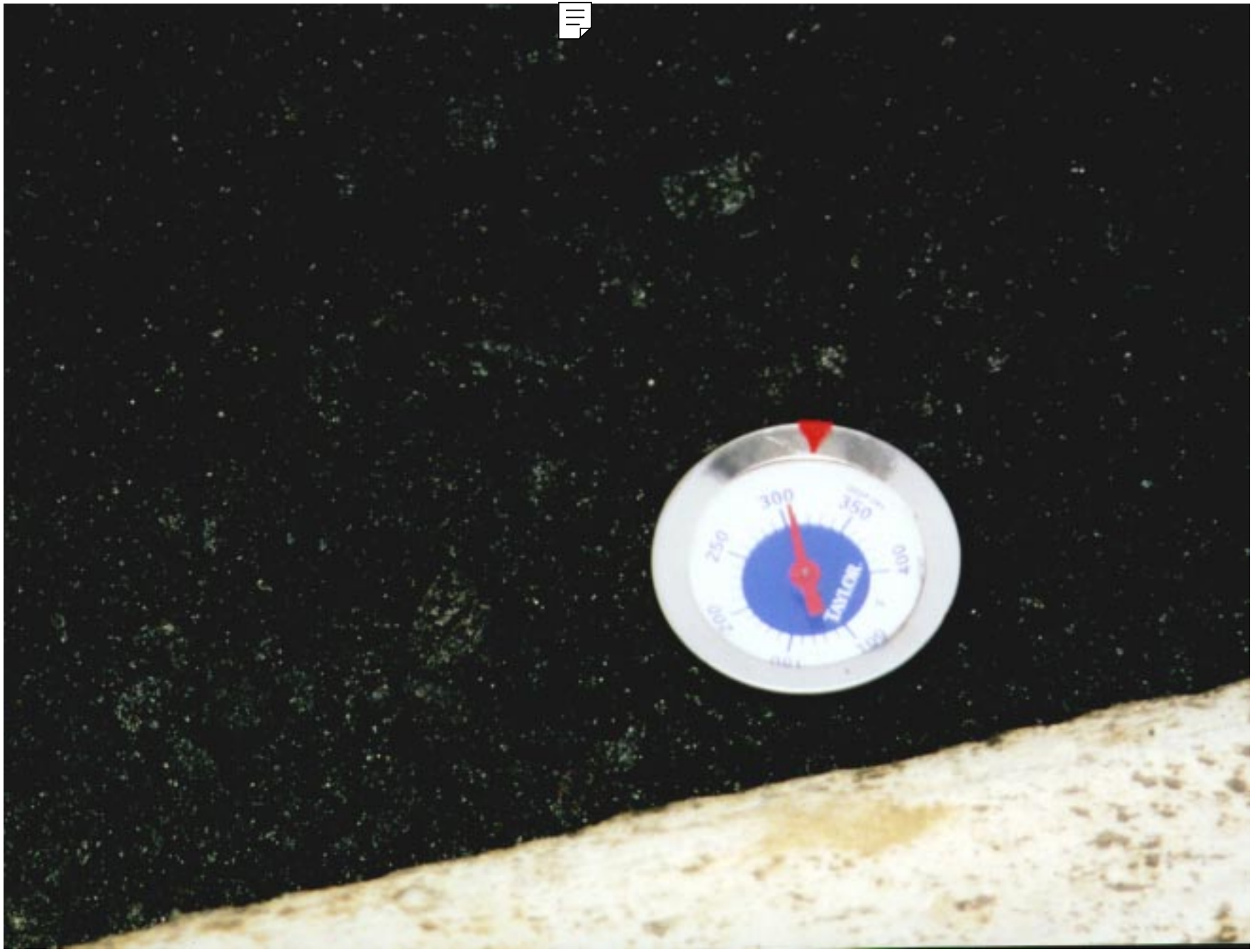
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Audit Results

- Contract for Draft Audit Report Ended September 1998

- Test Method Validation

  - Method validation is seldom if ever done on first test of a source

  - Method validation is very expensive and complicated

  - The test methods used at the California facility were the best methods available for the type of emissions expected. Where a test method had known limitations, additional methods were also performed.

Manual Testing Audit Results

- Surrogate Spiking of VOST prior to Sampling would be Better than Laboratory Spiking
  - Multiple analysis methods were performed and can be used for comparison.
  - Surrogate spiking is not required for VOST sampling, however the Method 18 samples were spiked.
  - The portable GC/MS samples are dynamically spiked and recovery calculations are not required.
  - All of the methods used had comparable concentrations. Therefore the overall results are not compromised.

Manual Testing Audit Results (cont)

⇨ Precision & Accuracy Stated in QAPP Not Established for Many Compounds of Interest

- Precision and accuracy was not determined.
- The results are based upon state of the art test methods which provide a sound assessment of the emissions from these operations

Instrumental Method Audit Results

⇨ **It was not specifically stated that MRI's QA officer would perform an audit by randomly selecting data to follow through the analysis and data processing.**

- MRI's QA officer performed this type of audit to eliminate the possibility of systemic transcription and calculation errors.

- EPA also performed this type of audit and found no systemic errors.

Additional Manual Method Issues

- Load Out Emissions
  - PAH species above calibration range
    - Although these were outside the method calibration range, they were within the linear response range of the detector and do not affect the reliability of the results

Additional Manual Method Issues

- Load Out Emissions
  - Only two SVOHAP/PAH runs were analyzed due to laboratory error
    - One of the reasons for collecting three samples is to accommodate a loss of one of the samples without significant compromise due to lab error.

Additional Manual Method Issues

- Load Out Emissions
  - VOHAP analyses outside 14 day window
    - It was not possible to analyze in this period due to lab difficulties. Studies indicate that little sample is lost up to as long as 30 days following collection, so these results are acceptable.

Additional Manual Method Issues

- Silo filling emissions
  - PAH samples diluted
    - The major difficulty created by sample dilution is that the internal spikes are lost and an estimate of the sample recovery can not be made with certainty. Recoveries based upon spikes performed in the laboratory were used in lieu of field spikes. The overall impact is believed to be small and does not significantly affect the results.

Additional Manual Method Issues

- Silo filling emissions
  - VOHAP analyses outside 14 day window
    - It was not possible to analyze in this period due to lab difficulties. Studies indicate that little sample is lost up to as long as 30 days following collection, so these results are acceptable.

Additional Instrumental Method Issues

- Toluene and Hexane by FTIR are Higher than Other Methods
  - The spectroscopist believes that for this source, the results from a method that separates compounds for analysis are superior to the FTIR analyses.
  - The difficulties experienced by the analysis of the FTIR spectra are due to the concentration and spectral similarities of a large number of non-target species.
  - The FTIR results are not for the individual species but for the overall class of compounds. The overall class emissions agree with the total hydrocarbons reported.

Emission Information

- ⇨Units of Pounds per 100,000 Tons of Product
- ⇨Results from Tests
- ⇨Whole Facility
- ⇨Individual Processes

Measured Emissions

(per 100,000 tons of Product)

- Particulate Emissions
  - Truck Loading CA 4.95 pounds
  - Truck Loading MA 17.5 pounds
  - Silo Filling CA 13.6 pounds

- Vaporous Emissions
  - Truck Loading CA 134 pounds
  - Truck Loading MA 165 pounds
  - Silo Filling CA 269 pounds

Measured Particulate HAP's

(per 100,000 tons of Product)

⇨ Tunnel emissions

- Total PAH 0.27 pounds
- Phenol 0.05 pounds
- Metals 0.000002 pounds

⇨ Silo emissions

- Total PAH 0.97 pounds
- Metals 0.000008 pounds

Measured Volatile HAP's

(per 100,000 tons of Product)

⇨ Tunnel emissions

Total	0.89 pounds
Benzene	0.08 pounds
Toluene	0.11 pounds
Xylene	0.33 pounds
MEK	0.10 pounds
Other	0.27 pounds

Measured Volatile HAP's (cont)

(per 100,000 tons of Product)

⇨ Silo emissions

Total	7.6 pounds
Benzene	0.18 pounds
Toluene	0.34 pounds
Xylene	1.37 pounds
MEK	0.18 pounds
Formaldehyde	4.4 pounds
Other	1.13 pounds

Total Facility Emissions

(per 100,000 tons of Product)

- Methodology
  - Production
    - Used Average of Drum Mix and Batch Mix Factors from Draft AP-42 Section
  - Loading (Truck & Silo)
    - Used Average of CA and MA data
  - Asphalt Storage
    - Pollutant Concentrations are the Same as was Measured for Silo Loading

Total Facility Emissions (cont)

(per 100,000 tons of Product)

- ⇨Particulate emissions 3,825 pounds PM
  2,625 pounds PM_{10}
  2,111 pounds $PM_{2.5}$
- ⇨PAH (19 compounds) 14.1 pounds
- ⇨Metals emissions 3.7 pounds
- ⇨VOC 2,991 pounds
- ⇨Volatile HAP's 861 pounds
- ⇨Carbon Monoxide 33,000 pounds
- ⇨Nitrogen Oxide 2,700 pounds
- ⇨Sulfur Oxide 460 pounds

Particulate Emissions by Process

(per 100,000 tons of Product)

- ⇨ Production
  - 3,800 pounds PM
  - 2,600 pounds PM_{10}
  - 2,087 pounds $PM_{2.5}$
- ⇨ Load Out — 11 pounds
- ⇨ Silo — 13.7 pounds
- ⇨ Asphalt storage — 0.28 pounds

VOC Emissions by Process

(per 100,000 tons of Product)

- ⇨ Production - 2,317 pounds
- ⇨ Load Out - 149 pounds
- ⇨ Silo - 269 pounds
- ⇨ Asphalt Storage 256 pounds

PAH Emissions by Process

(per 100,000 tons of Product)

- ⇨ Production - 12.8 pounds
- ⇨ Load Out - 0.27 pounds
- ⇨ Silo - 0.97 pounds
- ⇨ Asphalt Storage - 0.02 pounds

Metals Emissions by Process

(per 100,000 tons of Product)

- ⇨ Production - 3.7 pounds
- ⇨ Load Out - 0.000002 pounds
- ⇨ Silo - 0.000007 pounds

Volatile HAP Emissions by Process

(per 100,000 tons of Product)

- ⇨ Production - 846 pounds
- ⇨ Load Out - 0.95 pounds
- ⇨ Silo - 7.6 pounds
- ⇨ Asphalt storage - 6.6 pounds

CO Emissions by Process

(per 100,000 tons of Product)

- ⇨ Production - 33,000 pounds
- ⇨ Load Out - 0 pounds
- ⇨ Silo - 28 pounds
- ⇨ Asphalt storage - 24 pounds

NO_X & SO_2 Emissions

(per 100,000 tons of Product)

- ⇨Nitrogen Oxide
  - ➵Production 2,700 pounds

- ⇨Sulfur Oxide
  - ➵Production 460 pounds

Conclusion

- ⇨Two Emission Tests Performed
- ⇨Test Reports Distributed for Review
- ⇨Comment Period Ends September 15, 1999
- ⇨Additional Meeting to be Held after Comment Period
- ⇨Test Reports will be made Final