EPA United States
Environmental Protection
Agency

QAPP Guide for Clean Ports Projects: Environmental Information to Develop Emissions Inventories and/or Analyze Emission Reduction Strategies

Disclaimer

The statements in this document, with the exception of referenced requirements, are intended solely as guidance. This document is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States. This guidance may be revised without public notice to reflect changes in the EPA's approach to implementing Quality Assurance Project Plans.

1. Introduction and Instructions

The Quality Assurance Project Plan (QAPP) should substantially comply with the instructions, format, and content described below. Awardees should ensure that their QAPPs are written clearly using understandable terms. Doing so will help ensure that the Environmental Protection Agency's (EPA) Regional Quality Assurance Managers and Project Officers understand the purpose, outputs, and outcomes of the proposed project as well as the type of environmental information being collected. Applicants are not required, but are highly encouraged, to use the QAPP format described below, including the cover page, however, regardless of the preferred format, conformance with the QAPP Standard must be maintained.

This guide covers the required QAPP elements consistent with the current EPA Quality Assurance Project Plan Standard (Directive No: CIO 2105-S-02.1). Each QAPP element is accompanied by a description, basic instructions, and a set of questions to consider when completing each element. This guide also contains examples intended to assist with QAPP development; however, in many cases, the examples are simplified for brevity and may not represent the level of detail your organization may need to include in your QAPP. Language from these examples can be used in your QAPP. Some sections also include template language with places to fill in information.

Following this guidance will not necessarily guarantee that your QAPP will be approved on its first submission to your EPA Quality Assurance Manager, but it should help to ensure that your document covers the required material. This should both reduce the number of review comments and the time it takes to have your plan approved. Lastly, project teams should contact the organization sponsoring the work for region specific QAPP requirements or resources that should be used when writing or submitting their document for review.

2. QAPP Purpose

A Quality Assurance Project Plan (QAPP) is your organization's planning document for conducting a specific project involving environmental information. It is an overview of your organization's specific business rules, policies, and quality assurance/quality control (QA/QC) procedures for conducting the project. The QAPP structure (through its various sections) helps to focus and define some of the key project details and decisions - WHO is doing WHAT, WHERE are they are doing it, WHEN are they doing it, HOW are they are doing it, and WHY are they doing it. The QAPP serves as a place to document those details and associated decisions so that everyone who will be working on the project is clear about the details and understands his or her individual roles in the data generation process. By taking the time to think through your project and make necessary decisions during the planning process, you will be more likely to have a successful project and one that will be more cost effective in the use of your resources.

The QAPP is designed to help your project team produce environmental information consistent with project's intended purpose in a consistent manner. It is designed to help improve communications with all staff involved with the project, as well as detail their responsibilities such that all parties are aware of their roles. The QAPP also helps participants understand the importance of the specific project and can serve as both a training guide and legacy documentation.

Writing a QAPP requires a good knowledge of the best implementation practices, intended outcomes of the project, and quality assurance (QA) ahead of time. The QAPP writer should have access to EPA QAPP Standard Requirements when preparing a QAPP, in addition to the organization's Quality Management

Plan (QMP) and any other relevant policies and state regulations. References to assist the QAPP writer are provided throughout this guide and at the end of the document in the *References* section.

A QAPP must be written and approved by EPA **before** environmental information data is collected. By establishing the organization's plan and business rules up front, decision-making during the project should be consistent.

3. QAPP Structure

EPA Quality Assurance Project Plan Standard (Directive No: CIO 2105-S-02.1) specifies the required elements within a QAPP. The directive states that the QAPP must be composed of standardized, recognizable elements covering the entire project from planning, through implementation, to assessment. QAPP elements are divided into four groups:

- GROUP A - Project Management and Information/Data Quality Objectives
  - A1 Title Page
  - A2 Approval Page
  - A3 Table of Contents, Document Format, and Document Control
  - A4 Project Purpose, Problem Definition, and Background
  - A5 Project Task Description
  - A6 Information/Data Quality Objectives and Performance/Acceptance Criteria
  - A7 Distribution List
  - A8 Project Organization
  - A9 Project QAM Independence
  - A10 Project Organizational Chart and Communications
  - A11 Personnel Training/Certification
  - A12 Documents and Records
- GROUP B - Implementing Environmental Information Operations
  - B1 Identification of Project Environmental Information Operations
  - B2 Methods for Environmental Information Acquisition
  - B3 Integrity of Environmental Information
  - B4 Quality Control
  - B5 Instruments/Equipment Calibration, Testing, Inspection, and Maintenance
  - B6 Inspection/Acceptance of Supplies and Services
  - B7 Environmental Information Management
- GROUP C - Assessment and Oversight
  - C1 Assessments and Response Actions
  - C2 Oversight and Rep
- GROUP D - Environmental Information Review and Usability Determination.
  - D1 Environmental Information Review
  - D2 Useability Determination

To simplify the QAPP development process, the EPA provides flexibility to grant recipients based on a project's specific objectives, meaning no element should be omitted, but, if an element is not applicable, an explanation as to why it is not applicable shall be provided in the QAPP.

4. Other Tips

Because a QAPP is a plan, written before the project commences, its QA/QC commitments should, ideally, be written in future tense (e.g., "The organization *will* perform…").

Elements of a QAPP may be described or cited. If the designated references are well documented and are readily available to all key personnel, citations may be adequate; however, because weblinks and web addresses may change over time, one official, controlled version (such as a pdf) of the referenced documents should be placed on file with the appropriate EPA office and available for routine referencing when needed.

The use of citations to reduce verbiage and redundancy in writing is encouraged. However**, the use of citations should be specific**, to point the reader to the information that is needed within the referenced material. For example, if citing the CFR, use the specific, complete reference (e.g., 40 CFR 58.16, 40 CFR Part 58, Appendix A, Section 2.3.1, etc.). If citing a local, state, or federal standard operating procedure (SOP), point the reader to the specific section or chapter within the SOP where the necessary information can be found (e.g., "See Data Validation SOP, Revision 1, Section 4.2(b)"). Furthermore, it is necessary to summarize the referenced information in the element. Simply providing the reference is not appropriate nor does it satisfy the element. EPA can only approve the QAPP and does not routinely comment on agency/organization SOPs. For that reason, EPA must be provided with a concept of what is in the SOP as a summary within the element it's being referenced. You can also use citations for specific sections within the QAPP itself, so that information does not have to be repeated verbatim. For example, "See Section 9.4 of this QAPP for more information."

Group A. Project Management and Information/Data Quality Objectives

The following project management elements address the procedural aspects of project development and what to include in the QAPP project background, task description, and quality objectives elements.

A.1 Title Page

Instructions:

- A **Cover Page** is recommended for the QAPP. If used, inclusion of the organization's logo is suggested.
- The **Title Page** contains the following information:
    - the name of the document to include "Quality Assurance Project Plan",
    - date of QAPP preparation,
    - name of the organization conducting the work,
    - name of organization that developed the QAPP (if different from organization conducting the work),
    - period of performance; and
    - the grant name and grant ID number.

In addition to a cover and title page, the following are best practices for document organization:

- Include a **header** which contains the following information:
    - document control number or unique identifier such as a descriptive short title that includes organization or project name,
    - section name,
    - the version/revision number,
    - the version/revision date, and
    - page numbering in Page X of Y format is required as the page numbering practice.
    - The header generally is not included on the cover page but will start with the first page following the cover page. However, it is acceptable to include the header on the cover page.
    - For example, an appropriate document header could look like:

QAPP Short Title:	Port of Stormhaven CAQP QAPP
Section:	A.4 Project Purpose, Problem Definition, and Background
Revision No:	Rev. 0 Date: 01/01/2025
Page:	**12** of 44

- An **Acronym List** is recommended for the QAPP. It can be included after the cover page prior to Group A, or it can be included as an appendix at the end of the document. The Acronym List does not have to be long and should only include acronyms used within the QAPP.
- A list of **References** (i.e., bibliography) can be included in the document. If compiled, it is recommended that all references be included at the end of the QAPP, as a final section or appendix.

Example A.1 (Title Page)

Quality Assurance Project Plan for
<add long title of project here line 1>
<add long title of project here line 2>

Grant Name and Grant ID Number:
<add grant number, line 1>

Prepared by:
<add name of grant recipient, line 1>
<add name of grant recipient, line 2>
<add street address, line 1>
<add street address, line 2>
<add city, county, state, zip code>

Prepared for:
US EPA Region <add EPA Region Number>
<add EPA regional office street address, line 1>
<add EPA regional office street address, line 2>
<add EPA RO city, state, and zip code>

Date prepared:

<add date of submission>

Period of Applicability:

<add period of applicability>

Scope:

Per EPA Quality Assurance Project Plan (QAPP) Standard revised April 3, 2024,
work products that rely on Environmental Information Operations

A.2 Approval Page

Instructions:

In this section of the QAPP – which is typically just 1 page – include the following information:

- Placeholders for the signatures of staff members (include position titles) in the chain-of-command who need to review and approve the document, including the project's Quality Assurance Officer/Manager (or equivalent)
- Signature lines for the EPA Designated Approving Officials which include EPA Operations Manager (or designee) and EPA Quality Assurance Officer/Manager (or designee)
- Note, these are the required signatures, but additional signatures may be added based on the authoring organization's internal practices.
- Revision History (if applicable).

A **Revision History** page is required. If desired, a revision history table can be created that will serve as a placeholder for future revisions. For a new QAPP, it is recommended that "0" be used as the revision number. If used, update the Revision History section henceforward, summarizing the changes made on future revisions. Revision Histories do not need to contain lengthy explanations or detail every edit but rather summarize substantive changes so that they can be more easily tracked over time. Revision Histories can be placed at either the beginning or end of the document.

Example:

Revision #	Date	Author	Description of Change
0	1-3-2025	Jane Author	New Document; Initial Release
1	1-8-2025	John Operator	Section A.4: Revised and lowered calibration scale. Added information on automated calibrations. Section 4.2. Changed audit point concentrations.
2	1-4-2026	John Operator	Revised Section B.5: certification frequency; changed to annual.
3	1-8-2027	John Operator	Changes throughout document due to instrument model upgrade; new figures and tables, additional QA/QC, and new maintenance requirements added.
4	4-24-2027	Goldie Quality	Revised specified guidance for baseline and BAU inventory projections to the latest revision published at the following website [link to website] and amended Sections A.4, A.5, A.6, B.2, and B.4 to include requirements to use the most recent version of the guidance and requirements that all baseline emissions estimates (for the last year of operations prior to the project) are consistent with the methods used in the most recent version of the guidance.

Example A.2 (Approval Page)

_____   _____

Signature of Project Manager   Date
(Name and Title: Project Manager)
(Organization)

_____   _____

Signature of Project Quality Assurance Manager   Date
(Name and Title: Project Quality Assurance Manager)
(Organization)

_____   _____

Signature of EPA Regional Project Officer   Date
(Name and Title: EPA Regional Project Officer)
(Organization)

_____   _____

Signature of EPA Regional Quality Assurance Manager or Designee   Date
(Name and Title: EPA Regional Quality Assurance Manager or Designee)
(Organization)

QAPP Revision History

Revision #	Date	Author	Description of Change
##	MM/DD/YYYY	(PRIMARY AUTHOR NAME)	(DESCRIPTION OF CHANGES OR, IF NEW "ORIGINAL VERSION")

A.3 Table of Contents, Document Format, and Document Control

Instructions:

This table of contents includes all the elements specified in the EPA QAPP Standard consistent with EPA Quality Assurance Project Plan Standard (Directive No: CIO 2105-S-02.1). If you determine that one of the listed elements is not required for your implementation grant, please retain the section in your QAPP and provide an explanation as to why you believe your project does not require the associated content specified in the EPA's QAPP Standard.

Include a separate "List of Tables and Figures" that follows the main contents, if applicable. Provide page numbers for all tables and figures. It is recommended that tables be listed first, followed by figures.

Example A.3 (Table of Contents)

A.4 Project Purpose, Problem Definition, and Background

Instructions:

In this section of the QAPP, state the specific environmental problem that is to be investigated, decision to be made, or outcome to be achieved. For example, if the QAPP is being developed for a port emissions inventory, this section could discuss the geographic domain of the inventory, which port equipment sectors and activities are covered, and which pollutants of concern will be included. For additional decision points and considerations for conducting a port emissions inventory, see EPA's Ports Emissions Inventory Guidance: Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions (EPA-420-B-22-011).

Include sufficient background information in this section to provide a historical, scientific, and/or regulatory perspective for the project. If data has been collected in the past or this is a revised QAPP, historic information / data should be summarized. Some information can be pulled from the approved workplan. For example: If this is an update to an existing inventory, discussion of the assumptions and findings of the prior study could be included here.

Also in this section, identify other QA planning documents (e.g., QMPs) and briefly describe their relation to this QAPP.

Quality Resources:
- EPA Environmental Information Quality Policy, Procedure, QMP Standard, and QAPP Standard are located at https://www.epa.gov/quality/quality-program-directives.
- Regional-specific quality programs are available at https://www.epa.gov/quality/regional-offices.

When describing the project purpose, problem definition, and background, consider addressing the following questions if applicable to your project type:

- What is the environmental problem/issue to be studied?
  - What is the project purpose?
  - What planned environmental decisions or actions might this work inform?
  - What is the geographic domain of the analysis?
    - Does it include both land side and marine activities?
    - Does it include any off-port activities beyond the port "fence line" such as vessel anchorages or hoteling areas, freight or intermodal terminals, or common drayage routes to access the port?
  - Which specific pollutant(s) will be examined in the analysis?
  - What equipment sector(s) will be included?
- What is the background / history of the problem?
  - Is this an update to or expansion of prior work?
- Is this a new QAPP or the revision of an existing QAPP? If it is a revision to an existing QAPP, when was the original QAPP developed for this project?
  - Identify other applicable QA planning documents programs and standards.
- What are the sources for collecting environmental information?
  - What type, quantity, and quality of information is needed?
  - What QA will be applied?

Example A.4 (Project Purpose, Problem Definition, and Background)

The purpose of this project is to conduct an updated refined analysis of mobile source emissions and evaluate six future scenarios including business as usual at the "Port of Stormhaven." To implement this project, the project team will define the problem using three distinct sets of Environmental Information (EI) for port activities that impact local air quality:

a) *Update of baseline 2020 air emissions inventory.*
   The project team will incorporate the port's existing activity-based 2020 emissions inventory results into a revised assessment for 2020 using methodologies and estimates consistent with EPA's current Port Emissions Inventory Guidance. The updated inventory will reflect all significant mobile sources within the port's jurisdictional boundary consistent with the 2020 baseline emissions inventory.

b) *Business as usual inventory projections for 202X to 202Y.*
   The project team will develop BAU projections, absent this project. BAU estimates for each year will reflect all significant mobile sources within the port's jurisdictional boundary consistent with the baseline inventory. The project team will ensure baseline year estimates and BAU projections are completed on a comparable basis and consistent with EPA's current Port Emissions Inventory Guidance; and

c) *Five Reference Case (RC) scenarios for evaluating five different lower-emitting operating scenarios for 202X to 202Y.*
   This set of EI will be structured and calculated using the same activity framework used for the baseline and BAU scenarios. Each of the Reference Case projections will evaluate a unique emissions reduction strategy or a unique combination of strategies. Each Reference Case will reflect the same time period and port operations included in the Baseline and BAU estimates.

The question to be answered by the project team involves comparing the five different RC emissions reductions options for the period 202X to 202Y to the BAU projections for the same period to determine which emissions reduction option provides the greatest benefits to local air quality. Accordingly, each discrete Reference Case will be compared separately to the BAU projections to determine the emissions reductions strategies that offer the greatest potential for reducing the air quality impacts of port operations.

The Geographic domain of this project on land side is within port property and **** 3 miles off the shoreline of port property.

The project team will estimate changes in port-related emissions for the following pollutants:
- Nitrogen oxides (NO_X)
- Particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$)
- Particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10})
- Sulfur dioxide (SO_2)
- Volatile organic compounds (VOC)

The sources to be included in this analysis include off-road mobile equipment, vessels, and on-road vehicles servicing the port.

The project team will use methodologies consistent with the current EPA Port Emissions Inventory Guidance for all emissions estimates included in the baseline, BAU, and Reference Case comparisons.

Port of Stormhaven will use actual fuel and electricity purchase records for baseline emission calculations. These purchase records will be included in the final report or otherwise made available to the primary technical staff drafting estimates and to QC staff charged with verifying that emissions estimates are consistent with the port's historical fuel and energy usage.

The business as usual scenario will consider the same fuels used in the baseline inventory. All reference case projections for each port operation or activity will consider changes in some or all fuels and/or changes in equipment models.

When emissions reduction strategies are based on fuel-switching or electrification, the comparison must use a measure similar to the quantity of energy for the new (cleaner) form of energy (i.e. a comparison of switching from diesel to natural gas should rely on a comparison of the same amount of energy, in Joules, between the two fuels). Any significant decrease in energy used (Reference Case Projection minus BAU Projection) must be accompanied by the new equipment manufacturer's data sheet or other engineering estimates detailing how the energy efficiency improvement will be accomplished.

Where projected emissions reductions are based on replacing older models with newer (more efficient) models based on substantially the same technology, emissions reductions will be based on datasheets provided by the manufacturer of the proposed (or evaluated) new technology.

When preparing the emissions inventory, quality assurance should include: data source verification, cross-checking calculations, using standardized and current EPA emission factors, documenting assumptions and methodologies, implementing data quality checks, and comparing results to historical activity trends or industry benchmarks to ensure accuracy and reliability of the estimates throughout the inventory development process.

A.5 Project Task Description

Instructions:

In this section of the QAPP, describe all project tasks (description of work to be performed and products to be produced). Include a general overview of the pertinent work activities for this project, such as data collection, field activities and sampling, laboratory activities, data review and assessments, and products/reports to be generated. Some information can be pulled from the approved workplan.

Also include a table with the critical documents and records that will be maintained during this project.

Documents listed in this table should be consistent with the documents discussed in more detail in Section A. 12 Documents and Records. When summarizing the project, consider addressing the following questions if applicable to your project:

- What are the project objectives?
- Does the section summarize the work that is required to **collect**, **document**, and **report** the data? For example, for a project deploying ambient air sensors you will need to: design a network and deploy instrumentation; develop procedures; establish QA/QC criteria; perform assessments; validate data; and report the data. For a project conducting a port emissions inventory, you will need to: determine which equipment sectors are included in the analysis; develop procedures for collecting equipment activity and emissions data; establish QA/QC criteria; perform assessments; validate data; and synthesize the data into a report.
- What measurements are expected to be taken during this project? In other words, what types of data will be collected and reported to support the project objectives?
- What are the typical field activities performed to support the project?
- What are the typical laboratory activities performed to support the project?

Example A.5 (Project Task Description)
Environmental information operations (EIOs) for this project will be completed under the following tasks that perform the following analyses and produce the following work products:

1. Identification of activity level data sources for the port,
2. Preparation of the updated emissions inventory,
3. Review of the activity data used for the updated emissions inventory for comparability with future projections,
4. Development of BAU estimates and development of comparable RC estimates,
5. Comparison of the BAU and RC estimates to determine the most impactful option, and
6. Developing standardized documentation for the three primary EI data sets and the comparison of BAU and RC estimates.

Each task is further detailed in the following sections.

Task 1*. Identify Preliminary Information about the Port.* The compiled data about the port and its operations will provide useful insight that will support the port inventory efforts as well as future year projects and assessment of viable emissions control options. This will include compiling and evaluating data including, but not limited to the following sources:

- Current and historical industry indicators and activity data for the port to characterize the activity data used for baseline-year inventory and BAU projections:
  - Data published by the USDOT Bureau of Transportation Statistics (BTS)
    - 2024 Port Performance Freight Statistics Program: Annual Report to Congress
    - Port throughput profiles by year published by BTS
    - Vessel time at berth data published by BTS
  - Any publicly available global and U.S. or regional trade forecasts or freight movement trends expected to impact future port activity and associated emissions projections.
- Potential future changes in distribution patterns across the multiple modes at the port such as increasing numbers of post-Panamax vessels, expansions of rail and trucking, and implications for cargo distribution centers, warehouses, etc.
- Any existing or planned future environmental, energy, operational systems management, or other programs that could inform the analysis of this project.
- Potential state, local, or private incentives and barriers to increasing technological and operational emission reduction strategies at the port in the future.

Task 1 Work Products:

1. Listing of all port activities to be included in baseline-year, BAU, and Reference Cases.
2. Listing of available data sources or surrogates that show historical variations in port activities.
3. Relevant schedules and anticipated activity-level impacts of non-project-related, planned, capital improvements that should be included in BAU and RC projections.
4. A DRAFT emissions inventory framework that is compatible with available data resources on historical and future port activity data. The inventory framework will be compatible and consistent for baseline-year, BAU, and RC inventories. The DRAFT framework will be submitted to the project manager and all task leaders for review, deliberations, and finalization prior to beginning work on subsequent tasks.

Task 2. *Development of Baseline Year Emissions Inventory.*

The primary technical team (PTT) will use the following strategies to ensure that the port's baseline year inventory reflects all port activities that can significantly impact local air quality. The Project Manager and the Task Leader for Task 2 will coordinate with the task leaders for Tasks 1, 3 and 4 to ensure the baseline year inventory reflects an activity-driven framework that can be used consistently for both BAU and Reference Case projections:

- The framework will be based on appropriate activity-level data inputs and the EPA's latest emissions models, methods, and standards, as described in the most recent version of the EPA's Port Emissions Inventory Guidance.
- All calculations that show significant emissions reductions must include the documentation of both baseline and Reference Case activity levels and equipment characteristics, including manufacturer data sheets for evaluated new equipment.
- If manufacturer data sheets are available for the old equipment being evaluated for replacement, these "old" sheets will also be included in the report or otherwise made available to both the primary technical team and the QC team.

- The primary technical team will provide sufficient details as needed for assessing emission reduction strategies by providing comparable emissions calculations for the baseline year and ensuring that baseline year methodologies are compatible with the methodologies used for BAU projections and Reference Case projections.

Task 2 Work Products:

1. Baseline-year inventory using a framework approved by the Project Manager in consultation with all Task Leaders.

Task 3. *Evaluation of Equipment Activity Data*

Using the baseline inventory as a guide, the project team will evaluate different methodologies, activity data sources, and emissions data sources that are available for characterizing air emissions from port equipment. The evaluation will assess the advantages and disadvantages of using different data sets and methodologies to estimate emissions, fuel usage, and potential emission reduction strategies for various equipment sectors and activity modes (e.g., hoteling, incidental idling, etc.). The project team will quantify the variance within data sets and perform sensitivity analyses for different types of data. As available, the project team will utilize recent historical port activity data and trends to inform projected trends for these activities in future years.

Task 3 Work Products:

1. Updates to the Methods Report prepared under EIOs 1.5 and 1.6 with any additional methodologies identified under this task.
2. A report to the PM providing any recommended changes to the methods used in the baseline emissions inventory under Task 2 and the rationale for making the changes considering how the methodology will be useful for the baseline-year inventory, the BAU projections, and the RC projections.

Task 4. *Development of Future Year Emissions Inventory.*

The Project Manager and the Task 4 Leader will coordinate with the task leaders for Tasks 2 and 3 to ensure the future year inventory projections (for both BAU and Reference Cases) are consistent with the baseline year inventory's methodology, activity data, and emissions data. Accordingly, work products produced under Task 4 will reflect an activity-driven framework that can be used consistently for both BAU and Reference Case projections. Additionally, the Task 4 Leader will ensure that the port's future-year inventory projections are consistent with the following objectives:
- Projections are consistent with the port's economic forecast and capital improvement plans based on appropriate data inputs and EPA's latest emissions models, methods, and standards, as described in the EPA's Port Emissions Inventory Guidance.
- Projections are consistent with a business-as-usual assumptions that have been reviewed and approved by senior port officials
- BAU calculations, documentation, and spreadsheet deliverables provide sufficient details needed for the emission reduction strategy deliberations under Task 5.
- The Task 4 leader will formally request cost estimates from up to three vendors for any new equipment considered for replacing existing equipment in the reduced-emissions RC scenarios.

Task 4 Work Products:
1. BAU inventory projections for 202X-202Y using framework approved by Project Manager in consultation with all Task Leaders.
2. Five Reference Case inventory projections for 202X-202Y using PM approved framework.
3. Cost estimates from vendors for any new equipment included in RC inventories.

Task 5. *Development of Emission Reduction Strategy Analysis.*

This task will focus on evaluating future year viable control options to reduce port-related emissions. The Task 5 leader will utilize the Task 3 and Task 4 work products to develop five similar but distinct analyses to enable comparisons of the emissions reductions, costs, and local air quality benefits of the five Reference Case options for port equipment replacements. In addition to completing five stand-alone analyses, the Task 5 leader will produce a one-page, summary table to facilitate quick comparison of all five RC options.

Task 5 Work Products:
1. **Revised** BAU inventory projections for 202X-202Y using framework approved by Project Manager in consultation with all Task Leaders.
2. **Revised** Reference Case inventory projections for 202X-202Y using PM approved framework.

Work products 5.1 and 5.2 are only required if revisions are necessary to reflect any decisions made or adjustments to methodologies implemented by the Task 5 Leader during use of the Task 4 work products while developing the analyses for strategy selection.

1. Five separate analyses documenting review of the five reduced-emissions RC scenarios that each address the following aspects to be considered during option selection:
   a. Total estimated reductions by pollutant for all pollutants reduced in any of the five RCs. This requirement must be formatted to facilitate comparisons by pollutant across all RCs.
   b. Total estimated cost of new equipment with associated vendor estimates attached.
   c. Total estimated downtime of any port operation required for implementation with concurrence from senior port operations official.
   d. Summary of annual and seasonal ambient air quality improvements and associated attainment status of each pollutant showing reductions in strategy selection analyses.
2. One-page summary table comparing each of the five RC options to the baseline inventory and a one-page summary of the rationale for selecting the RC option approved by the port authority.

Task 6. *Documentation*

This task will focus on compiling the reports developed in the earlier tasks into a single, comprehensive report that clearly documents the activities implemented in a transparent and concise manner allowing for independent replication of the procedures used. The Task 6 Leader is responsible for ensuring each of the primary work products under Tasks 1-5 reflect the same emissions activities, the same framework for activity data and emissions calculations, and the same conventions for comparing BAU attributes to RC attributes.

Task 6 Work Products:
1. **Revised** BAU inventory projections for 202X-202Y using framework approved by Project Manager in consultation with all Task Leaders.

2. **Revised** Reference Case inventory projections for 202X-202Y using PM approved framework.

Work products 6.1 and 6.2 are only required if revisions are necessary. Substantive revisions may reflect any decisions made or adjustments to methodologies implemented by the Project Manager in consultation with Task Leaders during the option selection process. Non-substantive revisions may include format revisions for tables and narrative sections as the Task 6 Leader ensures standard conventions for reporting key outcomes are utilized on all the final work products.

1. DRAFT compilation of all work products using a standard framework and format for review by all Task Leaders.
2. Final compilation of all work products using a standard framework and format for review by all Task Leaders including an approval sheet and signatures by all Task Leaders, the Project Manager, and the QA Manager.

Instructions:

In this section of the QAPP, define the data quality objectives (DQOs), the performance and/or acceptance criteria to achieve those objectives, and the related data quality indicators (DQI).

The DQOs define the intended outcomes of the environmental information collection and reporting that will help ensure the project achieves resource-effective acquisition of environmental data.

Performance criteria address the adequacy of *new* information that is to be collected for the project (e.g., data collected for newly deployed vehicles purchased as part of the award). Acceptance criteria address the adequacy of *existing* information to be collected, often drawn from existing sources (e.g., fuel capacity information for legacy vehicles from manufacturers).

DQIs are quantitative and qualitative characteristics associated with the collected data. The standard DQIs for environmental information projects are precision, accuracy (bias), representativeness, comparability, completeness, and sensitivity – other DQIs may be appropriate depending on the type of project. The QAPP should list the relevant DQIs for the project and explain how the DQIs will be determined by the project team. The QAPP should also explain how the DQIs will be measured by both the primary technical team conducting EIOs for draft documents and by the QC team responsible for independent review of draft EI.

When formalizing the data quality objectives and criteria in this section, consider the following questions:
- Does the QAPP describe the Data Quality Objectives (DQOs) for the project's expected activity data collection efforts?
- Does the QAPP define the applicable Data Quality Indicators (DQIs)? Does the QAPP explain how each DQI is related to the project's expected data collection efforts?
- Does the QAPP describe how collected data will be evaluated to determine whether it meets expected DQOs? If data does not meet expectations, does the QAPP describe an action plan to raise and address such issues?

Example A.6 (Information/Data Quality Objectives and Performance/Acceptance Criteria)

The following primary data quality objectives of this project are aligned with the three sets of Environmental Information and EIOs that are required to reliably achieve the project's purpose of comparing these three data sets and identifying the most effective strategy for reducing the air quality impacts of port operations:

DQO 1.   The listings of emissions sources, activity data, and pollutants in each of the three sets of EI (baseline-year, BAU projections, RC reduced-emissions projections) used for the options analyses must be comprehensive (i.e., cover all relevant port operations).

DQO 2.   The activity data must be available in a primary form or in conjunction with other primary data sources to allow disaggregation of shared energy supplies to each discrete activity

on the Master List. The accuracy and precision (DQI) of such data sources will be regularly assessed during data collection and reporting periods.

DQO 3.   The activity data for a discrete, listed activity must be representative of all sources included under that activity, and the operating year(s) when the activity data was recorded must be representative of normal port operations and the facilities in service during the baseline period. Such representativeness (DQI) for the use of activity data for groups of dissimilar equipment (e.g., activities served by both older diesel engines and new diesel engines) may also be captured through available manufacturer data sheets or engine-specific fuel consumption logs and will be assessed using the following approach:

a.   The data quality rating of "A" under Table 1-1 will be assigned to all activity data for engines supported by manufacturer's data sheets or fuel consumption records.

b.   The data quality rating of "B" under Table 1-1 will be assigned to any engine activity data that is not based on an engine-specific manufacturer's data sheet but where the engine's activity data are derived from the engine's certification plate and the plate is substantially the same certification level and output rating as an engine accompanied by the manufacturer's data sheet.

c.   The data quality rating of "C" will be assigned to any engine activity data that is not based on an engine-specific manufacturer's data sheet but where the engine's activity data are derived from the engine's certification plate and the plate is not substantially the same certification level but has a similar output rating as an engine accompanied by the manufacturer's data sheet. Fuel consumption is derived from comparison of the engine's certification plate output rating versus the most similar engine with a different certification level but similar output rating and the manufacturer's data sheet.

d.   The data quality rating of "D" will be assigned to any engine that does not have the engine-specific manufacturer's data sheet where no similar engines are identified, and the fuel consumption estimate is based strictly on the engine's certification plate's output rating.

e.   A data quality rating of "E" will be applied to any engine that does not have a certification output plate indicating the output rating of the engine.

DQO 4.   The emissions estimating methodologies for different activities must be comparable, and technical staff should characterize (using Table 1-1) and publish the uncertainty of each activity-specific methodology to ensure that technical staff tasked with comparing reductions by activity can consider the uncertainty in each estimate included in the comparison. Comparability (DQI) of data produced with different methodology will be assessed by the difference between the Table 1-1 rankings. Acceptable comparisons are A-A, A-B, A-C, B-B, B-C, B-D, C-C, C-D, and D-D.

DQO 5.   The activity data must be complete and reflective of all the equipment listed under each activity. Any missing activity data must be disclosed to the Project Manager and QA Manager, and the Project Manager or his delegate must develop a data substitution protocol for review and approval by the QAM when more than 10 percent of the activity data is missing for the baseline year. The quantity of missing data (i.e., completeness) is a key DQI. If less than 10 percent of the activity data for a year is missing, the activity data set is acceptable.

The compiled data under each of the sets of EI (baseline-year, BAU projections, RC projections) will be evaluated relative to this specific project's data quality objectives. This evaluation will include: all data compiled for the project including port and off-port mobile sources and any additional data needed to develop the BAU projection profiles and emissions reduction RC scenarios. All compiled secondary data will be ranked based on the criteria in the table below:

Rank	Quality	Source
A	Highest	Federal and state agencies and laboratories
B	Second	Independent journal articles, academic studies, and manufacturer product literature: peer-reviewed
C	Third	NGO studies, trade journal articles, and conference proceedings: peer-reviewed
D	Fourth	Conference proceedings and other trade literature: non-peer- reviewed
E	Lowest	Individual estimates

These rankings will be recorded on the project *QA Documentation Sheets*.

Primary Data Needs

Primary data that quantifies vessel, rail, truck, and cargo handling equipment characteristics and operations is the priority for this work. Anticipated primary data collection includes:

- Annual odometer readings by source type (onroad)
- Annual hours of use by source type (nonroad)

Secondary Data Needs

Given the nature of this study, collecting and using primary data that quantify vessel, rail, truck, and cargo handling equipment characteristics and operations will be given priority over secondary data sources. This project may need to collect and use aggregated data for purposes other than the purposes for which those aggregated data were originally developed. Such data are known as secondary data. The project team will attempt to minimize the use of secondary data where possible. But it may be necessary to compile secondary data elements such as:
- Category 1 and 2 vessel characteristics
- EPA emission factors
- Vessel fuel type and fuel consumption rates
- Aggregated data used for future year projections
- Control profiles that quantify anticipated emission reduction and fuel savings
- Temperature and relative humidity by county, hour, and month;
- Fuel formulation and supply by county, month, and year;
- Inspection and maintenance (I/M) coverage by county and year;
- Stage II refueling program presence and efficiency by county and year;
- Age distribution average for the nation, by year;
- Vehicle miles traveled (VMT) and population, by county, hour, day type, month, year, and road type;
- Average vehicle speed distributions by source type (vehicle), hour, and day type;
- Annual hours of use by source type (nonroad), with temporal allocations.

Any secondary data used in this study must be the highest quality data publicly available derived from unbiased data sources and should be appropriate and representative for analyses of the three emissions inventories.

Approach for Evaluating Project Objectives

Data gathered for Task 1 through 3 will be evaluated relative to the DQOs 1-5 and noted in Table 1-1 to ensure that data are appropriate for use in this study and represent the highest quality currently available. This will ensure that the study will generate information suitable for a variety of uses.

During the data gathering phase of this project, information about how the data were originally identified and collected will be documented, including:

- Source of the data (e.g., federal and state agencies, port authorities, consultants, shipping lines, railroad companies, warehouse operators, etc.)
- Whether the data identify vessel, locomotive, highway vehicle or cargo handling equipment used for port activities, this would include:
  - Vessel/engine Characteristics
  - Operations
  - Fuel/Energy usage data
  - Emission factors
  - Load factors
  - Temporal data elements
  - Spatial elements
  - Relevant regulations
  - Previous and planned equipment retrofit and early retirement programs
  - Anticipate changes to the port, railroads, yards, trucking terminals and warehouses
  - Control options

For many cases, the most appropriate representation of the data will not be a single data value, but a range of acceptable values. Such information is particularly important when evaluating the quality of the data because it helps quantify variance and uncertainty. Data value ranges will be retained and provided as a data quality indicator.

There may be cases where information related to this project's data quality objectives is not available from the data source; these data will be flagged in the *QA Documentation Sheets* and discussed with the project lead to determine whether the data are acceptable for inclusion in this analysis.

The quality assessment of the compiled data will be recorded in the *QA Documentation Sheets*, including the quality ranking score (Table 1-1) as well as comments or issues identified by the project lead. It will also be noted whether the data meet the project's data quality objectives and whether the appropriate data entry and calculation checks have been made. These *QA Documentation Sheets* will be included in the project report.

A.7 Distribution List

Instructions:

For this section of the QAPP, list the names, titles, and organizations of the individuals involved in the project who will be notified of the QAPP and receive a copy. This should include any partnering agencies and contractors/subcontractors who participate in the project. The list should include personnel listed in Sections A.8 and A.10, including the EPA project officer and EPA QA Manager. State where the approved documents will be maintained. Include an address/location for each individual (can also include email addresses and phone numbers). The distribution list can be presented in tabular format, or the information can be detailed in a list. Distribution/Notification can be in hardcopy form, electronic, or both.

The individuals in this list will be notified/receive copies of any QAPP revisions or amendments during the project. Revisions and amendments must be approved prior to implementation and distribution. Please note that if the Primary Quality Assurance Organization PQAO for which the QAPP is being prepared includes multiple organizations, the distribution list for the QAPP may need to be abridged. In this case, include the above information for the key project personnel, including upper management and QA staff, from all organizations within the PQAO. Then, add a disclaimer, such as the following: "*The QAPP will be distributed to other personnel and operators beyond this list, in accordance with the organizational chart(s) presented in A.10 of this QAPP.*"

The location of the official, controlled version of the QAPP should also be identified. This version could be a signed hardcopy located in a centralized records repository, an electronic version maintained on the organization's local area network (LAN), or an electronic version maintained on the organization's website (recommended), among other locations.

Example A.7 (Distribution List)

The original Quality Assurance Project Plan (QAPP), and any subsequent revisions, will be distributed to the personnel presented below. Additionally, this QAPP will be provided to any unlisted staff who are assigned to perform work under this project. A secured copy of this QAPP and any subsequent revisions will be maintained in the project files located at <file location>.

Name	Position and Organization	Division/Office	Email	Address/Location
FIRST_NAME LAST_NAME1	Environmental Manager, Port of Stormhaven	Port Operations	FIRST_NAME LAST_NAME1@port.com	123 Port St.
FIRST_NAME LAST_NAME2	Quality Assurance Manager, Port of Stormhaven	Port Operations	FIRST_NAME LAST_NAME2@port.com	123 Port St.
FIRST_NAME LAST_NAME3	Project Officer, EPA	EPA Region 1	FIRST_NAME LAST_NAME3@epa.gov	456 Main St.
FIRST_NAME LAST_NAME4	Regional Quality Assurance Manager, EPA	EPA Region 1	FIRST_NAME LAST_NAME4@epa.gov	456 Main St.

A.8 Project Organization

Instructions:

Discuss key individuals and organizations, roles, and responsibilities. Specifically, identify individuals with the following roles and describe their responsibilities:

- Approval authority for the QAPP
- Senior Manager having executive leadership authority
- Operations Manager
- Project Quality Assurance Manager (QAM)
- Contractors, Subcontractors, and Sub-grantees
- The individual responsible for maintaining the QAPP
- Those conducting or supporting environmental information operations, data users, and others, as applicable.

This section of the QAPP discusses the roles and responsibilities of all key players in the project, illustrating the chain-of-command and lines of communication. This section clarifies which positions have been delegated authority to complete particular tasks.

The verbiage in this section should support the organizational chart in Section A.10 and clarify which position(s) serve in a QA oversight role and demonstrate, through the stated duties, the QA function. The terminology that is used to define positions should be used consistently throughout the QAPP.

Include discussion of any contractors/subcontractors or partnering agencies in this section and describe the tasks they perform. Explain the lines of communication with these partners.

This section of the QAPP also identifies the Primary Quality Assurance Organization (PQAO) under which the project team will operate. If multiple organizations will operate under a single PQAO for the project, this section should reflect the reporting relationships for each organization with the lead organization clearly identified.

When describing the responsibilities of the key positions, consider addressing the following questions if applicable to your project:
- Are each of the required roles and associated responsibilities clearly defined?
- Who is ultimately responsible for the quality of the project's data?
- If an assessment shows severe data quality issues, who could issue an order to halt data collection until corrective actions have been implemented?
- Who is responsible for writing the project's QAPP and determining if existing SOPs are consistent with project objectives? Who is responsible for revising and maintaining these documents based on project-specific findings when these documents are applied during primary EIOs for draft documents or applied to QC activities for draft documents submitted by the primary technical team to the QC team? (These may or may not be the same individuals.)
- Who serves as a liaison to the EPA Regional Office and is the primary point of contact?
- Who verifies, validates, and/or certifies collected data?

- Who is the "tie breaker" (i.e., final decision maker) when a disagreement exists? This is especially important with regards to data validation activities. Often, this is the project's assigned QA Officer/Manager (or equivalent).
- Who judges the success of corrective actions, once implemented, to ensure they are appropriate and effective?
- Who is responsible for ensuring QAPP/SOP revisions are communicated and distributed to all parties in the distribution list?
- If utilizing a contractor(s), who within the project team is responsible for contractor oversight and assessment of deliverables?

Example A.8 (Project Organization)

The primary personnel responsible for implementation of this project are the Port's assigned Chief Environmental Officer, Project Manager, the organizationally independent project Quality Assurance Manager, and the assigned Task Leaders for the described tasks. The Chief Environmental Officer will serve as the executive leadership authority and will provide senior-level oversight as needed. The Project Manager leads the Primary Technical Team, and the project QA Manager leads the QC Team responsible for measuring all draft work products (prepared by the Primary Technical Team) versus the acceptance criteria established in this QAPP. Position-specific duties are outlined briefly in this section. For this project, the Project Manager will serve as the Operations Manager for the team conducting the EIOs and is the individual responsible for maintaining the QAPP. The project QA Manager is independent of the Primary Technical Team and is responsible for assigning QC staff that were not involved in generating the data or conducting any EIOs related to the draft work products. Section A.9 further describes how the project's organization ensures independence of the project QA Manager and QC Team.

The Project Manager is responsible for the project's technical and financial performance as well as maintaining communications with the EPA's Project Officer to ensure mutual understanding of grant requirements, EPA expectations, and conformity with EPA quality procedures. The Project Manager will manage oversight and conduct of all primary project activities, including the planning of required training for technical staff; allocation of resources to specific tasks; and ensuring that quality procedures are incorporated into all aspects of the primary work to ensure all draft deliverables conform to acceptance criteria prior to submitting draft work products to the project QA Manager for independent review. The Project Manager is also responsible for developing, conducting, and/or overseeing QA plans and measures integrated into the primary tasks and during the hand-off of work products between the Primary Technical Team and Task Leaders, as necessary. The Project Manager will review any corrective actions identified by Primary Technical Team members or by QC team members, authorize specific Primary Technical Team member(s) to implement the corrective action, and provide direction to the Primary Technical Team member(s) in the approach for the corrective action. The Project Manager is responsible for day-to-day oversight as necessary to ensure project activities are consistent with the approved Quality Assurance Project Plan, and to ensure that all work products under this project are consistent with the specified type, quantity, and quality in the approved work plan. Finally, the Project Manager is responsible for developing a training plan for the Primary Technical Team and QC staff as necessary to ensure assigned staff have the requisite knowledge and skills to implement assigned tasks.

The Project Manager will assign a Task Leader for each technical task with instructions to complete the specific responsibilities for their assigned task. Note that some Task Leaders are contractors or sub

awardees. Each Task Leader is responsible for the day-to-day technical activities under their assigned task, including planning, reporting, and controlling of technical and financial resources allocated to the task by the Project Manager. Accordingly, each Task Leader is primarily responsible for implementing the quality measures integral to the primary work and coordinating with other Task Leaders as necessary to ensure the draft work products are consistent and comparable across all tasks as required by this QAPP.

For each major deliverable under each task, the assigned Task Leader will review all QA-related plans and reports and is responsible for transmitting the draft deliverable and the primary QA documentation to the QA Manager (or delegate) for independent QC review and approval. Each Task Leader is responsible for ensuring that the primary quality assurance procedures are implemented at the task level. Task Leaders are also responsible for maintaining the official, approved, task-level QAPP content. Each Task Leader will discuss with the Project Manager any concerns about quality identified during the primary technical activities and during internal reviews among Task Leaders and Primary Technical Team members during development of the draft deliverables.

Every Primary Technical Team member is authorized to propose to the Task Leaders or Project Manager any revisions to task-level QAPP content considered by the Primary Technical Team member as necessary to resolve observed quality issues. However, only the Project Manager is authorized to revise the QAPP. The Project Manager must obtain concurrence from the QA Manager (or delegate) to implement any revisions to the approved QAPP considered necessary by the Primary Technical Team to identify, resolve, or preclude problems or to amend task-level plans, as necessary. In addition, each Task Leader will work with the Project Manager and the QA Manager to identify and implement quality improvements both during the primary work and in response to any findings on draft deliverables reviewed by the QC Team. The Project Manager is responsible for ensuring the consistency of similar or related QA measures across tasks, and the Task Leaders are responsible for overseeing task-level work performed by the Primary Technical Team and for providing assurance that all required QA/QC procedures are being implemented in accordance with the approved QAPP.

Tasks 1, 2, and 3 are expected to proceed concurrently. Tasks 4 and 5 are expected to proceed through identification of the data source for estimates of future year port activity levels, but development of emissions estimating frameworks and methodologies under Task 4 and Task 5 will not proceed until the frameworks and methods for the baseline-year inventory have been drafted and approved by the Project Manager under Tasks 1-3.

The Project Manager will maintain close communications with each Task Leader and ensure any difficulties encountered or proposed changes at the task level are reviewed for implications on other similar or related tasks. The Project Manager is also responsible for communicating progress or difficulties encountered (across all tasks) to the EPA PO, who provides the EPA's primary oversight function for this project at EPA Region <X> and is responsible for review and approval of this QAPP and any future revisions. The Project Manager (with support from Task Leaders and other Primary Technical Team members) will be responsible for consulting with the EPA PO, on planning, scheduling, and implementing the QA/QC for all project deliverables and obtaining required EPA approvals.

The QA Manager role is discussed in Section A.9.

A.9 Project QAM Independence

Instructions:

Describe how the project's Quality Assurance Manager (QAM) is independent of the primary environmental information operations (EIO) completed prior to submitting draft work products to the project QA Manager and Quality Control (QC) Team for review. Note that for small organizations (e.g., small Tribal departments), the project QA Manager and EIO operations may be combined with approval from the EPA QA Manager.

Example A.9 (Project QAM Independence)

The project's QA Manager, is responsible for overseeing the quality system, monitoring, and facilitating QA documentation activities on tasks, and helping the Primary Technical Team (PTT) understand and comply with EPA QA requirements. This individual has the authority to access and to discuss quality-related issues with the grantee's senior management team, outside of their direct supervisory chain, as necessary. The project QA Manager will not be involved in data collection or analyses for the primary (draft) work products and is organizationally independent from the primary technical team responsible for developing the draft work products. As noted in Section A.8, the project QA Manager will oversee and direct all QC functions deploying only QC Team members who were not involved in any aspect of the development of draft primary deliverables subject to QC review. The assigned QC staff will review all assigned draft documents in accordance with guidance provided by the project QA Manager. The QC member will document any findings from the review and report those findings only to the project QA Manager in the format specified by the project QA Manager. It is the project QA Manager's responsibility to work with the individual(s) conducting or supporting EIO to confirm the validity of any findings and to confirm that the findings have been resolved prior to approving the release of any final work products on QC forms specified in the approved QAPP.

The specific project QA Manager responsibilities may include, but are not limited to:
- Maintaining oversight of planning, documenting, and implementing the requirements of this QAPP.
- Ensuring that process- and project-specific QA documents are developed; that required or recommended protocols are followed; that data are reduced, validated, and reported according to specific criteria; and that QC assessments are performed.
- Auditing project files to ensure that project staff are using appropriate methodologies to document data quality and that the deliverable review process is documented in the final project report.
- Ensuring that at least five percent of the data included in this analysis have been checked and not less than 10 percent of the calculations have been checked by a knowledgeable member of the QC team as delegated by the project QA Manager. The project QA Manager will document that these checks have been implemented on the QC forms specified in this QAPP.
- Reviewing the documentation to ensure primary and secondary data were evaluated against the project data use requirements. The project QA Manager will document whether these checks have been implemented.

A.10 Project Organizational Chart and Communications

Instructions:

Include organizational chart(s) in this section. Ensure that an independent QA function is clearly demonstrated in the chart(s). The verbiage in Section A.8 should match/clarify what is illustrated in the organizational chart(s). The terminology that is used to define positions should be used consistently throughout the QAPP.

Organizational charts should depict lines of authority and reporting responsibilities. The project organization chart must also include the following:

- The name of the organization responsible for conducting the environmental information operations.
- Identification of all contractors, subcontractors, and sub-grantees and their reporting relationships to the organization responsible for conducting the environmental information operations.
- The individual in the senior manager role.
- The individual in the project Operations Manager role for the organization conducting the environmental information operations and their reporting relationship to the senior manager.
- The individual in the project QAM role for the organization conducting the environmental information operations, their independence from environmental information operations, and their reporting relationship to the senior manager. If the senior manager does not directly supervise the project QA Manager, the project QA Manager must have authority to access and discuss quality related issues with the senior manager outside of their direct supervisory chain as necessary. The latter is demonstrated by a dotted line on the organizational chart.
- Titles, roles, and names (if determined during planning) of operations and quality individuals within the organization conducting or supporting environmental information operations and their reporting relationship.

Describe communication procedures to EPA, including elevating discrepancies and QAPP non-conformances, process improvements, seeking approvals between project personnel, timing of communication, and roles and responsibilities associated with the processes.

As an alternative to the template chart below, a grantee could include their organizational chart as well as a second chart showing the organization to EPA and/or contractors. If the organizational chart is included in an appendix, please reference the appendix in this section.

Example A.10 (Project Organizational Chart and Communications)
Note, Figure 1, below, presents a hypothetical organizational chart for the project. The example text also refers to the Project Manager and Task Leaders as the "Primary Technical Team" and refers to the project QA Manager and QC staff as the independent "QC Team." Under the EPA's QAPP Standard, the organization chart must also identify any contractor relationships relevant to environmental information operations (EIOs).

Figure 1. Template Organization Chart
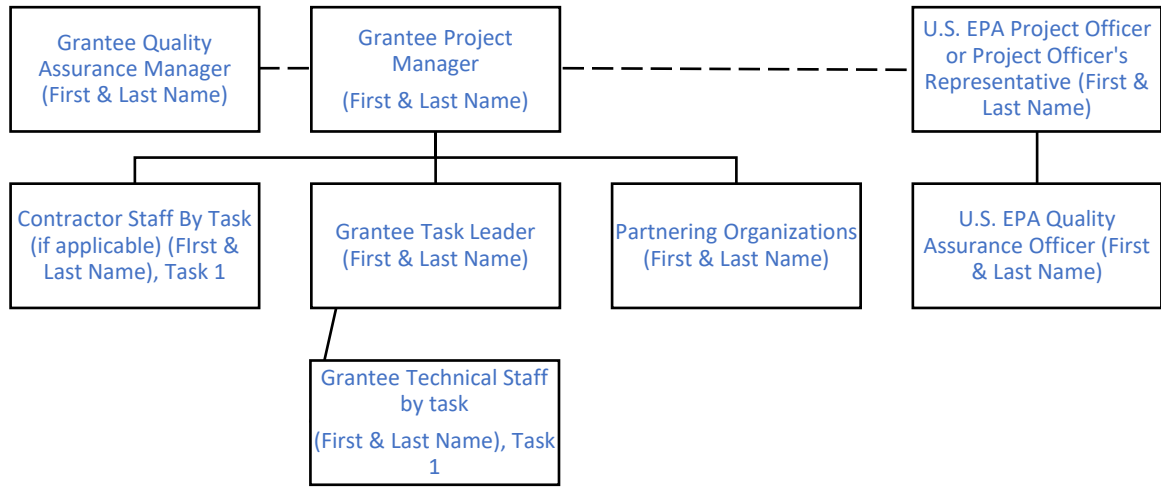
A.11 Personnel Training/Certification

Instructions:

In this section of the QAPP, identify and describe your project team's training and/or certification requirements. Discuss how training will be provided, tracked, and documented. Discuss how proficiency will be assessed, identifying the individual(s) responsible for determining whether project participants can successfully and independently perform the activities. Additionally, the process for ensuring project participants stay current on QA and related competencies should be described in this section as well. Finally, this section of the QAPP should identify where training records will be maintained and by whom.

When describing your project team's training requirements, consider addressing the following questions if applicable:
- Do any job title(s)/position(s) have specific training requirements that must be fulfilled that documents the employee can fully execute the responsibilities of the position? If so, describe the requirements.
- Who makes the determination that project staff are sufficiently trained to perform assigned tasks?
- Are certificates of completion issued when the project participants are found to be proficient or have completed a particular training/workshop/exam? Where are these certificates retained and by whom?
- How is the need for refresher training assessed and subsequently provided?
- Is vendor-provided training utilized? When taken, how is the training documented?

Example A.11 (Personnel Training/Certification)

All Port of Stormhaven (grantee) staff assigned to work on this project shall have appropriate technical and QA training to properly perform their assignments. Training records will be documented and maintained by the QAM. Port of Stormhaven (grantee) staff serving in QAM or Quality Control Coordinator (QCC) roles under this project will have completed a training course on QA/QC activities similar to the course available at https://www.epa.gov/quality/training-courses-quality-assurance-and-quality-control-activities. The Project Manager and all Task Leaders under this project will have completed an online training course on air emissions inventory on the Air Knowledge website at https://airknowledge.gov/EMIS-SI.html.

No additional technical training is required unless otherwise specified in this section for the following tasks:
- Task 1 – <specify any required certifications>
- Task 2 – <specify any required certifications>
- Task 3 – <specify any required certifications>
- Task 4 – <specify any required certifications>
- Task 5 – <specify any required certifications>
- Task 6 – <specify any required certifications>

A.12 Documentation and Records

Instructions:

In this section, describe your project team's document control system. In other words, describe the process for distributing the most current approved QAPP, as well as the process for notifying project staff of any revisions/updates to the QAPP, and ensuring that staff utilize only the current version. This description can also be included in Section A.7, Distribution List, if preferred. This section should also describe the document control process for distributing the most current version of SOPs, QA/QC forms, blank data entry forms, and so forth. These controlled documents may be maintained on the lead organization's network or website (recommended), or through other means specified in the QAPP for project teams responsible for particular EIOs that will rely on controlled documents. It is recommended that the QAPP include links to all controlled documents referenced in the QAPP to provide quick access to all project team members.

Also, in this section of the QAPP, identify the project records that will be maintained, how/where the records will be stored, and any record retention requirements. This section should include information about records generated in the field (e.g., data forms, logbooks, chain-of-custody forms), records generated in the laboratory, QA reports generated, corrective action reports, and so forth. Emails are also considered records; if the project team will use email as a primary means of communicating procedural updates and/or otherwise significant monitoring information, the process for retaining significant emails should be discussed.

The document review cycle for the QAPP and, ideally, its associated SOPs, should be included here, as well. As a best practice, organizations are required to document the annual review of the QAPP and record the review date and name/signature of the individual completing the review (even if no revisions to the document were required). The method for documenting and tracking the QAPP review cycle is an important part of an organization's quality system.

To reduce verbiage, a table may be included that summarizes the records that will be documented and maintained, including where they can be found within the file system used for the project.

When describing your project team's documentation and recordkeeping requirements, consider addressing the following questions if applicable:
- Does the QAPP describe the management of documents and records that will be produced that involve environmental information operations?

- Does the QAPP distinguish between hardcopy and electronic documentation requirements, if applicable?
- Will the project team utilize any commercial or in-house developed databases where project records, including QAPP records, are stored? If so, describe.
- Who is responsible for maintaining the records and files discussed in this section?
- Is access to any of the records limited? If so, who has access? Please briefly describe the type of access (e.g., "read-only", "edit permissions") granted to project personnel.
- Are electronic records backed up? If so, how and on what frequency?
- While in storage, are records (hardcopy and electronic) protected from damage, loss, and deterioration?
- Where are audit reports (internal and external) filed and maintained?

- Do senior quality officers use email to issue important notifications to staff regarding updates or changes to monitoring policies and procedures, etc.? Are copies of these email records maintained and filed? If so, where?
- For handwritten documentation (if applicable), are best practices listed in the QAPP to guide the reader (e.g., instructions such as use of indelible ink, single-line strikethrough for incorrect data entries with corrections to the side, initialed and dated)?
- Are handwritten records, such as site logbooks, backed up (i.e. scanned)? If so, on what frequency? Where are the scanned copies maintained?

The example text for A.12 (as well as example text in other sections) is a hypothetical example and section numbers and appendices listed are for demonstration purposes and may not reflect a QAPP prepared by an actual project team. Below an example QC Documentation form is also provided to illustrate how the applicable QC process might be tracked and recorded. Note that the specific format of the illustrative form example is not required, however awardees are responsible for retaining QC documentation that can be made available upon request (e.g., in the occurrence of an audit). The exact format and use of this document is ultimately up to the project team; however, the example form provides column fields that may be useful in documenting and maintaining a chain of custody of the work performed.

Example A.12 (Documentation and Records)

The Port of Stormhaven (grantee) will document in electronic form QC activities for this project. Each TL is responsible for ensuring that copies of all completed QC forms and other QA records (including this QAPP), will be maintained in the project files located <Insert file location>. Project files will be retained for at least <X> years after the submittance of the Final Project Report which is due at the conclusion of the grant term. The types of QC documentation that will be prepared for this project include:

- Planning documentation, including documentation of methodologies (e.g., QAPP)
- Implementation documentation (e.g., Review/Approval Forms and QC records)
- Assessment documentation (e.g., audit reports).

Documentation of QC activities for a specific task or subtask will be maintained using the QC Documentation Form shown below. This form will document the completion of the QC techniques planned for use on this project as referenced in Section B.4. One or more completed versions of these forms, as necessary, will be maintained in the project files. The types of documents and activities for which QC will be conducted and documented may include raw data, data from other sources such as databases or literature, and calculations and analyses necessary to determine or evaluate outcomes of measures.

Technical reviews will be used along with other technical assessments (i.e., QC checks) and QA audits to corroborate the scientific defensibility of any data analyses. A technical review (e.g., internal senior review) is a documented critical review of a specific technical work product. It is conducted by subject matter experts who are collectively equivalent (or senior) in technical expertise to those who performed the work. Given the nature of the deliverables under this project, a technical review is an in-depth assessment of the assumptions, calculations, extrapolations, alternative interpretations, and conclusions in technical work products. Technical review of proposed methods and associated data will be documented in the QC Documentation Form shown below. The form will include the reviewer's charge, comments, and corrective actions taken.

Quality Control Documentation Form

\<Grantee Org.\>
Documentation of QA Review and Approval of Electronic Deliverables
Approvals on this form verify that all technical and editorial reviews have been completed and the deliverable meets the criteria for scientific defensibility, technical, and editorial accuracy, and presentation clarity as outlined in the Quality Assurance (QA) Project Plan, QA Narrative, Quality Management Plan, and/or according to direction from the EPA PO.

Client:	EPA Region \<X\>
Grant Number:	\<enter grant number\>
EPA Project Officer:	\<enter EPA PO\>
Project Number:	\<enter internal Project ID\>
Project Name:	\<enter internal project name\>
Grantee Org. Project Manager:	\<enter grantee's project manager\>

QA Form Details

Item Number	File Name (Copy the name of the File Reviewed)	Deliverable Description	Date Sent to Client	Deliverable (Draft)	(Final)	Document Originator	QA Review Information (Review Type)	(Reviewer Name)	(Date Review was Performed)	(Brief Summary of Review Findings and Other Notes)	(Have all Findings Been Resolved)	QA Review Information (Originator Signature)	(Reviewer Signature)	(File Location) *Copy Long Folder Path Name*
01				☐	☐		Technical				☐ Yes			
							Technical				☐ Yes			
02				☐	☐		Technical				☐ Yes			
							Technical				☐ Yes			
03				☐	☐		Technical				☐ Yes			
							Technical				☐ Yes			
04				☐	☐		Technical				☐ Yes			
							Technical				☐ Yes			
05				☐	☐		Technical				☐ Yes			
							Technical				☐ Yes			
06				☐	☐		Technical				☐ Yes			
							Technical				☐ Yes			
07				☐	☐		Technical				☐ Yes			
							Technical				☐ Yes			

Group B. Implementing Environmental Information Operations

Group B Elements identify and address all aspects of environmental information operations to help to ensure products and services are of known and documented quality and to evaluate the products and services delivered under the project.

This section of the QAPP describes in comprehensive detail the implementation of necessary QA and QC requirements and other technical activities to ensure that the results of the environmental information operations performed will satisfy the intended purpose, and the information/data quality objectives and performance/acceptance criteria in the Group A4 and A6 Elements.

B.1 Identification of Project Environmental Information Operations

Instructions:

This section of the QAPP describes the EIOs to be conducted and how they will satisfy the project purpose, as well as the data quality objectives, and performance and acceptance criteria (defined in the Group A.4 and A.6 Elements). Similarly, any guidance, tools, templates, etc. used should be noted in this section. Environmental Information Operations is a collective term for work performed to collect, produce, evaluate, compile, or use environmental information and the design, construction, operation, or application of environmental technology. Environmental information can be classified as either "primary" or "secondary" data. Primary data refers to environmental data collected directly by the organization whether through field activities or other on-site data gathering activities. Secondary data (also referred to as existing data or non-direct measurements) may come from several sources, including other studies, government databases, etc. Projects may involve one or both types of data and acquisition of data types should be documented in the QAPP.

Under this project, the following types of information are considered environmental information because these data will be evaluated for use in methodologies to estimate baseline-year, BAU, and Reference Case annual emissions estimates:

- Vessel characteristics
- Vessel fuel type and fuel consumption rates
- Vehicle miles traveled (VMT) and population,
- Vehicle age distributions
- Equipment hours of operation
- Equipment load factors
- Temperature and relative humidity by county, hour, and month;
- Fuel formulation and supply by county, month, and year;
- Inspection and maintenance (I/M) coverage by county and year;
- Stage II refueling program presence and efficiency by county and year;
- EPA emission factors

Example B.1 (Identification of Project Environmental Information Operations)

This section of the QAPP describes the EIOs to be conducted and how they will satisfy the project purpose, as well as the data quality objectives, and performance and acceptance criteria in the Group A4 and A6 Elements.

The EIOs under this project are divided into the six tasks presented under Element A5. Our EIOs, consistent with the project purpose, will develop reliable estimates of baseline and future emissions from the port under several options for equipment replacement. The following detailed steps describe the primary EIOs that will be conducted under this project:

Task 1 EIOs. Identify Existing Information about the Port.

A wide range of data for a diverse set of port-related equipment and activities is necessary to prepare a port-wide emissions inventory. Under Task 1, the following primary EIOs are all related to developing a comprehensive listing of mobile-source related operations, obtaining historical activity data for those operations, obtaining projections of future activity data for those operations, and identifying emissions factors or other methods for reliably converting annual activity data to annual emissions estimates.

EIO 1.1.   Review the most recent emissions inventory prepared for the port. Compile a listing of all the activities, subcategories of equipment, and associated pollutants included in the port's most recent inventory.

EIO 1.2.   Compare the listing of activities, subcategories, and pollutants from EIO 1.1 to the EPA's Port Emission Inventory Guidance. Add to the EIO 1.1 listing "potential" activities, subcategories, and pollutants that appear in the EPA Guidance but that are not included in the port's most recent inventory.

EIO 1.3.   Present the draft listing from EIO 1.2 to the port's Management Team and request the following feedback from the port's Management Team (PMT):
   a.   For each "potential" activity, is the PMT aware of any similar activities at the port?
   b.   If yes, who should the project team contact for the required activity data?
   c.   Request the PMT to review the listing and to add any missing operations.
   d.   Request the PMT to identify any equipment that will be replaced using the port's capital budget over the next X years if the equipment is not selected for replacement under this project.
   e.   For any listed equipment flagged for replacement by the PMT, what year would the replacement occur and what existing equipment has the most similar operating and emissions characteristics as the planned "new" replacements.
   f.   If no similar equipment is listed, can the PMT refer the project team to a vendor for the equipment who can provide a data sheet for a similar new engine?
   g.   Request the PMT to confirm that the selected baseline year is representative of "normal" operations for the period prior to the project.
   h.   For any equipment using shared fuel supplies (e.g., shared diesel fuel tanks) and activity data based on hours of engine operations, request the PMT to provide the best available estimates of fuel consumption per hour of operation for each unique type of equipment in the draft listing.
   i.   For the baseline inventory year ask the PMT to provide purchase records for all fuels (including electricity service) to support QC efforts to ensure hours of operations

data and fuel consumption per hour estimates are consistent with the total fuel consumption in the baseline-year inventory.

EIO 1.4. Based on feedback from the port's Management Team, develop a Master Listing of all port activities, subcategories, and pollutants to be used for all inventories. Include designations to indicate which activities share the same fuel supply and planned years of replacements to be reflected in BAU estimates.

EIO 1.5. For each activity, subcategory, and pollutant in the Master Listing, prepare a Methods Report that presents the port's current methodology, the activity data used, and the emissions factor used (including the customary units of measure used by the port and the source of the emissions factors).

EIO 1.6. Concurrently with EIO 1.5, for each activity, subcategory, and pollutant in the Master Listing, compare the port's current methodology to the EPA's prescribed methodology. If the two methods differ, add a section under the associated Master Listing entry entitled "EPA Method" (following the same format as EIO 1.5) that presents the EPA's prescribed methodology, activity data, and emissions factor (including the customary units of measure used in the EPA's method).

EIO 1.7. For each activity where the port's current methodology deviates from the EPA's prescribed methodology determine if the activity data recommended by the EPA is available from port records. If the activity data recommended by the EPA is available from the port, prepare emissions estimates consistent with the EPA's method and add a section to the brief report under EIO 1.6 detailing the differences in the two emissions estimates. Indicate if one or both estimates are more compatible with BAU projections and assign the Data Quality Ranking in Table 1.1 to each distinct methodology.

EIO 1.8. Schedule a meeting with the Project Manager and the Task 2 Leader to review the listing prepared under EIOs 1.6 and 1.7 and the comparisons of results by the two different methods, where available. Include a column in the Master Listing to indicate the Project Manager's decision on which method should be used for the inventories.

How do the Task 1 EIOs satisfy the project purpose under A.4?

The activities, subcategories, pollutants, and emissions estimating methodologies will be derived primarily under EIOs 1.1 and 1.2 from the port's most recent inventory with any supplemental data identified under EIO 1.3. Use of information that is specific to this port (rather than national averages for ports) is consistent with statutory objectives for delivering community-level benefits because this approach allows the EPA to identify the projects that have the greatest potential for improving air quality in the most disadvantaged communities, including the communities adjacent to major transportation hubs. The EIO 1.4 ensures that the potential reductions in criteria, toxic, and GHG emissions under the options analyses reflect a comprehensive review of port operations. EIOs 1.5-1.7 ensure that the methodologies to be used for the inventories are reviewed for consistency with the EPA's prescribed methods with formal approval by the PM for cases where the EPA's prescribed method is not used. This documentation will allow independent reviewers from the QC team to evaluate potential impacts of deviating from prescribed EPA methods.

How do the Task 1 EIOs satisfy the acceptance criteria under A.6?

The port's baseline inventory and the EPA's guidance for ports are the foundation of subsequent EIOs under all tasks. The acceptance criteria under A.6, DQO 1 is intended to ensure the baseline-year inventory is accurate and representative. EIOs 1.1-1.3 include measures to identify activities that may be missing from the existing emissions inventory, measures to incorporate subcategories as necessary to tailor emission estimates to different types of equipment that serve the same activity (or port operation). EIO 1.3 also includes early engagement with the port's management team to ensure all port operations and subcategories are reflected in the initial activity and equipment listing. Finally, EIO 1.3 also ensures the baseline-year is representative of normal operations for comparison to operations after option selection.

DQO 2 is intended to ensure the inventories can accurately differentiate fuel consumption and emissions by older engines from newer engines when these engines are fueled from the same storage tanks. EIO 1.3 and 1.4 ensure the project team has access to the most useful data available from the PMT for differentiating these fuel usages and emissions estimates in the inventory.

DQO 3 is intended to ensure the listed equipment reflects BAU operations over the duration of the BAU period considered in the BAU annual inventories. EIO 1.3 includes requests for information from the PMT that will allow planned equipment replacements to be incorporated in the BAU inventories.

DQO 4 is intended to ensure comparability of the BAU estimates with the Reference Case estimates (for equipment replacement options under this project). EIO 1.5-1.8 include measure to ensure baseline-year methodologies are also good for BAU projections.

DQO 5 is intended to ensure the project team can identify missing data and make the necessary data substitutions when missing data is identified. EIO 1.3 includes measure for identifying missing fuel consumption data and for estimating fuel consumption in the absence of these data.

Task 2 EIOs. Develop Baseline Year Emissions Inventory.

Task 2 will produce the first year of the BAU period using actual operating data for the port. The EIOs for this task are conventional air emissions inventory operations:

EIO 2.1.   For each activity in the Master Listing as approved by the PM under EIO 1.8, develop a sample set of independent, baseline-year, spreadsheet calculations for each pollutant consistent with the PM's selected methodologies.

EIO 2.2.   Compare the EIO 2.1 estimate to either the port's original estimate or the estimate prepared under EIO 1.7 and confirm the EIO 2.1 independent calculation is substantially consistent (within 10 percent) of either the port's original estimate or the EIO 1.7 estimate.

EIO 2.3.   For any deviations between the two independent estimates, route the two calculations to the Task 1 Leader and schedule a meeting to reconcile the differences. If the Task 1 and Task 2 Leaders cannot reconcile the differences, engage the PM and follow the PM's direction on resolving the differences.

EIO 2.4.   Include in the project files documentation of the rationale for resolving any differences and include a column in the Master Listing for tracking the resolution and PM's decision rationale. Make all these documents available to QC staff when draft is ready for review.

How do the Task 2 EIOs satisfy the project purpose under A.4 and the acceptance criteria under A.6?

The EIOs under Task 2 build on the EIOs under Task 1 and independently ensure that the methodologies specified under Task 1 can reproduce substantially the same estimates prepared independently by either the port or the Task 1 Leader. Accordingly, the EIOs under Task 2 confirm that all the project purposes and DQOs are satisfied as described under Element B.1, Task 1.

Task 3 EIOs. Evaluation of Equipment Activity Data (prior to beginning any future year projections).

Task 3 is intended to expand the evaluation of emissions estimating methodologies and activity data options from the methodologies documented in the Methods Report under EIO 1.8 (the port's current methodology and the EPA's guidance methodologies) to other feasible options including options and activity data identified during collaboration with the port's Management Team under EIO 1.3.

While Task 1 and Task 2 are primarily focused on developing the Master Listing of activities and establishing the methods to be used for available historical activity data, Task 3 is primarily focused on evaluating options for adapting these historical methods to uniform calculations of future projections.

The project team expects that the activity-level decisions by the PM under EIO 1.8 will occur separately (on different days) so that activities at the top of the Master List will be resolved early in the project and activities at the bottom of the Master List will be resolved later in the project. Accordingly, the Master Listing and Methods Report will be maintained as shared documents and updated with each PM decision under EIO 1.8. As each activity and method is finalized, the Task 3 Leader will begin evaluating options for the activity data or economic projections that will be utilized to scale port activity projections for 202X-202Y.

EIO 3.1. As each activity in the Master Listing and each associated methodology in the Methods Report are approved by the PM, the Task 3 Leader will draft an additional section for the activity in the Methods Report entitled *Future Projection Method (FPM)*. The added FPM section will include information responsive to the following questions for developing a standard method to project port activity-level estimates for 202X-202Y:
   a. What data source estimating future economic activity or port throughput projections will be utilized to estimate the particular activity metrics for 202X-202Y?
   b. How will equipment retirement/replacement plans (obtained from port management under EIO 1.3) be incorporated in the projections?
   c. Does the project team have the necessary information (manufacturer data sheets) for the new equipment?
   d. Are there other activity level data that will be more useful for the projections compared to the historic data used for the baseline year?
   e. What is the form of the standard calculation that would be used with the alternative activity data?
   f. Can the baseline method be adapted to the alternative method?
   g. Does the alternative method yield similar estimates (within 10 percent) of the historically used method?

EIO 3.2. Based on the research completed under EIO 3.1, the Task 3 Leader will draft in the Methods Report use of a spreadsheet projection method detailing the proposed economic projections or scaling approach for using the same activity data used in the baseline methodology. The spreadsheet will provide draft estimates based on the methodology for 202X-202Y.

EIO 3.3.   Also based on the research completed under EIO 3.1, the Task 3 Leader will draft a spreadsheet projection method detailing the proposed economic projections or scaling approach for using any alternative activity data (not used in the baseline methodology). The spreadsheet will provide draft BAU estimates based on the alternative method for 202X-Y. A separate spreadsheet in the same workbook will demonstrate the use of this method for one hypothetical (RC) set of equipment replacements and how the BAU sheet and the RC sheet will be compared to estimate emissions reductions for the RC.

EIO 3.4.   The Task 3 Leader will schedule a meeting with the PM and the Task 4 Leader to discuss the pros and cons of alternative activity data and adapting the activity data for future year projections. The PM will determine which method should be used for each activity and the PM's rationale will be added to the Methods Report.

How do the Task 3 EIOs satisfy the project purpose under A.4?

One of the primary project purposes is to develop reliable estimates of future emissions at the port, and the EIOs under this task are all focused on documenting the rationale for developing reliable projections. Accordingly, Task 3 EIOs satisfy the project purpose of developing reliable future year projections.

How do the Task 3 EIOs satisfy the acceptance criteria under A.6?

DQO 2, 3, and 4 are all related to developing reliable future estimates. The proposed EIOs under Task 3 support all three of these DQOs.

Task 4 EIOs. Development of Future Year Emissions Inventories.

Like Task 3, Task 4 EIOs for each activity in the Master List will commence upon the PMs approval of updates to the Methods Report under EIO 3.4. The project team expects the EIOs under Task 4 to be repeated for each individual port activity or batch of activities approved in periodic PM approvals under EIO 3.4. While Task 3 EIOs are intended to develop one or more options for an activity's methodology (as applied to a single instance of the activity on the Master List) for the PMs consideration, Task 4 is intended to apply only the PM-approved methodology to all of the instances of the activity included on the Master List to develop projected emissions estimates (and cost estimates for an hypothetical 10 percent RC replacement scenario) for all instances of the activity for 202X-Y.

EIO 4.1.   Upon approval of each activity's emissions projection methodology under EIO 3.4, develop a spreadsheet-based BAU emissions projection (202X-Y) for the activity in accordance with the approved methodology in the Methods Report.

EIO 4.2.   Upon approval of each activity's emissions projection methodology under EIO 3.4, develop a spreadsheet-based RC emissions projection (202X-Y) for the activity in accordance with the approved methodology in the Methods Report that (hypothetically) reflects replacement of X percent of the equipment supporting the activity.

EIO 4.3.   Develop a third spreadsheet that demonstrate how the subtraction of the RC calculations from the BAU calculations is implemented to derive the emissions reduction estimate for the hypothetical RC case.

EIO 4.4.   Schedule a meeting with the PM and the Task 5 Leader to review use of the draft workbook and worksheets prepared under EIO4.1-4.3. Upon approval of the PM, incorporate a brief description for using the workbook under the appropriate activity in

the Methods Report. Upon approval by the PM of the workbook and the draft content in the Methods Report, the workbook can be released to the Task 5 Leader for implementation of the Emissions Reduction Strategy Analyses.

How do the Task 4 EIOs satisfy the project purpose under A.4?

A primary project purpose is to develop reliable estimates of future port emissions, and Task 4 EIOs are all focused on implementing the projections methodologies approved by the PM under Task 3. Accordingly, Task 4 EIOs satisfy the project purpose of developing reliable future year projections.

How do the Task 4 EIOs satisfy the acceptance criteria under A.6?

DQO 2, 3, and 4 are all related to developing reliable future estimates. The proposed EIOs under Task 4 support all three of these DQOs.

Task 5 EIOs. Development of Emissions Reduction Strategy Analyses.

Task 5 EIOs are not expected to commence until after all future year projection spreadsheets and methodologies have been approved by the PM under EIO 4.4. The project team expects the Task 5 Leader to use an iterative approach for determining the best equipment replacement strategy for a series of hypothetical project budgets (i.e., discrete strategies for different budget levels such as a $1 million budget, $2 million budget, $5 million budget, etc.).

- EIO 5.1. For a hypothetical budget of $X million use a separate copy of the workbook approved under EIO 4.4 to develop an emissions reduction strategy that achieves the greatest emissions reductions for Reference Case X.
- EIO 5.2. For a hypothetical budget of $Y million use a separate copy of the workbook approved under EIO 4.4 to develop an emissions reduction strategy that achieves the greatest emissions reductions for Reference Case Y.
- EIO 5.3. For a hypothetical budget of $Z million use a separate copy of the workbook approved under EIO 4.4 to develop an emissions reduction strategy that achieves the greatest emissions reductions for Reference Case Z.
- EIO 5.4. For a hypothetical budget of $ZZ million use a separate copy of the workbook approved under EIO 4.4 to develop an emissions reduction strategy that achieves the greatest emissions reductions for Reference Case ZZ.
- EIO 5.5. For a hypothetical budget of $ZZZ million use a separate copy of the workbook approved under EIO 4.4 to develop an emissions reduction strategy that achieves the greatest emissions reductions for Reference Case ZZZ.
- EIO 5.6. Develop a Reference Case Summary Report that allows easy comparison of all options to be considered by budget authorities.

How do the Task 5 EIOs satisfy the project purpose under A.4?

The overall objective of the project is to develop reliable estimates for a range of equipment replacement options at the port that can have the greatest impact improving air quality in the port's neighboring communities. Accordingly, all EIOs under this task will deliver the best option for a specified budget level and demonstrate how the tool developed under this project can be used to evaluate future budget allocations for equipment replacements.

How do the Task 5 EIOs satisfy the acceptance criteria under A.6?

DQO 4 requires that the BAU and RC cases must be developed on a consistent basis to ensure BAU projections are directly comparable to RC projections. Task 5 EIOs and the approval process for the workbook tool deployed under Task 5 EIOs ensure that the Task 5 EIOs will satisfy the DQO 5 under A.6.

Task 6 EIOs. Documentation.

Task 6 EIOs are not expected to commence until after all Reference Case scenarios are completed under Task 5. No specific EIOs are planned under this task, but EIOs may be necessary based on feedback from the Project Manager, QAM, and project team during scenario development and the comparisons required under Task 5. Accordingly, the EIOs described below are generic and intended to ensure that any revisions to the workbook (previously approved under EIO 4.4) are supported by corresponding revisions to the Master List of equipment and to any revised methodologies in the Methods Report.

EIO 6.1.   For any revision to activity X under the Task 5 EIOs, make the necessary revisions to the Master List of equipment and to the Methods Report. Submit the corresponding document revisions to the PM for review and approval prior to routing the Task 5 workbooks, Master List, Methods Report, and RC Summary Report to the QAM for final independent review.

EIO 6.2.   For any revision to activity Y under the Task 5 EIOs, make the necessary revisions to the Master List of equipment and to the Methods Report. Submit the corresponding document revisions to the PM for review and approval prior to routing the Task 5 workbooks, Master List, Methods Report, and RC Summary Report to the QAM for final independent review.

How do the Task 6 EIOs satisfy the project purpose under A.4?

The overall objective of the project is to develop reliable estimates for a range of equipment replacement options at the port that can have the greatest impact improving air quality in the port's neighboring communities. Developing reliable estimates inherently requires developing and maintain reliable documentation that future users and decision makers can rely on when replicating or altering assumptions and budget constraints over time. Task 6 EIOs satisfy the requirement for reliable project documentation by ensuring the documents published with the options analyses have been updated with the most recent decisions and outcomes through EIO 5.6.

How do the Task 6 EIOs satisfy the acceptance criteria under A.6?

DQO's 1-5 all reflect the key objectives and criteria necessary to produce reliable and comparable BAU and RC estimates for 202X-Y. The Task 6 EIOs ensure that all late revisions to the Task 5 Emissions Reduction Analyses are identified, routed to the appropriate member of the primary technical team, and routed to the QAM for final approval prior to finalization. Accordingly, Task 6 EIOs ensure that all acceptance criteria and DQOs are evaluated and addressed in the final deliverables.

B.2 Methods for Environmental Information Acquisition

Instructions:

This section of the QAPP should describe the methods and procedures to be used, or cite specific Standard Operating Procedures (SOPs), and describe how environmental information will be acquired and implemented (applies to field sampling; laboratory analyses; environmental technology; or existing information obtained from databases, websites, etc.).

For primary data involving field sampling, it is important to establish SOPs and include a table listing all field sampling SOPs that will be used (if applicable). Include the title of SOP, date, revision number and organization that wrote the SOP. Describe any modifications to the SOPs that are necessary for your project. In this QAPP section, detail the analytical methods you will use to analyze the field samples collected, along with the required analytical QC for those methods. (This information can also be provided as a table.) Reference applicable SOPs with hyperlink or put in attachments/appendices. SOPs shall be available to personnel conducting the environmental information operations. Consider identifying the following methods and parameters, if applicable to the project.

- Field Activities Environmental Measurements, derived from tools, instruments, observational results, investigations, and sample collection. Describe sampling methods as applicable, including:
  - Specific procedures
  - Sequencing of samples
  - Sample containers, volumes, preservation and holding times
  - How samples are to be homogenized, composited, split, or filtered
  - Equipment and support facilities needed and preparation steps
  - Decontamination and disposal of waste by-products
- Laboratory Analyses
  - Analytical methods by number/identifier, version/revision date and regulatory citation (if applicable)
    - Laboratory data package turnaround time needed, if important to schedule.
  - For non-standard method applications, appropriate method performance study information is needed. If previous performance studies are not available, they shall be developed during the project and included as part of the project results.
- Environmental Technology
  - Identify whether the technology is primarily for pollution prevention, contamination containment, storage, or remediation.
  - Describe the physical parameters or processes collected using environmental technologies as well as the specific systems, devices, and their components applicable to both hardware and methods or techniques that measure and/or remove pollutants or contaminants and/or prevent them from entering the environment.
- Existing Information
  - For analyses using existing secondary data, all data received should be reviewed by a technical staff member to assess data quality and completeness before their use. Original sources for all information and data contained in the document should also be included in a

list of references with appropriate citations. When using secondary data, the TLs must document information regarding each dataset and the rationale/selection criteria for selecting the data sources used. The TLs will be responsible for overseeing and confirming the selection of the data for the project tasks. See Section D.2 for further information on data usability.

When addressing methods for environmental information acquisition, consider the following questions:

For primary data:

- What primary data will be collected throughout the project period?
- What analytical method was used to analyze any primary data collected?
- Did you reference the specific analytical SOPs utilized for each method?
- For primary data involving collecting air quality data, did you calibrate and/or perform QC checks?
- For primary data involving collecting air quality data, does the QAPP include information about possible sensor interferences and how they will be addressed? For example, sensors are sensitive to dust build-up, so routine cleaning is necessary to protect the instrumentation.

For secondary data:

- What secondary data will be used for any analyses conducted throughout the project period?
- If the information is to be combined with new environmental information, describe the criteria to ensure compatibility.

Example B.2 (Methods for Environmental Information Acquisition)

All EIOs conducted in this project will involve existing, non-direct measurement data. All existing data received will be reviewed by a technical staff member to assess data quality and completeness before their use. Original sources for all information and data contained in the document will be included in a list of references with appropriate citations.

The TLs will document information regarding each dataset and the rationale/selection criteria for selecting the data sources used. The TLs will be responsible for overseeing and confirming the selection of the data for the project tasks. See Section D.2 for further information on data usability.

B.3 Integrity of Environmental Information

Instructions:

Describe or cite the procedures for ensuring the integrity of the environmental information operations. For field sampling (if applicable), describe sample handling requirements and chain-of-custody procedures. For laboratory analyses (if applicable), identify each contracted laboratory and back-up laboratory and the processes for ensuring the laboratories maintain current accreditation and/or certification for applicable analytes and matrices.

Examples include but are not limited to:

- field documentation
- packaging
- transport and/or shipment from the site
- storage at the laboratory
- sample labels example
- Chain of Custody (COC) forms example
- shipping protocols
- if laboratory involvement, identify each laboratory to be used, and include the <u>laboratory's current accreditation and/or certification</u> for the applicable analytes and matrices.

Example B.3 (Integrity of Environmental Information)

Data collected and used throughout this project may be primary or existing (secondary) data. Initially, estimates will be derived using federal, state, local, or manufacturer equipment specifications collecting year-manufactured, make, model, body style, fuel, and description operational data for each source category. Any data, formulas, methods, or best-practices that are used to inform the uses and calculations of the data, will be evaluated in a consistent manner to ensure source integrity. As primary and existing data and sources are identified and evaluated, they will be reviewed by a second technical staff to ensure consensus across the data and sources.

For existing (secondary) data -Subsequently, the Port may elect to supplement estimates derived using the *(insert methodology)* with estimates for each source category from existing local inventories, existing local activity data, or from other EPA, state, local resources. Calculated estimates derived from local activity data will be compared to federal datasets estimates for validation.

Port performance and statistical data will be downloaded from the USDOT Bureau of Transportation Statistics (BTS). Additional data, such as EPA emission factors, will be accessed from EPA websites.

Instructions:

In this section of the QAPP, describe the frequency of each type of QC activity, corrective actions, and how the effectiveness of the corrective action shall be determined and documented. State who is responsible for verifying the corrective actions have been implemented, and who is responsible for preparing and filing the QC documentation.

When describing quality control, consider addressing the following questions if applicable to your project type:

- How will the project team identify unexpected or incorrect variances in EI results that may warrant further data quality investigation?
- How will QC flags be recorded and communicated to the appropriate teams?
- Who will be responsible for reviewing the QC results and determining the appropriate actions to address them?
- What is the process to track and verify that corrective actions have been addressed?

Example B.4 (Quality Control)

Sections A.6 and B.1 discussed reviewing and assessing the data collected. Additionally, all data entered into spreadsheets and all calculations completed for analyses will be reviewed by a senior technical QC reviewer. The QC reviewer will evaluate the approach to ensure the methods are appropriate and have been applied correctly to the analysis. The QC reviewer will also confirm all data were entered correctly and that calculations are complete and accurate; one option is by repeating the calculation independently and comparing the results of the two calculations. Any data entry and calculation errors will be identified and corrected. Data tables prepared for draft and final reports will be checked against the spreadsheets used to store the data and complete the analysis.

After preparation of each primary estimate under Tasks 1, 2 and 3, the PTT will submit the draft products of each EIO to a senior technical QC reviewer. Within 1 week of receipt, the QC reviewer will complete an initial review of each draft work product and schedule a meeting with the PTT to discuss any questions and conformance with the acceptance criteria under A.6. The frequency of subsequent reviews will depend on the extent of the reviewer's findings, but best efforts will be deployed to finalize each work product within 4 weeks of the initial receipt by the QC reviewer. If findings are unable to be resolved during the review, the PTT will notify the QAM for guidance on resolution. Ultimately, the effectiveness of corrective actions shall be determined by the QAM in accordance with criteria established under A.6.

When comparing primary estimates to independent estimates under A.6 the basis for the calculated percentage shall be the primary estimate unless otherwise determined by the senior technical QC reviewer.

The default calculation shall be in the following form:

- Percent Difference (between primary estimate (PE) and QC estimates)

$$= [\text{Absolute Value of } (PE - QC)]/PE.$$

For EIOs that rely on existing data, QC activities will include the use of systematic review, independent secondary review of emissions factors and emissions limits in the open literature, and QC of constructed databases or spreadsheets prepared by the PTT.

B.5 Instrument/Equipment Calibration, Testing, Inspection, and Maintenance

Instructions:

The QAPP shall identify instruments/equipment, to include, but not limited to tools and gauges used for environmental information operations. The QAPP shall describe all procedures and documentation activities that will be performed to ensure that the instruments/equipment are available and in working order when needed. The QAPP shall describe or reference procedures and documentation activities on how instruments and equipment will be tested, inspected, and maintained. Applicable SOPs can be referenced in this section.

When describing calibration, testing, inspection, and maintenance, consider addressing the following questions if applicable to your project type:
- How will calibration be conducted, documented, and traceable to the instrument?
- What equipment (field and laboratory) needs periodic maintenance, testing, or inspection?
- How will instruments and equipment will be tested, inspected, and maintained?
- How will testing be documented?
- What is the availability of critical spare parts?

Example B.5 (Instrument/Equipment Calibration, Testing, Inspection, and Maintenance)

This CPP project does not involve the collection and analysis of samples nor the use of any laboratory equipment. Thus, this section (B.5 - Instrument/Equipment Calibration, Testing, Inspection, and Maintenance) is not applicable to this project, and this QAPP does not require the content specified in this element of EPA's QAPP Standard.

B.6 Inspection/Acceptance of Supplies and Services

Instructions:

In this section of the QAPP, describe or reference the procedures for how supplies and services are inspected and accepted.

Identify responsible individuals for inspection and acceptance.

Supplies may include but are not limited to spare parts for instruments/equipment, standard materials and solutions, sample bottles, calibration gases, reagents, hoses, deionized water, potable water, and electronic data storage media. Services provided by vendors to include, but not limited to contractors, sub-contractors, and sub-grantees may include document development, performing environmental information operations.

Note: If the project will not require supplies for collecting samples as noted in Element B.5, and will not utilize services provided by vendors, such as by contractors, sub-contractors, and subrecipients performing environmental information operations, see the example response text for Section B.6.

When describing your project team's procedures for inspection/acceptance of supplies, consider addressing the following questions if applicable to your project:

- Are critical supplies and consumables identified? If not listed within the QAPP, cite where this information can be found.
- Are acceptance criteria stated, if necessary?
- How are use of supplies and consumables tracked?
- Who is responsible for tracking/ordering supplies and consumables?
- Is documentation maintained that demonstrates the supplies/consumables are acceptable for use?
- Are procedures in place (e.g., labeling) to help ensure supplies/consumables are used before their expiration dates?
- Does the organization responsible for particular EIOs have any policies regarding the use of expired materials?

When describing your project team's inspection/acceptance of services, consider the following questions (if applicable):

- Are services provided by vendors identified?
- Who is responsible for oversight of the vendors?

Example B.6 (Inspection/Acceptance of Supplies and Services)

This CPP project does not require supplies for the collection and analysis of samples nor the use of any laboratory equipment. Additionally, this project does not utilize services provided by contractors or sub-grantees. Thus, this section (B.6 - Inspection/Acceptance of Supplies and Services) is not applicable to this project, and this QAPP does not require the content specified in this element of EPA's QAPP Standard.

This CPP project does not require supplies for the collection and analysis of samples nor the use of any laboratory equipment. However, this project does include services provided by contractors or subawardees for gathering and analyzing environmental data. The PM maintains contractor oversight for the life of this project. Contractor services will be reviewed as outlined in the Statement of Work for Contract #00000. Under this project, <the Grantee's> existing quality management systems will be utilized such that task-level deliverables will be subjected to required, regular reviews (e.g., quarterly) to ensure that technical, financial, and schedule requirements of this project are consistent with the expectations for handling and producing deliverables that reflect high-quality environment data as required by this QAPP. Assessment and oversight are discussed further in Sections C.1 and C.2, respectively.

B.7 Environmental Information Management

Instructions:

In this section of the QAPP, describe how environmental information will be managed, tracing the path of data generation in the field/laboratory to the final data use and end storage.

Identify and describe all data handling equipment and procedures to process, compile, and analyze the data, including any computer hardware and software, or paper-based processes.

Describe or reference the standard record-keeping procedures, the document control system, and the approach used for information storage and retrieval on electronic media. Include any checklists used for data management.

Describe the control mechanism for detecting/correcting errors and ensuring accuracy.

Describe or reference all procedures to process, compile, and analyze the information.

List any required computer hardware/software and describe the procedures to demonstrate hardware/software configuration acceptability and to assure that applicable information resource management requirements are satisfied.

Information security and back-up is also a critical function that should be discussed in this section of the QAPP. Describe the process for ensuring original, unaltered information is retained and never overwritten. Discuss how information is backed-up and at what frequency. *Note: Daily back-up is recommended.* Some file management systems (e.g., SharePoint) automatically save new file versions as documents are modified. Use of these file systems should be noted and explained.

When describing your project team's data management system, consider addressing the following questions if applicable to your project:
- How and where are data stored?

- What type of data acquisition system is in use?
- Is data transmitted by hand (e.g., data entry forms) or electronically?
- Are paper or electronic strip charts used?
- How is data integrity maintained? Is raw, unaltered data maintained such that the project team can always see or retrieve the original data? If so, where and how is the raw data maintained?
- Are procedures to process, compile, and analyze data included in a specific SOP? If so, which one(s)? Cite any applicable data handling, processing, and/or validation SOPs.
- Are there procedures in place to test or periodically audit the acceptability of the hardware and software configurations? If so, describe.
- Who is responsible for each information management task?
- What security measures are in place to ensure information is not unintentionally modified or deleted?
- How is data backed-up?
- What is the frequency of back-up?
- Are recovery measures tested?
- How is the final information stored and archived?
- How long is information retained?
- When software upgrades occur, are archived data(bases) similarly updated such that data is still accessible during its retention period?

Example B.7 (Environmental Information Management)

Quality Assurance/Quality Control (QA/QC) of data management will begin with the raw data and will end with a publicly available report. Data management encompasses and traces the path of the data from their source to their final use or storage and includes the control mechanism for detecting and correcting errors. Data management procedures also include file storage and file transfer. All project and data files will be stored on the Port of Stormhaven's (grantee) project servers. Files will be organized and maintained by the TLs in folders by project, task, and function, including a system of file labeling to ensure version control. The TLs will make sure that staff are briefed on and adhere to the project file organization and version control labeling to ensure that files are placed in consistent locations. The project server automatically backs up all files each night to avoid loss of data. Data are stored in various formats that correspond to the software being used. As necessary, data will be transferred using various techniques, including email, File Transfer Protocol, or shared drives. Section A.12 provides the record retention timeframe for files generated under this project.

The Port of Stormhaven (grantee) has developed a file naming convention/nomenclature for electronic file tracking and record keeping. Foremost, all files must be given a short but descriptive name. For those records and files gathered or provided to the grantee, the filename may include the identification of "original" in its filename. Similarly, files that have undergone a review by an independent, qualified person will include, at the end of the filename, the initials of the reviewer(s) along with the date reviewed and version number, to track which staff person(s) reviewed the file and when. For each successive draft of a document, the version is numbered sequentially (e.g., v1, v2, v3) until a final version is complete. The final version will have the highest version number and most recent date. In the event data retrieval is requested and to prevent loss of data, all draft and final file versions will be retained electronically - that is, superseded versions will not be deleted.

Note that changes made to deliverables will be documented using the software's track changes feature, which allows a user to track and view all changes that are made to the document version. All deliverable reviews will be documented in a QC Documentation Form (see Section A.12 Documentation and Records) for the project. This form will be maintained in the project files.

For this project, it is not anticipated that any special hardware or software will be used. General software available through the Microsoft Suite including Excel, Word, Access, and PowerPoint and will be sufficient to perform the tasks for this project.

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Group C. Elements for Assessment, Response Actions, and Oversight

The elements in this group address assessment, response actions, and oversight activities. Assessments ensure that the planned project activities in the QAPP are implemented as approved. Assessments can be internal and/or external and should be conducted throughout the project to ensure that usable environmental information are obtained. Response actions address findings, corrective actions and non-conformances identified from the assessments.

Oversight activities ensure that response actions and reporting mechanisms are in place to capture the project status and any QA issues that arise during implementation and through assessments. The elements in this group address the activities for assessing the effectiveness of project implementation and associated QA and QC activities.

C.1 Assessments and Response Actions

Instructions:

This element addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of an assessment is to ensure that the QAPP is implemented as approved. Assessments are conducted both during and after the environmental information operations identified in the Group B Elements. In this section of the QAPP, describe the assessments your project team performs or participates in, in order to ensure the project activities are being conducted as planned and are generating acceptable data.

You may choose to use a table or chart summarizing the assessments and their required frequencies. Descriptions for this section should:

- Identify the assessments for the project to include the number, frequency, and types of planned assessments.
- Identify the individual(s) responsible for performing the assessments and where the findings and corrective actions will be documented. *Confirm assessors do not have any conflicts of interest.*
- Identify who will receive the assessment document, who will be responsible for implementing response actions, and who will follow up to ensure completion of any response actions.

Assessment activities may include audits, performance evaluations, management reviews, peer reviews, inspections, surveillances, or readiness reviews (including competency assessment, pre-award assessment of proposal, or technical assessment), peer consultations, product reviews (e.g., data inspection, software testing, pre-dissemination reviews, or review of contractor deliverables).

Also, in this section of the QAPP, describe how and to whom the results of the assessments shall be reported. Along those lines, discuss how response actions to non-conforming conditions shall be addressed and by whom. Include a discussion of stop work orders, where appropriate.

When describing your project team's assessments and corrective actions, consider addressing the following questions if applicable to your project:

- How do you ensure the project is conducted as described in the QAPP?
- Do you conduct internal systems audits? If so, please describe. Who conducts them and on what frequency?

- Do you conduct internal performance audits? If so, please describe. Who conducts them and on what frequency?
- Who is responsible for reporting the need for corrective actions?
- Is there a process in place that would allow any project personnel to initiate a corrective action process, if warranted? If so, please describe. If included in an SOP, provide the specific reference.
- How many business days are allowed between the time the need for a corrective action is reported and the time the corrective action measure is completed?
- How are corrective actions tracked and documented?
- Who will assess the effectiveness of a corrective action measure to determine whether it successfully resolved the issue?
- Is there a process in place to communicate when corrective action measures are disputed and/or unresolved? How would such disputes be elevated? For example, would the issue be communicated to the project team's QA Manager or Director for resolution, or to the EPA Regional Office? Describe the mechanism used by the project team to resolve disputes.
- As a part of QA oversight, does the project team have any emergency/contingency plans that should be implemented when certain situations arise or when assessment(s) show that data quality/quantity is in jeopardy?

Note: *Assessors should be free of any conflicts of interest, such as might occur by close association with the environmental information operations being assessed. Independence from the environmental information operations helps to ensure that the assessor has no stake in the outcome of the assessment, other than an interest that the environmental information operations are conducted objectively and in accordance with the approved QAPP.*

Example C.1 (Assessments and Response Actions)

The QA program includes periodic review of data files and all draft deliverables. The essential steps in the QA program are as follows:

1. Identify and define the problem
2. Assign responsibility for investigating the problem
3. Investigate and determine the cause of the problem
4. Assign and accept responsibility for implementing appropriate corrective actions
5. Establish the effectiveness of and implement the corrective action
6. Verify that the corrective action has eliminated the problem.

The TL of the Primary Technical Team (PTT) will provide day-to-day oversight of the quality system for their task. The TL will meet regularly with project implementation staff to identify emerging or unanticipated problems and be responsible for stop work orders, corrective actions, and follow-up. Periodic project file reviews will be carried out by the QAM at least once per year to verify that required records, documentation, and technical review information are maintained in the files. The QAM will ensure that problems found during the review are brought to the attention of the applicable TL and are corrected immediately. All nonconforming data will be noted, and corrective measures to bring nonconforming data into conformance will be recorded.

The TLs and QAM are responsible for determining if the quality system established for the project is appropriate and functioning in a manner that ensures the integrity of all work products. All technical staff have roles and will participate in the corrective action process. Corrective actions for errors found during QC checks will be determined by the TL and, if necessary, with direction from the QAM or PM, as appropriate. The originator of the work will make the corrections and will note on the QC form that the errors were corrected. A reviewer or TL, not involved in the creation of the work, will review the corrections to ensure the errors were corrected. Any problems noted during audits will be reviewed and corrected by the QAM and discussed with the TL as needed. Depending on the severity of the deficiency, the TL may consult the QAM and stop work until the cited deficiency is resolved. The QAM will produce an assessment report outlining any issues discovered and the corrective actions taken. The assessment reports will be provided to the PM, as applicable. The QAM and TLs will comply and respond to all internal and EPA audits on the project, as needed. The QC forms, assessment reports, and periodic reports will be maintained in project files.

C.2 Oversight and Reports to Management

Instructions:

This section of the QAPP is geared towards illustrating how the results of assessments are communicated up the management chain, so that all parties supporting the project – including the lead organization's final decision maker – are aware of data quality issues and concerns. With this in mind, in this section of the QAPP, discuss your project team's approach to this communication process. Identify the frequency and distribution of routine reports issued to inform management of the status of the potential issues identified in the assessments, which includes information regarding the results of performance evaluations, systems audits, data audits, and/or any significant quality assurance problems and recommended solutions. Identify the preparer and the recipient(s) of the reports (the Project Operations Manager, Project QA Manager, and EPA organization sponsoring the work should be included), who will transmit the reports and how they will be transmitted, content of the reports, any specific actions management is expected to take as a result of the reports. This information may also be presented in a table format. At minimum, distribution shall include the Project Operations Manager, the Project QAM of the organization conducting the work, and the EPA organization sponsoring the work.

Your project team should complete internal reports to management, and possibly external reports that are provided to other data users. When writing this section of the QAPP, think about any internal or external reports you generate to share data results and concerns. Consider the following questions in the QAPP (if applicable):

- Who has responsibilities to make sure oversight activities, response actions, and reporting mechanisms are in place?
- Do project operators compose a routine report to the appropriate QA Manager that summarizes activities and/or highlights specific reasons for data loss? If so, please discuss.

- Are written reports issued that contain the results of in-house performance audits or systems audits? How are these reports disseminated?
- If during a performance or systems audit issues are found that require corrective action, do you generate a separate Corrective Action Report that is geared towards correcting the specific issue? Or is the need for corrective action contained within the body of the main report and not separated out?

Example C.2 (Oversight and Reports to Management)

After completion of each of the following milestones in the project, the QAM is responsible for preparing a report for the PM summarizing the initial findings by the QC team, response actions by the PTT, implications for subsequent tasks, and any recommendations for revising this QAPP. If milestones are completed concurrently, a report may include summary information for multiple tasks.

1. The initial training and certification of the PTT and QC team members under A.11.
2. The compilation of work products under Task 1.
3. The compilation of work products under Task 2.
4. The compilation of work products under Task 3.
5. The compilation of work products under Task 4.
6. The compilation of work products under Task 5.

Additionally, biannual progress reports (to the EPA PO) required in the grant agreement will describe the status of the project, accomplishments during the reporting period, activities planned for the next period, and any special problems or events including any QA/QC issues. Reports to the EPA will be drafted by the TL or other project staff familiar with project activities during the reporting period. These periodic progress reports will be reviewed by the PM to ensure the project is meeting milestones and objectives for the Clean Ports Program and that the resources committed to the project are sufficient to meet project objectives within the project performance period.

QC issues impacting the quality of a deliverable, the project budget, or schedule will be identified and promptly discussed with the assigned TL and the PM or QAM as appropriate. Significant findings will be included in the periodic reports with the methods used to resolve the specific QC issue or the recommendations for resolution for consideration by the EPA PO or designee.

Based on the technical work completed during the reporting period, progress reports will be reviewed internally by an independent, qualified technical person (equivalent or senior to the TL), prior to submitting to the PM. The PM will conduct a final review of the report before transmitting the progress report to the EPA PO.

Reports, such as the milestone QC reports and grant progress reports, are maintained in project files.

Group D: Elements for Environmental Information Review and Usability Determination

The elements in this group address the activities associated with environmental information review for the purpose of determining whether the environmental information meets the established environmental/data quality objectives, the performance/acceptance criteria, and are useable for its intended purpose. Information review activities ensure that products and services resulting from the environmental information operations are of known and documented quality for their intended use(s) and that any limitations concerning its intended use is documented and communicated.

Although environmental information review takes place after the environmental information operations have been conducted, determination of the type of information/data verification, information/data validation, and information/data quality assessment activities needed to determine whether the project's environmental information/data quality objectives are met begins during the planning phase of the project and are documented in the QAPP.

D.1 Environmental Information Review

Instructions:

In this section of the QAPP, describe the methods or procedures to be used when verifying and validating data, as well as documenting the process. The QAPP should describe who is responsible for each level of data review and what each level of data review entails. Verification includes both self-review and peer-review of data and records. Validation, on the other hand, should be independent of the data generation process and involve a more in-depth review, ensuring data meets its intended use. This section should:

- Describe the procedures for the information/data verification and validation activities, as they are conducted prior to and may serve to inform information/data quality assessment activities. All three processes (verification, validation, and quality assessment) should be described along with who is responsible for each step.
- Describe the QA activities that will occur after the EIO phase of the project is completed.
- Describe how performance/acceptance criteria and information/data quality indicators identified in Section A.6 will be incorporated in the environmental information/data review process.
- Describe who will conduct these activities and how the activities will be documented and communicated.

When describing your project team's verification/validation methods, consider the following questions:
- Do you have a Data Validation SOP? If so, cite it. Language for this section can be reduced by referencing the SOP, as appropriate.
- Do you identify and flag data that may have been considered an outlier or exceptional event?
- Who verifies the data? On what frequency does it occur and what does it entail?
- Who validates data? On what frequency does it occur and what does it entail?
- Is there a hierarchy in this data review process that ensures multiple sets of eyes review the data? Describe the hierarchy and explain how it provides adequate independence during data validation.

- If your project team does not have a multi-leveled (tiered) data review process because of limited staffing, how will your team maintain adequate independence when validating data? Describe the review structure and explain how independence will be achieved.
- How is the data verification/validation process documented? For example, do site operators complete a monthly report where they have verified, flagged, and/or coded the data sets for which they are responsible, and then submitted those reports to a QA Manager (or equivalent) for additional review and validation? Or does the QA Manager complete a report each month that describes the overall validation of the data set? Describe your process.

Example D.1 (Environmental Information Review)

As a standard operating procedure, each TL is responsible for ensuring all data (retrieved or generated) for this project will be submitted to the QAM for verification, validation, and data quality assessments (as differentiated below with the definitions of these terms).

Work conducted under this project by the Primary Technical Team (PTT) will be subject to technical and editorial review, first by TLs followed by independent QC staff. When existing data for the same activity are available from multiple sources, the background information documents will be reviewed for all sources to determine the dataset that is the most representative of operations in the domain and the PM (or TL) and QAM will determine which data set(s) should be used for the primary estimates and which should be used for QC measures. Additionally, preference will be given to the most recent dataset that is representative of similar activities in the domain.

In addition to the quality assurance measures implemented by the PTT, the quality of data used and generated for the project will be formally verified and documented by the QC team when the PTT submits each draft deliverable to the QAM. This formal QC verification of EIOs will be conducted by a senior technical reviewer (on the QC team) with specific, applicable expertise and training under Section A.11. The QC team is responsible for verifying both the original draft and any modified files prepared by the PTT in response to QC team findings. Both original and modified data files will be verified for input, handling, and calculation errors. Additionally, units of measure will be checked for consistency. Potential issues identified through this review process will be evaluated and, if necessary, data will be corrected, and analysis will be revised as necessary, using corrected data. These verification activities will be documented in project records.

Typical data verification reviews may include checks of the following:

- Data sources are clearly documented and will be evaluated to confirm that the data meet quality objectives,
- Calculations are appropriately documented (e.g., factors used to convert the data to the required units will be checked against primary references and will be documented),
- All relevant assumptions are clearly documented,
- Conclusions are relevant and supported by results,
- Text is well-written and easy to understand,
- At least 5 percent of the data entered into data tables will be checked and no less than 10 percent of calculations will be checked by a knowledgeable member who did not perform the calculations.

Some data operations conducted on this project will involve existing, non-direct measurement data (e.g. electricity use). All existing data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use.

Consistent with the EPA's QA requirements, this QAPP describes the procedures that will be used to ensure the selection of appropriate data and information to support the goals and objectives of this project. Specific elements addressed by this QAPP include:

- Identifying the sources of existing data,
- Presenting the hierarchy for data selection,
- Describing the review process and data quality criteria,
- Discussing quality checks and procedures should errors be identified, and
- Explaining how data will be managed, analyzed, and interpreted.

Table 3.1 Existing Data Quality Ranking Hierarchy

Quality Rank	Source Type
Highest	Federal, state, and local government agencies
Second	Consultant reports for state and local government agencies
Third	NGO studies; peer-reviewed journal articles; trade journal articles; conference proceedings
Fourth	Conference proceedings and other trade literature: non-peer-reviewed
Fifth	Individual estimates (e.g., via personal communication with vendors)

The documented review process will be stored with deliverables for the project.

QC objectives include verification that data in database tables are stored and transferred correctly, algorithms call data correctly, units are internally consistent, and reports pull the required data. These data management measures will be addressed as part of the QC checks of data acquisition and document preparation.

Forms for documenting QC activities and review of deliverables are included in Section A.12 Documentation and Records. Documentation of calculations to support verification will be included in spreadsheet work products and in supporting memoranda, as appropriate.

After completion of verification of the primary calculations by the QC team, the QC team will validate the emissions estimates for conformance with Section A.6 acceptance criteria using independent calculations as directed by the QAM.

For this project, it is not anticipated that any special data validation software will be required. However, where calculations are required to assess the data/datasets, calculations will be performed using computer spreadsheets (like Excel spreadsheets with predefined functions, or formulas) and calculators to reduce typographical or translation errors. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work as described in Section A.5.

The QAM will prepare a formal report of the findings for each cycle of primary work followed by formal independent review. The TLs will review each DQA report with the PM, QAM, and the EPA PO (as directed) to ensure the PTT understands the QAMs findings and to ensure the planned corrective actions are fundamentally sound and will meet the project objectives. All documentation developed by the TL to resolve DQA Report findings will be maintained in project files and made available to the QAM for final resolution of findings.

Any quality deficiencies detected by reviewer parties will be documented and communicate in writing to the QAM and EPA PO. The TLs will be responsible for ensuring that appropriate corrective action is taken and that these actions are reported for final review and concurrence. These corrective actions will also be documented in the final report.

D.2 Usability Determination

Instructions:

Determining usability of the environmental information is the culmination of the entire QA process for the project and involves a retrospective evaluation of the planning process. Not all environmental information may be useable for its intended purpose. The usability of the environmental information is performed at the conclusion of the environmental information operations using the outputs of the environmental information/data verification, validation, and quality assessment activities. This reconciliation phase involves a qualitative and quantitative evaluation of environmental information to determine if the project information is of the right type, quality, and quantity to support its intended use and are suitable for the decisions that will be made.

This section should:

- Describe the overall project evaluation process that will be routinely performed to determine the usability of the data. *For example, the process will include evaluation of observations, trends, anomalies, or data gaps that may exist; assessment of the results to determine if the project information is of the right type, quality, and quantity to support its intended use and are suitable for the decisions that will be made; and evaluation to determine if the objectives of the project have been met. Draw conclusions and recommendations from all the information.*
- Identify who will conduct the determination and where documentation of the determination will be kept.
- Describe communication methods of any known or anticipated limitations on the use of the environmental information, to whom that information will be communicated, and how and where the communication will be documented.

Example D.2 (Usability Determination)

The TLs will document all data sources used and any significant limitations of utilized data or information to ensure that the data are appropriate for their intended use. An internal technical reviewer will review the approach for selecting and compiling data; the review will include examination of the data sources and the intended use of the data. The specific QC techniques used will depend on the technical activity

or analysis to which they are applied. The TL is responsible for verifying the usability of data and related information. Not all environmental information will ultimately be useable. All documentation developed by the TL for the usability determinations will be maintained in project files.

The TL will work with the QAM and EPA PO to ensure that all data used for the project are appropriate for their intended use. The main criteria that will be used in the selection of the data are the quality of the data (based on peer review, credible source, and/or QA documentation), availability, and suitability for the intended purpose.

These measures of data quality will be used to judge if the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will document a discussion for review and approval by the PM and QAM explaining how outcomes that relied on such data compare to estimates. We will also consider, for example, the age (i.e., date of the source dataset) and the representativeness of the data and will include in the outcomes report for review and approval by the PM and QAM any quality concerns or uncertainties introduced with use of these data, such as data gaps or inconsistencies with other sources. Any data source utilized that is older than 10 years will specifically be flagged in the outcomes report.

Representativeness will be evaluated by determining that the emissions or activity data are descriptive of conditions in the United States, that the data are current, and that the data are descriptive of similar processes within the domain. Any incomplete datasets will be identified, and deficiencies will be evaluated to determine if data are missing or confusing and if they meet quality objectives.

Key screening criteria will be used to screen the sources identified. The TL will provide oversight to the screening process to ensure sources collected are the most relevant and meet quality requirements. Available data and information from the selected sources will be compiled and relevant summary information will be extracted from the information sources to develop the required output for each of the project tasks. As noted above, documentation developed by the TL for the usability determinations will be maintained in project files.

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5. References

EPA, *Chief Information Officer's Policy Directive on Information Technology / Information Management: Quality Assurance Project Plan (QAPP) Standard*, Directive # CIO 2105-S-02.1, April 2024. Available at https://www.epa.gov/quality/quality-program-directives.

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EPA, *Guidance on Systematic Planning Using the DQO Process,* Guidance QA/G-4, Directive # EPA/240/B-06/001, February 2006. Available at https://www.epa.gov/quality/quality-program-directives.

EPA, *Quality Assurance Requirements for Monitors used in Evaluations of National Ambient Air Quality Standards*, 40 CFR Part 58, Appendix A to Part 58. Available at https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-58/appendix-Appendix%20A%20to%20Part%2058