

# Request for Approval under the “Generic Clearance for Citizen Science and Crowdsourcing Projects” (OMB Control Number: 2080-0083)

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## **TITLE OF INFORMATION COLLECTION:**

Impact of Heating Stove Replacement on Indoor and Outdoor Pollutants and Respiratory Health in Shiprock, NM, Navajo Nation

## **PURPOSE:**

The majority of households on the Navajo Nation heat with wood; many also supplement with coal overnight and on colder days. The stoves in use are often very old, in poor condition, improperly vented, and not designed for the mix of fuels being used. A federal Clean Air Act Settlement Agreement with the Four Corners Power Plant is providing \$4.7 million to replace older wood and coal stoves and to weatherize homes (“*stove changeout*”). The stove changeout will include replacement of stoves with a new, custom-designed cleaner burning dual-fuel (wood and coal) stove model, a first in the United States. This new stove was custom-designed for this project, is EPA-certified, and shown in the lab to reduce emissions of particulate matter and carbon monoxide while burning wood and coal. Additionally, it is expected that the improved efficiency of the newer stoves, coupled with home weatherization, will lessen the need for people to use coal to keep warm at night. This citizen science research project seeks to document the impact of stove replacement on indoor air quality, outdoor air quality, and asthma and COPD symptoms. Researchers will place air quality monitors inside and outside participating homes before and after stove replacement and will work with participants to log home activities (such as when fuel is loaded, cooking, cleaning, etc.), health symptoms, and stove and fuel use.

## **NEED AND AUTHORITY FOR COLLECTION:**

The research seeks to determine 1) if the stove replacement and weatherization improves air quality 2) if the stove replacement and weatherization improves respiratory symptoms in participants with asthma and COPD using standardized assessment 3) if the stove replacement and weatherization improves respiratory symptoms in participants without diagnosed asthma or COPD using standardized assessment and 4) if participants notice improvements in air quality, health, and quality of life. Information collected from research participants will be critical to gather information on potential air quality confounders (such as cooking), respiratory health symptoms, fuel use, and perception of air quality changes and stove performance. The statutory authority is 42 U.S.C. §7403(a) [Clean Air Act/Research, Investigation, Training, and Other Activities].

## **USES OF RESULTING DATA:**

The data are being collected for research purposes, as no other changeout program in the U.S. has incorporated cleaner stoves for coal users. The research data will be shared with the community and Navajo Nation government (including other stove changeout projects, such as under the Weatherization Assistance Program) to inform their efforts to improve indoor and outdoor air quality. The data will also be of interest to other communities that heat with coal. In particular feedback from participants can inform educational materials used in explaining how to properly operate the stove. For instance, if

participants report dissatisfaction with the stove performance, that will indicate that additional and more effective education is needed on operating the new appliance.

**DATA COLLECTION METHODS:**

Data will be collected primarily in-person during home visits using paper surveys, forms, and questionnaires. Scheduling will take place over the phone, and some follow up may be necessary over the phone as well, if information is missing or unclear. Home visits will take place before stove replacement, as well as 1 or 2 times after stove replacement. Participants will help researchers fill out a home assessment survey during each visit (the researcher will do the writing but will need feedback from participants for some items in the survey). Participants will fill out a general respiratory health questionnaire, and participants with diagnosed COPD or asthma will fill out an asthma or COPD questionnaire. Participants will sign necessary consent forms to participate in research on the first visit, and during each 2-7 day monitoring period (2-3 periods total) participants will fill out a graphic-based activity log. Home visits will be conducted by staff with the Navajo Nation Environmental Protection Agency, with assistance from a student intern with Dine College, the Navajo Tribal College. Each home visit takes approximately 1 hr to complete.

<i>Name of Instrument</i>	<i>Who?</i>	<i>Purpose (i.e. what data is being collected?)</i>	<i>Time to Complete</i>
American Thoracic Society General Respiratory Health Questionnaire (ATS-DLD-78A)	All participants (children under 18 years will not answer tobacco questions)	Respiratory health symptoms	15-20 minutes
Childhood Asthma Control Test (C-ACT)	Children in household with diagnosed asthma	Asthma control level for children (4-11 yrs)	5-10 minutes
Asthma Control Test (ACT)	Adults in household with diagnosed asthma	Asthma control level (> 12 yrs)	5-10 minutes
COPD Assessment Test (CAT)	Adults in household with diagnosed COPD	Impact of COPD (Chronic Obstructive Pulmonary Disorder)	5-10 minutes
General Household Survey 1	Primary adult in household	Household conditions that may confound study findings (i.e. other sources of pollutants) and study members with COPD or asthma. Used during first visit (pre-changeout)	20-30 minutes
General Household Survey 2	Primary adult in household	Shortened version of Survey 1 for second assessment period (post-changeout)	10-20 minutes
Activity Log Form	Primary adult in household	Time of activities in the home that may increase pollution levels – such as cooking or stoking the stove.	30 minutes
Consent/Assent Forms	All participants	Obtain consent and assent	5 minutes

<i>Name of Instrument</i>	<i>Who?</i>	<i>Purpose (i.e. what data is being collected?)</i>	<i>Time to Complete</i>
		to participate in research	

**PARTICIPANT UNIVERSE:**

Category of Respondent	No. of Respondents	Number of responses per respondent	Participation Time per response	Burden Hours
All Respondents	200	Max of 8 forms	16.8 minutes	2.24
Totals				448 hours

The burden estimates are based on the scenario of a respondent who needs to fill out every form (including the asthma control test, the child asthma control test, and the COPD control test) in addition to the standard forms. See table above for time for each respondent to fill out each response. Not all forms will be filled out in the same visit, the 2.24 burden hours are stretched between 2-3 visits.

8 homes were assessed during the pilot in 2018. A max of 192 more participants may be assessed in the remaining years of the study.

**REVISIONS:**

Minor revisions to the study instruments previously approved under EPA ICR # 2521.11) are being made based on lessons learned from a pilot study implemented in 2018. Revisions to the study instruments are summarized here:

**1. General Respiratory Health Questionnaire (ATS-DLD-78A) (new)**

Used for assessing respiratory health for all study participants.

- This standardized instrument from the American Thoracic Society is a new addition to this study. Previously, health questionnaires for asthma and COPD were only given to participants with a diagnosis of asthma or COPD. This questionnaire will be given to all study participants.
- Questions about tobacco smoke will only be answered by people over 18 years old

**2. Activity Log (updated)**

Used for collecting information on activities in the home that may influence air quality measurements

- Reformatted the layout for ease of use
- Used sun and moon icons to distinguish between AM and PM
- Added Navajo translations to the questions.

**3. General Household Survey (GHS) 1 (updated)**

Used for collecting information about the household on first visit (number of occupants, housing conditions, stoves, etc.)

- Added information about new ATS-DLD-78-A/C health survey on first page
- Now collecting information on all applicants not just those with asthma/COPD (i.e. initials, age, diagnosed with asthma/COPD/not applicable)
- Request a brief description of stove from person filling out the form

#### **4. General Household Survey (GHS) 2 (updated)**

Used for collecting information about the household on second visit (number of occupants, housing conditions, stoves, etc.)

- Now collecting information (i.e. initials, age, diagnosed with asthma/COPD/not applicable) on all applicants, not just those with asthma/COPD

#### **5. Consent (updated)**

Used for obtaining consent from study participants

- Added information about the General Respiratory Health Questionnaire
- Replaced contact information for lead staff from Navajo Nation EPA (Michael King → Tennille Denetdeel)

#### **6. Parental Permission (updated)**

Used for obtaining permission from parents for any household member under the age of 18 who will answer a health questionnaire.

- Added information about the General Respiratory Health Questionnaire
- Replaced contact information for lead staff from Navajo Nation EPA (Michael King → Tennille Denetdeel)

**AGENCY COST:** The estimated annual cost to the Federal government is \$2,767. Work to collect and analyze data will primarily be done by external partners, as described in the following paragraph. Federal employee role will be limited to data review and communication; therefore, this analysis estimates a maximum of 35 minutes per respondent. Total work hours will be 116 (0.58 hr. x 200 respondents = 116 hrs.). EPA's labor costs are calculated here using an hourly rate of \$95.42 for a GS-14 (step 1) based in San Francisco, CA<sup>1</sup> including an additional 60% for overhead and benefits. Total federal employee labor costs for the full four-year project are estimated to be \$11,069.

EPA is partially sponsoring the work of external partners to collect and analyze the data through a combination of EPA grants and in-kind donations of partners; additional grants are being sought. Navajo Nation Environmental Protection Agency staff – supported by college interns -- will conduct home visits at an hourly rate of \$25/hr x 9.95% overhead and benefits = \$27.49/hr x 800 hrs = \$21,990. Estimating 200 homes x 4 visits x 1 hr = 800 hrs. In addition, the PI from the University of Colorado, Boulder will oversee data analysis. Approximate time spent would be 100 hours at a rate of \$95.42 = \$9542 for University employee labor costs.

Total estimated costs for data collection are approximately \$42,601 for 1016 hours of work.

#### **STATISTICAL ANALYSIS:**

We will test for normality on the data obtained and if appropriate, analysis of variance (ANOVA) will be used to investigate the relationship between air pollutant exposure (dependent variable) and the factors contributing to the measured exposure (independent variables). If data are not normally-distributed, a non-parametric approach will be followed. A more detailed statistical analysis is being developed for grant proposals.

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<sup>1</sup> [https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/18Tables/html/DCB\\_h.aspx](https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/18Tables/html/DCB_h.aspx)

**DATA QUALITY ASSESSMENT PROCEDURES:**

This research study has an existing, approved quality assurance project plan (QAPP). Data quality will additional be assured by using standardized, gold-standard health assessment questionnaires for respondents with asthma and COPD.

**ADMINISTRATION OF THE INSTRUMENT:** (Check all that apply)

- Web-based or Social Media
- Mail
- Telephone (scheduling + missing info)
- Other, Explain
- In-person

**INSTRUMENT:** Copies of the questionnaires and surveys used in this collection are provided in a separate, attached document. Prior to use they will be amended to include the following language:

OMB Control No. 20XX-XXXX

Approval expires XX/XX/XX

The public reporting and recordkeeping burden for this collection of information is estimated to average 16.8 minutes per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

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