

Project Title: Alaska Community Criteria Pollutant and Greenhouse Gas Emission Inventory Tool
Development

Organization: Alaska Department of Environmental Conservation

Date of Preparation: May 23, 2025

Period of Applicability: May 23, 2025- Jun 30, 2025

Grant Number: 5A - 02J35901 – 0

Version Number: 2.0

Version History

Version 1.0: Original project QAPP. Signed and approved October 20, 2023.

Version 2.0: QAPP updated to include community surveys to conduct sensitivity analysis on emission inventory toolkit created under version 1.0 QAPP. Signed and approved June 5, 2025.

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Acronym/Terms	Definitions
ADEC	Alaska Department of Environmental Conservation. The department of state government with primary responsibility for management and oversight of provisions of the Clean Air Act.
AML	Alaska Municipal League
ANPMS	Air Non-Point & Mobile Sources Program
CPRG	Climate Pollution Reduction Grant. This federal program provides grants to states, local governments, tribes, and territories to develop and implement ambitious plans for reducing greenhouse gas emissions and other harmful air pollution. It is authorized under Section 60114 of the Inflation Reduction Act.
DAC	Disadvantaged Communities
EJScreen	The EPA's environmental justice mapping and screening tool that provides EPA with a nationally consistent dataset and approach for combining environmental and demographic socioeconomic indicators.
EPA	U.S. Environmental Protection Agency
EPA FLIGHT	Facility Level Information on Greenhouse Gases Tool. FLIGHT provides information about greenhouse gas (GHG) emissions from large facilities in the U.S. These facilities are required to report annual data about GHG emissions to EPA as part of the Greenhouse Gas Reporting Program (GHGRP).
EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks	EPA develops an annual report, called the Inventory of U.S. Greenhouse Gas Emissions and Sinks (Inventory), that tracks U.S. greenhouse gas emissions and sinks by source, economic sector, and greenhouse gas going back to 1990. This annual report provides a comprehensive accounting of total greenhouse gas emissions for all man-made sources in the United States, including carbon dioxide removal from the atmosphere by “sinks,” (e.g., through the uptake of carbon and storage in forests, vegetation, and soils) from management of lands in their current use or as lands are converted to other uses. The gases covered by the Inventory include carbon dioxide, methane, nitrous oxide,

	hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride.
EPA MOVES	EPA's Motor Vehicle Emission Simulator. A state-of-the-science emission modeling system that estimates emissions for mobile sources at the national, county, and project level for criteria air pollutants, greenhouse gases, and air toxics.
EPA SIT	The EPA's State Inventory Tool. An interactive spreadsheet model designed to help states develop GHG emissions inventories, and provides a streamlined way to update an existing inventory or complete a new inventory.
Justice40	A federal initiative that directs 40% of the overall benefits of certain Federal investments – including investments in clean energy and energy efficiency; clean transit; affordable and sustainable housing; training and workforce development; the remediation and reduction of legacy pollution; and the development of clean water infrastructure – to flow to disadvantaged communities (DACs).
NEI	National Emissions Inventory. The National Emissions Inventory (NEI) is a comprehensive and detailed estimate of air emissions of criteria pollutants, criteria precursors, and hazardous air pollutants from air emissions sources. The NEI is released every three years based primarily upon data provided by State, Local, and Tribal air agencies for sources in their jurisdictions and supplemented by data developed by the US EPA.
OAQPS	EPA's Office of Air Quality Planning and Standards. This office is charged under the authority of the Clean Air Act (CAA) to protect and enhance the quality of the nation's air resources. OAQPS sets standards for pollutants considered harmful to public health or welfare and, in cooperation with EPA's Regional Offices and the States, enforces compliance with the standards through state implementation plans (SIPs) and regulations controlling emissions from stationary sources.
PQAO QA	Primary quality assurance organization. A monitoring organization or a coordinated aggregation of such organizations that is responsible for a set of air monitoring stations that monitor the same pollutants and for which

	data precision and accuracy assessments can logically be pooled.
QA	Quality Assurance
QAPP	Quality Assurance Project Plan. A plan which identifies data quality goals and identifies pollutant-specific data quality assessment criteria.
QC	Quality Control
QMP	Quality Management Plan. This document describes the PQAO's quality policies and procedures, responsibilities, and authorities. It also implementing and assessing the effectiveness elements of a quality system that must be with EPA requirements.

A3. Distribution List:

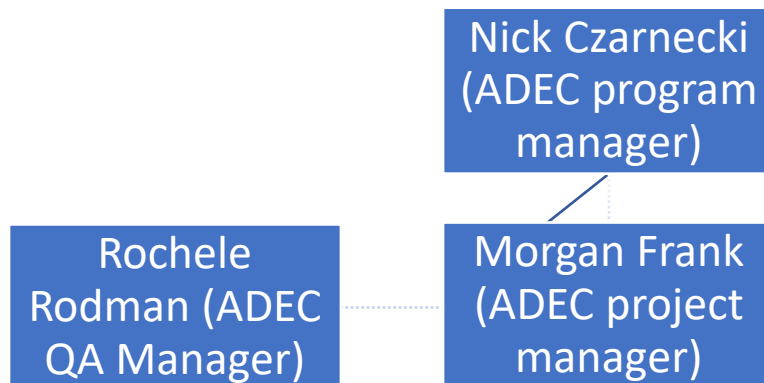
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A4 Project/Task Organization:

Alaska Department of Environmental Conservation:

- Nick Czarnecki is program manager for Alaska Department of Environmental Conservation, Division of Air Quality Air Nonpoint and Mobile Sources (ANPMS). Responsible for overall project oversight, resource allocation (personnel, funding, materials), and ensuring project alignment with DEC goals.
- Morgan Frank is the project manager for the “Alaska Community Criteria Pollutant and Greenhouse Gas Emission Inventory Tool Development” project with Alaska Department of Environmental Conservation, Division of Air Quality ANPMS. This position is responsible for conducting project management, programmatic planning, relationship building, and reporting operations to contractors, EPA, and senior management. Morgan Frank reports to Nick Czarnecki and is responsible for maintaining the official QA project plan, once approved.
- Rochele Rodman, QA Manager for Alaska Department of Environmental Conservation, Division of Air Quality Air Quality and Monitoring Assurance. Responsible for assessing the effectiveness of the QAPP. Rochele Rodman reports to TJ Brado and has independent oversight authority to discuss quality-related issues with senior management.

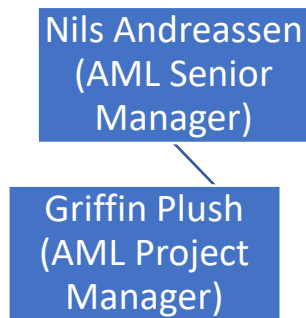
Figure 1: ADEC Organizational Chart



Alaska Municipal League:

- Nils Andreassen, senior manager for Alaska Municipal League. Provides overall direction and resources for AML’s involvement in the project.
- Griffin Plush, project manager for Alaska Municipal League. Manages emission inventory acquisition, display, and stakeholder connection. Reports to Nils Andreassen.

Figure 2: AML Organizational Chart



Reporting Structure:

AML reports findings to DEC. Morgan Frank is the named contact for reports and invoices.

Principal Environmental Information Users:

- Internal Users:
 - DEC personnel (Nick Czarnecki, Morgan Frank) for internal reporting and decision-making.
- External Users:
 - Tribal and municipal representatives, funding agencies (e.g. EPA), and community stakeholders using the emission inventory toolkit for environmental planning and grant applications.

A5 Problem Definition/Background:Purpose:

The purpose of this project is to develop a comprehensive emission inventory toolkit to enable rural and disadvantaged Alaskan communities to estimate and track criteria pollutants and greenhouse gas emissions, thereby supporting federal funding applications and environmental decision-making.

Problem & Background:

DEC currently produces a statewide Greenhouse Gas Report every 5 years and is not frequently able to update criteria pollutant emission inventory for rural communities. This work urgently requires updating and broadening. DEC recognizes the current dearth of usable granular data on criteria pollutants and greenhouse gases in our small and rural communities. Many of these communities are small, rural, and disadvantaged communities who are qualified for federal funding but need data to qualify.

As of the 2020 census, nearly 22% of Alaska's population identified with the census category of American Indian or Alaska Native or a combination. There are 229 Federally recognized Tribes in Alaska. Approximately one-third of Alaska's population lives in small rural communities of less than 1,000 residents; however, the incidence is significantly higher for Alaska Natives, with two-thirds of the population spread out across over 200 remote villages. Many of these communities meet the conditions to be defined as disadvantaged communities, using both or either Justice40 or EJSCREEN metrics on environmental and pollution hazards, socio-economic vulnerabilities, and barriers to accessing healthcare. Due to difficulties and expense accessing these communities, many of these communities have not been fully represented in community emission inventory work. With the breadth of geographic and community diversity present in Alaska, it is important to be able to account for the wide range of conditions present within the state. To have a full and accurate understanding of priority criteria and greenhouse gas reduction measures and targets within the state of Alaska, these communities need to be involved in community emission inventory work.

Almost all rural communities in Alaska are exposed to air pollution from sources including wildfire smoke, road dust from gravel roads, and other windblown dust. Local emission sources, such as open burning in landfills, use of burn barrels, industrial activities, and diesel power generation also impact local air quality in rural Arctic communities, and statewide. However, data to determine the scale of air quality impacts from sources such as these is lacking across the state, as many areas have never conducted emission inventories or have purchased monitoring equipment. Income barriers present challenges to addressing health outcomes from pollution exposure and to dealing with local pollution sources.

In order to start the process of addressing this gap in environmental data, DEC needs to have a full and complete understanding of what data exists. EPA has a wide suite of tools to estimate emissions. Some emission inventories have been conducted by state departments or related agencies. Some communities have elected to conduct their own emission inventories. DEC needs to aggregate the available data to see what gaps exist.

This project will build on ADEC's historical reporting efforts, such as the statewide Greenhouse Gas Report, by making this data more granular at the community scale (as opposed to statewide scale), making data available and understandable to communities that are working on environmental projects and quantifying emission reductions. In the first stage of this project, DEC aggregated available data to

feed into a emissions model. In this next phase of the project, DEC will survey 12 representative rural communities to make sure that the model accurately predicts emissions, collecting data on fuel use for home heating, electrical generation, and transportation. Communities were selected to be representative of regions of Alaska and energy use in specific environments. This project aligns with the Justice40 Initiative and EJSCREEN, as all of the communities that we will be working with meet at least one or more of either Justice40 or EJSCREEN metrics on environmental and pollution hazards, socio-economic vulnerabilities, and barriers to accessing healthcare. In working with the selected communities, we will have regular consultation with community members and stakeholders will be involved in data validation. Once the collected data is validated, the data will be fed back into the existing model and a sensitivity analysis will be performed, to verify that the model is accurate to the data collected.

The environmental information generated by this project will be used to:

- Inform state and local policies aimed at reducing emissions and improving air quality in rural areas.
- Empower communities to prioritize and implement mitigation strategies based on their specific emission profiles.
- Facilitate long-term planning and research on air quality impacts in Alaska.

A6 Project/Task Description:

DEC has contracted with AML for the following items. These items are intended to address that communities cannot access data on a more granular basis. The outcomes from this project are intended for use at the community level.

1. Collect and synthesize data from EPA FLIGHT, EPA SIT, EPA MOVES, EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks, DEC's annual and triennial NEI data, as well as from community emission inventories. The data will be collected, moved into a uniform format, and undergo quality assurance and quality control procedures. The data will be stored in a visualization tool/calculation toolkit that will allow for filtering on location at the community or regional level. This visualization tool/calculation toolkit will be updated annually with NEI data and any updates to EPA systems.
2. Create a visualization and calculation toolkit that allows for community or regional level estimations of criteria air pollutants and greenhouse gas emissions. Alaska is currently only able to make statewide estimations of emissions, which has been a barrier to communities conducting energy planning. This visualization tool/calculation toolkit will allow communities to calculate baseline emissions and track progress from planned and implemented projects to control emissions.
3. Identify gaps in the currently available data and will determine how to best address these gaps. Review old community emission inventory data and surveys to draft a new community emission inventory survey. The new survey will contain instructions on how to conduct community level emission inventories so that they can be sent to communities for their use.
4. Identify a list of communities to conduct community emission inventories in that are representative for the various regions in Alaska and can be used as templates for other communities in the same region.
5. Coordinate with communities that have contacted DEC and other partners.
6. Identify municipal and tribal contacts for stakeholder engagement, as well as establish partnerships with organizations that might provide technical assistance and expertise.

DEC is frontloading the work during the early phases of this grant to have this tool available for the planning and implementation phases of the CPRG. Many of our communities and stakeholders have expressed interest in participating, so we are anticipating increased need for this data.

Workplan Activities and Schedule:

1. Identify current or in-progress climate action plans. (Data collection, by AML)
 1. Milestone September 2023.
 2. The output will be a report of communities who have conducted or are currently conducting climate action plans or community emissions inventories.
2. Review and analysis of current GHG emission inventories. (Data collection, by AML)
 1. Milestone October 2023
 2. The output will be community level emission data integrated with emission datasets available through other sources, such as EPA FLIGHT, EPA SIT, EPA MOVES, EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks, and annual and triennial NEI

data, and other identified data sources. This dataset is ready to be scaled to a regional or community level.

3. Identification of communities with potential mitigation projects. (Planning, by AML)
 1. Milestone November 2023.
 2. As AML works with communities, they will identify projects that could decrease community level emissions.
 3. The output will be a report of communities with potential mitigation projects with the community's name, summary of project, and community contact.
4. Establish community contacts and engagement process. (Planning, by AML)
 1. Milestone December 2023.
 2. AML will work with communities to establish community contacts and engagement for community emission inventory work and for emission mitigation project identification.
 3. The output will be a summary report of community contacts with date and name of contact, and a report of questions asked by stakeholders.
5. Coordinate with list of communities that have contacted (Planning, by DEC)
 1. Milestone October 2023.
 2. DEC's Air Non-Point and Mobile Sources (ANPMS) will provide AML with a list of communities that have expressed interest in community emission work or climate action planning.
 3. The output will be a summary report of community responses to AML outreach containing date on conversation, response type, and name of contact.
6. Review NEI community inventories from 2005 (Data collection, by DEC)
 1. Milestone August 2023.
 2. DEC will review the last conducted community emission inventories (2005), including selected communities, survey contents, and methodologies.
 3. The output will be a written summary of findings, including items that should be utilized in future community emission inventories and items that may need to be reworked.
7. Draft NEI community inventory survey (Planning, by DEC)
 1. Milestone October 2023.
 2. Building on Item 6, DEC will draft an updated NEI community emission inventory survey.
 3. The output of this work will be a draft survey, near ready for distribution.
8. Toolkit on how to conduct community inventory (Planning, by DEC).
 1. Milestone November 2023
 2. Building on Item 7, DEC will prepare a toolkit on how to conduct community emission inventory work, with the intended audience being the community conducting the emission inventory.
 3. The output of this work will be a toolkit including instructions on how to conduct community emission inventories and answers to frequently asked questions.
9. Analysis of available data provided by communities (Data collection, by AML)
 1. Milestone December 2023.

2. Building on Item 2, the emission dataset will be analyzed for findings and trends that may provide insight into future implementation projects.
 3. The outcome of this work is an analysis of the emissions dataset.
10. Develop scope of mitigation project potential at community level. (Planning, by AML)
 1. Milestone December 2023.
 2. Building on item 3, each identified emission mitigation project will be scoped for scale, feasibility, readiness, and necessary budget.
 3. The outcome of this scoping will allow for projects to be identified for the implementation funding becoming available through the CPRG implementation funding.

Time Constraints:

This project is to be completed in order to support the Climate Pollution Reduction Grants, where the first deliverable under that grant is due March 1, 2024. This work must occur on a relatively compressed timeline.

Second Phase Workplan Activities and Schedule: Emission Inventory Surveys

To verify accuracy and sensitivity of the emission dataset, emission inventories surveys will be conducted in a representative sample of communities and integrated into the emission dataset. The grant workplan was updated in July 2024.

1. Survey Design (Planning, by AML and DEC)
 1. Milestone January 2025
 2. AML and DEC will identify desired data to be collected and design a survey and survey instructions around those points. This will be based off previous DEC surveys and updated.
 3. The outcome of this work will be a survey instrument and instruction set, intended to be used by members of the public.
2. Survey deployment (Data collection by AML)
 1. Milestone June 2025
 2. AML will perform the survey in selected representative communities and prepare a dataset.
 3. The outcome of this work will be a dataset of energy use, translated into a emission inventory.
3. Sensitivity Analysis (Planning, by AML Constellation)
 1. Milestone June 2025
 2. AML and Constellation will take the collected dataset and feed it back into the emissions dataset to finetune the accuracy and sensitivity of the tool.
 3. The outcome of this work is increased accuracy of the emissions dataset.

A7 Quality Objectives and Criteria:

The data quality objectives (DQOs) for this project are to ensure that environmental information is accurate, representative, and comparable to support environmental planning in rural Alaskan communities.

Emission inventories or emission data must meet several criteria in order to be included into the final dataset. Criteria for emission inventory will be set similar to a literature review, with inclusion and exclusion criteria. Searches for emission inventory reports will be conducted in scientific literature, State of Alaska documentation and websites, federal government websites, and across community government websites and via in person discussion.

Sources to be reviewed are EPA FLIGHT, EPA SIT, EPA MOVES, EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks, DEC's annual and triennial NEI data, as well as from community emission inventories. Sources must meet the following inclusion criteria, which align with General Assessment Factors (GAFs) such as soundness, applicability, and clarity, as well as relevant PARCCS indicators (e.g. accuracy, representativeness, comparability):

- Emission inventory must be clear on the boundary that they are collecting emissions within. The boundary must be the state lines of Alaska or geographic boundary within.
 - Inclusion criteria: boundary must be clear and geographically delineated within the state of Alaska.
 - Exclusion criteria: boundary is not well defined or cannot be mapped. Data is included from outside of Alaska that cannot be separated at the state level.
- Emission inventory is created from data collected in or after 2017. DEC's baseline year is 2020. After 2026, updated data will be necessary.
 - Inclusion criteria: data is collected in or after 2017 and prior to 2026.
 - Exclusion criteria: data is collected before 2017 or after 2026 without being updated.
- Emission inventory must contain visualizable or granular data.
 - Inclusion criteria: data must be specific enough to use in visualization (include specific location data and specific emissions metrics).
 - Exclusion criteria: data is vague and does not include specific metrics.
- Emission inventory must be clear on what sources were included in the inventory and what sources were not.
 - Inclusion criteria: Sources and sectors are clearly delineated. Inventory documentation specifically lists whether major sources, nonpoint sources, or community level sources are included.
 - Exclusion criteria: sources and sectors are not clearly delineated. It is unclear if major sources, nonpoint sources, or community level sources are included.
- Emission inventory must include published information on methods used to collect the data.
 - Inclusion criteria: methodology is published either within the report itself or publicly accessible online.
 - Exclusion criteria: methodology is not included or is not detailed enough to be replicated.
- Calculation methodology must be clear and replicable if the study is using publicly available data.

- Inclusion criteria: methodology includes details on utilized emission factors or calculations used.
- Exclusion criteria: methodology does not include details on utilized emission factors or calculations.
- Some communities have likely utilized contractors that utilize proprietary emission models that are not published. If so, the inventory must include the basis the model is founded upon and the logic in utilizing the model.
 - Inclusion criteria: it is clear what data the model utilizes and how it applies to the community utilizing it.
 - Exclusion criteria: it is not clear what data the model utilizes, or the model utilizes data that is not widely applicable to the community.

These acceptance criteria ensure environmental information is reliable for decisions such as prioritizing emission reduction strategies and informing state air quality policies.

After the inclusion/exclusion criteria is applied, the inventories that met the inclusion criteria must be compared to datasets prepared by known entities covered under a Quality Management Plan, such as the EPA, DEC, and USGS. If the emission inventory is compared to an EPA dataset, and is off by 20% or more, then the inventory preparers must have checked their methods and found no error or deviation in methodology that would introduce such a large discrepancy and they must introduce a scientifically sound hypothesis to explain the discrepancy.

The final toolkit will contain community or regional estimations of criteria air pollutants and greenhouse gas emissions. The toolkit will also be used to identify gaps that require future study.

A8 Special Training and Certification:

No formal certifications are required for project personnel. All parties involved in this project have been working in the environmental science space for at least one year, with most parties in excess of five years. All personnel must be familiar with greenhouse gases, criteria pollutants, emission inventories, and stakeholder engagement. In order to form this project team, resumes were reviewed to make sure that all team members have the relevant experience and background. While no specific training was required, DEC and AML project managers performed qualification reviews on team member, to verify that each member had experience in similar projects. Community stakeholders will not undergo any training to participate in the projects, but will be supported by a DEC or AML staff member upon request. If training becomes required, DEC will be responsible for training documentation and qualification review.

A9 Documentation and Records:

All emission inventories collected using the above inclusion and exclusion will first be entered into an online repository where the original version will be kept for reference. Working copies of all emission inventories will be kept separately and processed for information on where, how, and when the data was collected and other relevant details from the publication. This information will be kept in a spreadsheet for comparison purposes. At this point, the spreadsheet will be reviewed by the project team to identify emission inventories that may not be fully compliant with the inclusion and exclusion criteria. The spreadsheet will also be used to identify redundant or conflicting information. Any items that do not align with the inclusion criteria will be excluded. If redundant data is identified, the publication containing the original data will be kept and other versions excluded. If there is conflicting data, then the team will review the full publications and decide which publication is most in line with EPA and DEC methodology and findings.

Once the final list of emission inventories to be used is completed, data will be entered into an Excel workbook to build the first iteration of the toolkit. Issues with data integrity and validation will be identified throughout the building of the workbook. Resolving issues will be done using best practices as noted by EPA. Issues and resolutions will be documented, with the document kept in the online repository. As the toolkit goes through revision, drafts of each version should be kept in the online repository until the project is completed.

Project information should be kept five years past the completion of the project, per the State of Alaska record retention policy. While work is occurring, the project files should be kept in an online repository. At the end of the project, DEC and AML should each download a copy of the online repository and store the copy in their internal servers.

The State of Alaska uses Sharepoint as an online file repository, which has a built-in back-up mechanism for files stored within. Any files that cannot be kept in Sharepoint should be backed up to an internal server at least once a month.

All individuals identified in the distribution list will receive a copy of the approved QA plan, by dissemination of their respective project leader. Morgan Frank will disseminate for DEC and Griffin Plush will disseminate for AML.

B1 Sampling Process Design:

DEC has reviewed the 2.2.1 “Sampling Design Process” section of EPA’s Guidance for Quality Assurance Plans. This project uses existing emission inventories from EPA and DEC datasets, eliminating the need for new sampling.

B2 Sampling Methods:

DEC has reviewed the 2.2.2 “Sampling Methods” section of EPA’s Guidance for Quality Assurance Plans. As the project relies on pre-existing emission inventories, no sampling methods are required.

B3 Sample Handling and Custody:

DEC has reviewed the 2.2.3 “Sampling Handling and Custody” section of EPA’s Guidance for Quality Assurance Plans. Since the project uses existing digital datasets, no physical sampling or custody is required.

B4 Analytical Methods:

DEC has reviewed the 2.2.4 “Analytical Methods” section of EPA’s Guidance for Quality Assurance Plans. Analytical methods are not applicable for sampling but involve aggregating and calculating emission estimates using EPA and DEC datasets, as detailed in Section B9.

B5 Quality Control:

DEC has reviewed the 2.2.5 “Quality Control” section of EPA’s Guidance for Quality Assurance Plans. Quality control is not applicable for sampling but is ensured through inclusion/exclusion criteria and dataset comparisons, as detailed in Section A7.

B6 Instrument/Equipment Testing, Inspection, and Maintenance:

DEC has reviewed the 2.2.6 “Instrument/Equipment Testing, Inspection, and Maintenance” section of EPA’s Guidance for Quality Assurance Plans. No instruments or equipment are used, as the project relies on existing digital datasets.

B7 Instrument/Equipment Calibration and Frequency:

DEC has reviewed the 2.2.7 “Instrument/Equipment Calibration and Frequency” section of EPA’s Guidance for Quality Assurance Plans. Calibration is not required, as the project uses pre-existing digital datasets without instrumentation.

B8 Inspection/Acceptance for Supplies and Consumables:

DEC has reviewed the 2.2.8 “Inspection/Acceptance for Supplies and Consumables” section of EPA’s Guidance for Quality Assurance Plans. No supplies or consumables are used, as the project relies on digital datasets.

B9 Non-direct Measures:

Emission inventory files and publication will be identified during the literature review process and reviewed using the inclusion and exclusion criteria listed above in A7. Data limitations will be identified and documented. Limitations will be researched to see if data exists that can be used to fill the gap. If so

such data exists, the gap will be documented, and that documentation will be included in all publicly facing files that are released. Included files will be stored in an online file repository. Working files will be kept separately from original files. The included files will be utilized to build the toolkit.

B10 Data Management:

Emission inventory files and publication will be identified during the literature review process and reviewed using the inclusion and exclusion criteria listed above in A7. Included files will be stored in an online file repository. Working files will be kept separately from original files. The included files will be utilized to build the toolkit.

While building the toolkit, records and documentation will be kept on encountered issues and decision-making matrices used for resolution.

As the toolkit goes through revision, drafts of each version should be kept in the online repository until the project is completed. Only DEC, AML, and Constellation staff will have access to the online repository. Stakeholder information requests will be met by providing separate files to the stakeholder. The stakeholder will not have access to the repository. Before release, each packet being given to a stakeholder will be reviewed by AML or DEC staff to verify that no sensitive information is released. The Sharepoint access management is covered by DEC Office of Information Technology practices and access management.

C1 Assessments and Response Actions:

AML and DEC will review data included in the first toolkit separately. Any differences in data excluded or included will be discussed between parties, and resolution and decision-making matrices will be documented.

Morgan Frank, Rochele Rodman, and Griffin Plush have authority to conduct assessments and stop work if necessary. If work is stopped for any reason, senior management will be notified and used to negotiate to agreement on resolutions of issues.

Assessments should be reported to senior management and counterparts within 5 business days. If Morgan Frank conducts an assessment, she will notify DEC senior management and her AML Counterpart. If Griffin Plush conducts an assessment, he will notify AML senior management and his DEC counterpart. Assessments should be reported in a document, and assessment documents should be stored in the online repository, for inclusion in quarterly and final reports, as well as to be shared with any interested party upon request.

Morgan Frank, Nick Czarnecki, and Rochele Rodman have the ability to identify any necessary corrective action. If it is identified that a corrective action is needed, then the person who identifies the corrective action should notify the other two team members and discuss methods of addressing the corrective action. A voting mechanism will be used to determine the best course of action, where the decision supported by the majority of the team will be utilized. Once a resolution is decided on, the team member who originally called for corrective action will communicate the resolution path to all team members within 5 business days. Any issue requiring corrective action will be documented, along with resolution steps, in the online repository.

C2 Reports to Management:

DEC team members meet weekly to discuss project progress. The outcome of those meetings is reported to management on a weekly basis via an established reporting mechanism, including updates on tasks, QA findings, corrective actions, and other information. AML team members meet weekly to discuss project progress. The outcome of those meetings is reported to management on a weekly basis via an established reporting mechanism. DEC and AML meet every two weeks to go over project progress, review of deliverables, and discuss progress and obstacles. DEC and AML will meet with communities at the end of data collection to discuss findings and potential impacts. DEC will also generate a final project report to EPA at grant close-out, and this report will be available to stakeholders.

Reports written for this project are the semi-annual progress reports, project deliverables, and a final report. AML will draft reports based on findings derived from ongoing work. DEC will receive drafts one week prior to the due date and review prior to due date. If no edits are required, then DEC will submit items to EPA. If edits are needed, then DEC will communicate necessary changes to AML at least 5 days prior to deadline, and then will submit the corrected item. Reports to DEC should be submitted via email to Morgan Frank, with Paul Goodfellow copied. Feedback to AML will be submitted via email to Griffin Plush, with Nils Andreassen copied. Reports will be stored in the Sharepoint repository and on DEC's shared drives until the required record retention period has passed, managed by DEC Air Non Point and Mobile Sources Team.

D1 Data Review, Verification, and Validation:

The following acceptance criteria ensure that environmental information included in the toolkit is accurate, representative, and suitable for community-level emission estimates. Data validation will primarily be performed by AML and Constellation and reviewed by DEC. Stakeholders are able to make comments about concerns that they may have about the data. Those comments will be investigated by DEC and AML, and issues will be resolved between DEC, AML, and the stakeholder.

Inclusion and exclusion criteria for emission inventories into the toolkit:

- Emission inventory must be clear on the boundary that they are collecting emissions within. The boundary must be the state lines of Alaska or geographic boundary within.
 - Inclusion criteria: boundary must be clear and geographically delineated within the state of Alaska.
 - Exclusion criteria: boundary is not well defined or cannot be mapped. Data is included from outside of Alaska that cannot be separated at the state level.
- Emission inventory is created from data collected in or after 2017. DEC's baseline year is 2020. After 2026, updated data will be necessary.
 - Inclusion criteria: data is collected in or after 2017 and prior to 2026.
 - Exclusion criteria: data is collected before 2017 or after 2026 without being updated.
- Emission inventory must contain visualizable data.
 - Inclusion criteria: data must be specific enough to use in visualization (include specific location data and specific emissions metrics).
 - Exclusion criteria: data is vague and does not include specific metrics.
- Emission inventory must be clear on what sources were included in the inventory and what sources were not.
 - Inclusion criteria: Sources and sectors are clearly delineated. Inventory documentation specifically lists whether major sources, nonpoint sources, or community level sources are included.
 - Exclusion criteria: sources and sectors are not clearly delineated. It is unclear if major sources, nonpoint sources, or community level sources are included.
- Emission inventory must include published information on methods used to collect the data.
 - Inclusion criteria: methodology is published either within the report itself or publicly accessible online.
 - Exclusion criteria: methodology is not included or is not detailed enough to be replicated.
- Calculation methodology must clear and replicable if the study is using publicly available data.
 - Inclusion criteria: methodology includes details on utilized emission factors or calculations used.
 - Exclusion criteria: methodology does not include details on utilized emission factors or calculations.
- Some communities have likely utilized contractors that utilize proprietary emission models that are not published. If so, the inventory must include the basis the model is founded upon and the logic in utilizing the model.

- Inclusion criteria: it is clear what data the model utilizes and how it applies to the community utilizing it.
- Exclusion criteria: it is not clear what data the model utilizes, or the model utilizes data that is not widely applicable to the community.

D2 Data Collection for Inventory Verification

Data collection will primarily focus on verifying emission inventories to ensure their usability in the toolkit, targeting regional representation mirroring the 2005 WRAP Rural Alaska Emissions Study, ideally adding a community on the North Slope which the original study wasn't able to reach. Other interested communities who want more accurate emissions inventories could be included, as well. If AML faces difficulties contacting the original target communities, alternatives from the same region and similar populations could be substituted.

Scope Communities – based on 2005 WRAP Survey

Community	Population	5% of Households
Arctic Village	229	4
Bethel	6135	117
Buckland	511	10
Dillingham	2382	45
Huslia	310	6
Klawock	777	15
Kongiganak	478	9
Minto	136	3
Northway Village	338	6
Port Graham	150	3
Sand Point	911	17
Sitka	8652	164
Stebbins	646	12

This project will primarily gather data via survey, targeting residential buildings as well as non-residential buildings. If fuel data is made available by local fuel suppliers, this data will also be incorporated preferentially into the final report, as an aggregate input.

Survey data for this project will be gathered with a [JotForm](#) prepared by Constellation Navigator. This JotForm allows for the collection of building, vehicle, and waste emissions data via cloud-based tool. Use of the JotForm will be guided by the User Guide (see Appendix 1 for forms and user guide). It will primarily be filled out by AML staff interviewing or reviewing documents from community members; however, community members who are oriented to using it may also complete it. After use with the first 2-3 communities, AML will review the JotForm and validate data against A7 criteria, updating it if necessary before further use and documenting updates in the Sharepoint repository.

Constellation will review data from the Jotform survey alongside any fuel sales data and prepare a report to assess the usability of emission inventories for the toolkit. DEC and AML will review survey results alongside Constellation. If issues are found, DEC, AML, and Constellation will discuss how to proceed with the data. Potential actions include excluding outlier data points, reaching back out to stakeholders for clarification/correction, or inclusion into the dataset. Any issues will be logged in corrective action logs by Constellation and stored in the Sharepoint repository. Stakeholders will be involved in data validation by being able to comment on the survey, the survey process, their answers, and the final product.

The report will estimate how much variation from the modelled estimates for each sectors in scope communities is likely based on the resulting data, and provide error for these estimates. The report will also provide error estimates for all other modelled emissions inventories, interpolating from the data collected based on region and population. The report will specifically outline the modeled activity and modeled emissions for the in-scope communities, compared to the pro-rated (per household) actual activity and emissions data. Narrative will include the major potential causes of deviation, as well as future ways to collect and/or estimate better activity and emissions data. The report will confirm that validated data meets project objectives, with limitations documented.

Survey Administration Considerations:

We have outlined clear and concise instructions for each question. To reduce respondents time, we are keeping the survey as short as possible while still gathering the necessary information. We have also ensured that the survey is easily accessible and navigable on mobile devices. Use a secure survey platform that protects respondent data, and addresses any concerns about data privacy

Contact Information for Questions: Provided a contact person and email address for respondents to ask questions (Griffin@akml.org). The survey implementers may send occasional reminder emails to non-respondents to increase participation, or follow-up directly outside of the reporting form.

We have clearly defined the geographic region, and provide insights into the selection options in dropdown lists, like markets, units, types, sectors, years and activity. We list common fuel types, with "Other" options for customization in the notes section - this reduces ambiguity and ensures data consistency, while also allowing for explanations of unusual data points.

By carefully designing and administering this survey, we can collect valuable data on individual consumption patterns, augmented by regional bulk fuel sales, which can inform important decisions related to planning, infrastructure, and market analysis.

D3 Verification and Validation Methods:

After the inclusion/exclusion criteria is applied, the inventories that met the inclusion criteria must be compared to datasets prepared by known entities covered under a Quality Management Plan, such as the EPA, DEC, and USGS. If the emission inventory is compared to an EPA or DEC dataset, and is off by a large factor, then the inventory preparers must have checked their methods and found no error or deviation in methodology that would introduce such a large discrepancy and they must introduce a scientifically sound hypothesis to explain the discrepancy.

Once the final list of emission inventories to be used is completed, data will be entered into an Excel workbook to build the first iteration of the toolkit. Issues with data integrity and validation will be identified throughout the building of the workbook. Resolving issues will be done using EPA best practices for data quality management and documented in corrective action logs, primarily by Constellation, although DEC will store the logs in the Sharepoint repository. Issues and resolutions will be documented, with the document kept in the online repository. As the toolkit goes through revision, drafts of each version should be kept in the online repository using version control until the project is completed.

The final toolkit will contain community or regional estimations of criteria air pollutants and greenhouse gas emissions. The toolkit will also be used to identify gaps that require future study.

D4 Reconciliation with User Requirements:

The deliverables of this project are intended for use by community members to support environmental planning. The workplan was written with community needs in mind.

While the data in the toolkit has been reviewed by the project team, there are still uncertainties associated with the data. The toolkit will contain information on the development methodology and what data is contained within the toolkit so that users can review original source data. This toolkit will be eligible to be included in other works (studies, grant application, or other uses) based on the inclusion/exclusion criteria in A7.

Because the toolkit is ultimately an amalgamation of multiple emission inventories, there will be limitations inherent in the data. The toolkit and any visualization developed from the toolkit will be accompanied by caveats on what data gaps have been identified throughout development and what the toolkit's intended use is. For example, DEC expects that some regions will have very little emissions data and, in this circumstance, would include a caveat that not all nonpoint or areas sources were measured and that actual emissions in the region are likely higher. Additionally, the toolkit would contain cautions about using it for activities outside of emission estimation. Limitations will be described in the user guide and any reports generated for this project. Stakeholders will also have the limitations communicated to them verbally.