

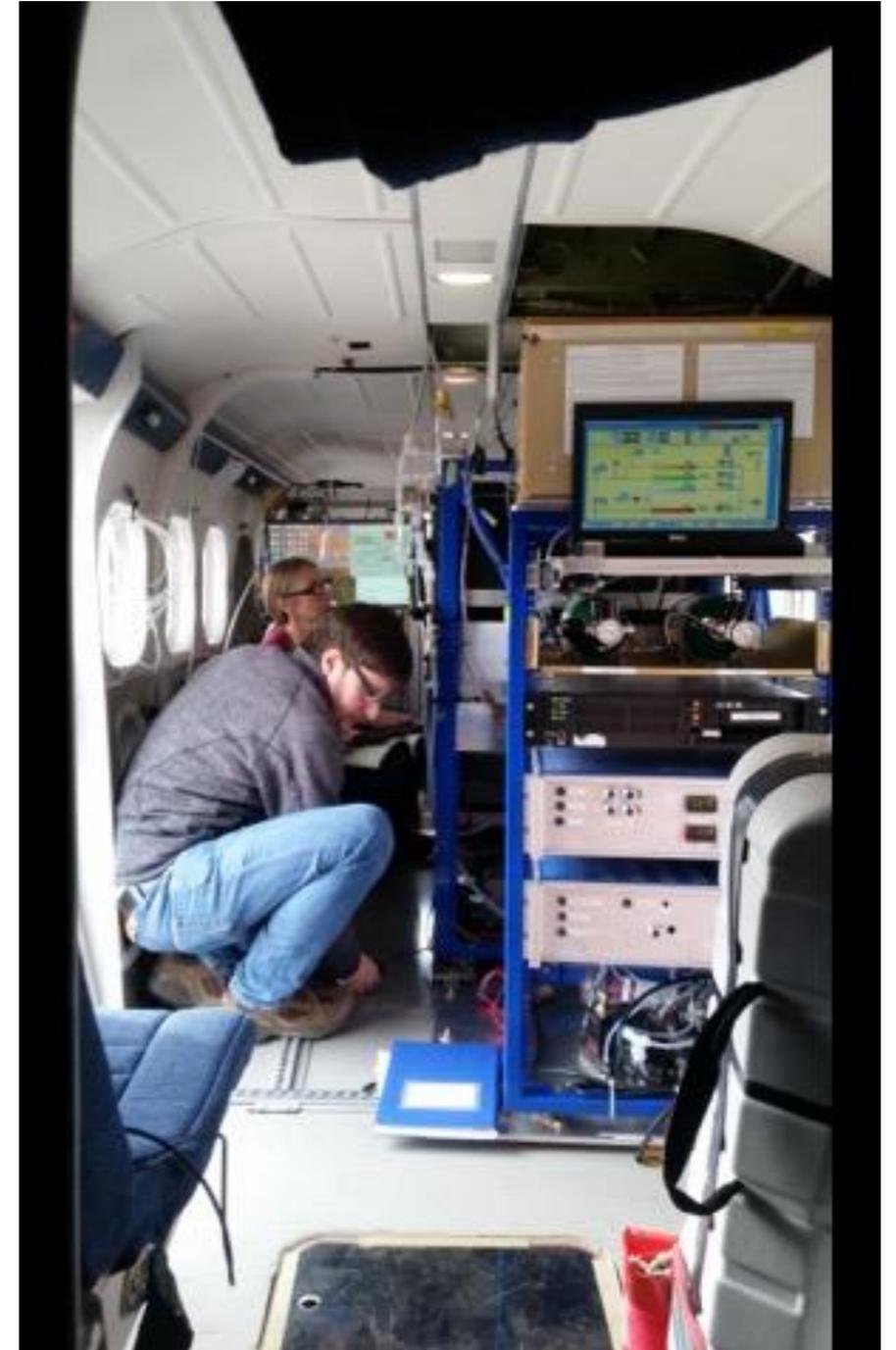


UTAH DEPARTMENT *of*
**ENVIRONMENTAL
QUALITY**

SCIENCE FOR SOLUTIONS
DATA-DRIVEN, EFFECTIVE
DECISION-MAKING

The Value of Utah-Based Research

- Accurate scientific information is the foundation of DEQ decision-making.
- Utah-specific data ensure regulations are fair and based on sound science.
- Local research supports local solutions to the state's environmental challenges.
- Public and stakeholder trust in DEQ science fosters the collaboration, cooperation, and confidence needed to resolve complicated environmental issues.
- Seed funding for research leverages funding from federal, state, and academic partners, expanding research scope and improving outcomes.



Public Access to Research Findings

Past and present research projects are available on the DEQ website. DEQ provides detailed explanations of each research project's purpose, results and findings.

- Air Quality Research Projects

- Summary of project along with relevant documentation
deq.utah.gov/category/air-quality/research/aq-research-projects
- Project summary table
deq.utah.gov/air-quality/utah-division-of-air-quality-applied-research
- Air Quality Research Projects Booklet
documents.deq.utah.gov/air-quality/technical-analysis/DAQ-2017-009769.pdf

- Utah Lake Water Quality Study

Summary of Water Quality Work plan, description of study phases, PDF of the full Work Plan, periodic updates, and Steering Committee and Science Panel meeting agendas, presentations, and meeting minutes

deq.utah.gov/legacy/destinations/u/utah-lake/work-plan.htm



Air Quality Research Projects

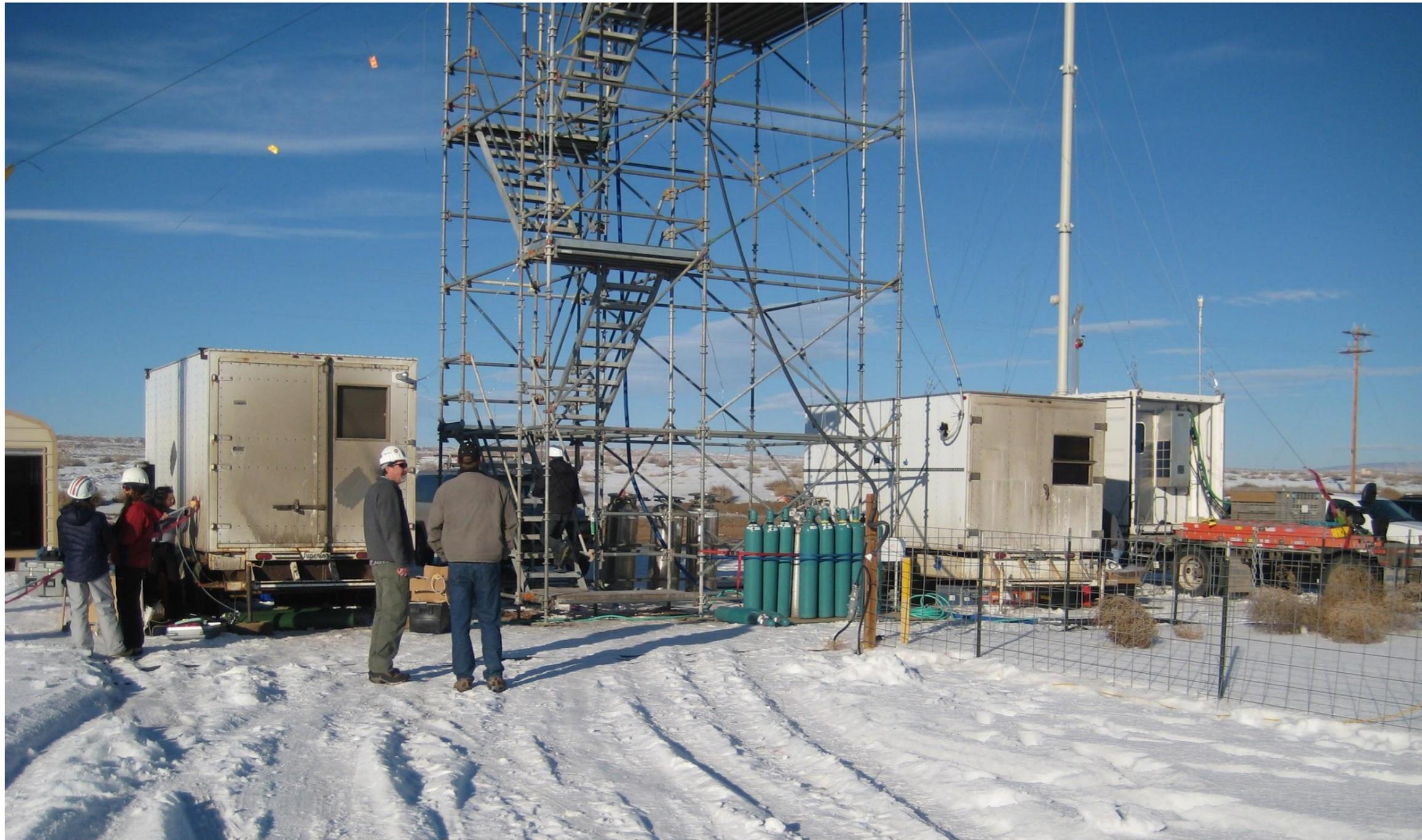


Importance of Air Quality Research

- Tailor solutions to Utah's unique atmospheric chemistry and meteorology.
- Supports development of State Implementation Plans (SIPS) to bring Utah into attainment with federal air-pollution standards for PM_{2.5} and ozone.
- Improved understanding of these chemical reactions leads to more cost-effective rules, regulations, and control strategies.
- Leverages community research, resulting in more comprehensive datasets that DAQ can use to identify local solutions to the state's air-quality problems.



Uinta Basin Winter Ozone Study (UBWOS)



Uinta Basin Winter Ozone Study (UBWOS)

Funding: Utah Legislature: \$0

Leveraged from partners: \$3.5 million

Purpose

Assess the role of atmospheric chemistry and the interaction of precursor gases to create high levels of wintertime ozone in the Uinta Basin.

Results and Findings

- Volatile organic compounds (VOCs) and oxides of nitrogen (NOx) are the primary chemical precursors of ozone.
- A review of all emissions sources within the Basin indicates that activities associated with oil and gas exploration and production are the predominant sources of ozone precursors.
- Emissions of VOCs from storage tanks, leaking equipment, venting, blowdowns, and other intermittent events need to be better quantified.
- Preliminary modeling indicated that Basin ozone air chemistry will respond to volatile organic compound (VOC) controls.

Actionable Items

- Identify controls to reduce VOC emissions rather than NOx emissions.
- Issue four new rules for the oil and gas industry to reduce VOC emissions.
 1. General provisions for good air-pollution control practices
 2. Pneumatic controller standards
 3. Flare usage and conditions
 4. Tank-truck loading through bottom-filling
- Institute a new Permit-by-Rule program to improve emission inventories.
- Identify further areas for study based on UBWOS findings.

UBWOS Supplemental Research Projects



UBWOS Supplemental Research Projects

Storage Tank Emissions Pilot Project (STEPP)

Utah Legislature Funding: \$150,000

Purpose

Screen for leaks of volatile organic compounds (VOCs) on oil-and-gas-condensate storage tanks using infrared (IR) cameras.

Results and Findings

- One or more infrared-visible emission plumes were detected at 39 percent of the well pads.
- Most of the plumes were emitted before they reached the control device.
- Seventy-four percent of the detected plumes were emitted from the thief hatch or pressure release valve.

Actionable Items

Develop a new leak detection and repair (LDAR) program that helps operators reduce VOC emissions from leaking equipment to reduce ozone precursors and capture product that would otherwise be lost.

ULend Program

Utah Legislature Funding: \$200,000

Purpose

Enable small oil-and-gas operators to develop a leak detection and repair (LDAR) program to find and repair leaks.

Results and Findings

- Access to IR camera leads to improved rates of leak detection and emission reductions from oil and gas facilities.
- Small-operator LDAR programs provide DAQ with better information about the sources of emission leaks.

Actionable Items

- Use leak information from the LDAR programs to develop effective rules and control strategies.

Well Emissions Decline Study



Well Emissions Decline Study

Funding: Utah Legislature: \$100,000

Leveraged from partner (BLM): \$30,000

Purpose

- Improve assumptions of projections of Uinta Basin development and emissions growth.
- Estimate the number of wells that might be drilled in the Uinta Basin in the future.
- Estimate production rates from new and existing wells.

Results and Findings

- Information gained from this research used to estimate emissions from oil and gas operations that lead to high ozone levels in the Uinta Basin during the winter.

Actionable Items

- Identify the most cost-effective emission regulations to help maintain regulatory ozone standards while minimizing the economic impact on the oil and gas industry.
- Examine impacts from continued oil and gas permitting in the Uinta Basin.
- Issue permits based on decline study findings to strike an appropriate balance between oil and gas facility emissions and well development.

Utah Winter Fine Particulate Study



Utah Winter Fine Particulate Study

Funding: Utah Legislature: \$130,000

Leveraged from partners: \$1.87 million

Purpose

- Identify important above-ground chemical mechanisms responsible for the formation of PM_{2.5}.
- Identify the sources of the chemicals responsible for the formation of PM_{2.5} and emission “hot spots.”
- Learn how pollutants vary temporally, vertically, and spatially.
- Supplement ground-level monitoring data.

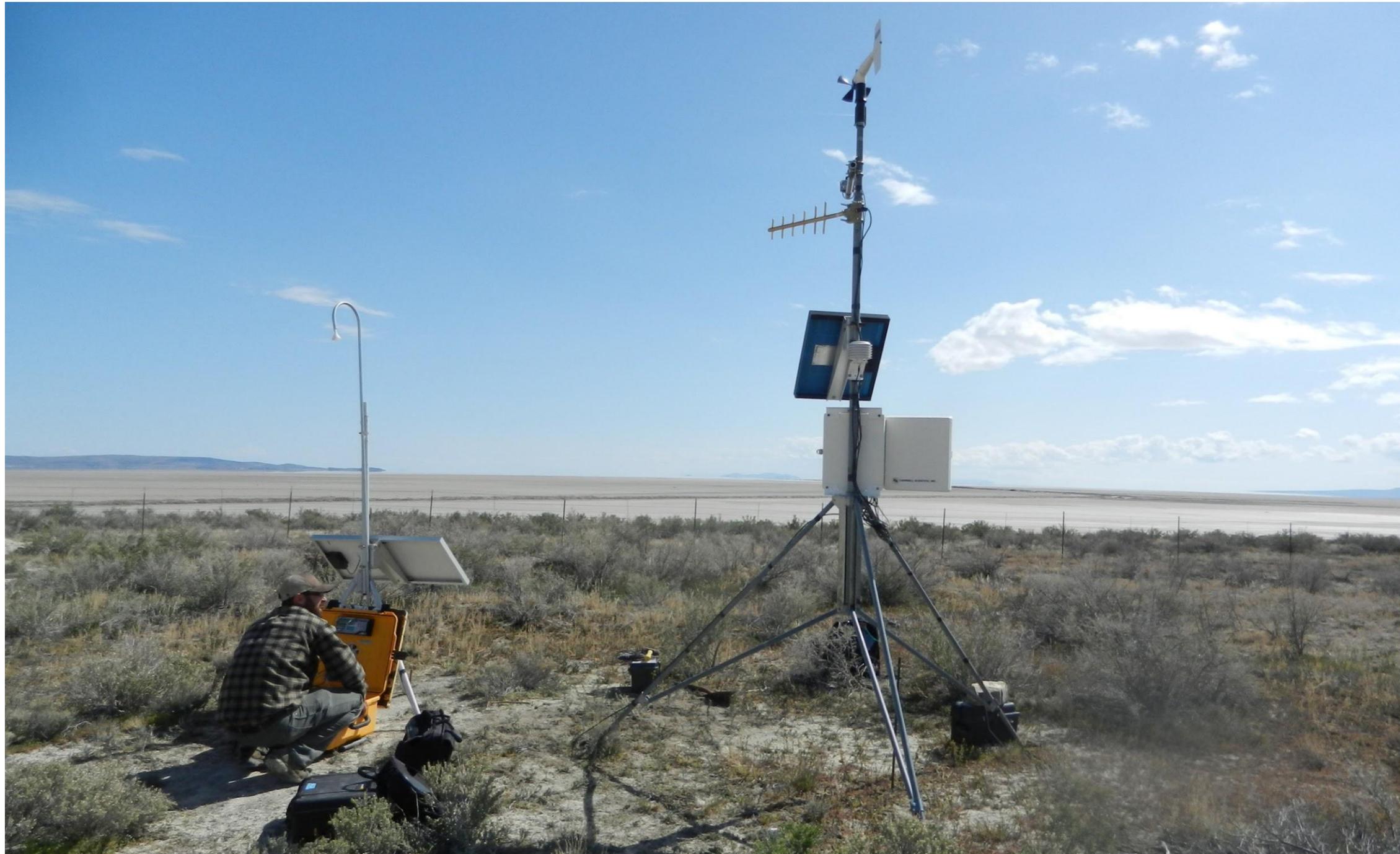
Results and Findings

- Approximately 75 percent of the PM_{2.5} mass during high pollution events is dominated by ammonium nitrate. Both Salt Lake and Utah Valleys are predominantly nitrate limited. For Utah Valley and especially Salt Lake Valley, reductions in either nitrate and/or ammonia may be effective in reducing ammonium nitrate.
- Oxides of nitrogen (NO_x) were higher in more populated urban areas closer to local sources and lower in rural areas such as the Cache Valley.
- As pollution episodes progress, NO_x and ammonium nitrate increase in all three valleys.

Actionable Items

- Conduct additional studies to determine whether ammonia-reduction or nitrogen-oxides-reduction control strategies would be most beneficial for the Salt Lake and Utah Valleys.
- Use these data to improve modeling and test the effects of proposed regulations.
- Pursue future research/field studies to help reduce scientific uncertainties, improve modeling, and identify appropriate control technologies.

Great Salt Lake Summer Ozone Study



Great Salt Lake Summer Ozone Study

Funding: Utah Legislature \$65,000

Purpose

- Increase understanding of the patterns of ozone formation over the Great Salt Lake.
- Help DAQ provide more accurate forecasts of ozone conditions.
- Improve photochemical modeling to better analyze the sources and interactions responsible for high ozone concentrations during the summer months.

Results and Findings

- Lake wind systems affected the transport and exchange of background ozone and ozone precursors between the lake and urban environments.
- Lake-modulated boundary-layer depth affected pollutant vertical mixing over the lake and along the Wasatch Front.
- Diminished lake levels exposed highly reflective surfaces, aiding ozone production photochemistry.
- Biogenic precursor sources in the wetlands surrounding the southeastern portion of the lake affected ozone levels.

Actionable Items

- Improve numerical forecasts and simulations of ozone concentrations to capture the factors affecting ozone concentrations.
- Improve emission inventories of ozone precursors.
- Develop modeling capabilities to resolve both the local and regional circulations and simulate the generation of ozone through the various possible pathways identified in the study.
- Use this information to identify ozone-control strategies and rulemaking for upcoming Ozone State Implementation Plans (SIPs) along the Wasatch Front.

Utah Lake Water Quality Study



Utah Lake Water Quality Study

Funding: \$1 million (Water Quality Board)

Purpose

- Evaluation of potential numeric nutrient water-quality criteria to protect recreation, aquatic life, and agricultural uses in Utah Lake
- Development of a watershed implementation plan to achieve and/or maintain protective water quality that balances costs and benefits

Results and Findings

- Phase 1 completed in-house (2016 – 2018): Data gathering and characterization
 - Established a stakeholder process for Phase 2
 - Selected WASP and EFDC as modeling tools for Phase 2
 - Identified data and knowledge gaps for Phase 2 and [online data visualization tool](#)
- Phase 2 includes Steering Committee and Science Panel seated in Spring 2018

Actionable Items

- Develop cost-effective Utah Pollutant Discharge Elimination System (UPDES) permits for wastewater and storm water discharges to Utah Lake.
- Identify voluntary load reductions from other sources (e.g., agricultural, septic, forest, natural) and lake treatments.
- Aim to protect public health and the environment, provide regulatory certainty, allocate public financing resources, and integrate water quality decisions with other agency management objectives (e.g., recreation, fishery, and water management).

Water Use Data Study



Water Use Data Study

Funding \$1.5 million FY17

Purpose

Funding was not new money but authorization to use existing State SRF funds for this project.

- \$1,000,000 was allotted to water systems as a loan to install meters and monitoring systems to collect water-use data.
- \$500,000 was allotted to the Division of Drinking Water to provide support to water systems and research new sizing standards.

Results and Findings

- Metering Equipment Alternatives and Analysis Report, April 2017
- Staff determined statewide standards are not appropriate and recommended system specific strategy in December 2017 Audit Update.

Actionable Items

- Commissioned guidance document to design and install metering equipment (\$32,418).
- Billed staff time to do outreach and existing data collection and review, and conduct workgroup of large water systems (\$40,000).
- Returned \$978,388 to SRF fund when no loans were requested.

Questions?

