

A large, faint watermark of the United States Environmental Protection Agency (EPA) logo is centered in the background. The logo consists of a circular emblem with a stylized flower or leaf design in the center, surrounded by the text "UNITED STATES ENVIRONMENTAL PROTECTION AGENCY".

Tribal Air Sensors Pilot Project

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Background

- Goal – Assist the Tribe in understanding local-scale air quality issues and potential differences between local- and regional-scale particulate matter (PM)
- EPA lending three PM sensor devices to the Leech Lake Band of Ojibwe Tribe*
 - Evaluate potential benefits and determine limitations of continuous PM measurements
 - Examine sensor precision by comparing data collected among sensors
 - Examine sensor accuracy by comparing sensor data with local Federal Reference Method (FRM) data
 - Evaluate spatial gradients in concentrations near PM emission sources

* The equipment and monitoring data collected during the study are not intended for regulatory purposes

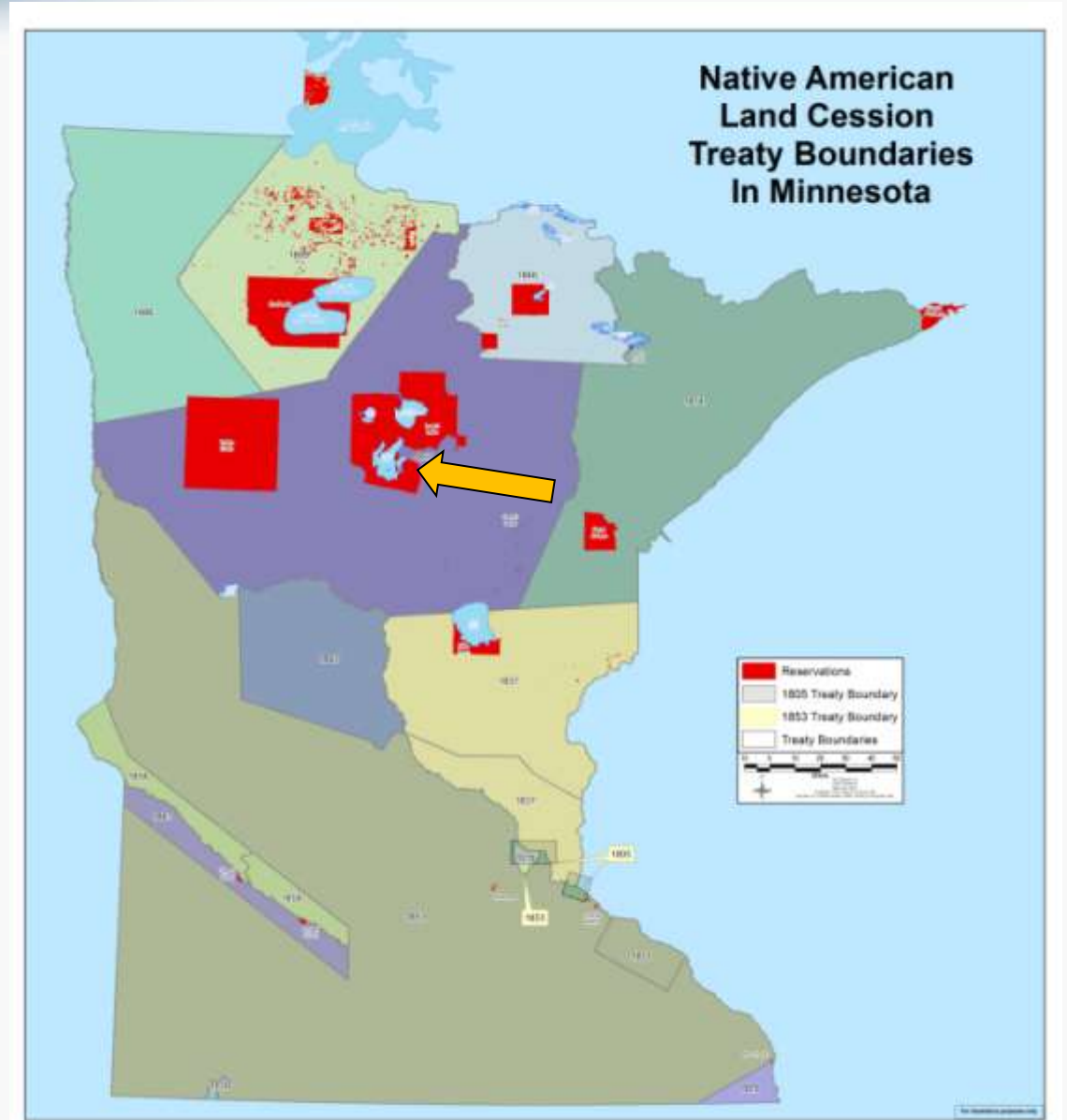
Monitoring Study Design

- Collocation study to occur periodically over ~4-6 months
 - Monitoring began in late October 2015
- Quality Assurance Project Plan (QAPP)
 - Category IV QAPP – intended for education and outreach initiatives
- Two phases
 - Periodic collocation of the sensors with an existing PM_{2.5} FRM
 - Use of existing gravimetric PM_{2.5} FRM managed by the Tribe
 - The instrument reports 24-hour average PM_{2.5} concentrations on a one-in-six day schedule
 - Periodic mobile monitoring near local sources to examine the impact of sources on local air quality and nearby PM concentration gradients



Siting & Logistical Considerations

- Tribal federal reference method (FRM) monitor is in a remote “background” location
 - Power onsite
 - No communications
 - manual storage and data download required
 - Staff make routine weekly visits
 - FRM PM, NADP Hg, Meteorological
 - No shelter available



Selection of Sensors

- PM sensor models
 - RTI MicroPEM (Quantity = 1) Reports concentration in $\mu\text{g}/\text{m}^3$ every 10 seconds for direct comparison with FRM
 - Performance evaluated by EPA
 - Moderate-cost ($\sim\$2,900$)
 - Durable
 - AirBeam (Quantity = 2)
 - Reports particle counts every minute for qualitative comparison with FRM and comparisons with one another
 - Performance evaluated by EPA
 - Low-cost, easy to use ($\sim\$250$)
 - Good mobility for examining spatial gradients near sources



Data Quality Objectives

Data Quality Indicator (DQI) goals for the project – automatic checks by DMS

Sensor	Assessment	Criteria	Corrective Actions
RTI MicroPEM	<ul style="list-style-type: none"> (1) PM concentration (2) Sticking check (3) RH check^a (4) Data completeness (5) FRM check 	<ul style="list-style-type: none"> (1) Maximum > 200 µg/m³; Minimum <-5 µg/m³ (2) > 3 hours (3) RH > 95% (4) 75% completeness (by hour and hours in day) (5) ± 5 µg/m³^b 	Data will be flagged in database for review by analyst.
AirBeam	<ul style="list-style-type: none"> (1) Particle count (2) Sticking check (3) Buddy check (4) Temperature check (5) RH check (6) Data completeness 	<ul style="list-style-type: none"> (1) Maximum >1000 hpcf^c (2) > 3 hours (3) ± 100 hpcf (4) Temperature outside range of 32° to 122°F (5) RH > 95% (6) 75% completeness (by hour and hours in day) 	Data will be flagged in database for review by analyst.

^a The RTI MicroPEM itself does not measure relative humidity. MicroPEM data will be flagged when the AirBeam reports that the relative humidity exceeds 95%.

^b The ± 5 µg/m³ criteria for the FRM check may be fine-tuned with experience.

^c hpcf: hundreds of particles per cubic foot.

Field Deployment



Lessons Learned to Date

- MicroPEM calibration issues (in lab and field)
 - Related to software, contacted RTI for assistance
- MicroPEM computer connection & timestamp issues (in lab and field)
 - Issue were diagnosed, data was retrieved
 - Time has not been kept accurately - possibly due to dead batteries
- One of the AirBeams has been working intermittently (in field)
 - In field troubleshooting included cable replacement, change of port connection to the computer, etc but sensor has now been disconnected for testing indoors to diagnose problem
 - Significant data loss has occurred

Next Steps

- Continue field deployment of sensors
- Final report will document study design, data collected, results of data analysis, project challenges, and other lessons learned
 - 21 comparison data sets
- Data collection will likely conclude at the end of February 2016
- Highly anticipated study
 - Present at 2016 National Tribal Forum
 - Fielding Tribal questions





Questions?

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