Criteria air pollution monitoring for PM on the Hopi Reservation: Site establishment and preliminary data collection.

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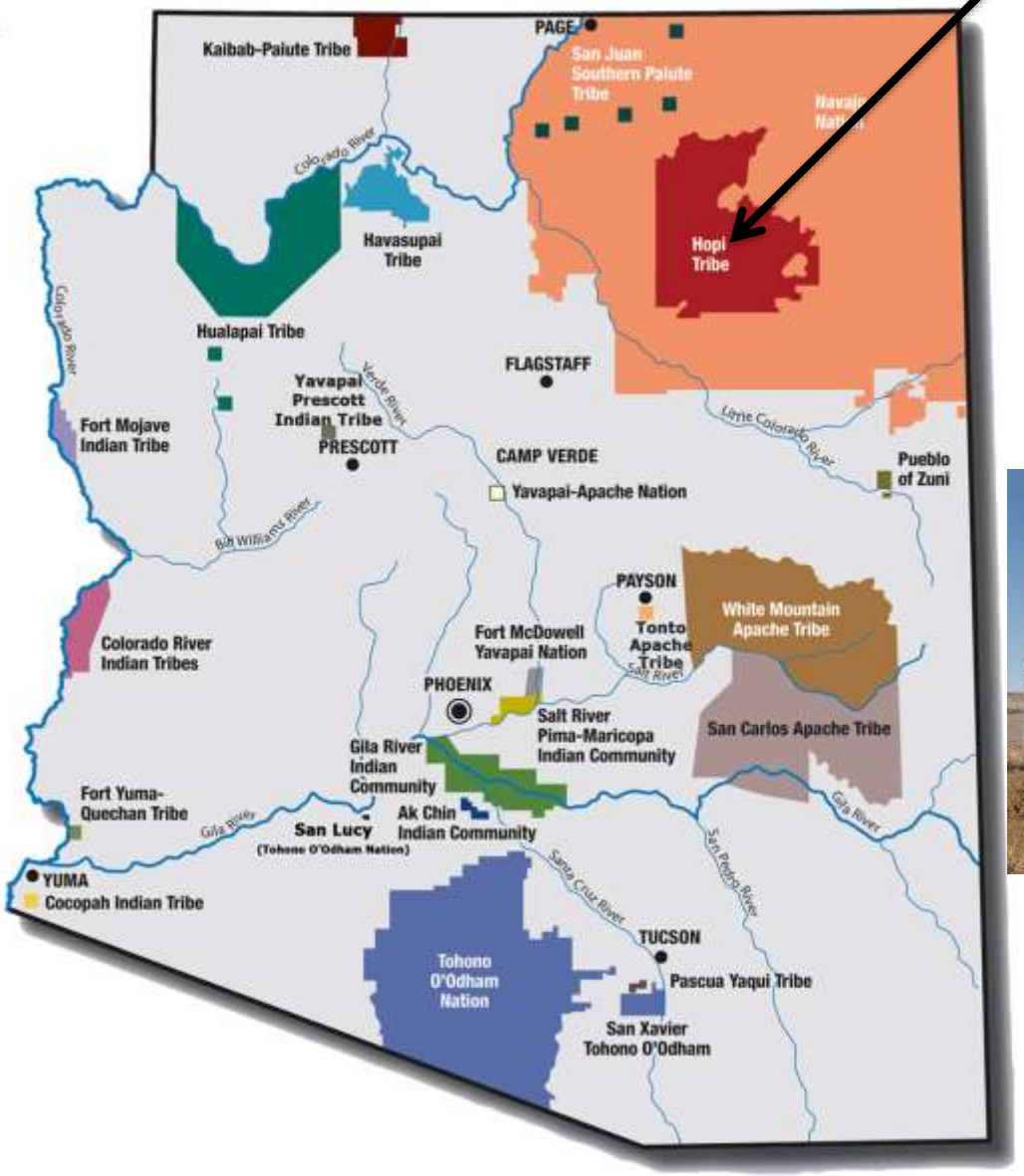
THE HOPI TRIBE

THE UNIVERSITY OF ARIZONA

Collaborative Project

- The Hopi Tribe and the University of Arizona's Mel and Enid Zuckerman College of Public Health
- Proposal submitted in January of 2015
- Project funded and Tribal Council Approval obtained August 2, 2016.
- Collaborating Hopi Tribal Programs
  - Hopi Environmental Protection Office
  - Hopi Health and Human Service Office
    - Community Health Representatives (CHRs)

Hopi Lands



Kykotsmovi Village

HOPI MISSION
LIL'BRUINS

Primary Project Purpose

- Tribal Concern: High rates of asthma and other diseases
- Goal: To determine the relationships among exposures to environmental agents inside and outside homes and their relationship to disease
- Part 1: Developing a regional monitoring station for PM_{10} & $PM_{2.5}$

Step 1: Equipment Considerations

- **Costs**
  - Instrument & Supplies
    - Gravimetric: daily filter changes; no diurnal measures
      - $10-20K
    - TEOM: continuous operation; data at 30 minute intervals
      - $30-45K
      - Plus $15K container and site preparation
  - Support Facilities (access to electricity)
    - Gravimetric:
      - Clean Room with constant Temperature and Humidity control
      - Balance capable of microgram measurements
      - Space
    - TEOM:
      - Level, temperature controlled container

Step 1: Equipment Considerations (continued)

- Time and Labor (trade-off: equipment cost vs support labor)
  - Technician time for daily filter exchange and maintenance of the weight room
  - Periodic checks, operates up to 1 month; monthly maintenance and flow checks, periodic maintenance; annual service (less day to day care needed)
- **Selection**
  - TEOM 1405-DF
    - Set at 30 minute records and 24 hour integrated value for PM_{10} & $PM_{2.5}$

Step 2: Site Selection

- **Considerations**
  - Access to site (secure location for equipment)
  - No damage to roof & monitoring building
  - Available electricity
  - Within community
  - Not directly adjacent to primary sources (roadway or chimney)
  - General topography
  - Wind flow

Step 2: Kykotsmovi Village
Two Potential Sites

Hopi Day School

Nearby combustion sources *

Local road sources

Hopi Mission School

No close combustion sources

Low local road use

Airflow through town to site (S to N)

Great enthusiasm & permission by school

Step 3: Building the Site

a. Approval by Board of Hopi Mission School

b. Leveling the Site

c. Compacting

d. Framing and Rebar

Step 3: Building the Site (cont.)

e. Arrival of Concrete

f. The Pour

g. Finishing

The installed TEOM, Container & Fence

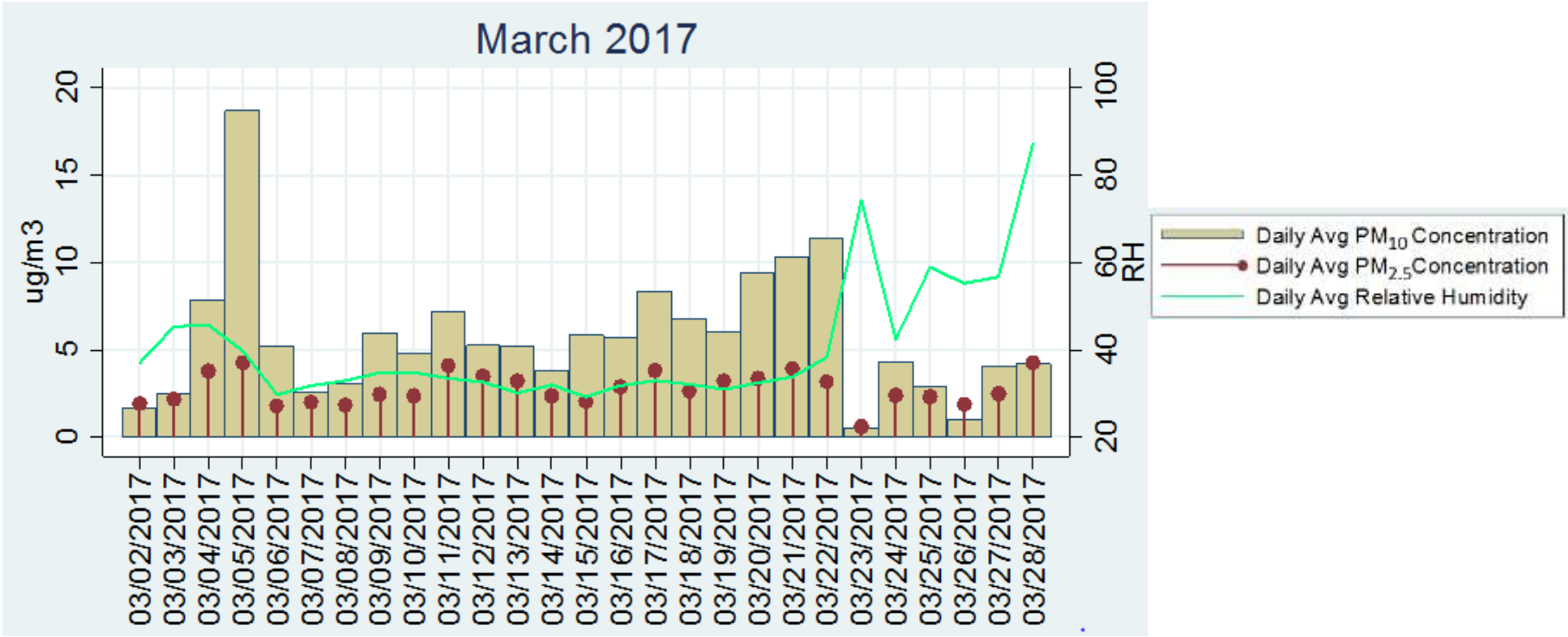
Step 4: Operation and Initial Data

	Standard →	150 µg/m^3		35 µg/m^3	
Month/Year	**Days Sampled**	**PM_{10} (low)**	**PM_{10} (high)**	**$PM2_{2.5}$ (low)**	**$PM_{2.5}$ (high)**
December 2016	24	1.23	10.01	1.95	4.76
January 2017	18	Equipment Malfunction		<1.00	4.82
February 2017	28			1.67	4.94
March 2017	28	2.11	17.04	2.23	4.16
April 2017		Collection in Process			

★ Federal Equivalent Method

- Particle loads are well below the standards for both PM_{10} & $PM_{2.5}$
- High wind season not represented
- **Regional** air quality appears excellent for the time sampled

March: Day to Day Variability & Response to Moisture



- PM decreases with rain or high humidity
- Dust storms increase PM_{10}
- Burning and traffic increase $PM_{2.5}$

Conclusions

- Lengthy process acquiring tribal council approval for the project.
- Building and installing the air quality structure on selected site was challenging.
  - Electric connection was particularly problematic
- Learning how to operate the system took time and required help from the company and colleagues.
- Experienced minor equipment failures.
- Equipment is now operational and good data flow is expected.

Acknowledgements

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