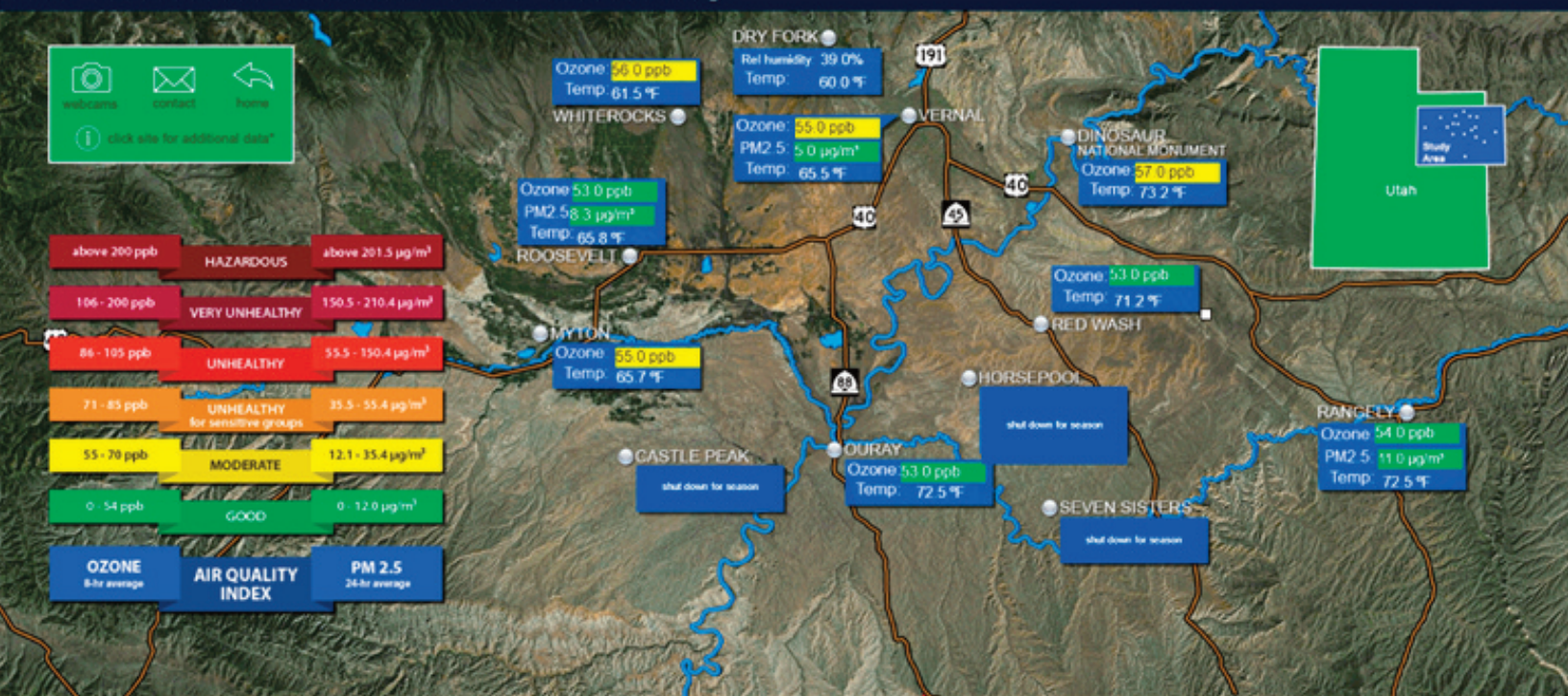


# ★ Uintah Basin Air Quality



DISCLAIMER: Real-time data are preliminary and have yet to undergo quality control. Some data are obtained in cooperation with other agencies, including the Ute Indian Tribe and the Utah Department of Environmental Quality. © 2021, Utah State University.

\* Year-round monitoring does not occur at all sites.

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## The Uinta Basin: Part 2— Ozone and Collaboration

by Deborah Burney-Sigman

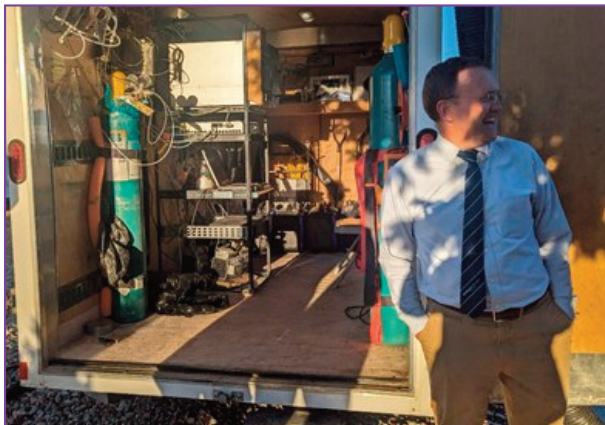
This article is the second in a two-part series focusing on Utah’s Uinta Basin. Part 1 looked at the Uinta Basin as an oil-and-gas-based economy that’s navigating cultural and regulatory complexities.<sup>1</sup> As discussed there, one of its challenges is to reduce the methane intensity of its operations. Part 2 considers the related but separate challenge of intermittently high ground-level ozone.

**The smell of ozone on cold winter days in the Uinta Basin isn't new.** The colorless pollutant is normally associated with urban summertime, however, so it was still a surprise to discover high ozone readings on research monitors back in 2009—ones that were intended to study wintertime particulate matter. It has since been demonstrated that during the winters that the Basin floor has prolonged snow cover, there can be intermittent sharp temperature inversions and buildup of the highest wintertime ozone levels recorded in the United States.<sup>2</sup>

Emissions from petroleum operations, in particular non-methane volatile organic compounds (VOCs) and oxides of nitrogen (NOx), are the precursors that form ozone. Basin residents would no more wish away their economic mainstay than their annual precipitation. Reducing precursors needs to be strategic, effective, and cost-effective. Proposed solutions also need buy-in, and that depends on there being confidence in the process.

### The Bingham Research Center

For building that confidence, the Bingham Research Center in the Uinta Basin is an enviable resource. Part of Utah State University, its mission includes research in service of the local community (see Figures 1 and 2). The first time I met director Dr. Seth Lyman, he was doing maintenance at the Horsepool site, in an unassuming-looking trailer whose insides were decked out with samplers, spectrometers, and chromatographs. The Horsepool site is non-regulatory (its readings don't factor in official U.S. Environmental Protection Agency (EPA) designations), but its data are used by all the air agencies to track hourly ozone levels (see Figure 3).



**Figure 1.** Dr. Lyman led a tour of equipment and facilities as part of the Bingham Center's 10th anniversary on August 28, 2023. A research student helped design this mobile lab equipped to measure methane, CO<sub>2</sub>, humidity, and other gases. It has nearly everything for analyzing data, but could use a more comfortable chair.

*Photo: Anna McEntire, USU.*

The Bingham Center's state-of-the-art labs, computing centers, and classrooms are at the Vernal campus of Utah State University. However, measurements and samples come from sites throughout the Uinta Basin, and on a typical day any of the faculty or student researchers could be on a site visit to one of the air research stations around the Basin, or taking measurements at snow surfaces, near a produced water pond, or on a well pad. The Bingham Center also hosts a collaborative forum that meets monthly during ozone season, the Uinta Basin Ozone Working Group (UBOWG). Explains Seth, "Our vision is to provide good information so people can make good decisions".

### Ozone Nonattainment in Utah

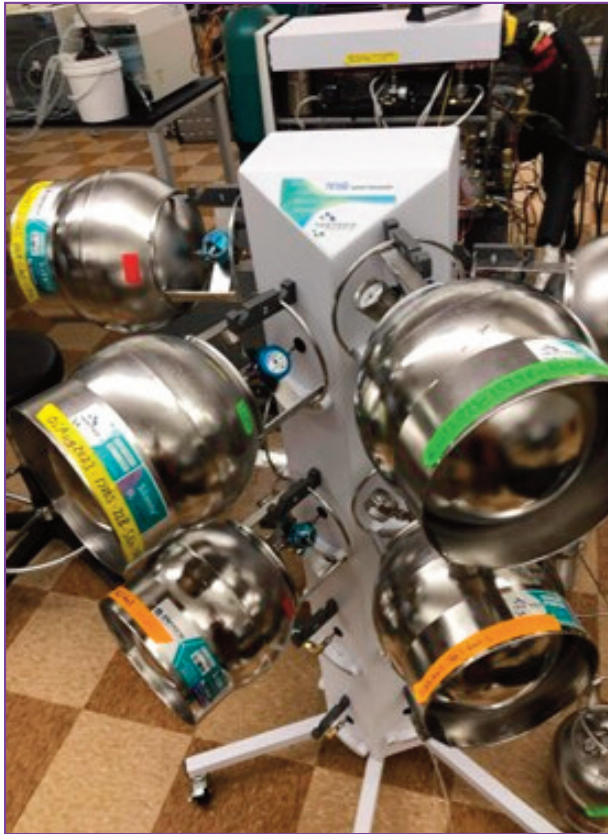
Ozone is highly reactive, which is why it's dangerous: breathing it can trigger a variety of airway-related health problems, including triggering or worsening bronchitis, emphysema, and asthma.<sup>3</sup> The legal standard for ozone in the United States as set in 2015 by EPA is 70 parts per million (ppm), which bluntly is a compromise between protecting public health and whether controlling precursor pollutants is remotely feasible.

EPA determined that the Uinta Basin was out of attainment for ozone in 2018.<sup>4</sup> This determination set a three-year clock for demonstrating attainment. Two factors have contributed to a one-year extension<sup>5</sup> on that clock, and may even add a second one-year extension. One, as discussed below, is that the Federal Implementation Plan (FIP) for the Uintah and Ouray (U&O) Reservation (U&O FIP) just became effective at the beginning of this year, and is likely to cause significant improvements for ozone as it has time to work. The second is that a clean year is required for an extension to be considered, and three winters with relatively low oil and gas activity and a lack of strong inversions (2019–2020, 2020–2021, and 2021–2022) resulted in three clean years in a row.

Unfortunately, conditions could turn on a dime, and they did: January through April of this year saw record snowfall across Utah, and Basin ozone readings were above 100 ppm on several days (see Figure 3). The EPA Administrator is expected to make a decision shortly whether to grant the second one-year extension. If granted, the Basin would have technically achieved attainment. If not, the Basin will be reclassified as Moderate, or possibly Serious.

As described in the Part 1 article published in September, six agencies oversee mineral rights, drilling permits, royalties, and air emissions. The response to ozone falls mainly to three of those agencies, the Utah Division of Air Quality (UDAQ), Ute Indian Tribe's Air Quality Division, and the EPA Region 8. On state-managed lands UDAQ has been delegated full authority to monitor air emissions, promulgate regulations, and enforce compliance. Within reservation boundaries, Ute Air Quality maintains air monitoring stations, but EPA is responsible for





**Figure 2.** Gas sampling canisters at home in the lab. The chromatographs to identify all the compounds in air samples are too large and fragile to transport by trailer, so samples are brought back to campus.

Photo: DLS.

regulations and enforcement for ozone and its precursors. The Air Resource Program for the Bureau of Land Management also evaluates permits for projects within their jurisdiction based on impact to the full airshed.

Dr. Lyman and fellow Bingham Center faculty Dr. Marc Mansfield studied air trends since ozone monitoring began, and found strong evidence suggesting ozone levels are trending downward (Figure 3, reported here as number of exceedances). While the authors attribute much of the improvement to decreases in emissions due to regulatory and voluntary actions, total energy production also declined over the same period, and as the industry rebounds, there is some evidence that emissions are increasing again.<sup>6</sup>

### ‘Everything about the Uinta Basin Is Different’

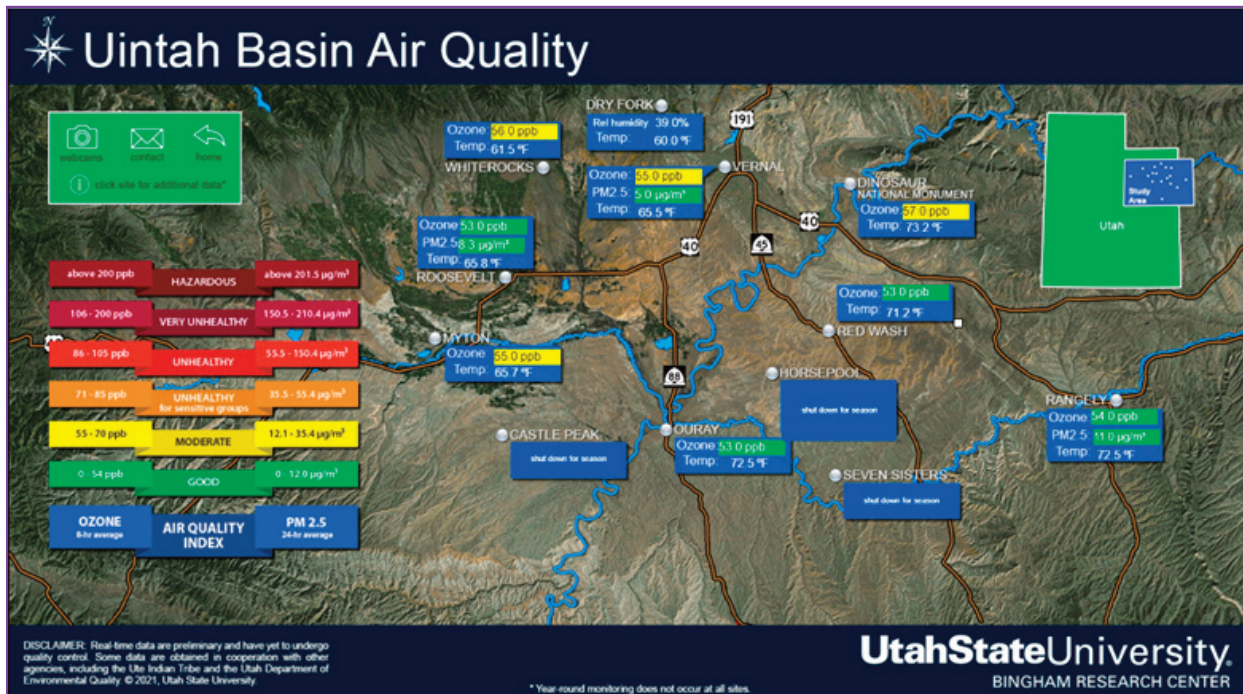
The majority of facilities and ozone precursor emissions are within the U&O Reservation, however, and regulations applicable to areas outside the Reservation in the 2000s and 2010s did not apply within. The Basin’s overall complexity made promulgating the Federal Implementation Plan<sup>7</sup> for the reservation (U&O FIP), initiated in 2014, a nine-year odyssey.

Chris Dresser worked in EPA’s Region 8 office from 2016 to 2020 and helped draft and coordinate the first proposed FIP. Described Dresser, “Everything about the Uinta Basin is different. Working with the State of Utah, the Forest Service, the BLM, EPA headquarters, industry, and most importantly, the Ute Tribe Business Council, we had more intersections and touchpoints than anywhere else. Plus, the FIP was stamped as ‘economically significant.’” Twice during the FIP’s odyssey U.S. presidential elections brought change in administration, which inevitably called under review any significant agency actions. These and other delays allowed inventory data and modeling to become outdated and need revision. The final signature last November and effective date this January were met with relief.

Marginal nonattainment carries few mandates for regulatory agencies beyond setting the clock to three years for meeting the standard. One stipulation is that getting a UDAQ air permit for a new major source (a facility that would emit 100 tons per year of VOC or NO<sub>x</sub>—like a power plant) requires a 110% offset. In other words, a means must be identified to quantifiably, permanently remove enough emissions from somewhere else in the air shed so that the total emissions are reduced by at least 10%. Likewise, under the General Conformity rule, the BLM requires offsets in order to approve any project permit for a new major source. Most oil and gas operations are well under the major source threshold, and no projects of that size are currently proposed. Moderate nonattainment maintains the same major source threshold, but would require 115% offset. However, the Serious status automatically reduces the threshold for a major source to 50 tons per year, a level that applies to several types of petroleum operations. At present, there are some emissions offsets in a bank that Utah maintains that haven’t been tapped. Both Moderate and Serious nonattainment status also require that EPA and UDAQ generate a plan with additional controls and modeling (State Implementation Plan, or SIP).

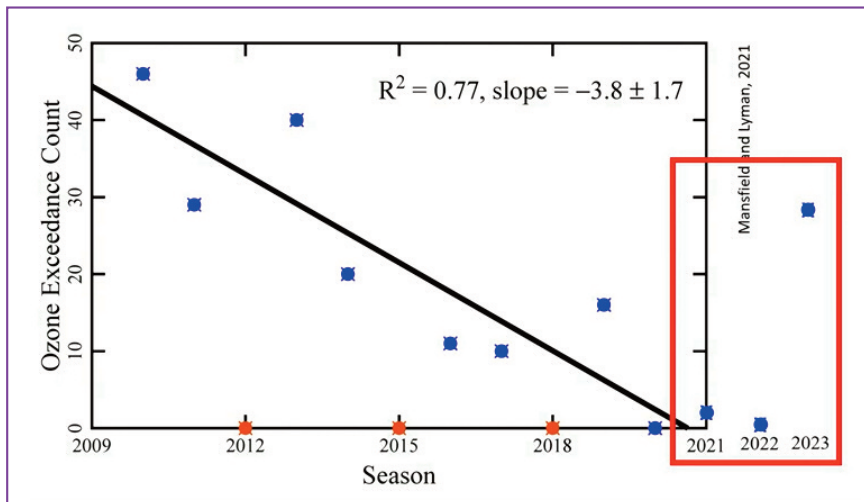
### The Uinta Basin Ozone Working Group

The years leading up to the designation were not without effort, or progress. The Bingham Center began formal air quality information- and technology-sharing with the Bureau of Land Management in 2014.<sup>8</sup> The same year Ute Air Quality and UDAQ started monthly in-person meetings, partnering on involvement in EPA’s Ozone Advance Program. The trade group Western Energy Alliance formed an ozone committee in 2014, and joined forces with Utah Petroleum Association in 2019. The joint committee generated a robust list of recommendations that continues to inform respective memberships. UPA has in the last year tracked voluntary upgrades that include the aerial leak-detection monitoring (described in the Part 1 article) and thief hatch alarms and metered valves (LACT) that bypass thief hatches, improvements instigated in response to results of



**Figure 3.** Real-time ozone readings in the Uinta Basin on a webpage administered by Bingham Center (accessed 10/20/23 11:00 am MST, before the Dec 1 start of Ozone Season).

Source: <http://ubair.usu.edu/index.html>



**Figure 4.** Modified by authors from Mansfield, M.L.; Lyman, S.N. Winter Ozone Pollution in Utah's Uinta Basin is Attenuating.

Source: *Atmosphere* 2021, 12, 4; <https://doi.org/10.3390/atmos12010004> using current-year data provided by UDAQ. Figure reprinted with permission from authors.

exciting challenge, “That was the first time the EPA had done a credit bank for an individual nonattainment area. States do it, and in the Northeast VOC credits can go for thousands of dollars per ton. It touched everything...it hit on Permitting, PSD (prevention of serious deterioration), Planning, Legal, Tribal leadership.”

An Advance Notice of Proposed Rulemaking was published in May of 2019.<sup>11</sup> Said Dresser, “We got great feedback on advance notice. It seemed to hit a sweet spot... continued development while ratcheting down emissions.” Public interest in the rule waned during the Marginal nonattainment phase of the last five years while there

joint Bingham Center/UDAQ research.<sup>9</sup> The Bingham Center’s UBOWG gathered these stakeholders together and added many more regulators and community members.<sup>10</sup>

The UBOWG as an entity elected to not initiate new policies to address air quality, but a wide array of participants lobbied EPA to put resources into drafting one to manage ozone precursors on the U&O Reservation. Dresser recalls that it was an

was no demand for offsets. The winter of 2022–2023 seems to have changed that. Sheila Vance of UDAQ recently noted, “I’ve been asked more and more about the status of the EPA’s ERC banking rule in the last few months. We can take a position on its implications, including the possibility of cross-jurisdictional trading, after the rule is published.”

As mentioned in the Part 1 article, some companies did



proactively adopt practices that successfully anticipated the new standards, drawing on the value of social license to justify the capital and operational investments. In general, uncertainty discourages risk-taking; collaboration encourages

creativity. While most are dreading being plunged to a Moderate or Serious nonattainment status because of both workload and expense, we're ready to call this game and huddle for the next one. **em**

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