



Modernization of EPA's CASTNET

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In December 2024, EPA released a 3-year modernization plan for CASTNET. The plan, which is available at https://www.epa.gov/system/files/documents/2025-01/castnet_modernization_plan_dec2024_final.pdf, lists the steps the program will take to respond to input from an external scientific review of CASTNET and address the evolving data needs of the EPA and the scientific community. The scientific review made several key recommendations, among them to maintain long-term multipollutant monitoring at as many locations as possible, add PM_{2.5} measurements using non-regulatory sensors, and continue to address spatial gaps in the Central United States. The review also recommended expanding Tribal partnerships to address gaps in data coverage and better understand environmental impacts to those communities.

The ultimate goal of the modernization effort is to establish a cost-effective, sustainable future for CASTNET. This involved difficult decisions about decommissioning select sites and ending certain measurements to enable the long-term viability of the network. The scientific review suggested criteria for evaluating existing sites, and these were used to perform a network assessment and determine which sites would be discontinued. Also, SO₂ measurements from the CASTNET filter pack were ended at most sites (EPA- and NPS-sponsored), and continuous NO_y measurements were ended with the exception of several special study sites and the NCore site at Bondville, IL.

During 2025 and early 2026, WSP has worked to begin implementation of the modernization plan. WSP has recommended and procured replacement, regulatory ozone analyzers and transfer standards for all EPA-sponsored sites. Teledyne API N400 and N703 models will begin deployment during the summer of 2026. We have acquired and deployed lower-cost PM sensors at all EPA- and Indian River Lagoon (IRL) Council-sponsored CASTNET sites. WSP decommissioned seven CASTNET sites and transitioned two sites to ozone-only. We also worked on repairing existing infrastructure including several major shelter refurbishments. Since the third quarter of 2024, CASTNET has seen the addition of four sites [one with a Tribal partner, one with Haskell Indian Nations University, and two in conjunction with Indian River Lagoon (IRL) Council, a national estuary program] and the restart of a site in West Virginia whose operations had been suspended in May 2022.

Adjustments to Pollutants Reported

EPA suspended SO₂ concentration measurements in July 2024 at most CASTNET sites. Currently, CASTNET sites on Tribal lands, sites sponsored by NY Department of Environmental Conservation and the Indian River Lagoon Council continue to monitor SO₂ concentrations. While SO₂ continues to be an important component of dry deposition and acidification of sensitive ecosystems, the concentrations are < 1 µg/m³, a decrease of 95% since 1990. Maintaining SO₂ measurements at select sites will provide spatial coverage for model validation and trends.

Most CASTNET sites are co-located with National Atmospheric Deposition Program (NADP) monitoring locations. The NADP provides data on air concentrations of ammonia and other toxics (e.g., mercury) and precipitation chemistry. The value of the ammonia concentrations provided by the Ammonia Monitoring Network (AMoN) remains significant for evaluating trends, satellite validation, and source contributions to PM formation. The NADP has adopted a lower cost option (ALPHA samplers) for the passive samplers. The cost savings will allow EPA to maintain existing sites and re-invest to address the scientific review's recommendation to expand ammonia sites in the upper Midwest and Central U.S. where we see increasing trends in concentrations. EPA has also invested in replacement precipitation collectors for its National Trends Network (NTN) sites so that the aging Aerochems can be updated to N-Con collectors.



NADP Pothead



N-Con collector

New Partnerships

EPA is exploring new partnerships with existing networks/sites. For example, CASTNET is co-located in three locations with the Atmospheric Science and Chemistry Measurement Network (ASCENT), a new network that seeks to characterize aerosol chemistry composition and physical properties using high-time resolution measurements at 12 locations. New technology deployed at these monitoring locations will be evaluated against the CASTNET measurements to determine the viability (cost savings) and stability (robustness for network-wide operations) for potential future deployment at CASTNET sites.



PM Sensors

The scientific review recommended that EPA deploy PM_{2.5} sensors at CASTNET locations where existing PM mass concentrations are sparse. While CASTNET measures the major components of PM_{2.5} (SO₄²⁻, NO₃⁻, NH₄⁺), the network has not traditionally reported PM_{2.5} mass concentrations, one of the six criteria air pollutants the Clean Air Act requires EPA to control. WSP has deployed commercially available low-cost sensors at all EPA- and IRL Council-sponsored CASTNET sites. As of June 2026, 68 PurpleAir Flex sensors, 21 QuantAQ MODULAIR sensors, and 42 MODULAIR-PM sensors are reporting data from CASTNET sites. The measurements provide a first look at ambient PM concentrations in areas that often lack other sources of ambient air quality measurements. While data provided by low-cost sensors are not used for regulatory purposes such as determining attainment of the National Ambient Air Quality Standards (NAAQS), the concentrations reported are being compared to the recently revised PM_{2.5} NAAQS, which was lowered to 9 µg/m³ in February 2024. The PurpleAir data are also included in the AIRNow Fire & Smoke Map for near real-time reporting to the public. The QuantAQ MODULAIR system uses both an optical particle counter and nephelometer to provide better measurements of PM₁₀. Two different models are deployed at CASTNET sites – PM only and PM with gases. The select units that offer additional gas measurements (CO, O₃, NO₂, NO) have been added to small footprint, ozone-only CASTNET sites to provide a more complete multipollutant suite of measurements. They have also been deployed to special study sites where NO_y measurements are available for comparison. The PM_{2.5} concentrations and existing CASTNET PM precursor data are being leveraged to explore pollutant relationships during smoke and non-smoke impacted events to evaluate how trends may change over time. To increase availability and utility of CASTNET data, hourly lower-cost sensor data are posted daily on the EPA CASTNET website, and all historical CASTNET filter pack data (PM precursors) through 2025 have been posted in EPA's Air Quality System (AQS).

The Clean Air Status and Trends Network (CASTNET) is a national multipollutant air monitoring program that provides data to characterize air pollutant concentrations in rural communities, estimate the deposition of air pollutants to quantify their ecological effects, and assess the health and environmental effectiveness of the Agency's regulatory programs. Rural in scope, CASTNET provides information on air pollution trends in rural state and Tribal lands and in national parks and other Federal lands. Launched approximately 35 years ago in response to the Clean Air Act Amendments of 1990, CASTNET evolved from the National Dry Deposition Network (NDDN), which began in 1987 and has consistently provided valuable, nationwide data on atmospheric concentrations of nitrogen and sulfur species, their precursors, ozone levels, and ammonia. This extensive database has been crucial for reporting long-term and spatial trends in air quality across the contiguous U.S. CASTNET has evolved to address the emerging scientific and policy needs, while maintaining key long-term consistent air quality measurements. Key changes over the past two decades include the transition to regulatory O₃ measurements, development of lower-cost sites (small-footprint), addition of trace-level precursor gas measurements including the "nitrotrain" system, and addressing spatial gaps in the network by working with Tribal, state, and other partners interested in supporting sites.

Network Updates

Replacing aging equipment and reinvesting in the infrastructure is critical for maintaining the highest quality data and expanding the partnerships that help sustain the network. The monitoring community and researchers often leverage the rural CASTNET sites to deploy supplemental measurements and equipment (e.g., Pandora spectrometers in conjunction with NASA) as the sites fill a niche that supports model development, ground-based observations for satellite validation, and method evaluations for new monitoring technologies. EPA will continue to leverage these partnerships to advance the science and policy needs of the Agency as we seek additional cost-sharing opportunities.

Routine maintenance to refurbish aging shelters (e.g., water-damaged roofs and floors) and repair site infrastructure will occur at many sites across the network. Cost analyses have shown that repair of the shelters is more cost-effective than replacement. Over the past several years, WSP has repaired shelters at Stockton, IL (STK138) and Speedwell, TN (SPD111), and a refurbished shelter from Pisgah National Forest, NC (PNF126) was relocated to the restarted site at Cedar Creek State Park, WV (CDR119). Several additional shelter refurbishments are planned during the remainder of 2026, including Connecticut Hill, NY (CTH110) and Washington Crossing, NJ (WSP144). These investments will result in a more robust infrastructure that can withstand the harsh weather conditions found at many of the remote CASTNET locations and maintain data collection during extreme weather events.



New N400



Conclusion

As CASTNET celebrates its 40th birthday, the network continues to evolve to meet changing Agency goals and needs. Infrastructure issues will continue to be addressed, O₃ instrumentation (and associated local site network IT equipment) will be updated by mid-2027, and PM data collection and analysis will continue.

Decommissioned Sites

Site Name	State	Site ID	Reporting Dates	Comment
Alhambra	IL	ALH157	07/1988 – 12/2022	Landowner initiated site closure.
Ashland	ME	ASH135	01/1989 – 05/2022	Scientific review criteria used
Cadiz	KY	CDZ171	10/1993 – 05/2022	Landowner initiated site closure.
Catskills	NY	CAT175	05/1994 – 09/2025	Scientific review criteria used
Deer Creek	OH	DCP114	10/1988 – 05/2022	Scientific review criteria used
Huntington Wildlife Forest	NY	HWF187	06/2002 – 05/2022	Scientific review criteria used
Kickapoo Tribe	KS	KIC003	02/2014 – 03/2024	Tribe unable to support site.
Cranberry	NC	PNF126	01/1989 – 05/2022	Scientific review criteria used
Underhill	VT	UND002	11/2012 – 05/2022	Scientific review criteria used