



Navajo Nation EPA

AIR QUALITY CONTROL PROGRAM

Navajo Nation Ambient Air Quality Monitoring Locations

Ambient Air Monitoring Sites



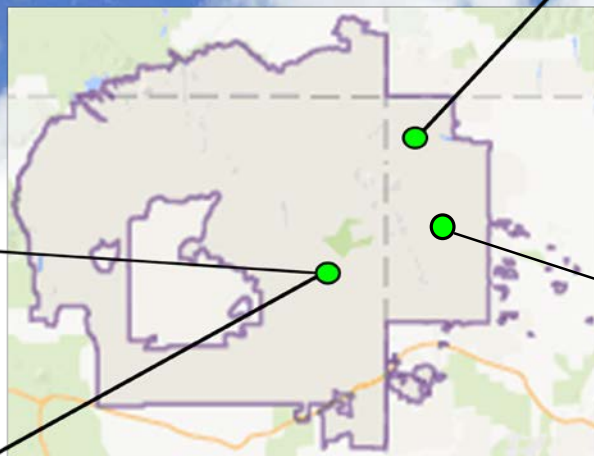
MET TOWER



SHIPROCK, NM



FRM PM_{2.5}



COUNSELOR, NM

NAZLINI, AZ



EBAM



Air Quality Control Program & Operating Permit Program
Navajo Route 112 North Bldg. 2427
P.O. Box 529
Fort Defiance, AZ 86504

Telephone: (928) 729-4246 Fax: (928) 729-4323
Website: www.navajonationepa.org/airquality
Email: airquality@navajo-nsn.gov

WHY DO WE MONITOR?

The AQCP was developed to protect human health and the environment as well as preserve and enhance the Navajo Nation air resources.

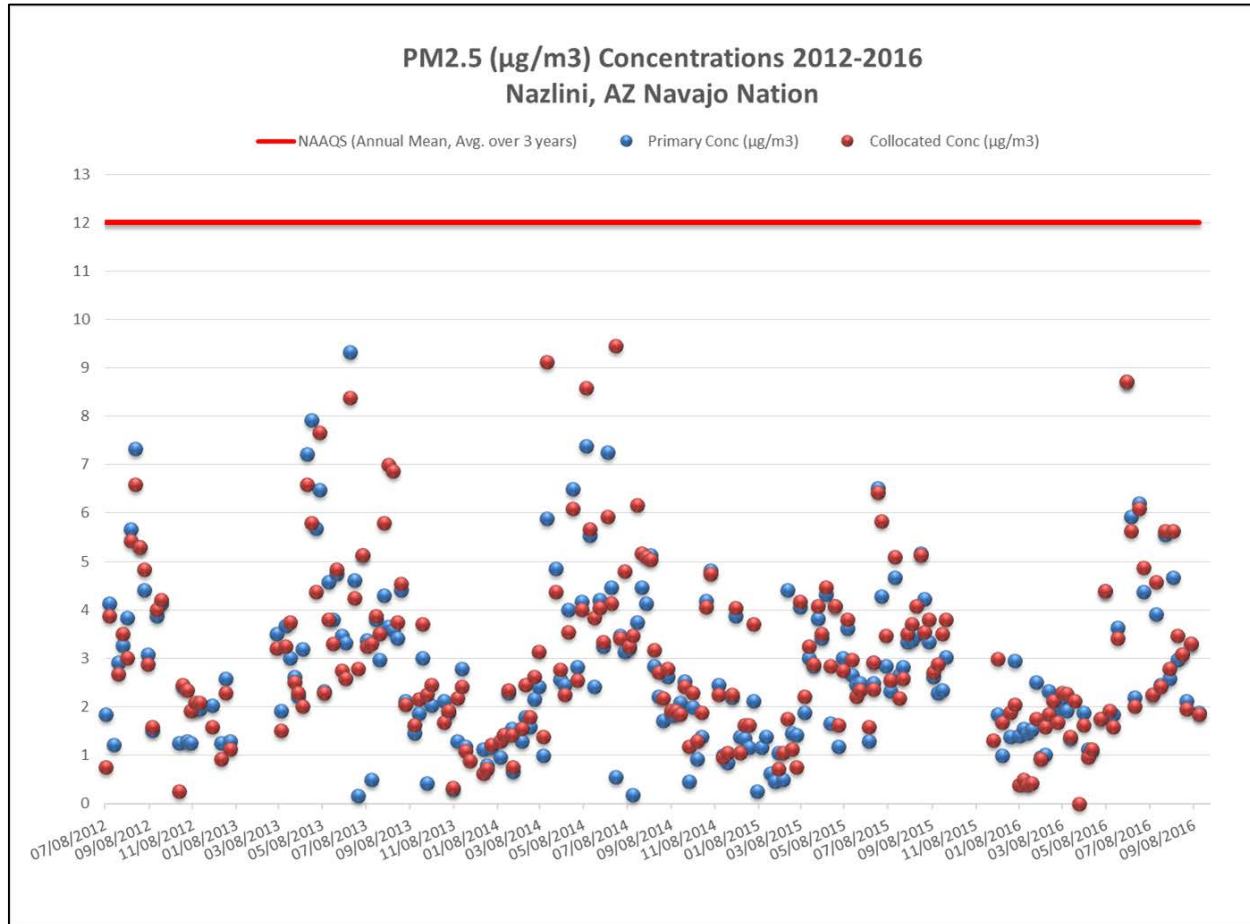
Measured Air Pollutants, AQI, and NAAQS

- Ozone
- Particulates
- Nitrogen Dioxide
- Sulfur Dioxide

Air Quality Index (AQI) Values	Levels of Health Concern	Health Effects
0 to 50	Good	Little or no risk
51 to 100	Moderate	Acceptable quality
101 to 150	Unhealthy for Sensitive Groups	General Public not likely affected
151 to 200	Unhealthy	All may experience some effects
201 to 300	Very Unhealthy	All may experience more serious effects
301 to 500	Hazardous	Emergency conditions

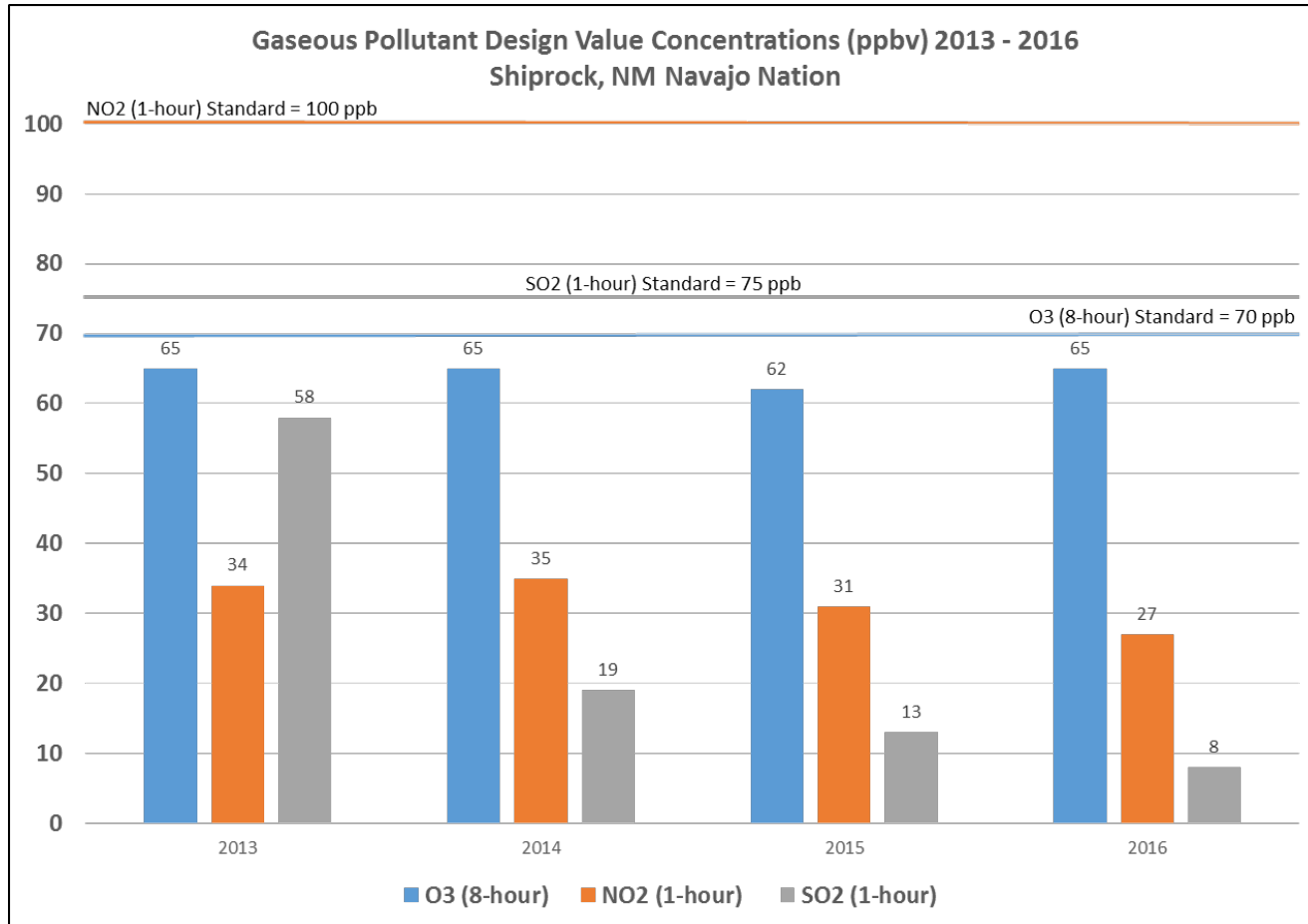
	POLLUTANT	LEVEL	AVERAGING TIME	PRIMARY/SECONDARY
1.	Carbon Monoxide	9 ppm (10 mg/m ³) 35 ppm (40 mg/m ³)	8-hour 1-hour	primary
2.	Lead	0.15 µg/m ³	3 month	primary & secondary
3.	Nitrogen Dioxide	53 ppb (100 µg/m ³) 100 ppb	Annual 1-hour	primary & secondary primary
4.	Particulate Matter (PM ₁₀)	150 µg/m ³	24-hour	primary & secondary
	Particulate Matter (PM _{2.5})	12 µg/m ³ 15 µg/m ³ 35 µg/m ³	Annual Annual 24-hour	primary secondary primary & secondary
5.	Ozone	0.070 ppm	8-hour	primary & secondary
6.	Sulfur Dioxide	75 ppb 0.5 ppm	1-hour 3-hour	primary secondary

Navajo Nation Air Quality



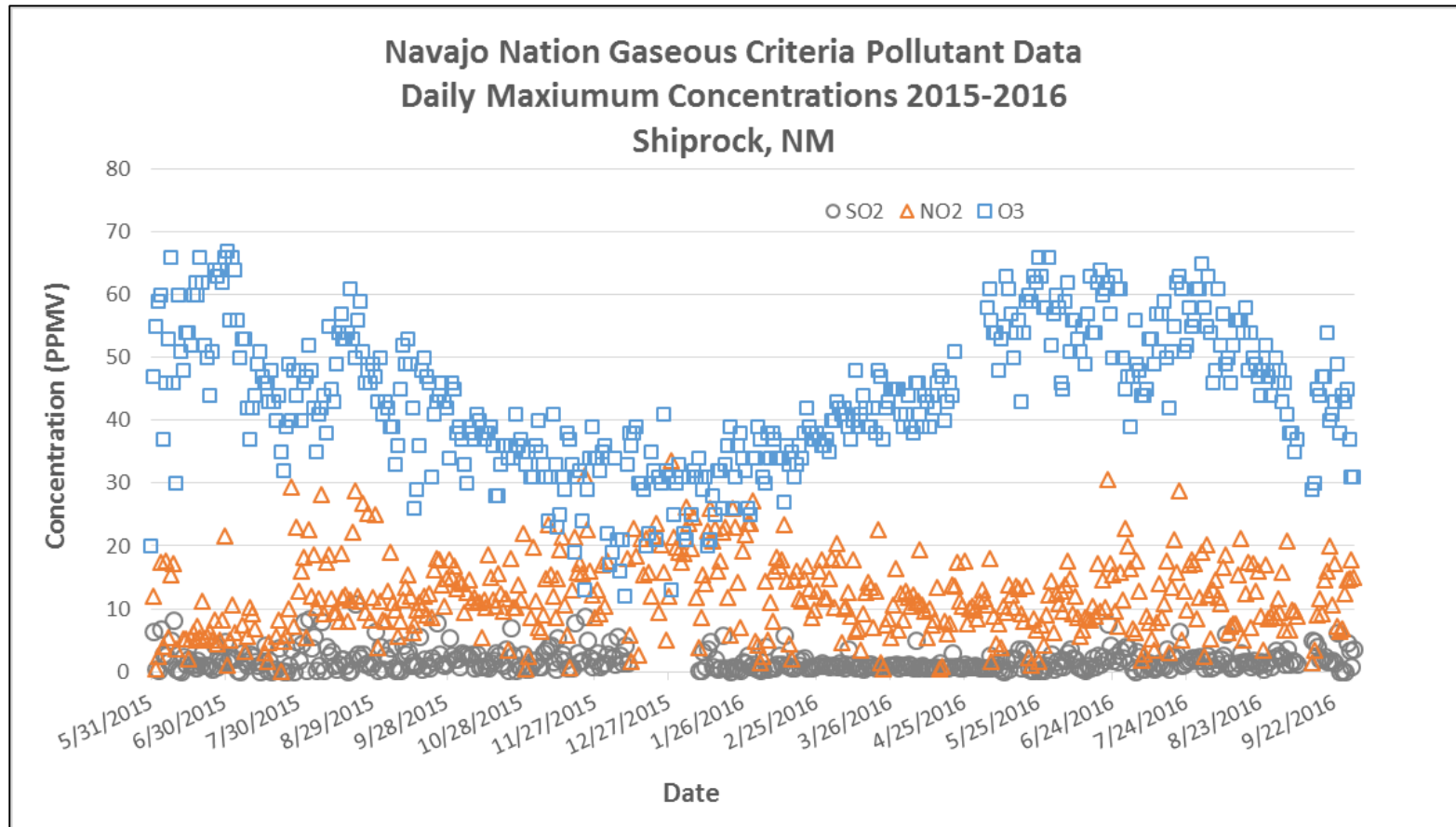
Air Quality Data shows no exceedances of NAAQS
(24-hour concentrations are below the primary standard of $35 \mu\text{g}/\text{m}^3$)

Navajo Nation Air Quality



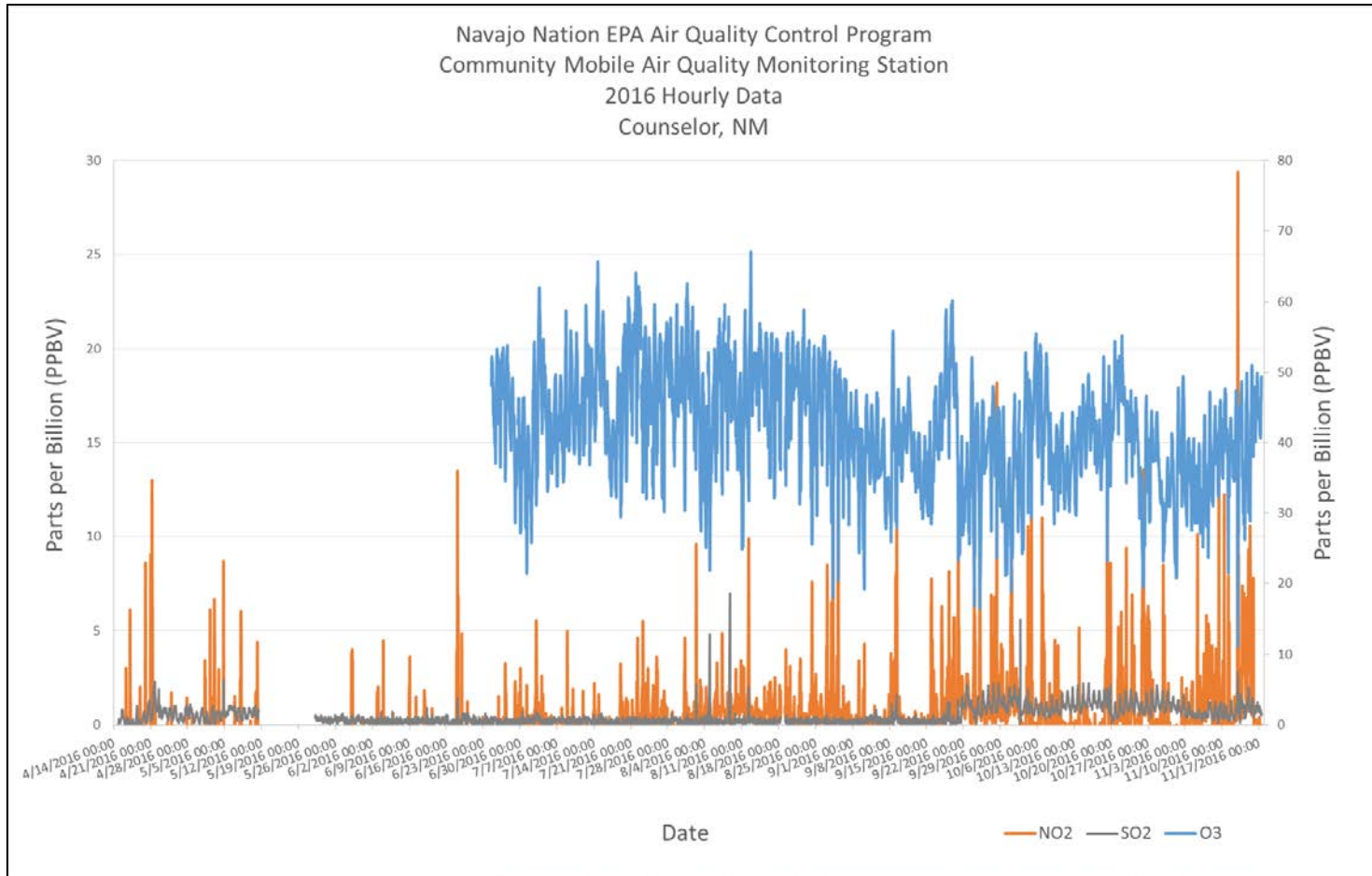
Air Quality Data shows no exceedances of NAAQS

Navajo Nation Air Quality



Air Quality Data shows photochemistry

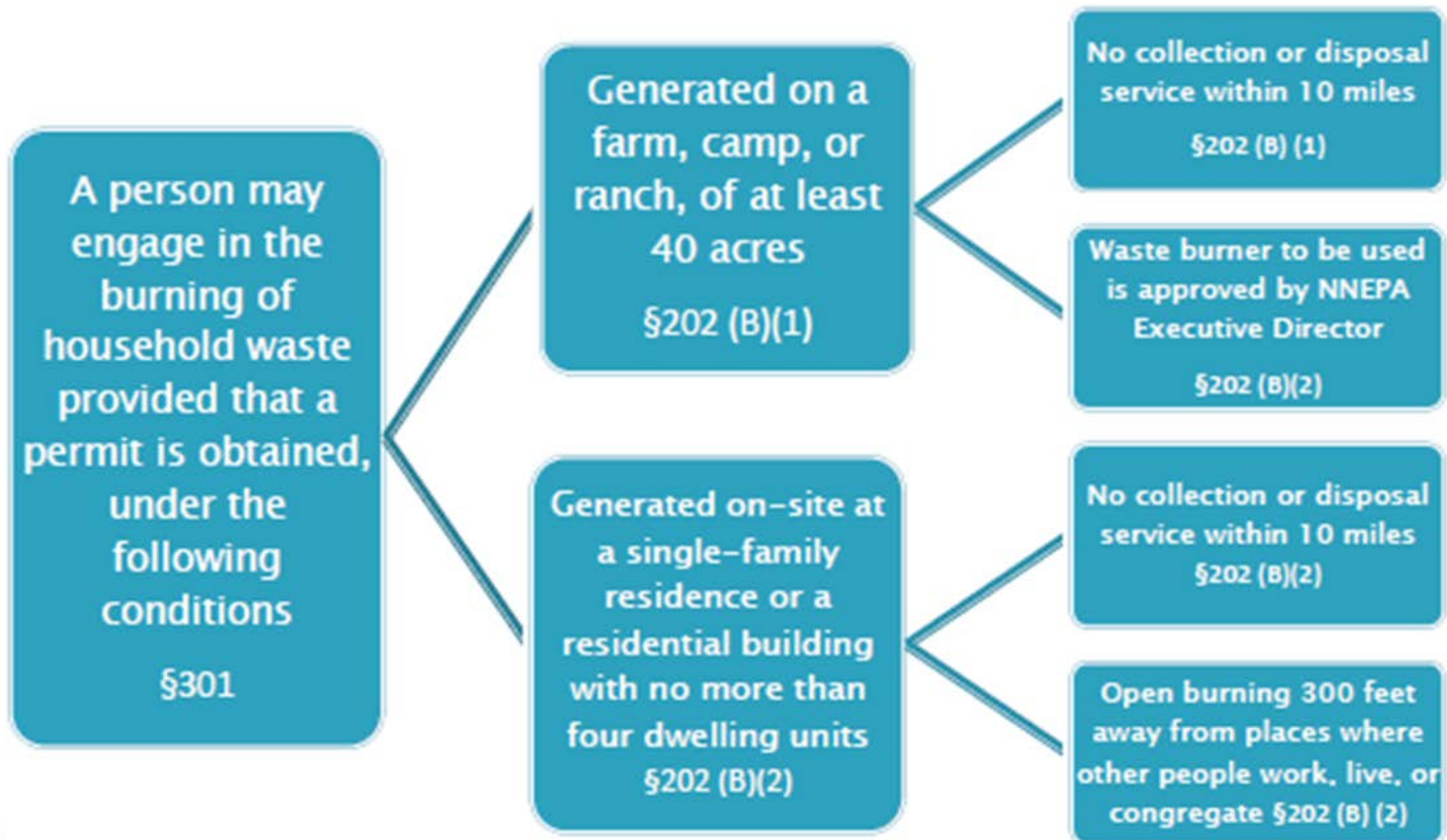
Navajo Nation Air Quality (Community Mobile Air Monitoring Station)



Air Quality Data shows no exceedances of NAAQS

Navajo Nation Open Burn Regulations

Approved on November 20, 2012



Types of Open Burning



Household
Burning:
Burning of
household
waste



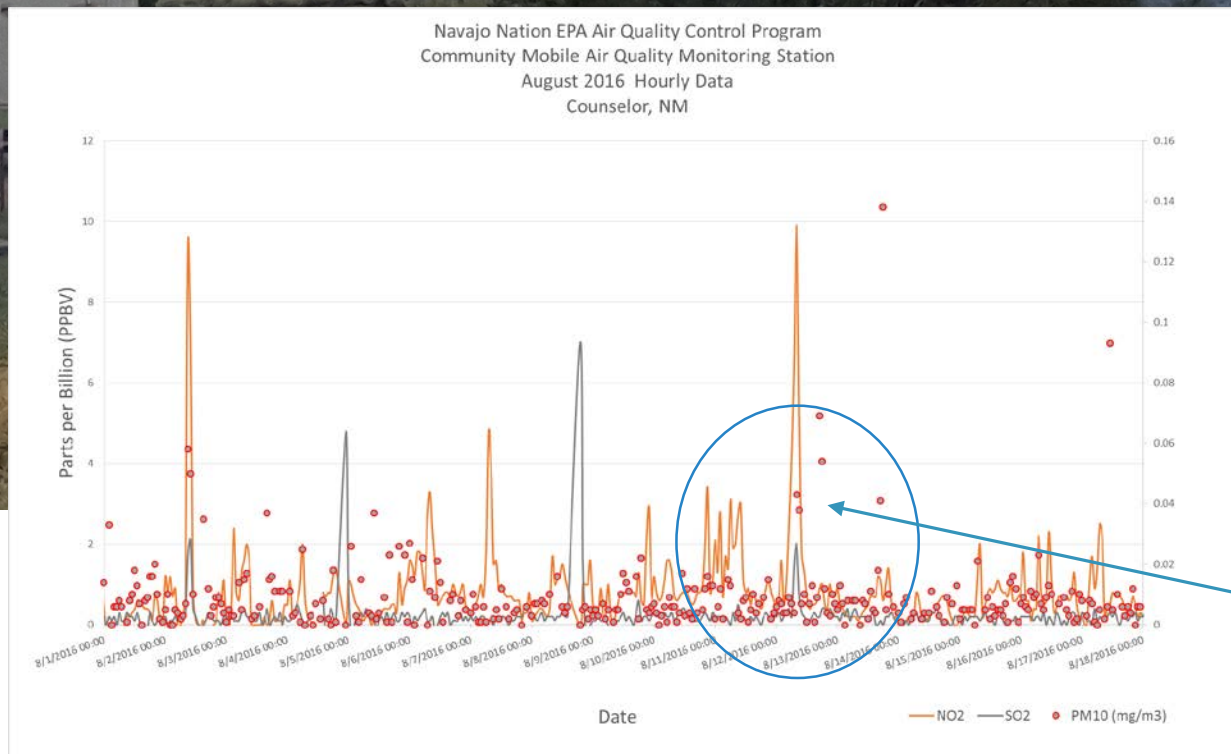
Agriculture Burning:
Burning for farms, weeds,
brush, forestry or
siviculture activities



Cultural and Traditional
Burning:
Ceremonial purposes

Open Burning of Household Trash and Impacts to Residential Air Quality

Ambient air quality monitors observe increase in air pollution concentrations during this open burn event.




A spike in air pollution concentrations corresponds with illegal open burning of household trash

Indoor Air Quality on the Navajo Nation

- Study performed by USGS “Navajo Coal Combustion and Respiratory Health Near Shiprock, NM.”
- Over 130 homes surveyed.
- Stoves in one-quarter of homes surveyed were found to be inappropriate for coal combustion.
- Study found high levels of respiratory diseases within communities. Residents appear to be at greater risk for respiratory disease than in other communities in the Four Corners region.
- Navajo Nation Emission Inventory
 - Residential Wood and Coal Burning

Combustion Source	CO (tpy)	NOx (tpy)	PM2.5 (tpy)	PM10 (tpy)	SO2 (tpy)	VOC (tpy)
Wood	41,137.8	423.4	5,634.9	5,634.9	65.1	37,294.3
Coal	489.5	16.2	8.6	11.1	55.2	17.8

- We saw a need but lacked funding...



Navajo Coal and Air Quality in Shiprock, New Mexico




Figure 1. Typical emission plume from a powerplant near Shiprock, New Mexico, is horizontal during an inversion October 26, 2002; inversions are more common in winter than summer. Photograph copyright ©2002 Diane J. Schmitt. All rights reserved, used with permission.

Among the Navajo people, high levels of respiratory disease, such as asthma, exist in a population with low rates of cigarette smoking. Air quality outdoors and indoors affects respiratory health. Many Navajo Nation residents burn locally mined coal in their homes for heat, as coal is the most economical energy source. The U.S. Geological Survey (USGS) and Dixie College, in cooperation with the Navajo Division of Health, are conducting a study in the Shiprock, New Mexico, area to determine if indoor use of this coal might be contributing to some of the respiratory health problems experienced by the residents. Researchers in this study will (1) examine respiratory health data, (2) identify stove type and use, (3) analyze samples of coal that are used locally, and (4) measure and characterize air quality inside selected homes. Interim results are summarized below.

Indoor air quality.—In the Shiprock area of the San Juan basin, people are exposed to poor air quality conditions when atmospheric thermal inversions trap combustion products from two nearby large-capacity coal-fired powerplants (fig. 1). The number of respiratory incidents in the Shiprock area increases in winter (when inversions are more common) and decreases in summer. This increase may be related to inversions and to burning coal, wood, and other materials indoors for heating during the winter.

Respiratory health data.—Our study indicates that people living in Shiprock are more than five times as likely to be seen at the Northern Navajo Medical Center (NNMC) Indian Health Service facility for respiratory complaints as are residents of other nearby communities that are less affected by inversions. Another notable finding is that Shiprock residents under the age of 5 and over 56 are more than twice as likely to be treated at NNMC for respiratory issues as would be expected of the entire Shiprock population. The very young and the elderly spend more time indoors during winter when coal may be used for home heating, and people in these age groups may have immune systems that are compromised relative to the systems of people between 5 and 56.

Stove type and use.—The use of a properly operated and maintained stove designed to burn coal should not significantly lower air quality indoors. The greatest tons surveyed 117 households that used coal-burning stoves in 2004 and found that one-quarter of them were burning coal in stoves that were designed to operate at lower temperatures for burning wood and that many of the stoves had visible cracks or were poorly vented to the outside (fig. 2).

According to the results of this study, people can reduce their risk of respiratory disease by doing the following:

- Choosing and properly maintaining coal-burning stoves
- Properly venting these stoves
- Using a stove designed for the appropriate fuel
- Safely handling coal and ash

Coal analyses.—Most of the coal used by our survey participants came from the Navajo mine at the Four Corners Power Plant. Samples of coal from Shiprock area homes, as well as from the mines and powerplants, have been analyzed for their chemical composition. No significant differences were found in the quality of coal from those various sources, and no dangerous levels of trace elements, such as arsenic, were detected.

Particulate matter.—When coal is burned, numerous potentially harmful materials are released into the air. Of particular concern are small particles known as PM_{2.5} (particulate matter 2.5 micrometers or less in diameter). These particles, less than 1/30th the diameter of a human hair, are small enough that they can travel deep into the lungs and can directly enter the bloodstream. PM_{2.5} can then be transported to any organ in the body, and they have been implicated as a cause of heart disease among other ailments. From a human health standpoint, the composition of the particles may be even more important than their size. USGS scientists are currently measuring the amount of PM_{2.5} indoors and outdoors and analyzing that material in the laboratory to determine what chemical elements and compounds make up or are stuck to the particles.

Results.—This collaborative study of USGS scientists with Navajo students, residents, and health officials is providing valuable training for Navajo students in geographic information science (GIS), public health research methods, and geochemistry. Final results of the study will be provided to Tribal leaders, who can use the data in developing community practices that improve the public health effects of coal used for home heating in the Navajo Nation.

For more information, please contact:

Joseph E. Hunsell U.S. Geological Survey 960 National Center 12201 Sunrise Valley Drive Reston, Virginia 20192 Telephone: (703) 648-6497 E-mail: jhunsell@usgs.gov	Linda V. Garcia Dixie College, Cravens Education Program 1225 Yucca Street, P.O. Box 360 Shiprock, New Mexico 87420 Navajo Nation Telephone: (505) 368-3316 E-mail: lgarcia@dixiecollege.edu
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Figure 2. Representative of stoves used in 25 percent of homes surveyed. This stove was not designed to burn coal safely. Photograph by Veronica Pritchard-Caplan, Dixie College, 2004, used with permission.

U.S. Department of the Interior
U.S. Geological Survey

Printed on recycled paper

Field Sheet 2004-2005
July 2006

Indoor Air Quality on the Navajo Nation

- Hospital admissions/outpatient visits to Northern Navajo Medical Center increases during winter months

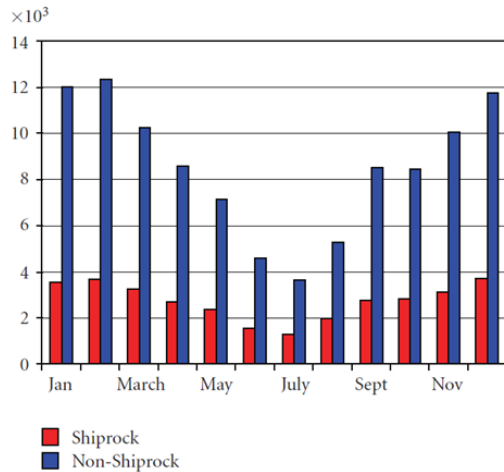


FIGURE 1: Total unadjusted raw numbers of hospital admissions/outpatient visits to NNMC for all seven diseases/conditions by month over the time period April 1997–December 2003, with residents of Shiprock in red and all other communities included in the study in blue.

- Indoor PM_{2.5} 24-hour concentrations exceed PM_{2.5} NAAQS with spikes in PM_{2.5} concentrations coincides with activities such as adding chunks of coal to the stove.

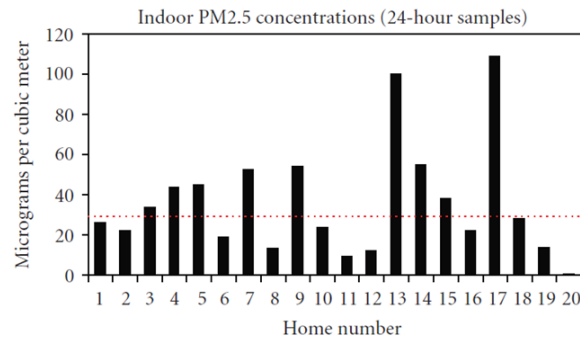


FIGURE 4: Average concentrations of winter (2005, 2006, and 2007) indoor PM_{2.5} over 24 hours at 20 homes. Home numbers 1–19 were burning coal during sampling period; home number 20 had an alternate heating source. Red dotted line indicates the 24-hour ambient US Environmental Protection Agency standard of 35 µg/m³ for comparison.

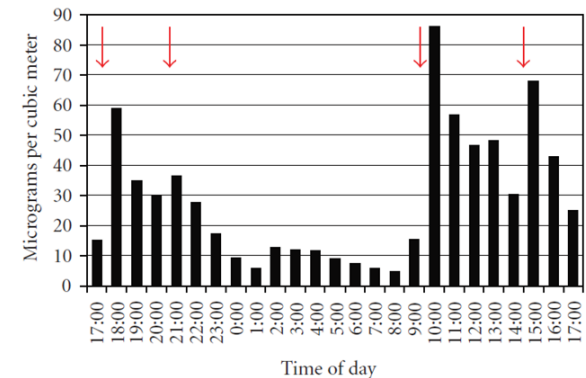


FIGURE 5: Representative display of PM_{2.5} concentration hourly averages over a twenty-four hour sampling period in one home (site Nav135). On the basis of interviews with residents, spikes in PM_{2.5} concentrations coincided with activities such as adding chunks of coal to the stove (red arrows).

Navajo Wood & Coal Stove Outreach

- Worked with ITEP interns, contractors and EPA Burnwise to develop flyers, public service announcements and best burning practices outreach video
- Conduct Indoor Air Quality Assessments and provide recommendations to improve indoor air quality
- We didn't want to promote methods that people on the Navajo Nation couldn't easily follow, or carry out.
- Focused on 4 main ideas that we felt would be applicable to Navajo
 - 1) Clean and Repair your stove and chimney
 - 2) Burn the right fuel
 - 3) Ensure proper ventilation
 - 4) Use smoke detectors and carbon monoxide alarms

4 Tips for Cleaner Stoves and Healthier Homes

Fire is sacred and should be treated with respect inside Navajo homes. Follow these guidelines to minimize smoke and protect your health when using the family stove.

- 1** **Clean and repair your stove and chimney.**
Repair cracks or gaps and clean your stove and chimney regularly to ensure a safe fire and to keep your family warm.
- 2** **Burn the right fuel.**
Burn only dry, seasoned wood in a wood-burning stove and clean, high-quality coal in a coal stove. Never burn trash, tires, or combustible liquids like gasoline or lighter fluid.
- 3** **Ensure proper ventilation.**
Ensure that your stove pipe and chimney vent properly so smoke is directed outdoors. Keep the stove door closed tightly when a fire is burning to avoid releasing harmful smoke into your home.
- 4** **Use smoke detectors and carbon monoxide alarms.**
These devices help make your home safer for you and your family. Test regularly to ensure proper functioning.

For more information on how to heat your home safely, go to [NavajonationEPA.org/AirQuality](https://www.navajonationepa.org/AirQuality).

<https://www.youtube.com/watch?v=jfq873KVxyo&feature=youtu.be>

Mitigation Project Four Corners Power Plant Stove Change Out Project

- A 2010 EPA Settlement Agreement with Four Corners Power Plant for CAA violations is providing \$3.2 million in mitigation for a stove change-out project
- 750 change-outs will occur in a five year period in the Shiprock Area
- The agreement requires both the use of Navajo workers where possible and the use of workers who are certified (or equivalent) for a safe installation of stoves (Wood Stove Training for Contractors)
- EPA Certified stoves are not designed to burn coal. EPA is working with manufactures to design dual fuel stoves that will be able to burn wood and coal.
 - Visited the Navajo Nation to learn more about burning habits
 - Participated on calls with Navajos who burn coal
 - Want a stove that will create less pollution that will improve air quality

Wood Stove training for contractors

NNEPA, USEPA, and National Fire Institute conducted wood stove installation for Navajo contractors

The training helps Navajo contractors become more knowledgeable of the proper installation of stoves in order to help assist with the installation

Also putting on short session for community members on Burn Wise techniques



LEARN BEFORE YOU BURN

Fire is sacred and should be treated with respect inside Navajo homes.

SEPTEMBER 1, 2016
THURSDAY @ 3:30 - 4:30 PM

DINE COLLEGE, SOUTH CAMPUS
ITV CLASSROOM
BIA ROAD 0570
SHIPROCK, NM

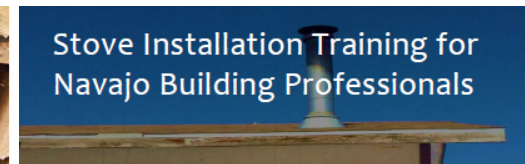


With heating season just around the corner, come learn ways to minimize smoke and protect your health when using the family stove.

FOR MORE INFORMATION CONTACT: TENNILLE BEGAY @ (928) 729-4248



For more information on how to heat your home safely, go to NavajoNationEPA.nrg/AirQuality



This FREE training will give contractors and others in the construction and housing industry the knowledge needed to install wood, coal, pellet, and gas stoves. Proper installation is crucial for the safety and comfort of a home's occupants.

This TWO-DAY training will take place in two locations:

AUGUST 29TH- 30TH
9:00 AM - 4:30 PM

NAVAJO NATION MUSEUM
CONFERENCE ROOM 3
HWY 264 AND LOOP RD.
WINDOW ROCK, AZ

AUGUST 31ST - SEPT. 1ST^H
9:00 AM - 4:30 PM

DINE COLLEGE, SOUTH CAMPUS
ITV CLASSROOM
BIA RD 0570
SHIPROCK, NM

To register for this training, please contact:
Tennille Begay, Navajo Nation Environmental Protection Agency
(928) 729-4248 / tbbegay@navajo-nsn.gov



Partnering with Research Participants

Univ. of Montana: Residential Wood Smoke Interventions

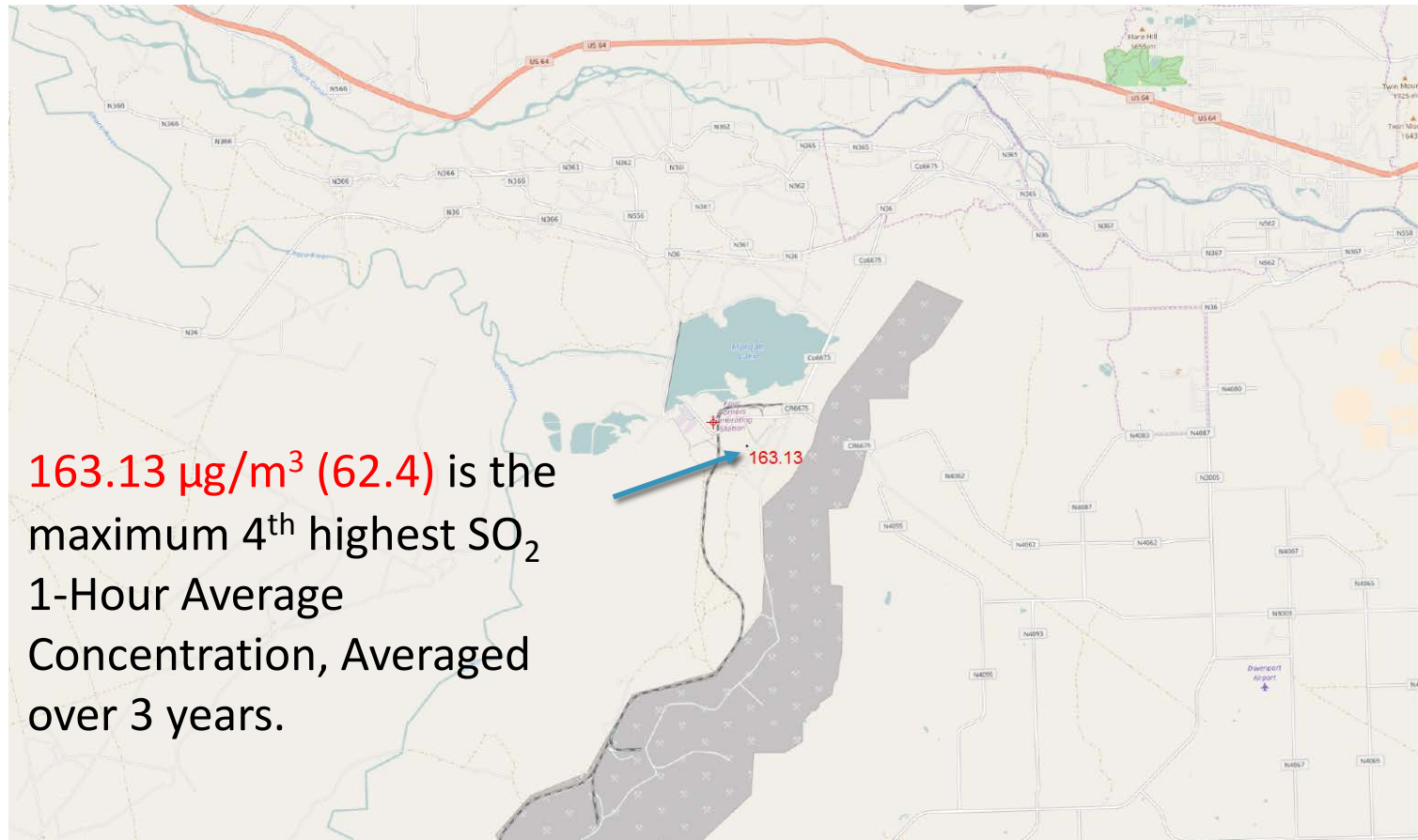
- This project aims to reduce wood smoke/particulate matter exposure among the elderly and reduce adverse respiratory outcomes
- Test community-based exposure reduction strategies in tribal households that use wood stoves for home heating and evaluate the impact on respiratory function among the elderly
- Community based participatory research techniques are used to adopt intervention approaches to meet cultural content of each participating community
- Development of a community level wood yard
- Household level education strategies will be given to participants
- Goal is to design education based interventions that will result in sustainable strategies for reducing personal exposure to wood smoke

Participating with Research Participants

University Of Tulsa: From home to School Tribal IAQ Intervention Study

- This study focuses on effective IAQ interventions that reduce asthma and infectious disease related to home & school childhood environmental exposure in tribal populations
- The intervention will consist of targeted hygiene practices and asthma/allergy trigger reduction in schools and homes
- 14 Navajo families in the Shiprock Agency will be signed up (BIA schools)
- Interventions will be given at homes and schools
- Green cleaning tools will be given with directions on how to reduce asthma & allergen triggers
- Air quality samples will be taken at homes and schools
- Attendance records will be obtained to determine if the intervention will reduce school absentees that related to respiratory illnesses

SO₂ (DRR) Dispersion Modeling for Four Corners Power Plant



Operating Permit Program- Overview

- October 2004 and March 2006, USEPA approved a Clean Air Act (CAA) program for NNEPA to administer a Title V Operating Permit Program (OPP) (Part 71 permit program)
- Under this approval, OPP issues air permits to 12 facilities operating on Navajo Nation
- EPA issues PSD permits and approves final Title V permits
- OPP performs applicability determination such as NSPS, NESHAP's requirements etc.,
- OPP incorporates PSD , FIP requirements to the Title V permit
- Emission fees from the Title V facilities paid to the Navajo Nation is used to cover the cost of operating the OPP

Title V Sources on the Navajo Nation

- El Paso Natural Gas Compressor stations at:
 - Leupp
 - Dilkon
 - Navajo (Cornfields, AZ)
 - Window Rock
 - Gallup
 - White Rock
- Transwestern Pipeline Leupp Compressor Station
- Peabody Western Coal Company
- Western Refinery Wingate Plant
- Resolute Aneth Unit
- APS Four Corners Steam Electric Station
- SRP Navajo Generating Station

Thank you!



To protect and enhance the health and livelihood of Navajo people



To protect and preserve the natural beauty and environment on the Navajo Nation



To ensure the air emissions from the industries operating on the Navajo Nation are regulated