Assessing the Adequacy of the Ambient Air Monitoring Database for Evaluating Community Health Concerns

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Document release timeline

HC 1: *Assess the Adequacy of the Ambient Air Monitoring Database to Assess the Potential for Health Effects*

- Are air monitors in the right place?

- Are they looking for the right chemicals?

- Is monitoring every 6th day for 24 hours enough?

- Are there "hot spots" in the community?

HC 2: *Assess the Public Health Implications of Criteria Air Pollutants and Hydrogen Sulfide*

- Do facility emissions and Midlothian air quality impact the health of residents?

- Data include ozone, lead, particulate matter, nitrogen dioxide [NO2], sulfur dioxide [SO2], and hydrogen sulfide [H2S])

HC 3: *Assess Exposures to Organic Compounds (VOC) and Inorganic Pollutants in Air*

What are the public health implications of exposure these pollutants in ambient air?

HC 4: *Review and Analyze Organic Compounds (VOC) and Inorganic Pollutants in Media Other than Air*

What are the public health implications of these pollutants in other media?

HC 5: *Evaluate Health Outcome Data for the Midlothian Area.*

Is there a relationship between acute or chronic health outcomes and emissions from the facilities and ambient air?

HC 6: *Evaluate Reported Animal Health Problems in the Midlothian Area.*

Is there a relationship between health outcomes in animals and emissions from the facilities and ambient air?

Spring   Summer/Fall   Winter

Project 1—COMPLETED

Project 1: *Assessing the Adequacy of the Ambient Air Monitoring Database for Evaluating Community Health Concerns*

Does NOT reach health conclusions but answers the following questions we were asked by the community:

- Are the air monitors in the right place?
- Are there "hot spots" in the community?
- Has monitoring been conducted for the right chemicals?
- Does monitoring every 6th day for 24 hours give adequate information?

Project 1—Conclusion

General:

- [ ] The air data ARE sufficient to answer public health questions for many pollutants over many years

BUT

- [ ] For some pollutants emitted from the local industrial facilities and over some timeframes, no data exist
- [ ] This hinders our ability to assess exposures to these pollutants

What we evaluated to reach this conclusion

- [ ] Air pollutants monitored
- [ ] Sample collection and analyses methods
- [ ] Sampling data quality
- [ ] Monitoring time frames
- [ ] Sampling frequency and duration
- [ ] Monitoring locations

Issue 1: Air Pollutants Monitored

Question:

Has air been tested for all pollutants released from cement kilns and steel mills?

Short Answer:

No.

Issue 1: Air Pollutants Monitored

Long Answer:

- **Inorganic pollutants**: Some data exist for every inorganic pollutant in facility emission reports EXCEPT hydrochloric acid, sulfuric acid, and vapor phase mercury.

- **Volatile organic compounds (VOCs):** Data exist for most VOCs emitted in the greatest quantities but not some released in small quantities

Issue 1: Air Pollutants Monitored

Long Answer (cont):

- **Semi-volatile organic compounds**: No data exist for dioxins, furans, and polycyclic aromatic hydrocarbons (PAHs).

- **National Ambient Air Quality Standards (NAAQS)**: Data exist for all criteria pollutants emitted by area facilities (lead, nitrogen dioxide, particulate matter, and sulfur dioxide) except carbon monoxide.

Issue 1: Air Pollutants Monitored

No data for:
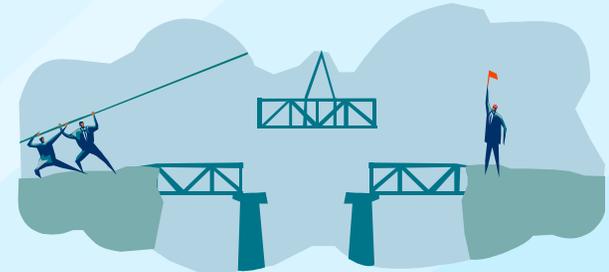
- **Inorganic Pollutants** hydrochloric acid, sulfuric acid, and vapor phase mercury.

- **VOCs** small quantity emissions (e.g., formaldehyde)

- **SVOCs** dioxins, furans, and PAHs

- **NAAQS** carbon monoxide

Issue 1: Air Pollutants Monitored

Question:

What's next for the pollutants with no data?

Answer:

Modeling to estimate typical and worst-case conditions

Results of modeling yield one of two things:

- ❑ Recommending sampling for a pollutant; or
- ❑ Eliminating a pollutant as a contaminant of concern

Issue 2: Monitoring Methods

Question:

Did monitoring use scientifically defensible methods?

Short Answer:

Yes, but some methods change over time.
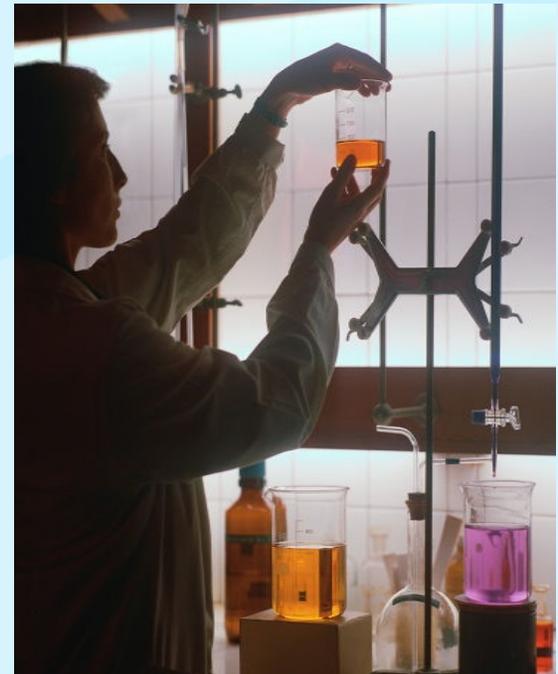
Issue 2: Monitoring Methods

Long Answer:

❑ All data were collected using widely-accepted methods at the time.

❑ BUT some methods were later determined to underestimate contaminant concentrations. For example:

- *Metal concentrations collected in 1981 and between 1991-1994 were probably underestimated, EXCEPT lead (which had a well-establish analytical method already)*

- *Nitrate levels were probably underreported during this time*

Issue 2: Monitoring Methods

Long Answer (continued):

- VOC, inorganic, and NAAQS methods generally had detection limits low enough to measure pollutants below levels of health concern.

- Arsenic and cadmium detection limits were sometimes above ATSDR's most sensitive health based comparison values.
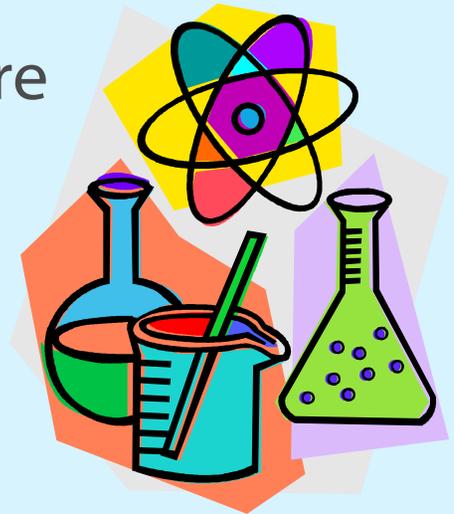
Issue 2: Monitoring Methods

Long Answer (continued):

❑ 1,2-dibromoethane methods were not sensitive enough for this analysis, but there is no evidence that this compound is used, processed or released by area facilities.

❑ Hydrogen sulfide measurements prior to 2000 were not sensitive enough to assess chronic exposures.

Issue 2: Monitoring Methods

Question:

What do we do with limitations in data sensitivity?

Answer:

We will factor pollutant detection limits into our evaluation and make health protective assumptions when assessing data.

Issue 3: Quality of monitoring measurements

Question:

Are the monitoring data collected in Midlothian accurate, reliable, and of a known and high quality?
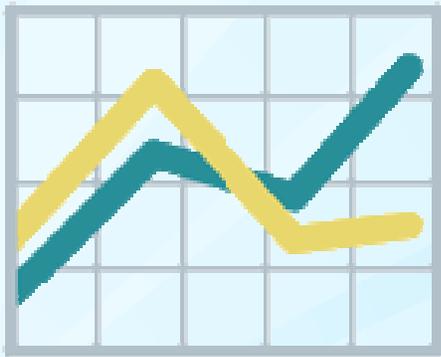
Short Answer:

Yes, with a few exceptions.

Issue 3: Quality of monitoring measurements

Long Answer:

❑ Some metals have been detected in "blank" or "clean" samples which might mean the sample results overestimated barium, total chromium, copper, manganese, molybdenum, and silver

❑ Continuous and non-continuous sampling has occurred for PM2.5. We know the continuous method generally underestimates ambient exposures, and by comparing the results side by side, we know by how much.

Issue 3: Quality of monitoring measurements

Question:

How will you address these issues?

Answer:

ATSDR will assume continuous PM2.5 measurements underestimate actual exposures. We will also consider that some metals data may be overestimates of actual exposure due to blank contamination.

Issue 4: Time frames of sampling

Question posed:

Are valid monitoring data available for the time frames of greatest interest?

**Short Answer:**

Yes and no—it depends on the pollutant.

Timeline of Ambient Air Monitoring Activities by Pollutant Group, 1980–2010
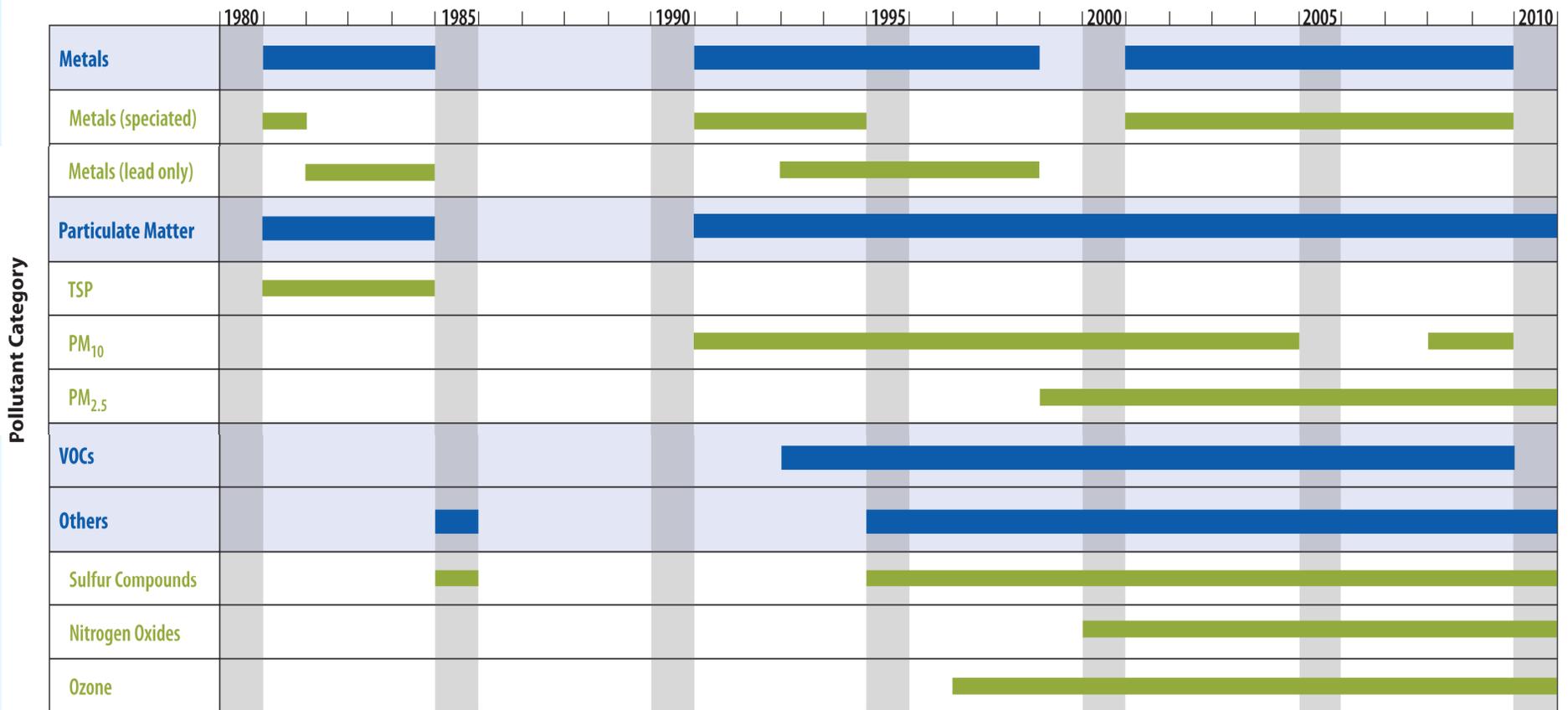
Issue 4: Time frames of sampling

Long Answer:

At least some valid data are available for:
- *Particulate matter: 1981-1984; 1991-2010*
- *Lead: 1981-1984; 1992-1998; 2001-2009*
- *Inorganics (not including lead): 2001-2009*
- *VOCs: 1993-2009*
- *Sulfur compounds: 1985 and 1995-2010*
- *Nitrogen oxides: 2000-2010*
- *Ozone: 1996-2010*
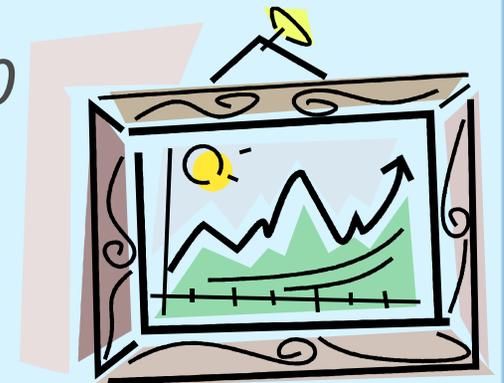
Issue 4: Time frames of sampling

Long Answer (continued):

We won't be able to answer questions:

- *Before sampling data began being collected in 1981*

- *During the years when Ash Grove cement was burning hazardous waste because no sampling data were collected in the vicinity at that time.*

Issue 4: Time frames of sampling

Question:

How will you address these issues?

Answer:

ATSDR will evaluate all existing data, and make efforts to derive estimates of air pollution from other information sources. These include facility-specific fuel usage statistics, emission rates, pollution control efficiency, and air modeling.
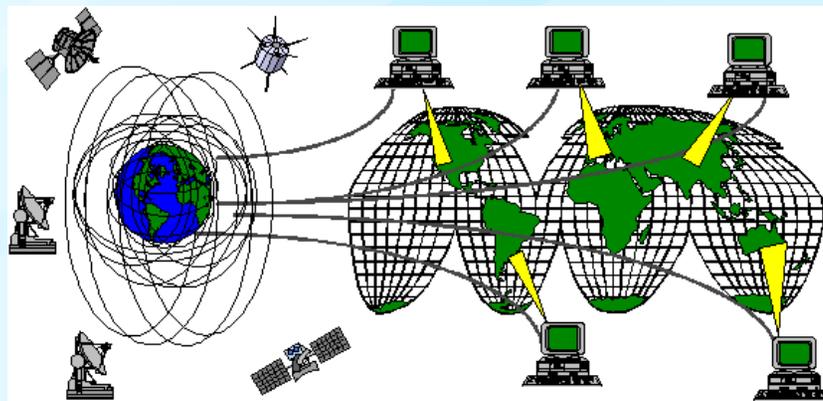
Issue 5: Sampling frequency and duration

Question:

Is ambient air monitoring currently being conducted at appropriate frequencies and durations?

Short Answer:

Yes.

Issue 5: Sampling frequency and duration

Long Answer:

❑ Sampling frequency reflects standard methods used across the country.

❑ Depending on the pollutant, sample frequency ranges from continuous data collection to one sample every six days.

❑ Sampling duration also varies by pollutant, with data reported anywhere from hourly to 24-hour averaged samples.

Issue 5: Sampling frequency and duration

Long Answer (continued):

❑ There is no evidence that the Midlothian facilities altered their emissions based on the 1-in-6 day sampling schedules. We based this finding on a review of continuous monitoring data and continuous air pollution measurements.

❑ 1-in-6 day sampling is representative of long term exposure but might underestimate short term exposures.

Issue 5: Sampling frequency and duration

Question:

How will you address the short term exposure limitations with 1-in-6 day sampling?

Answer:

ATSDR will fully describe uncertainties associated with using a 1-in-6 day sampling schedule to assess short term air pollution levels.
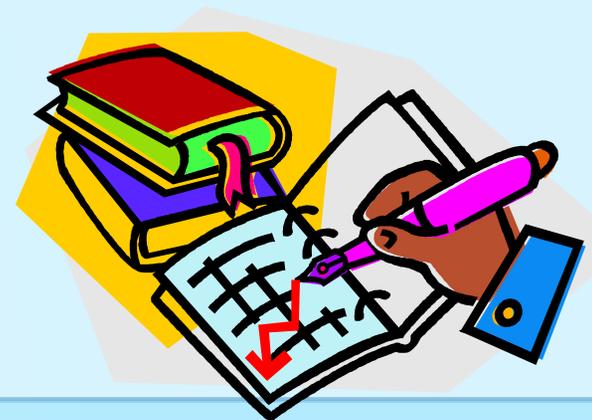
Issue 6: Air monitoring locations

Question:

Are the monitoring stations placed in locations that adequately characterize outdoor air pollution in the community around the facilities of concern?

Short Answer: *Yes and No.*

Issue 6: Air monitoring locations

Long Answer:

❑ The number and location of air monitoring stations has varied greatly by pollutant and year.

❑ Locations were chosen for different reasons:
- To try to capture the highest concentrations of pollutants
- To characterize air in areas with the most community concerns
- Because they met the siting requirements identified by USEPA's guidance.

Issue 6: Air monitoring locations

Long Answer (continued):

❑ Stations located upwind (south) of TXI (Midlothian Tower station, Mountain Creek station, Mountain Peak Elementary station) do not measure worst-case conditions.

❑ Sites operating north of TXI and Gerdau (Old Fort Worth Road and Wyatt Road) are reasonable indicators of exposures for those in neighborhoods along Cement Valley and Wyatt Roads.

Issue 6: Air monitoring locations

Long Answer (continued):

❑ The most important gap in monitor placement is immediately adjacent to the four industrial facilities, where we would expect to see the most fugitive emissions.

Fugitive emissions are pollutants released into air from leaks in equipment, pipelines, seals, valves, loading areas, storage pits, etc., and not from the usual sources such chimneys, stacks, and vents.
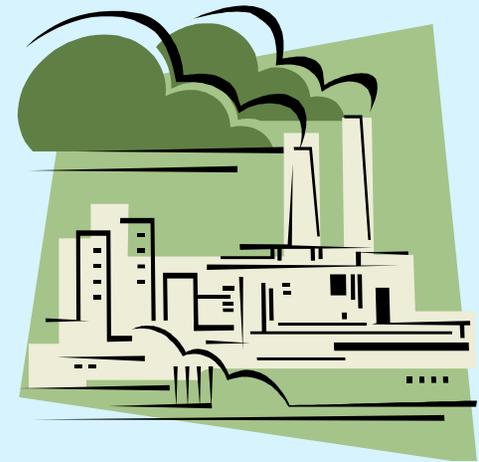
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Issue 6: Air monitoring locations

Question:
How will ATSDR address shortcomings in monitor placement?

Answer: ATSDR will evaluate existing measured data, conduct modeling for some pollutants, and evaluate those data in the context of monitoring site locations. Recommendations for future sampling may be made based our findings.

Summary

❑ For most pollutants emitted in high quantities, we have sufficient data to evaluate potential impacts to health

❑ We understand the limitations of assessing data from samples collected:
  - For certain pollutants during certain time periods.
  - Using different methods than ones currently available.

❑ Generally, sampling used appropriate methods, sampling frequency, and sampling duration.

Summary (Continued)

- If we identify important data gaps, we will:
    - *Discuss the limitations in the appropriate Health Consultation and make recommendations for sampling as needed*
    - *Use air models to:*
        - Estimate worst case estimates of exposure
        - Recommend sampling for pollutants not previously tested or not tested in a location of interest
        - Eliminate pollutants from our list of contaminants of concern

- Five additional health consultations will follow by the end of the year to address:
    - *Different pollutant classes*
    - *Possible human and animal health outcomes of exposure*

Questions?

For more information please contact Agency for Toxic Substances and Disease Registry

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