OCS Study
BOEM 2024-067

Outer Continental Shelf Air Quality System (OCS AQS) Operator User Manual (Version 1.14)

The Outer Continental Shelf Air Quality System

U.S. Department of the Interior
Bureau of Ocean Energy Management
Sterling, VA

OCS Study
BOEM 2024-067

Outer Continental Shelf Air Quality System (OCS AQS) Operator User Manual (Version 1.14)

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DISCLAIMER

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List of Acronyms and Abbreviations

Short Form	Long Form
AEM	Activity & Emissions Manager
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
BEC	Batch Emissions Calculator
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CH_4	methane
C_2H_6	ethane
C_3H_8	propane
C_4H_{10}	butane
C_5H_{12}	pentane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CSV	Construction Support Vessel
DOI	Department of the Interior
e-GGRT	electronic Greenhouse Gas Reporting Tool
EF	emission factor
FAQ	Frequently Asked Question
GHG	greenhouse gas
GHGRP	Greenhouse Gas Reporting Program
GOADS	Gulfwide Offshore Activities Data System
GOR	gas-to-oil ratio
GWP	Global Warming Potential
HAP	hazardous air pollutant
LDAR	Leak Detection And Repair
MS	Microsoft
MSL	mean sea level
NO_x	nitrogen oxide
NPLO	non-point lease operations
OCS AQS	Outer Continental Shelf Air Quality System
OMB	Office of Management and Budget
OPD	Official Protraction Diagram
$PM_{2.5}$	fine particulate matter
PM_{10}	coarse particulate matter
QA	Quality Assurance
QC	Quality Control
SO_x	sulfur oxide
SO_2	sulfur dioxide
THC	total hydrocarbons
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

Units of Measure

Units	Description
%	Percent
bbl	U.S. barrel (42 gallons)
Btu	British thermal unit
days	24-hour period
deg F	degree(s) Fahrenheit
ft	foot/feet
gal	gallon(s)
hp	horsepower
hr	hour(s)
kW	kilowatt(s)
lb	pound(s)
lb xx/lb	fraction of xx in total weight
MMBtu	million Btus
MMscf	million standard cubic feet
mol	mole(s)
month	calendar month
Mscf	thousand standard cubic feet
ppm	parts per million
ppmv	parts per million volume
psia	pounds per square inch, atmosphere
psig	pounds per square inch, gauge
scf	standard cubic feet
wt%	percent of total weight
year	calendar year

1 Getting Started with OCS AQS

The Outer Continental Shelf Air Quality System (OCS AQS) is a comprehensive web-based software solution for managing and reporting OCS emission source data in the Gulf of Mexico and Alaska regions, including inputting activity data, calculating emissions, performing quality assurance and control, and submitting the emissions results. OCS AQS provides an intuitive user interface to facilitate the participation by the offshore operators in the annual survey program mandated by the Bureau of Ocean Energy Management (BOEM).

1.1 About this Document

This user manual was prepared to assist the operators in their use of OCS AQS to complete the 2023 OCS Emissions Inventory in compliance with 30 CFR 550.303(k) and 550.304(g). As OCS AQS is a web solution that supports regular updates, the user manual will serve as a living document which will be updated periodically to reflect software updates to OCS AQS.

> ***IMPORTANT:*** **This document is <u>for operators ONLY</u>**. While officials at BOEM have access to a broader range of functionality, it is not described here. A separate Administrator Guide is available to BOEM and Bureau of Safety and Environmental Enforcement (BSEE) users.

Please note that OCS AQS replaces the legacy Gulfwide Offshore Activities Data System (GOADS) but includes similar required data input fields. Key differences between OCS AQS and GOADS include the following:

- OCS AQS is a web-based system that can be accessed from a web browser and does not require a separate software installation.
- OCS AQS has dashboards, reports, analytics, and mapping features to provide user-friendly and content-rich interfaces.
- OCS AQS includes historical emissions inventories (2000, 2005, 2008, 2011, 2014, 2017, and 2021) for reference and review by operators and lessees.

1.2 Supported Browsers

OCS AQS can be accessed by authorized users from any computer with an internet connection. OCS AQS supports most major browsers including:

- Microsoft Edge™
- Mozilla Firefox™
- Google Chrome™

Other browsers may run OCS AQS without significant issues, but they are not explicitly supported.

> ***IMPORTANT:*** OCS AQS does not support Microsoft Internet Explorer™.

1.3 Accessing OCS AQS

To gain access to OCS AQS, complete the following steps:

1. BOEM or BSEE will send an invitation email with instructions on how to access OCS AQS. If you are an operator (or authorized consultant) and did not receive an email, please send an account request to ocs.aqs_support@weblakes.com.
2. If you did receive the invitation email, follow the instructions, including the requirement to create a login.gov account. When setting up your login.gov account, you must use the same email address in which you received the OCS AQS invitation. If you would like to use a different email address, please send your request to ocs.aqs_support@weblakes.com.
3. In certain cases, the OCS AQS Systems Administrator may require 24 hours to complete the account setup process, so please keep this in mind the first time you log into the system.

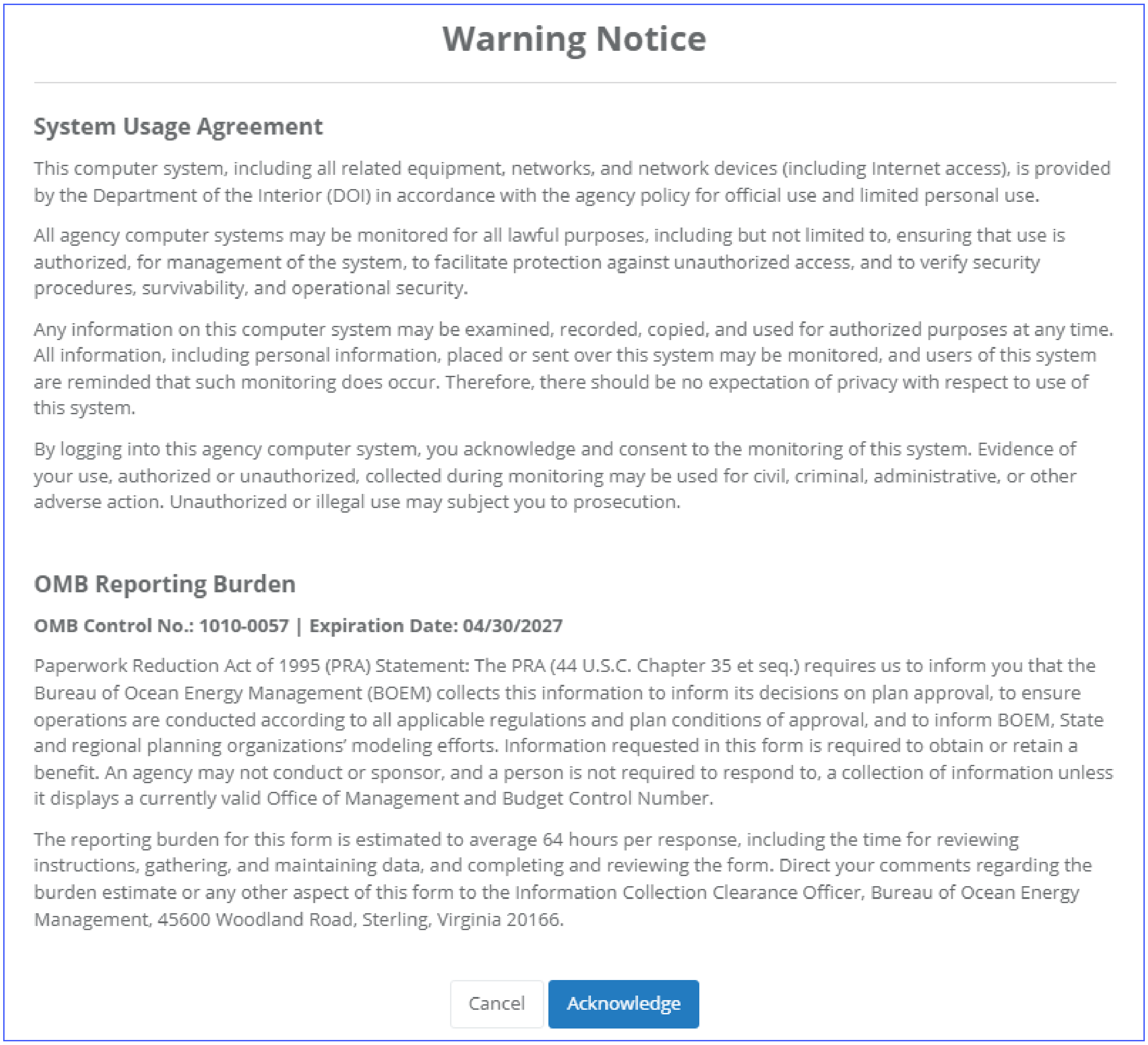
1.4 Logging in the First Time

Go to https://ocsaqs.doi.gov.

You should see a login screen similar to Figure 1. Click **Continue**.

Figure 1. OCS AQS login screen

Click **Continue**, and this will take you to the **Warning Notice** screen, which contains the **System Usage Agreement** and the **OMB [Office of Management and Budget] Reporting Burden** as shown in Figure 2.



Warning Notice

System Usage Agreement

This computer system, including all related equipment, networks, and network devices (including Internet access), is provided by the Department of the Interior (DOI) in accordance with the agency policy for official use and limited personal use.

All agency computer systems may be monitored for all lawful purposes, including but not limited to, ensuring that use is authorized, for management of the system, to facilitate protection against unauthorized access, and to verify security procedures, survivability, and operational security.

Any information on this computer system may be examined, recorded, copied, and used for authorized purposes at any time. All information, including personal information, placed or sent over this system may be monitored, and users of this system are reminded that such monitoring does occur. Therefore, there should be no expectation of privacy with respect to use of this system.

By logging into this agency computer system, you acknowledge and consent to the monitoring of this system. Evidence of your use, authorized or unauthorized, collected during monitoring may be used for civil, criminal, administrative, or other adverse action. Unauthorized or illegal use may subject you to prosecution.

OMB Reporting Burden

OMB Control No.: 1010-0057 | Expiration Date: 04/30/2027

Paperwork Reduction Act of 1995 (PRA) Statement: The PRA (44 U.S.C. Chapter 35 et seq.) requires us to inform you that the Bureau of Ocean Energy Management (BOEM) collects this information to inform its decisions on plan approval, to ensure operations are conducted according to all applicable regulations and plan conditions of approval, and to inform BOEM, State and regional planning organizations' modeling efforts. Information requested in this form is required to obtain or retain a benefit. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget Control Number.

The reporting burden for this form is estimated to average 64 hours per response, including the time for reviewing instructions, gathering, and maintaining data, and completing and reviewing the form. Direct your comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Bureau of Ocean Energy Management, 45600 Woodland Road, Sterling, Virginia 20166.

Cancel Acknowledge

Figure 2: System Usage Agreement and OMB Reporting Burden

While the **System Usage Agreement** outlines the conditions under which the system can be accessed, the **OMB Reporting Burden** states the relevant legislation and the approximate time requirement. Read the information carefully and then click **Acknowledge** to proceed to the login.gov screen as shown in Figure 3. Enter your login.gov credentials and click **Sign in**.

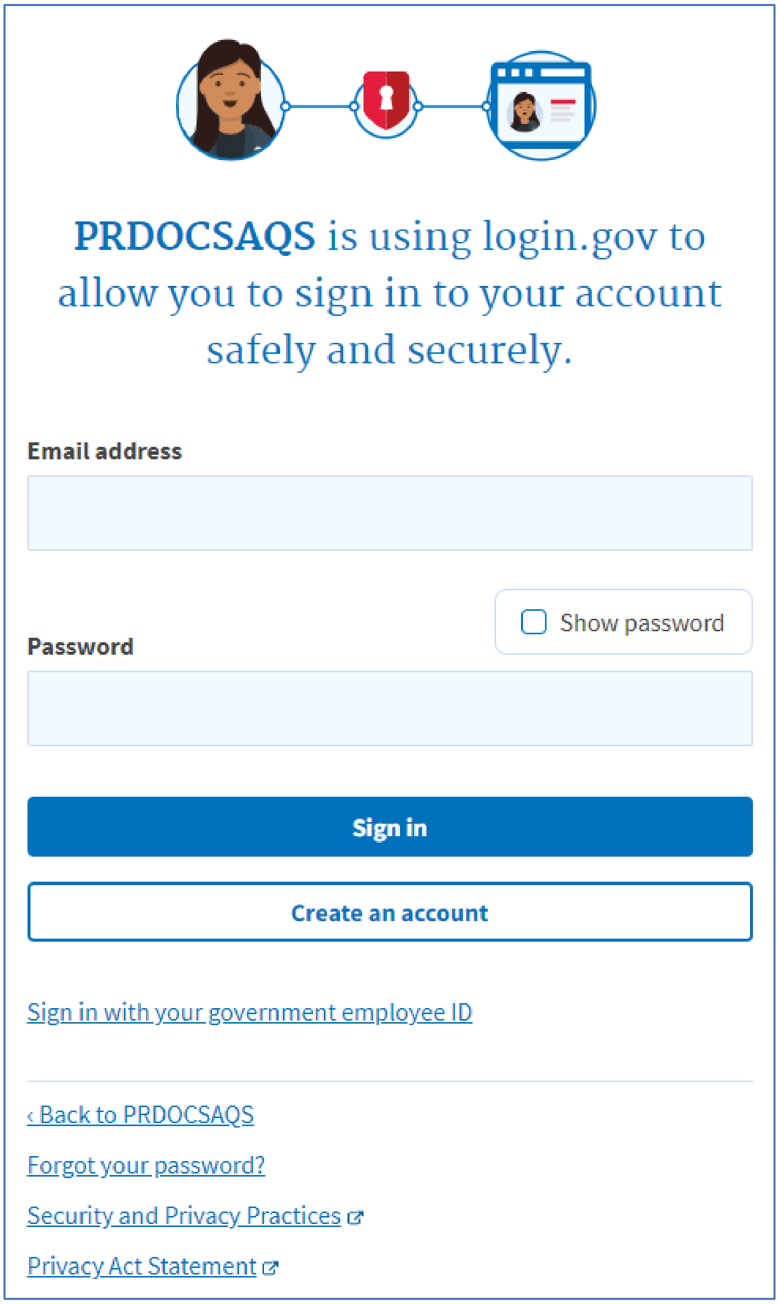


Figure 3. Main login.gov page

If this is your first time accessing OCS AQS through login.gov, depending on the two-factor authentication option you selected when you created your login.gov account, you will be prompted with additional instructions. For example, if you elected to use text messaging, login.gov will send a code to the phone you specified with instructions on how to enter the code to complete the two-factor authentication process. If you run into any problems with login.gov, please contact login.gov technical support.

After you have successfully logged in, your initial landing page (and home page) is the Dashboard module, similar to the one shown in Figure 4.

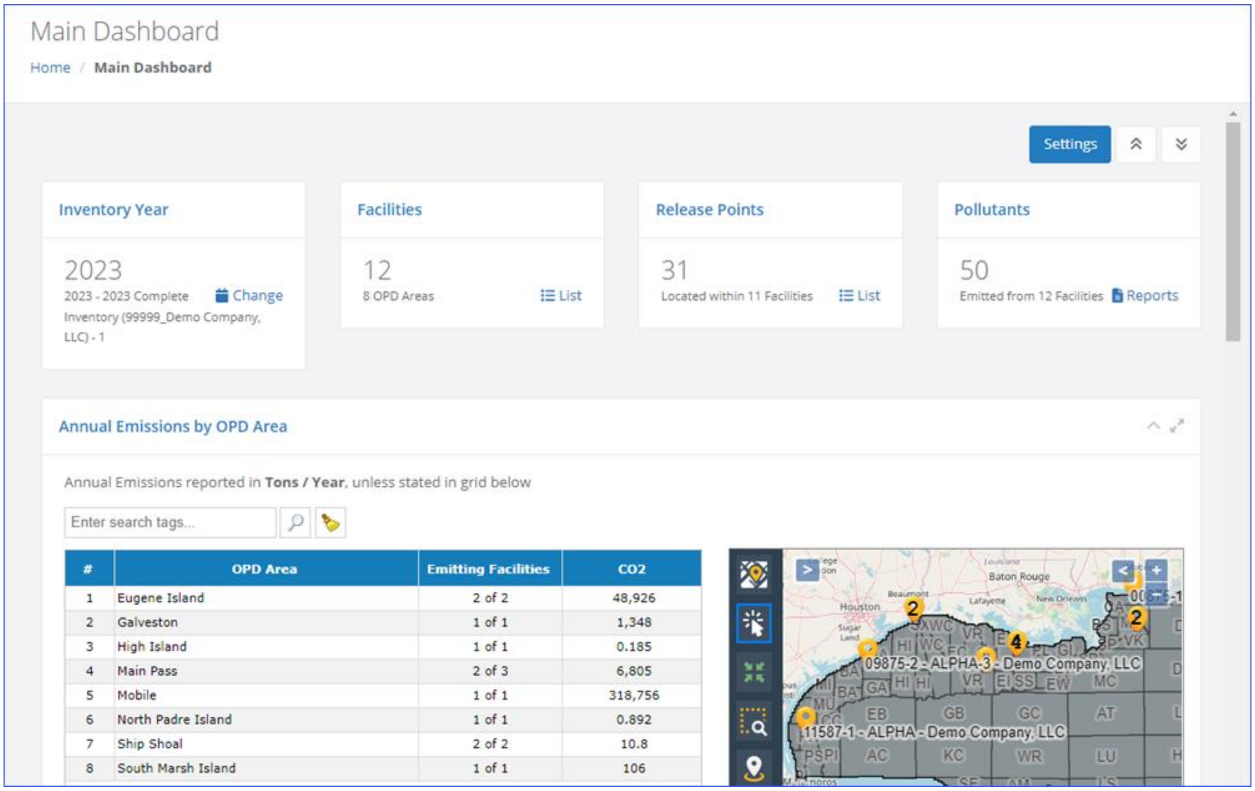


Figure 4. Main dashboard after login

The number of different dashboards available to you in the Navigation Panel may vary depending on assigned access rights, and the displayed data may vary due to the default inventory in your account.

1.5 System Security

1.5.1 Automatic Logout

Due to the U. S. Department of the Interior (DOI) security requirements, if you do not use the system for more than 15 minutes, you will be automatically logged out, and you will have to log back in again. You will be given a one-minute warning prior to the automatic logout, during which you can refresh your session and prevent the automatic end-of-session.

> ***IMPORTANT***: If you are logged out while in **Edit** mode, any unsaved changes will be lost.

1.5.2 Password Recovery

If you forget your password, simply click **Forgot your password?** (as shown toward the bottom of Figure 3), and follow the instructions provided.

1.5.3 Account Management

OCS AQS implements a 60-day inactivity policy, where accounts that have no activity for 60 days are automatically deactivated. If a user's account is deactivated due to inactivity, the user must complete the user reauthorization process before their account can be reactivated.

1.6 Navigating the System

1.6.1 Overview

After you log in, you will see a screen similar to Figure 5 shown below. Although the content of each screen will vary based on available level of access and the location within the application, the main navigation tools are always located in the same area for easy reference. For the current submittal year, users will only have access to their specific inventories and facilities.

> ***IMPORTANT:*** The **Dashboards** and **Map** modules do not have navicons but a custom interface (explained in corresponding sections).

The main navigation tools are as follows (Figure 5):

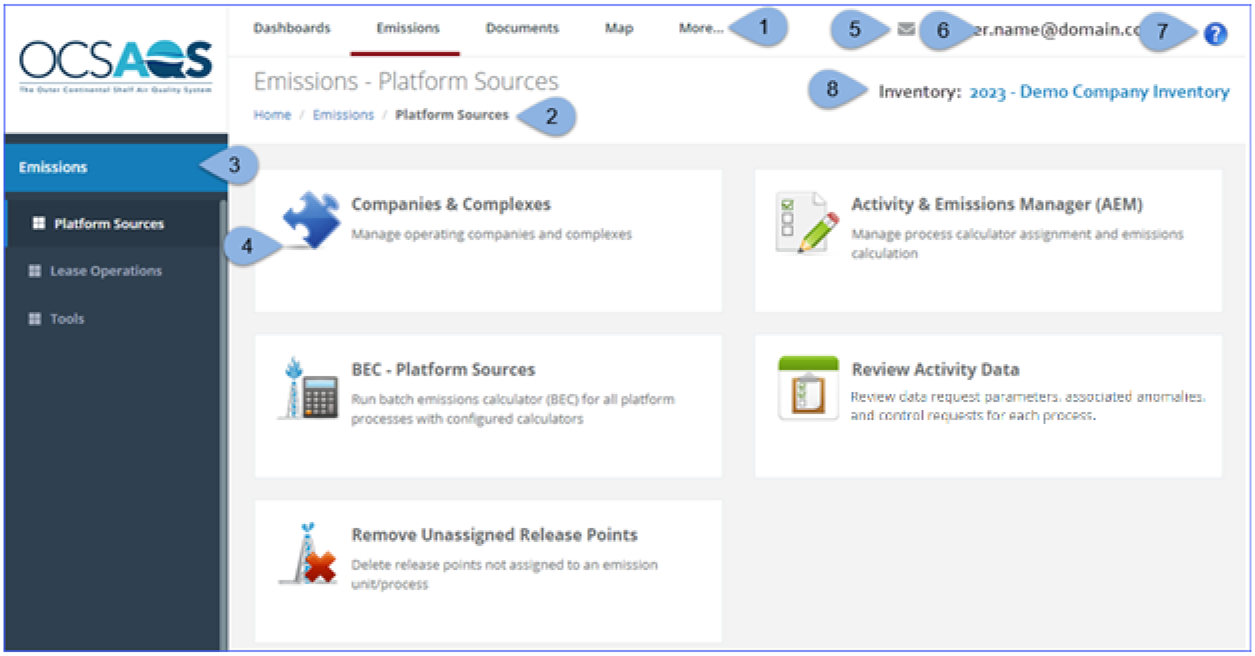


Figure 5. Example home screen

1. **Module Tabs:** These tabs provide access to the OCS AQS modules (see next section for a description of each module). The module you are in is underscored by a blue line.
2. **Breadcrumbs:** This link shows your current location within the web hierarchy and thus provides contextual information to the current page. Clicking on any text will take you to that particular page. Clicking on **Home** takes you back to the first page you see after login.
3. **Navigation Panel:** These folders provide navigation options for a given module and the steps you are taking. For pages other than the dashboard, there will be **Navicons** to access different pages and wizards.
4. **Navicons:** Icons and headings that represent sections and tools included in each section.
5. **Notification Indicator:** This icon shows if you have system messages related to OCS AQS operations.
6. **User ID:** Displays the ID of the user currently using the application. Clicking the user ID or the down arrow beside it allows you to log out of the system.
7. **Help:** Click to load context-sensitive help for the current page.
8. **Inventory Selector:** This tool is used to select the emissions inventory that you will be working in. Depending on your user rights, your access may be limited to a single inventory. Past inventories (2021, 2017, etc.) will be locked () and available for review only.

NOTE: During the 2023 reporting cycle, the inventory assigned to you is labeled as "2023-Company Name". However, if you submitted an inventory for 2021, you can click on this inventory and change to 2021 to review the 2021 inventory (Section 1.7).

1.6.2 Using Windows and Tables

Detailed data in OCS AQS is organized and presented using windows and tables. An example of a table that lists emission units for platform sources (to be covered later) is shown in Figure 6. A number of tools are available to navigate, search, manipulate, and export the information in the tables. These tools are identified in Figure 6 and described below.

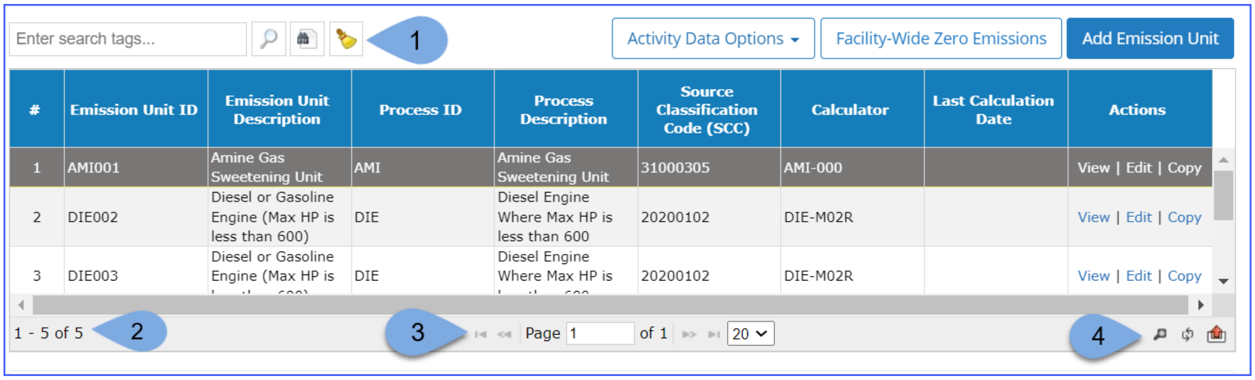


Figure 6. Window and table tools

1. The **Search Tool** in the upper left of the window allows you enter keywords to find specific records. Keywords can include partial spellings like "pneu" for "pneumatic" and are not case sensitive. The search button ( ) executes the search and the cleanup button ( ) removes all text in the search bar.
    a. **Advanced Search** ( ) allows you to search the table by utilizing multiple keywords for the different categories in any given table. Categories can include items such as Emission Unit ID, Equipment Type, and Unit Type Code for the Emission Units table. This type of search is not available in every table.
2. **Available Records** in the lower left corner of the window shows the number of records available in the table.
3. **Page Controls** in the lower center of the window allow you to navigate the table page by page, jump directly to a specific page, and control the number of rows displayed per page using the drop-down menu.
4. **Data Tools** in the lower right of the window allow you to perform a more customized search ( ) and reload the table after the query ( ). The export icon (up arrow) allows the user to export the table's records in Excel or CSV [comma-separated values] format. The table can also be printed from this icon.

1.6.3 Panel Controls

The OCS AQS interface uses data panels to organize information and for ease of navigation. Each panel, depending on context, will have one or more of the following controls:

Click to access panel/dialog-specific help.

^/v Collapse/expand the panel. Collapsing a panel will hide the panel content, leaving only the panel header and reducing the amount of space it occupies. Recommended for smaller screens.

Maximize panel. Maximizing the panel will stretch it to fit the entirety of the available screen space. Recommended when viewing content-heavy panels (e.g., dashboards) on a small screen.

1.6.4 Getting Help

OCS AQS is designed to be easy to use and intuitive. Additional tools are provided to assist you:

- Online Help: Press the ? icon on the top right-hand corner of any page to go to a help section for the page or the ? button in the top right corner of a data panel (if available) as seen in Figure 7.

Figure 7. Help buttons

- Full Help: In the Online Help window, click **View Full Help** as seen in Figure 8. This will provide a searchable help feature.

Figure 8. View full help

- User Manual (this document): The user manual provides in-depth assistance with easy-to-follow examples and indexed content. The user manual is found under the **Public Documents** section of the **Documents** module (see Section 6.1.1 for more information).
- OCS AQS support team: For help not covered above, contact technical support for OCS AQS at ocs.aqs_support@weblakes.com.

Technical support is available by clicking on the OCS AQS Technical Support link in the bottom part of the screen after you log in as shown in Figure 9. Clicking on the link opens up the OCS AQS Technical Support page that gives contact information for both technical support and BOEM point of contact email address (OCSEmissionsInventory@boem.gov).

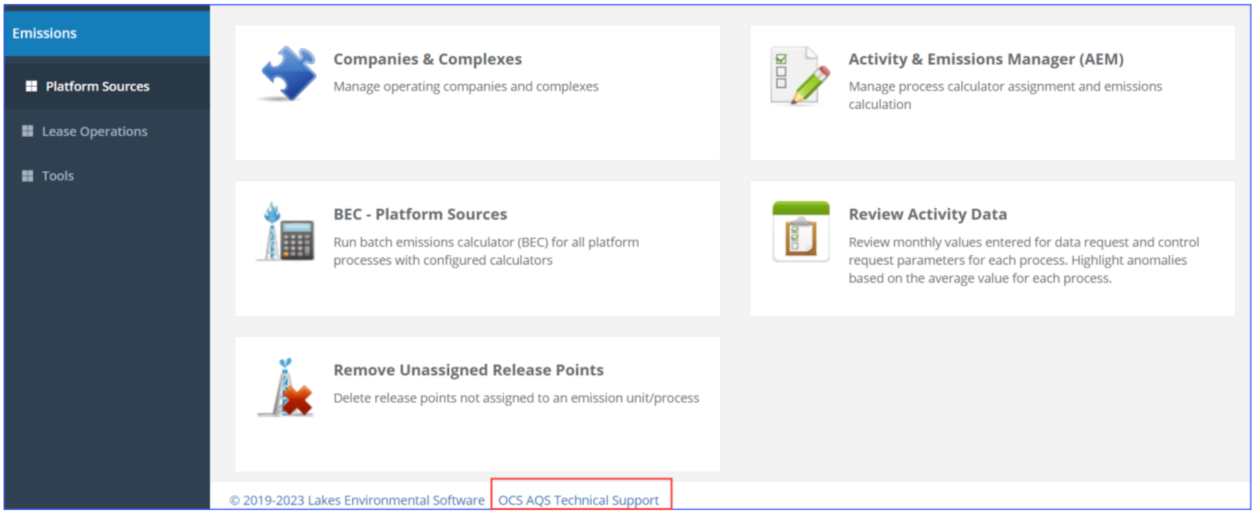


Figure 9. Technical support link

IMPORTANT: When requesting technical support, please let us know which web browser you are using so that we can tailor our response to your requirements. Each browser displays content slightly differently.

1.7 Selecting Inventories

The selected emissions inventory determines the year and emissions scenario you will be working with. It is therefore extremely important to make sure you select the correct inventory before you begin working. By default, upon the initial login users will automatically be directed to the most recent inventory. If you have questions, contact your OCS AQS representative at OCSEmissionsInventory@boem.gov to determine which inventory you should be using.

Operators also are able to switch between inventories and select historical inventories. To change or select a specific inventory, click on **Inventory Selector** (as described in Section 1.6.1). This will take you to the **Inventory Configuration** page (as described in Section 10.1.1). Click on the desired inventory name. The name of the selected inventory should appear in the **Inventory Selector** area, similar to the example shown in Figure 10. In some cases, when you initially log in, there may be only one inventory.

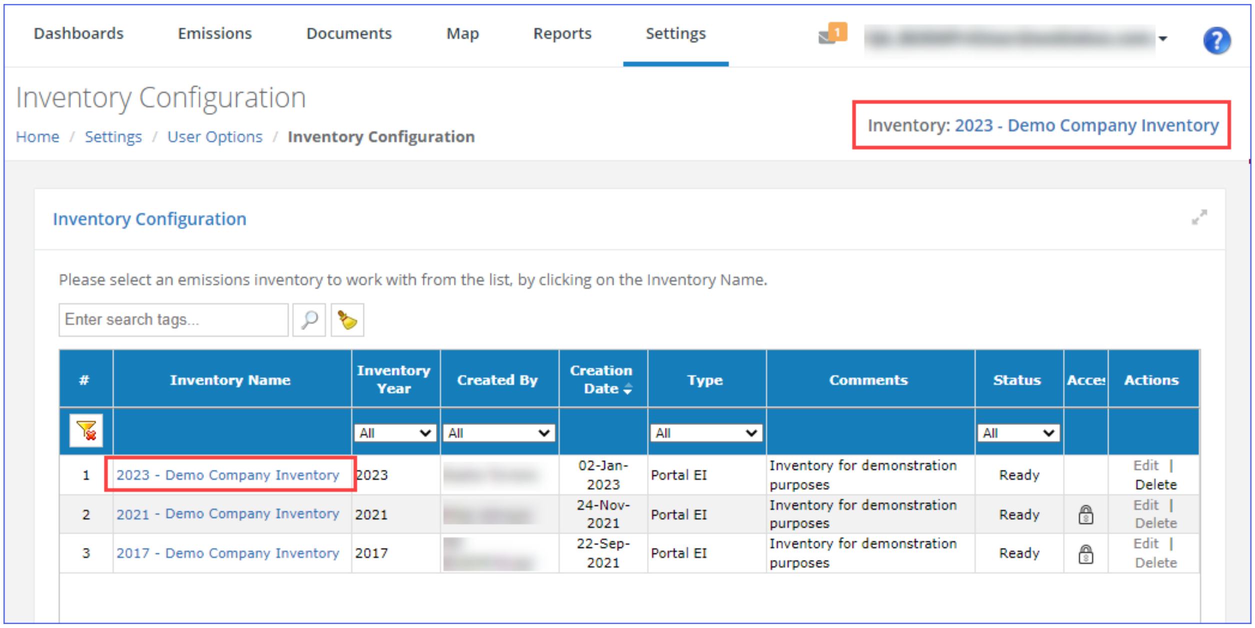


Figure 10. Inventory configuration page

Use the **Module Tabs** or **Breadcrumbs** to navigate to other pages.

1.8 OCS AQS Modules

OCS AQS has several modules that group functionalities for easy navigation. Switch between the modules by clicking on the **Module Tabs** as shown previously in Figure 5. The available modules are:

- **Dashboards**: This module presents a snapshot of activities based on your access rights. The Navigation Panel has several options you can choose from. You can customize what data is displayed on some dashboards the **Settings** button located in the upper right corner of the page.
- **Emissions**: This module provides all the resources you will need to add and update emission sources and pollutant totals.
- **Documents**: This module contains supplemental documentation—such as user guide and course materials—and allows you to review or download any file uploaded/downloaded/generated by the system.
- **Map**: This module provides an interactive GIS style map with different layers for sources, emissions, and shapefiles. Sources are linked to pages in the **Emissions** module for easy reference.
- **Analytics**: This module contains a collection of graphical and tabular analysis tools. These tools allow you to review data across the entire inventory, while still being able to filter it based on specific elements: pollutants, equipment type, or parameter type.
- **Reports**: OCS AQS comes with multiple prepared reports ready to use. Each report has its own wizard to guide you through criteria selection to help create a report specific to your requirements.
- **Settings**: This module allows you to review your activity in the system as well as access the inventory list.

1.9 OCS AQS Definitions

OCS AQS uses the same nomenclature as GOADS in reference to hierarchies and definitions. The following terms are used throughout this manual:

- **Company** refers to the organization or legal entity that owns and operates assets and has the requirement and responsibility to submit the OCS Emissions Inventory.
- **Lease** refers to the legal agreement between the company and BOEM to operate in a specified manner and location.
- **Lease Operations** refer to specific activities taken by the Lessee as part of the Lease. Lease operations include platform sources; however, for OCS AQS, lease operations refer only to drilling operations in which the drilling rig is connected to the seabed, and well stimulation and installation support vessels installing new platforms or pipelines.
- **Complex** refers to a group of related structures within a lease area that is assigned a BOEM Complex ID.
- **Facility** refers to an individual structure (Complex-Structure Number). A single facility or multiple facilities can make up a complex.
- **Emission Source** refers to a process or piece of equipment on a facility that generates air emissions and releases it to the environment. For OCS AQS, an emission source consists of an emission unit and a release point. In some cases, such as fugitive emissions, the emission unit and the release point are the same.
- **Emission Unit** refers to the process or equipment type of a facility capable of generating air emissions. In some cases, such as fugitive emissions, the emission unit is a collection of components that may be located throughout a facility.
- **Release Point** refers to the physical properties of an emission source that release emissions into the environment.
- **Process** refers to the physical and chemical reactions that take place in an emission source and convert throughput material into air emissions.

1.10 OCS AQS Function Map

An outline of all OCS AQS modules and functions located within the Navigation Panel selections is shown in Figure 11.

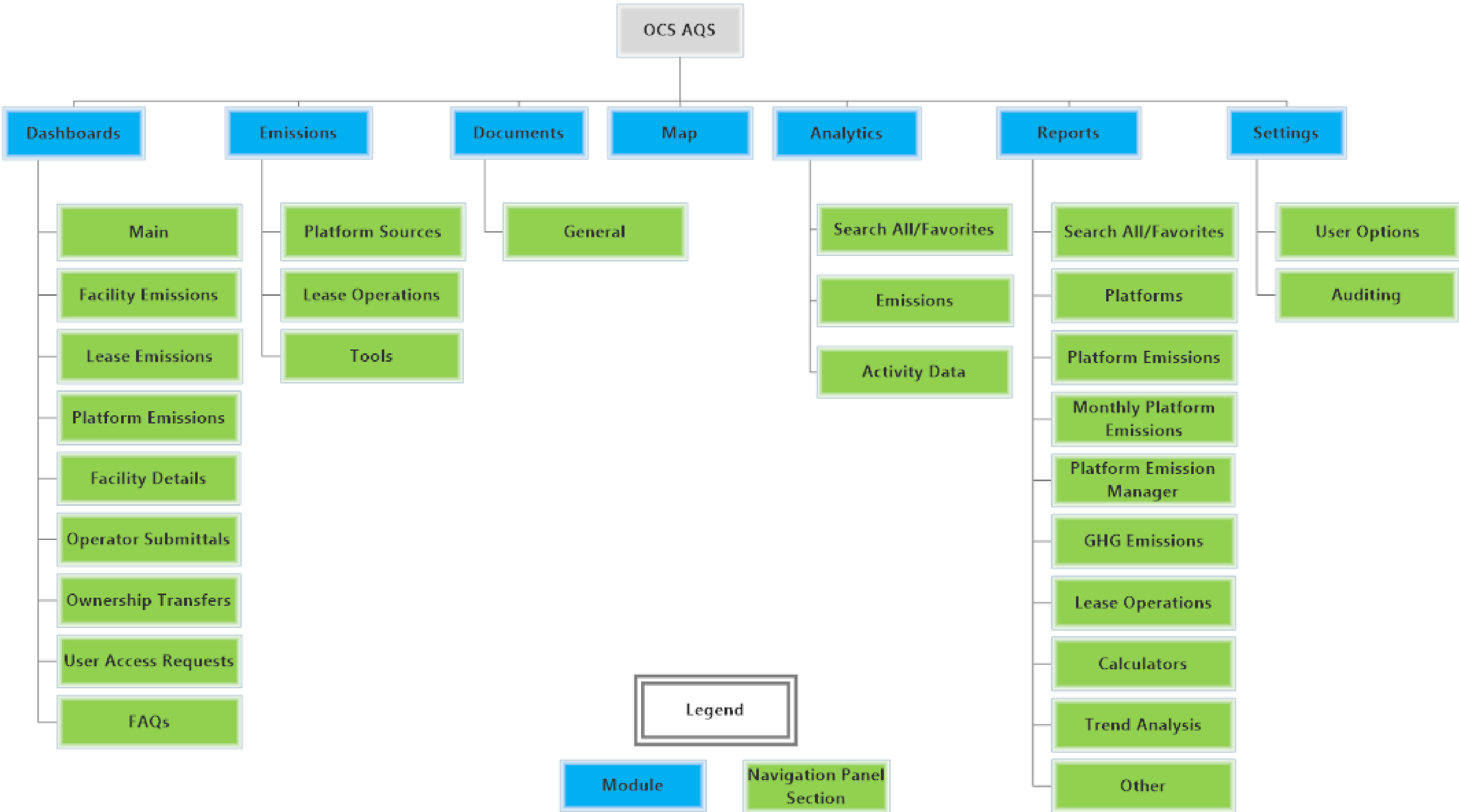


Figure 11. OCS AQS function map for operators

1.11 Layout of User Manual

The rest of the user manual is laid out in the following sections:

- Section 2 – Dashboards
- Section 3 – Emissions: Platform Sources
- Section 4 – Emissions: Lease Operations
- Section 5 – Emissions: Tools
- Section 6 – Documents
- Section 7 – Map
- Section 8 – Analytics
- Section 9 – Reports
- Section 10 – Settings
- Appendix A – Platform Calculator Descriptions
- Appendix B – Lease Operation Calculator Descriptions
- Appendix C – Revision History

The **Emissions** module is broken into three parts in order to describe in greater detail each section within the module.

Each section will have a more detailed map of the functions accessed through the Navigation Panel.

2 Dashboards

Dashboards provide a summary of key OCS AQS data using tables, maps, and graphs. There are multiple dashboard screens available, all accessible on the Navigation Panel as shown on the module map in Figure 12. The specific dashboards available to you will depend on your access rights.

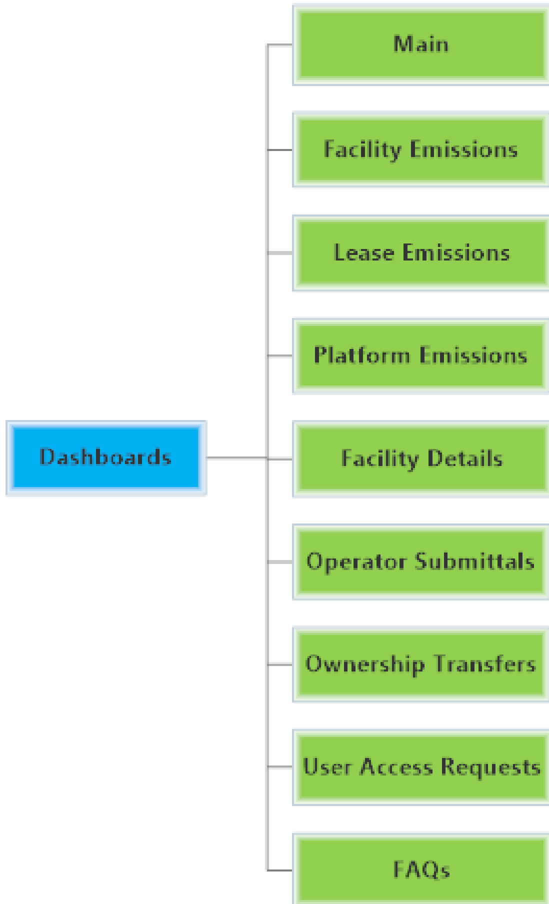


Figure 12. Dashboard module map showing panels available to operators

2.1 Dashboard Overview

Pathway: Dashboards

The dashboard pages share several common features:

- Graphs and visuals on the page can be changed by clicking on **Settings** in the top right of the page. Select (or deselect) the options you want to see on the dashboard page and click **Save** to apply the changes. Some pages do not have a **Settings** feature.
- Selecting the three bars next to a graph gives you the option to save the graph figure in .png or .jpg format. You can also export the data that was used to generate the chart into an .xlsx file.
- Scrolling over graphs reveals the data tables.

  IMPORTANT: Information in the dashboards is arranged vertically. Scroll down to see additional content.

TIP: If you do not see the data on a dashboard page that you want, check the inventory and make sure you are working in the right inventory year.

The available dashboards include the following:

- **Main** – This is the main dashboard that will be displayed when you log in. It shows the inventory year and includes a summary of facilities, release points, and pollutants inventoried. This dashboard also includes a map that shows the facilities that emit the pollutants selected in the Settings page and are located in the Official Protraction Diagram (OPD) Area currently selected in the table, as well as the summary graphs of selected pollutant emission totals. An example of this dashboard is shown in Figure 13.

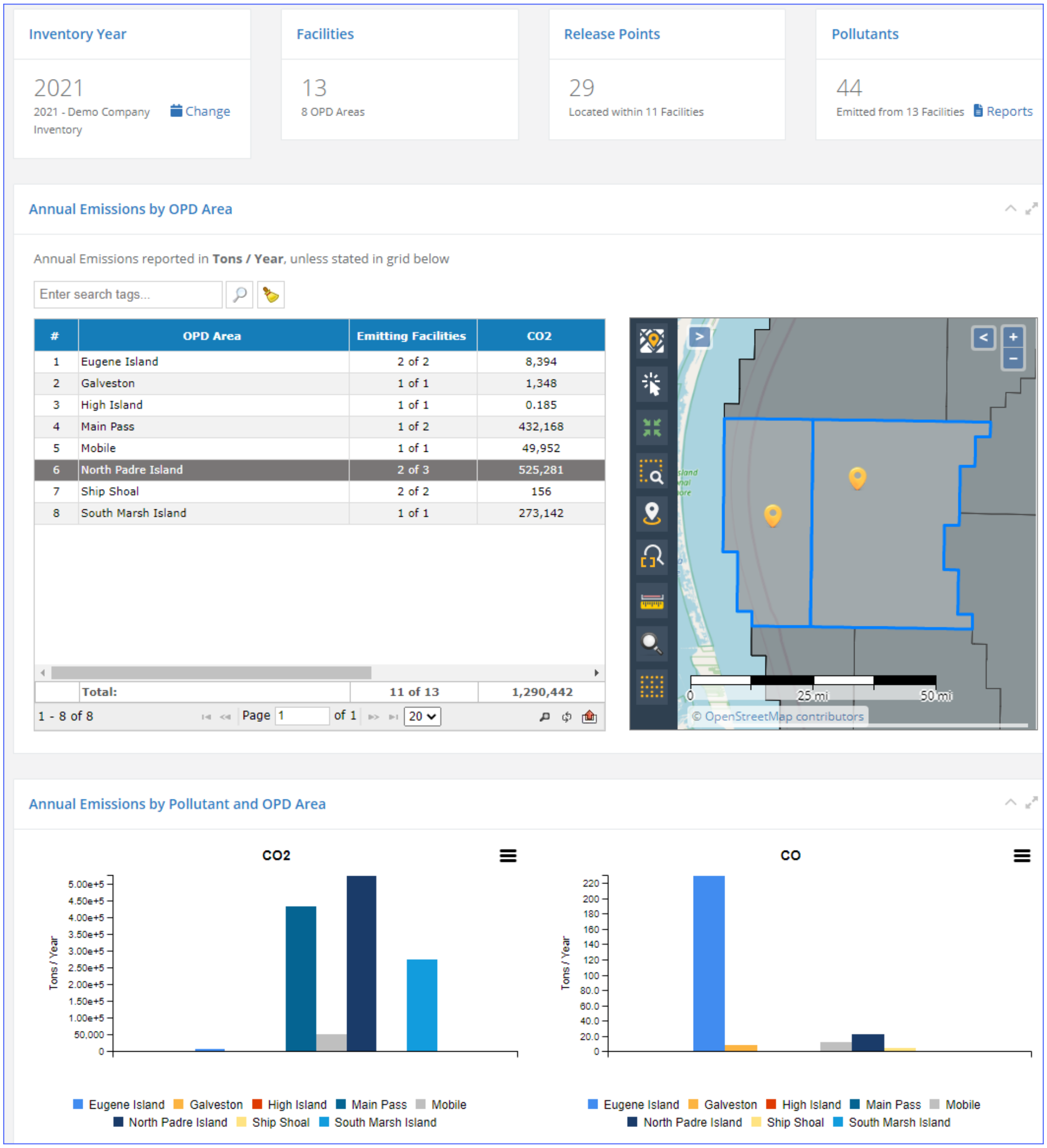


Figure 13. Main dashboard for operators

- **Facility Emissions**: This dashboard is similar to the Main dashboard but shows a breakdown of emissions by facility across a region.
- **Lease Emissions**: This dashboard is similar to the Facility Emissions dashboard but shows a breakdown of emissions by lease and lease source across a region.
- **Platform Emissions**: This dashboard provides an overview of emissions (groups or individual pollutants) for each emission period aggregated by location (platform) as bar charts.
- **Facility Details**: This dashboard provides facility level data details as well as a list of pollutant totals emitted by the facility.
- **Operator Submittals**: This dashboard provides controls to submit the completed inventory to BOEM and the status of facility inventory submittals. This dashboard is discussed in greater detail in the next section.
- **Ownership Transfers**: This dashboard shows the status of facility transfers made by BOEM on behalf of companies that have bought/sold a facility.
- **User Access Requests:** This dashboard allows you to request access to operator inventories when you have been retained by a new operating company (existing users only).
- **FAQs**: This is not technically a dashboard but provides a collection of Frequently Asked Questions (FAQs) about the OCS AQS software, emissions inventories and other topics. The FAQs are grouped in the following categories:
  - General Questions
  - Emissions Calculations
  - Lease Operations
  - Dashboards
  - Analytics
  - Maps
  - Reports
  - Submittal

Some dashboard pages, especially the **Main**, **Facility Emissions**, and **Lease Emissions** dashboards, have quick links in the top row of summary information. These allow you to access the tables or reports that are associated with the displayed data.

2.2 Operator Submittals Dashboard

Pathway: Dashboards > Operator Submittals

Completed inventories are submitted to BOEM through the **Operators Submittals** dashboard. As shown in Figure 14, the submittal dashboard contains two sections: **Submittal Status Summary** and the **Submittal Information** table.

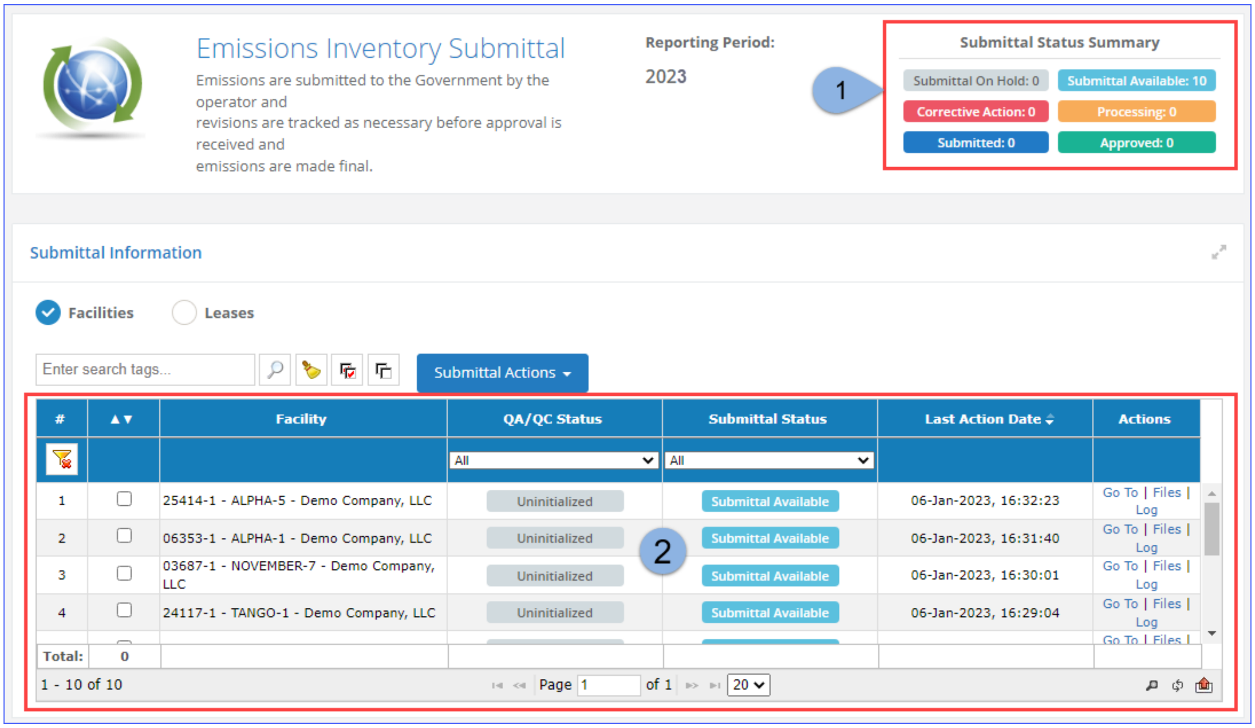


Figure 14. Operator Submittal dashboard

1. The **Submittal Status Summary** displays how many sources in the current inventory year are in various stages of the submittal process.
2. The **Submittal Information** table allows you to initiate and monitor the source inventory submittal process.

At the top of the **Submittal Information** table, the following options are available to allow you to quickly find specific information:

- **Facilities/Leases** filter, which allows you to select which source type is displayed.
- **Search** bar, which allows you to locate a specific source.
- **Submittal Actions** (Figure 15):
    - **Run QA/QC…:** Run a Quality Assurance/Quality Control (QA/QC) check on the selected facilities/leases. This process ensures that all required (i.e., mandatory) values have been specified and that the emissions calculations are based on the most recent data.
    - **Download QA/QC…:** Download generated QA/QC files from multiple facilities or leases at the same time.
    - **Submit…:** Submit the selected sources to BOEM for review. A final QA/QC check will be automatically performed on any source being submitted.

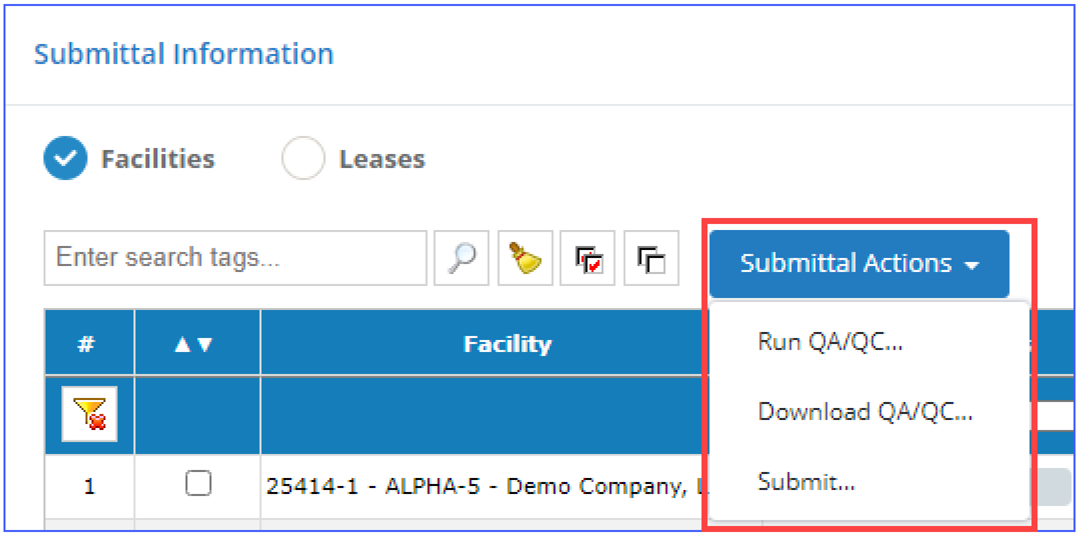


Figure 15. Submittal Actions button

The **Status Information** table displays the following information for each source:

- **Checkbox**: Check the box for any source you wish to submit or run a QA/QC check on
- **Facility/Lease**: Name of the structure or lease (depending on the active filter)
- **QA/QC Status**: Status of the QA/QC check last time it was performed will be one of the following:
  - **Uninitialized**: QA/QC check has not been performed.
  - **Processing**: QA/QC is being performed.
  - **Passed**: QA/QC check passed successfully; source is ready to be submitted.
  - **Failed**: QA/QC check detected issues. Click **Files** in the **Actions** column to download the QA/QC file and review the issues.
- **Submittal Status**: Current status of the source inventory in the submittal process will be one of the following:
  - **Submittal On Hold**: Submittal is not available at this time.
  - **Submittal Available**: Source can be submitted if all data is complete.
  - **Corrective Action**: The source has been reviewed by BOEM and returned for corrections, or the source failed the QA/QC check during the submittal procedure.
  - **Processing**: Temporary status while the system processes the submittal.
  - **Submitted**: The source has been submitted to BOEM for review.
  - **Approved**: BOEM has accepted the submitted source inventory as complete, and no further action on the part of the operator is required.

  IMPORTANT: When all sources in the inventory are of the status **Submitted** or **Approved**, the inventory will be locked and cannot be edited.

- **Last Action Date**: Date and time when the last QA/QC or submittal action was performed
- **Actions**:
  - **Go To:** Go to the **Activity & Emissions Manager** (for platform sources) or **Lease Operations Emissions Manager** (for lease sources) to correct any issues detected during QA/QC check.
  - **Files**: Open the dialog where you can download the QA/QC file. If issues are detected during the check, the title of the file will begin with “QAQC_FAILED.”
  - **Log:** Display a log of submittal actions taken for this source (Figure 16).

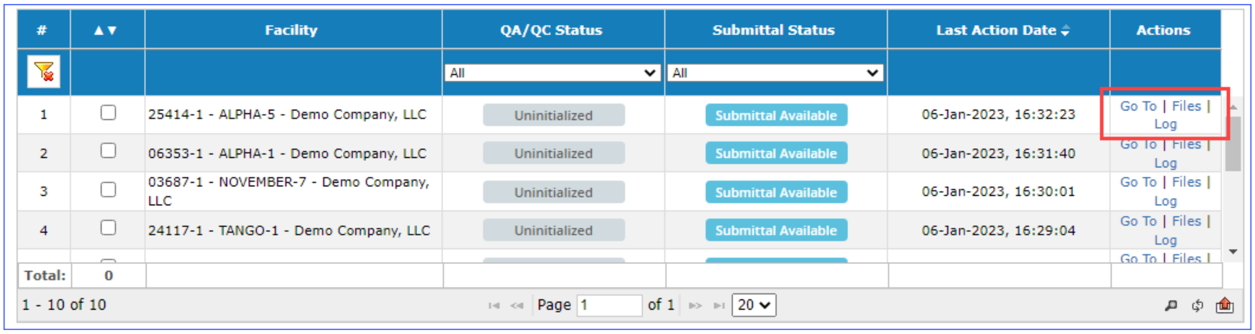


Figure 16. Source submittal available actions

2.2.1 Begin Submittal Process

Pathway: Dashboards > Operator Submittals

IMPORTANT: Please make sure to use the **Review Activity Data** tool to detect any anomalies in the entered activity data (Section 3.3.3) before submitting the source inventory.

NOTE: It is advisable to review the operator comments before submitting the source inventory. You can do this by running the **QA/QC Comments** report in the **Platform Emission Manager** section of the **Reports** module (Section 9.2.4).

To submit a new source inventory that has a **Submittal Available** status, take the following steps:

1. Check the box for the sources to be submitted.
2. Click **Submittal Actions** and select **Run QA/QC…** (Figure 17).

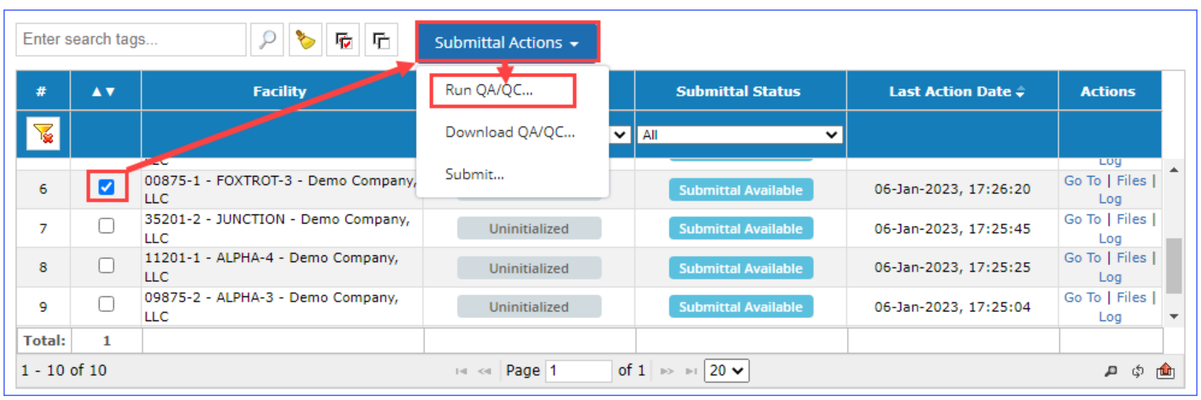


Figure 17. Run QA/QC check

3. The **Facility/Lease Submittal QA/QC** dialog with a list of all selected sources (
4. Figure 18) will appear. Above the table the following statistics are displayed:
    a. **Selected Facility/Lease Count:** Total number of sources selected.
    b. **Valid Facility/Lease Count:** Number of sources for which the QA/QC check can be run.
    c. **Invalid Facility/Lease Count:** Number of facilities on which the QA/QC check cannot be performed at this time. See the **Validation Message** column for more information.

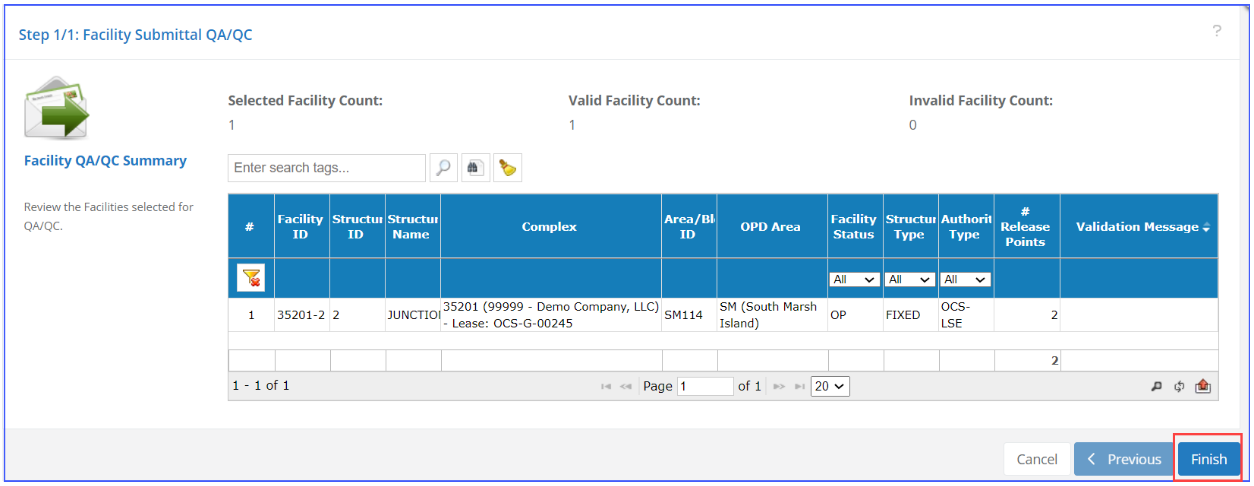


Figure 18. Source QA/QC verification

5. Click **Finish** to run the QA/QC on the valid sources.
6. The **QA/QC Status** for the source will briefly display **Processing…** and then **Failed** or **Passed** depending on the case of the source you are submitting.
   a. If the **QA/QC Status** is flagged as **Passed**, skip steps 3–11 below and go to step 13.
   b. If the **QA/QC Status** is flagged as **Failed**, follow steps 3–12 below.
7. Click **Files** in the **Actions** column for the source flagged as **Failed.**
8. In the **Facility Submittal Files** dialog, locate the file with the name that starts with "QAQC_FAILED."
9. Click the file to download it to your local machine and open it (Figure 19).

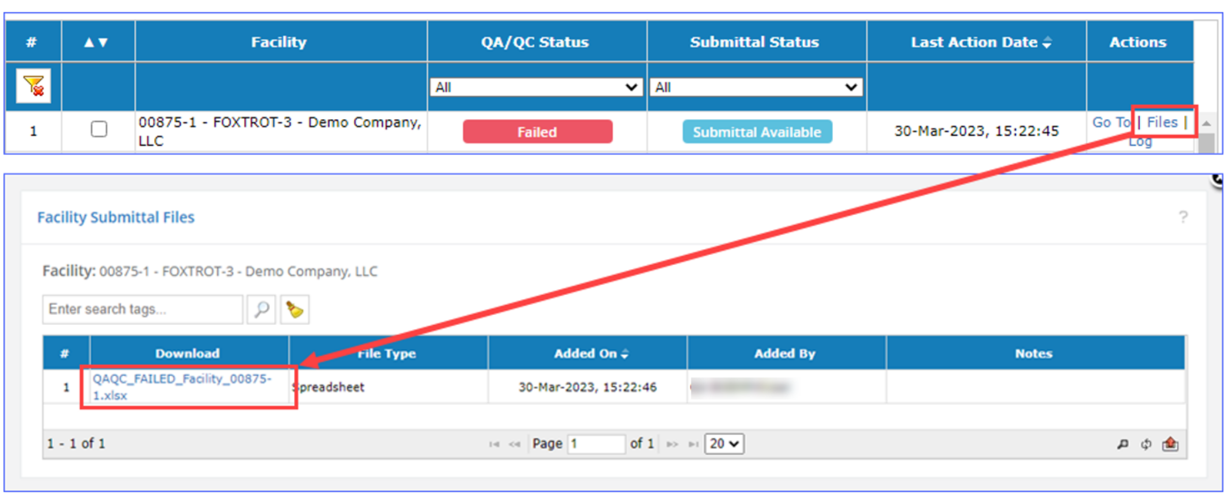


Figure 19. Download the facility QA/QC report

10. In the **Summary** tab, see what sections are labeled as **Failed.**
11. Click on the hyperlink of the failed sections or go directly to the tab for more detailed information regarding the issues detected (Figure 20).

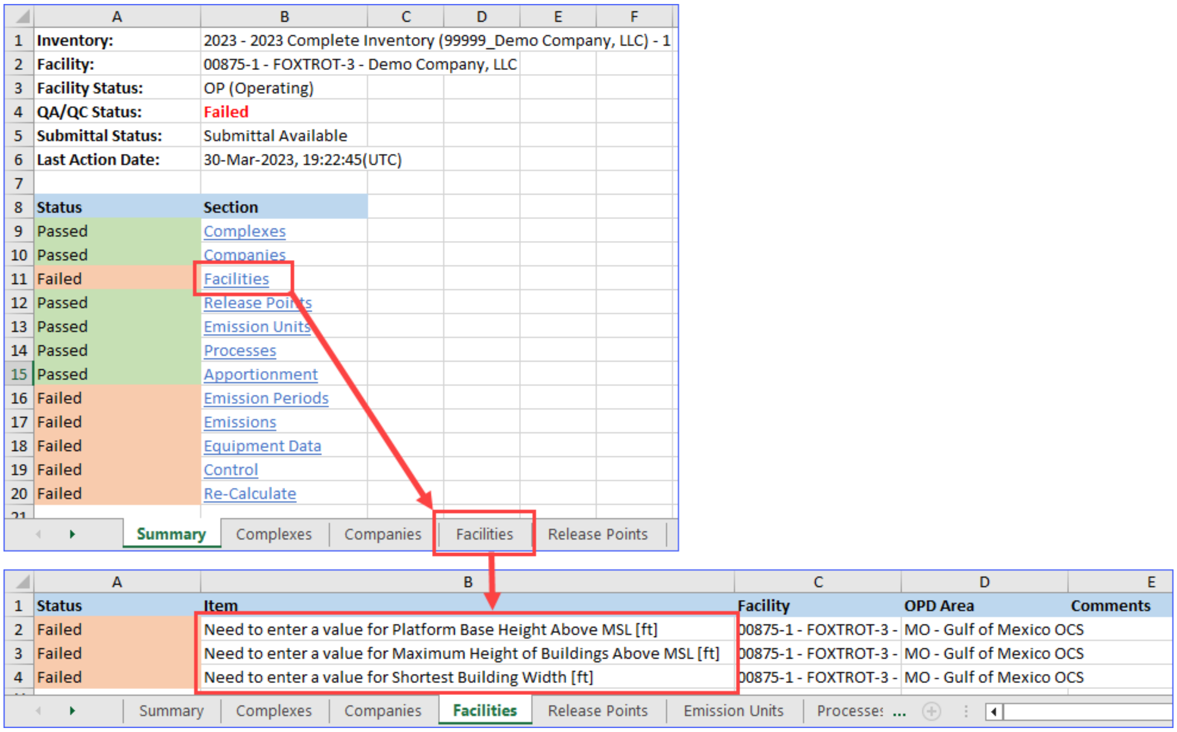


Figure 20. Sample QA/QC file report

12. In the **Actions** column for the source, click **Go To** to open the **Activity & Emissions Manager** (or **Lease Operations Emissions Manager** for a lease source) in a new tab (Figure 21).

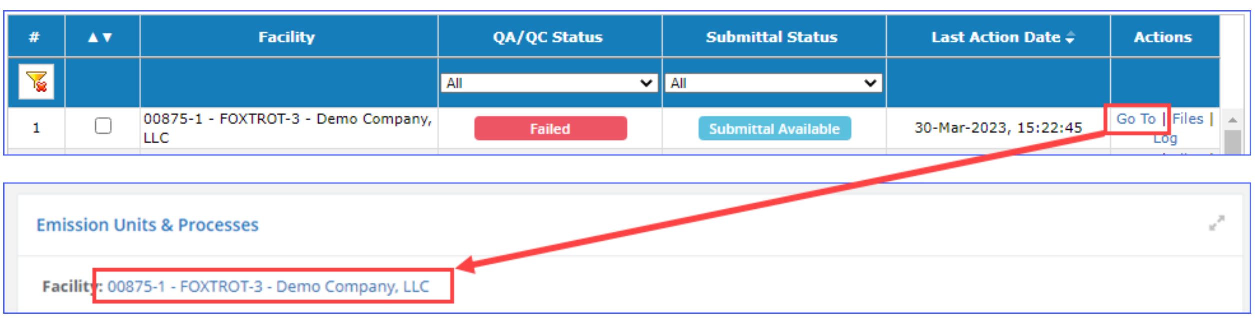


Figure 21. Use Go To feature to open Activity & Emissions Manager (AEM) in new tab

13. Correct all issues flagged by the QA/QC check. The above example only demonstrates the correction of the **Facility** issues, but ALL failed items must be addressed.
14. Return to the **Operator Submittals** dashboard.
15. Re-run the QA/QC check on the source; this time it should come back as **Passed.**
16. Click **Submittal Actions** and select **Submit…** (Figure 22).

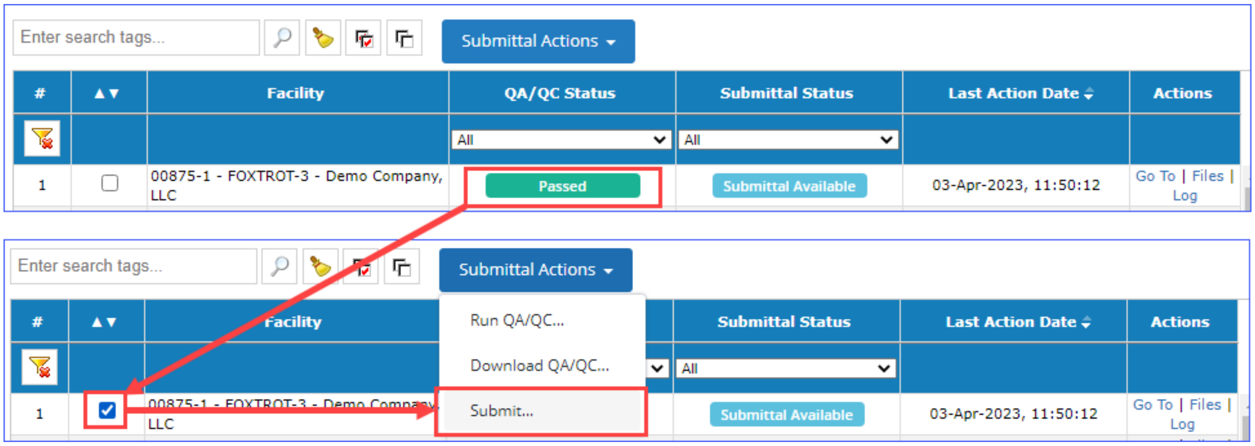


Figure 22. Facility submit

After BOEM reviews the submitted data, it will be marked either **Approved** or **Corrective Action**, depending on the result of the review.

> ***IMPORTANT***: You can check multiple boxes to run the QA/QC check or submit multiple sources.

2.2.2 Submittal Corrective Action

BOEM will review the source inventory after it has been submitted. If there are questions regarding the inventory data, BOEM may send it back with comments for corrective action and resubmission.

If this happens, correct the inventory, address the comments, and re-submit using the same procedure described above.

> ***IMPORTANT***: Though a notification email is sent when the sources are submitted for review, there is no notification issued if the source is returned for **Corrective Action**. Please continue to check the **Operator Submittals** dashboard regularly, until all sources are marked as **Approved**.

2.2.3 Download Multiple QA/QC Reports

OCS AQS allows you to download the QA/QC reports simultaneously for any sources for which they have been generated. To download multiple QA/QC reports, check the box for each source you wish to include and select **Download QA/QC…** under **Submittal Actions**. Figure 23 demonstrates an example where the export is attempted for three facilities: Facility ID# 00875-1 (QA/QC ran and passed), Facility ID# 25414-1 (QA/QC ran and failed), and Facility ID# 06353-1 (QA/QC not run). In this last case, the **QAQC Download** dialog displays a warning that only QA/QC files that have been generated will be included in the downloaded file.

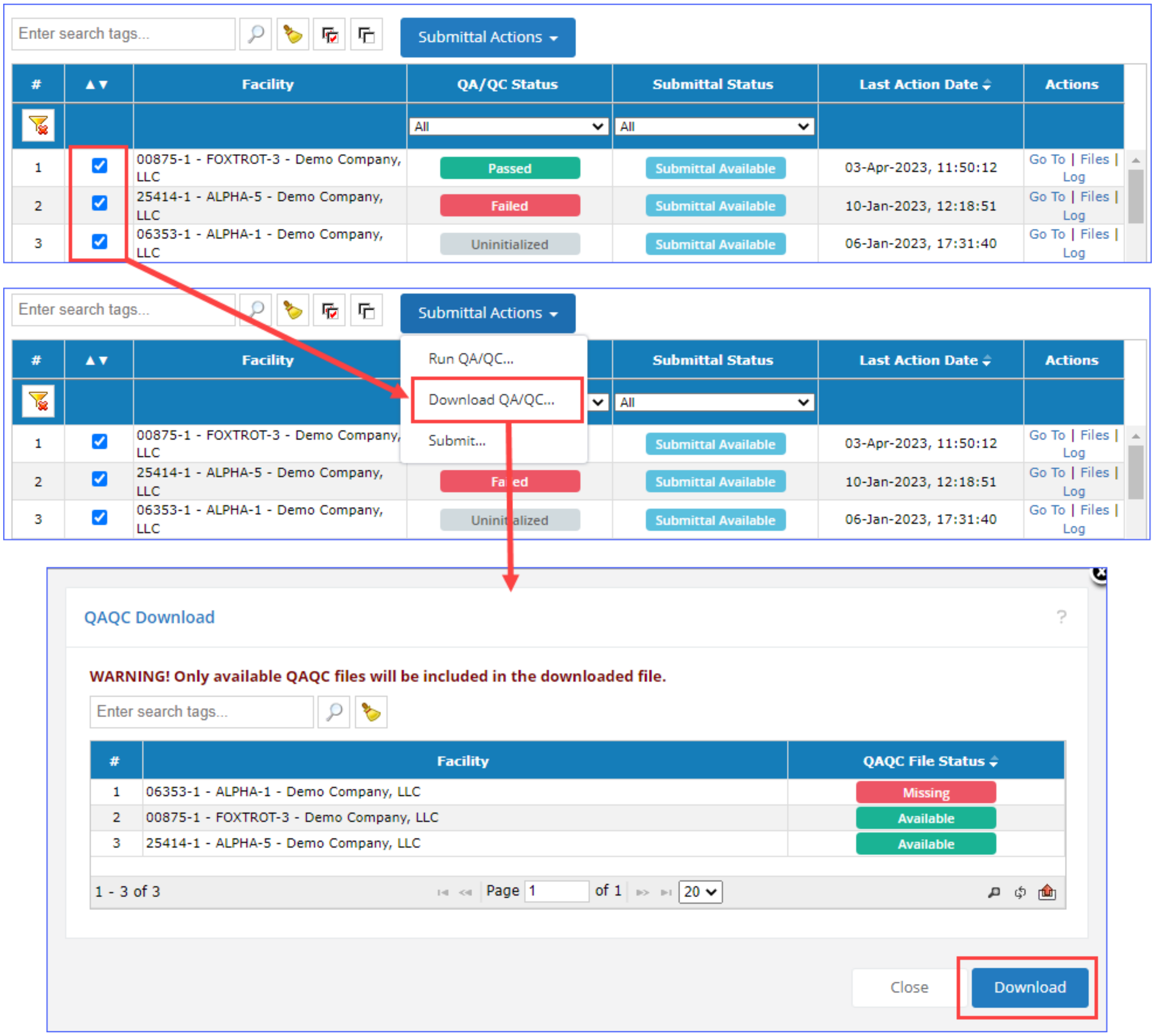


Figure 23. Export multiple QA/QC reports

The QA/QC files are exported as a .zip archive. Once you have downloaded the archive to your local machine, you can extract the files and view each file individually.

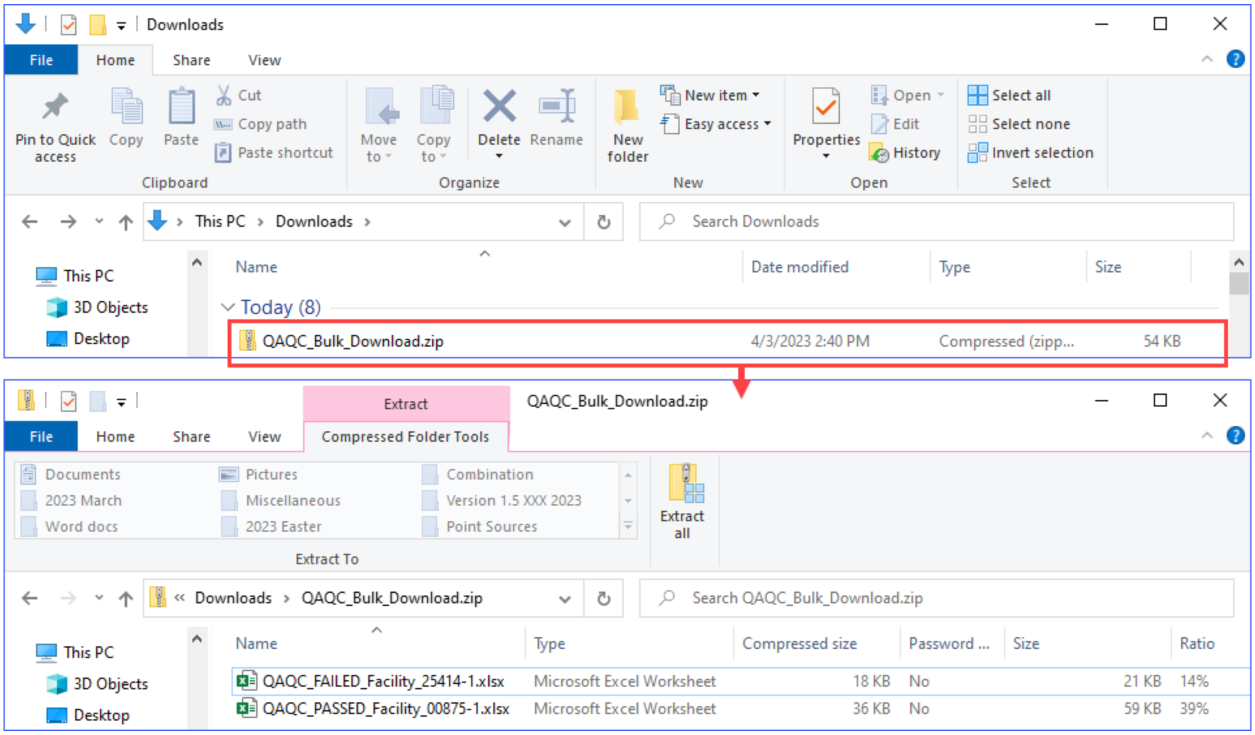


Figure 24. Exported QA/QC .ZIP archive

Note that in Figure 24 only the QA/QC files for the Facility ID# 25414-1 and Facility ID# 00875-1 have been included.

3 Emissions: Platform Sources

Pathway: Emissions > Platform Sources

Platform sources make up the majority of emission sources and pollutant emissions in OCS AQS. You can manage all platform sources in the **Emissions** module. When you select the **Emissions** module, you are automatically taken to the **Emissions – Platform Sources** page. The **Platform Sources** page provides links to several different options, as shown in Figure 25 with the various navicons. Navigation to other **Emissions** module functions is done using links on the Navigation Panel.

Figure 25. Emissions main page functions

A typical workflow for the **Platform Sources** section is as follows:

1. Use the **Activity & Emissions Manager (AEM)** (Section 3.2) to manage existing or create new emission units, enter activity data, and calculate emissions.
2. Use **Review Activity Data** (Section 3.3) to screen the entered activity data for any anomalies.
3. Use **BEC – Platform Sources** (Section 3.4) to bulk-calculate emissions for the facilities where all required activity data has been specified.
4. Review complex/structure hierarchy and verify the supporting documentation (Section 3.5).
5. Remove obsolete release points (Section 3.6).

3.1 Platform Sources Emissions Calculation Workflow

OCS AQS is designed to make updating and editing emission sources easy in the **AEM**. The AEM provides a one-stop shop for all platform emission source functions. The basic workflow using the AEM is shown in Figure 26.

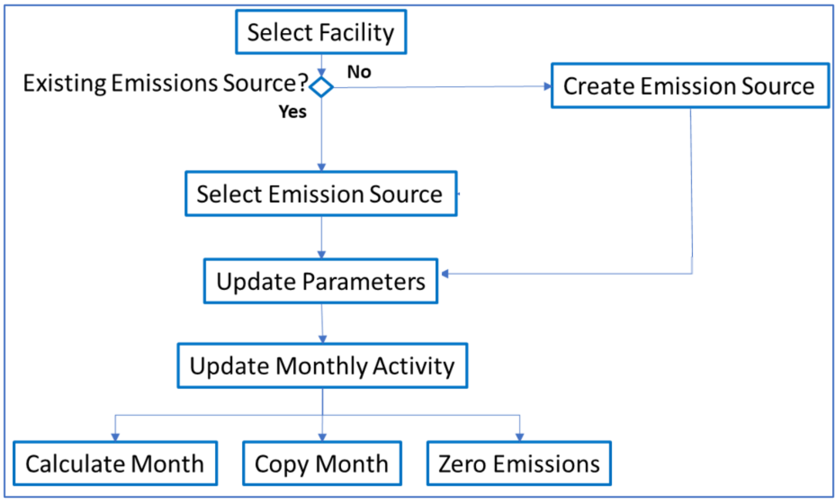


Figure 26. Emission source workflow using the AEM

To implement this workflow, OCS AQS uses integrated toolsets and prepared import/export templates for all emission processes.

3.2 Using the Activity & Emissions Manager (AEM)

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM)

To access the AEM, click on the **Activity & Emissions Manager (AEM)** navicon (shown in Figure 25 above). This takes you to the list of facilities in the inventory. Select the facility to work with by clicking the hyperlink in the **Facility ID** column or clicking on **View** in the **Actions** column, as shown in Figure 27. If your facility is not in the list, please contact OCS AQS support.

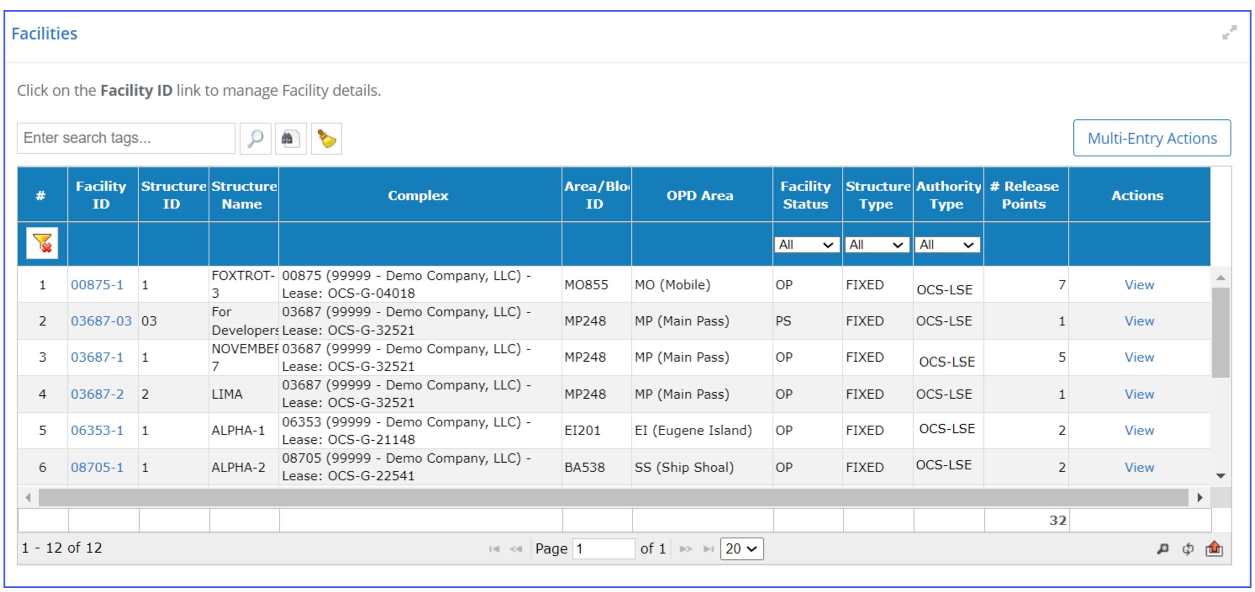


Figure 27. Selecting a facility in the AEM

3.2.1 Activity & Emissions Manager Details Page

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Selecting the facility takes you to the **AEM Details** page with a view similar to Figure 28. This page allows you to make changes in designated fields as well as perform certain other operations.

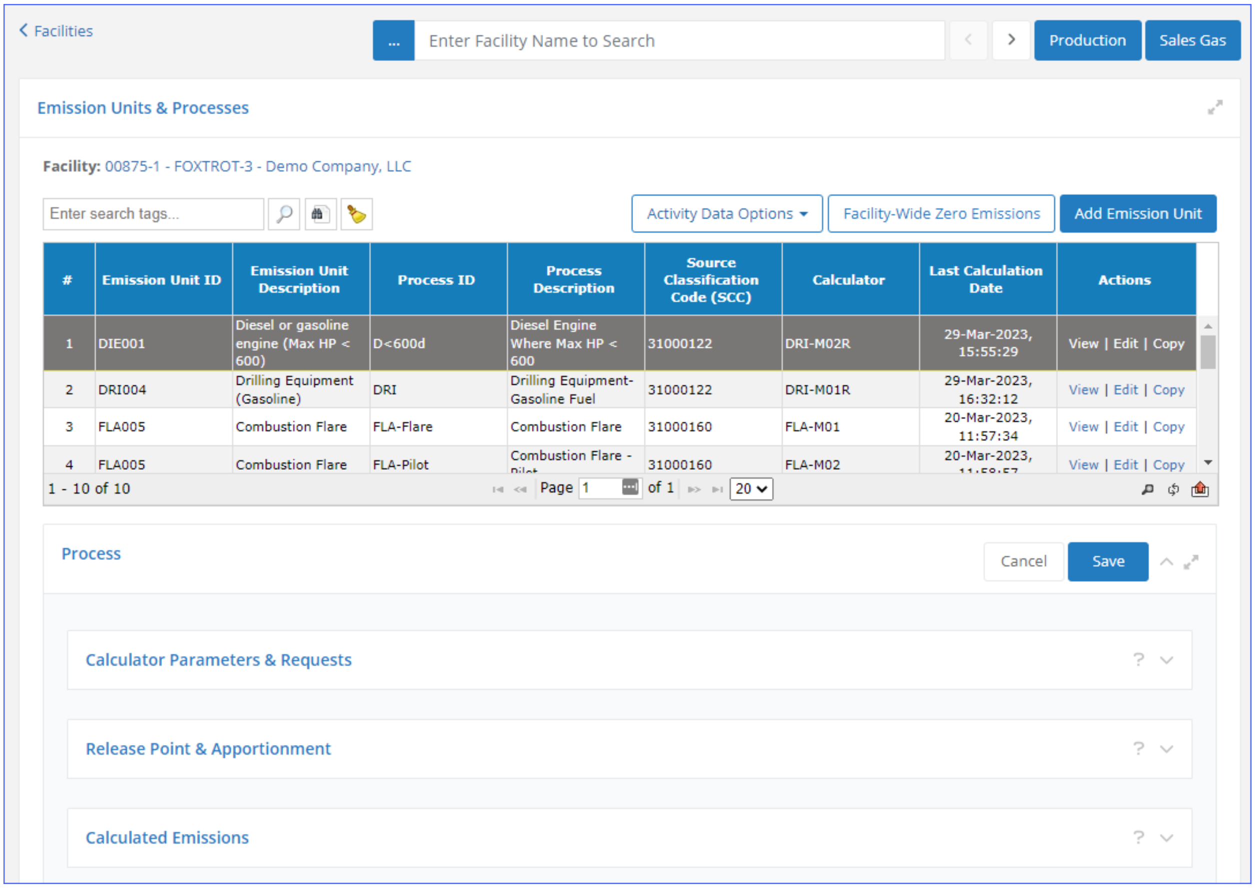


Figure 28. Default view of the AEM Details page

3.2.1.1 Main Features of AEM Details Page

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

The **AEM Details** page has a number of features that can be seen by scrolling down the page. These features and their use will be described in detail in the sections that follow.

First, in the upper right part of the page, there are buttons to update annual **Production** and throughput values and **Sales Gas** composition for the selected facility. Below them, you can see the **Emission Units & Processes** section, which shows the different emission units and their associated processes within the facility in tabular form, and includes buttons to **Add Emission Unit**, **Activity Data Options** (which allows you to import and export activity data for the selected process), and **Facility-Wide Zero Emissions**.

The second section encompasses the **Process** section, which includes the following sections:

- **Calculator Parameters & Requests**: Provides the activity data entry for emission calculation parameters and associated metadata for individual sources. This will be described in greater detail below.
- **Release Point & Apportionment**: View and update release point parameters associated with an emission source or delete release points that are no longer in use.
- **Calculated Emissions**: Shows the calculated emissions for an emission unit for the entire year by month based on calculator parameters provided in the Process feature.
- **Attached Files**: Contains emission rate source files for the amine and glycol units. ***IMPORTANT:*** The **Attached Files** panel only becomes available after a data file has been imported.
- **Tags**: View and update keywords related to the process.
- **Data Entry QA and Log**: Shows when updates were made and by whom.

3.2.1.2 Edit Mode

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

It is important to note that you will automatically be in Edit mode when you enter the **AEM Details** page. You can confirm this by checking if you are able to edit or otherwise make changes to fields in the **Process** section.

> ***TIP:*** If you are not in Edit mode and cannot load it by clicking **Edit**, check to make sure that your inventory is not locked; a locked inventory would have the 🔒 displayed in front of the inventory name. A locked inventory icon appears in the **Inventory Selector** as follows:
>
> Inventory: 🔒 2023 - 2023 Complete Inventory (99999_Demo Company, LLC) - 1

If you are <u>not</u> in Edit mode, the data will be read-only, and many options and buttons will not be available. You can exit Edit mode by clicking either **Save** or **Cancel** under the **Emission Units & Processes** panel.

To save data, click on **Save** in the upper right corner of the **Process** section. This will update the **Process** section and hide several buttons and selectors. To return to Edit mode, highlight the desired **Emission Unit** in the table at the top of the screen and click on **Edit** where **Save** used to be.

> ***IMPORTANT:*** If you do not save your work, it will be lost if you navigate away or are automatically logged off.

3.2.2 Updating Annual Production Rate and Sales Gas Composition

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

3.2.2.1 Annual Production Rates

Production rates can be updated by clicking on **Production** in the upper right corner. This will open a window with fields for annual production, throughput, and usage. To edit the values, click on **Edit** in the bottom right corner as shown in Figure 29. Be aware that input fields are for specific energy type (crude oil, natural gas, and diesel) based on the units and field descriptions. All values must be greater than or equal to 0.

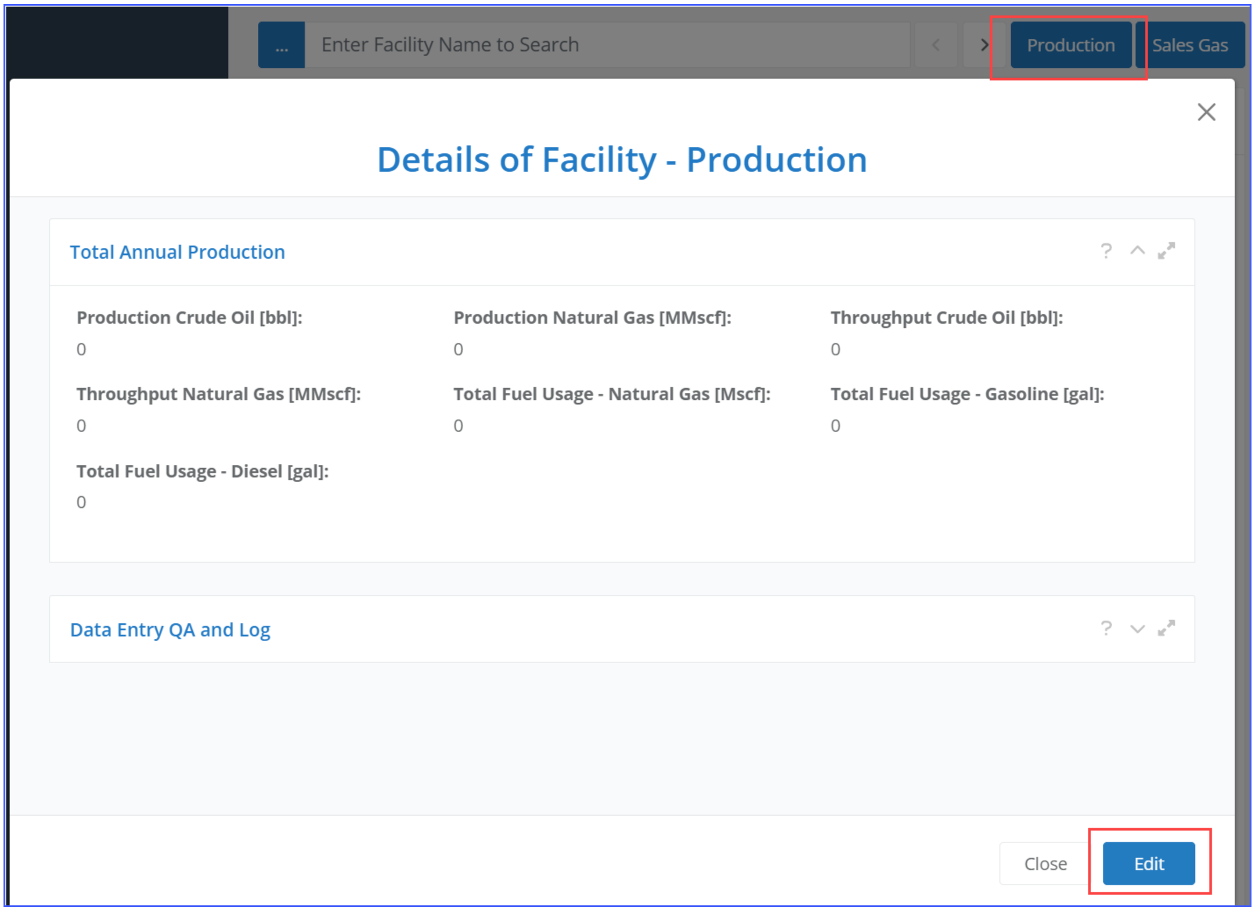


Figure 29. Production data

The production values are defined as follows:

- **Production Crude Oil [bbl]:** Total volume of crude oil extracted by the current structure during the survey period
- **Production Natural Gas [MMscf]:** Total volume of natural gas extracted by the current structure during the survey period adjusted to standard temperature and pressure (60 ^{o}F, 1 atm)
- **Throughput Crude Oil [bbl]:** Total volume of crude oil handled at the current structure during the survey period, including production volumes and volumes transferred by pipeline from another location
- **Throughput Natural Gas [MMscf]:** Total volume of natural gas handled at the current structure during the survey period, including production volumes and volumes transferred by pipeline from another location; volume is adjusted to standard temperature and pressure (60 ^{o}F, 1 atm)
- **Total Fuel Usage – Natural Gas [Mscf]:** Quantity of natural gas consumed at this structure during the survey period
- **Total Fuel Usage – Gasoline [gal]:** Quantity of gasoline consumed at this structure during the survey period
- **Total Fuel Usage – Diesel [gal]:** Quantity of diesel fuel consumed at this structure during the survey period

Click **Save** to save updates and get out of **Edit** mode. Click **Close** to close the window.

3.2.2.2 Sales Gas Composition

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Update sales gas composition by clicking on **Sales Gas** and **Edit**, similar to the procedure described above for production rates.

The input fields for the different mole fraction components will automatically sum in the lower right box (**Sales Gas Total [mole%]**). If the final sum does not equal 100% but is between 99% and 101%, you can normalize the value clicking on the **Normalize** button that will appear in the upper right corner of the window. **Normalize** will add or subtract from the non-zero elements in the fields by a linear weighting method that allows the composite total to sum exactly to 100.00%. If the sum is equal to 100.00%, the **Normalize** button will not appear.

> ***IMPORTANT:*** Sales gas composition is required as it affects certain calculations. If specific sales gas data is not available for the platform, default values can be found in the FAQs dashboard, Emissions Calculations section.

An example of the Sales Gas update screen with a sum not equal to 100.00% is shown in Figure 30.

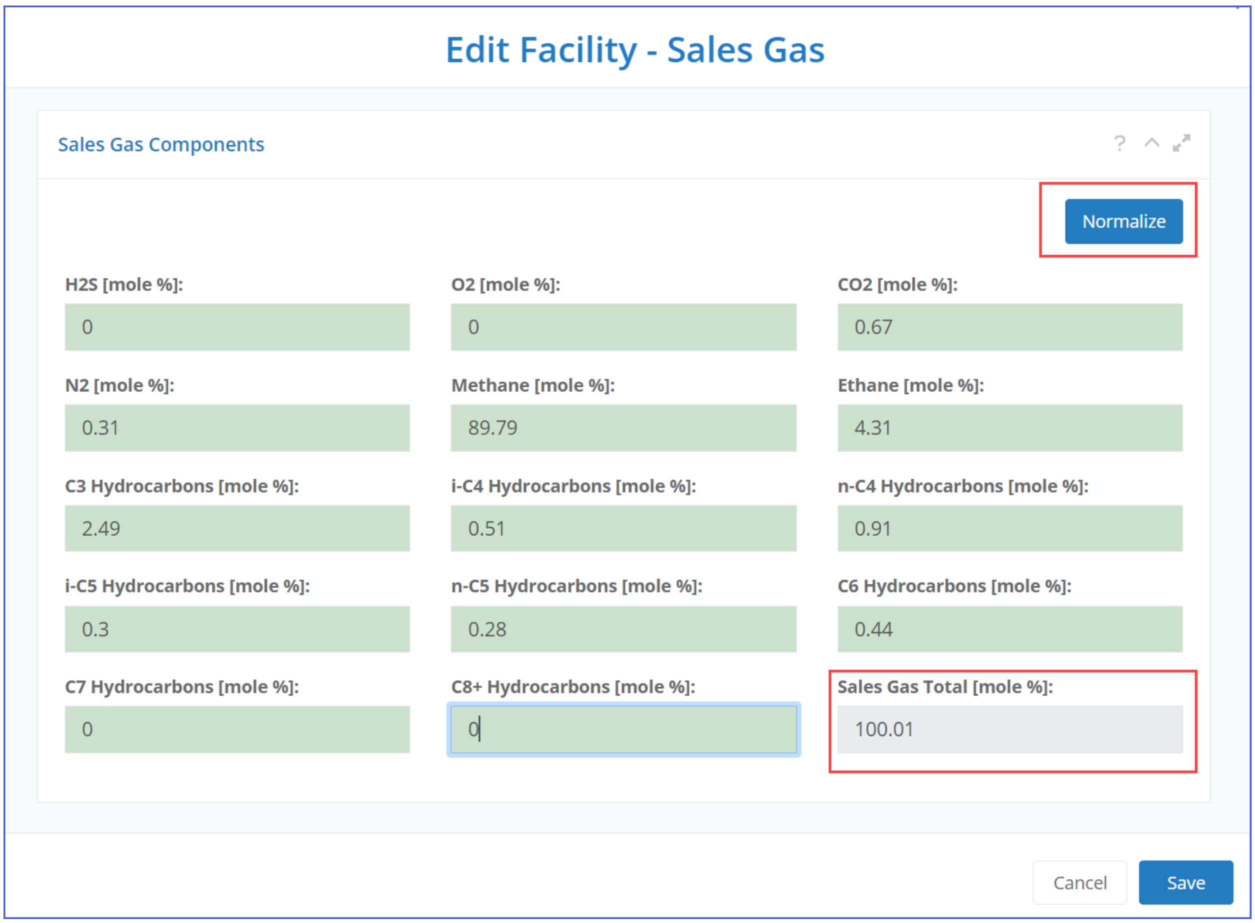


Figure 30. Sales Gas Components page

3.2.3 Importing Amine & Glycol Emissions

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Emissions for amine and glycol processes are calculated based on the emission rates generated by AMINECalc©[1] and GRI-GLYCalc™,[2] respectively. These values can be imported as emission rates for any relevant process directly in AEM. The emissions can then be calculated using these emission rates and the operating hours for each month.

To import the emission rates, follow these steps:

> ***IMPORTANT:*** You can only import amine emission rates for amine gas sweetening units and glycol emission rates for glycol dehydrator units.

1. In the **Emission Units & Processes** table, locate and select the amine unit (with calculator type AMI-000) or the glycol unit (with calculator type GLY-000) for which you wish to import data.
2. An **Import Amine Emission Rates** or **Import Glycol Emission Rates** button will become available in the **Calculator Parameters & Requests** panel, depending on your selection. Click this button (Figure 31).

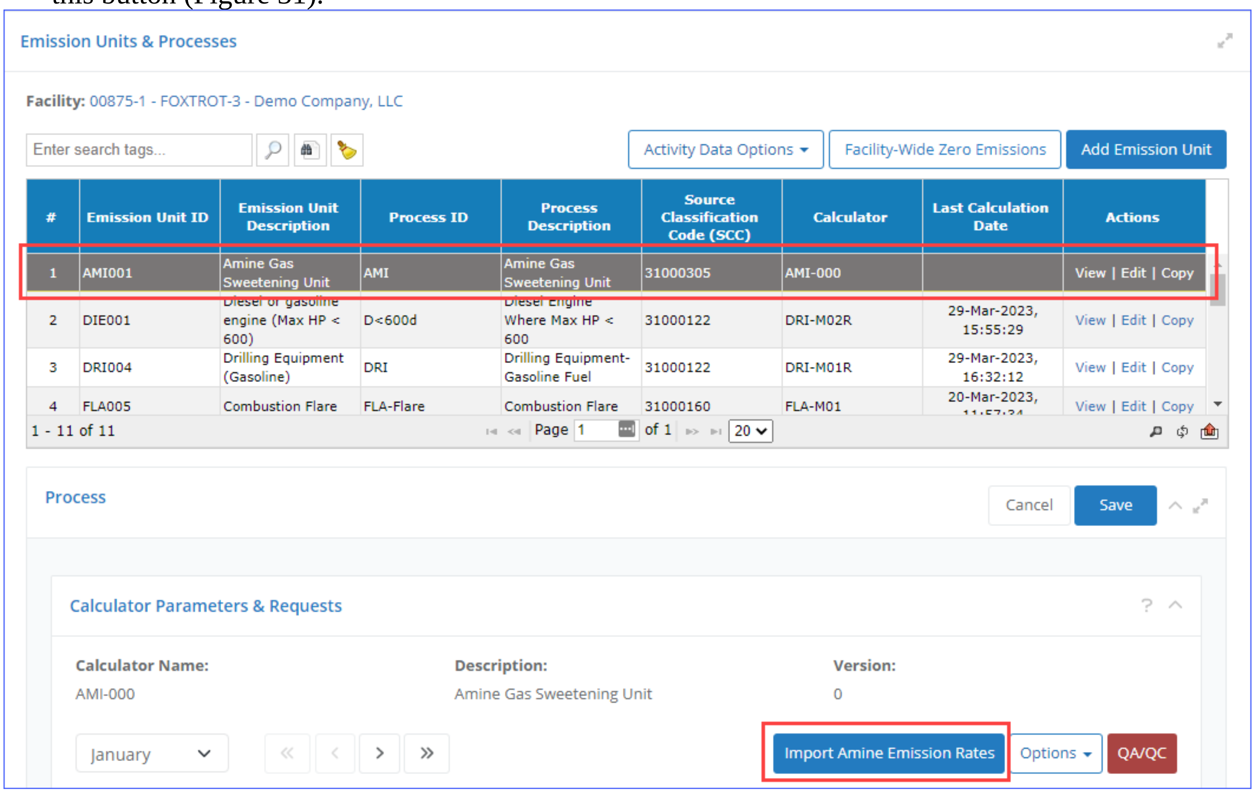


Figure 31. Import Amine & Glycol Emissions options

3. Click **Yes** in the message confirming that your any unsaved work will be saved.
4. Click **Select file**.
5. Navigate to and select the file that contains the data. Click **Next**.
6. Check the box for each **Stream** you wish to import. If a stream you are looking for is not available, the data file may be corrupted. Click **Next**.
7. Select the **Emission Periods** for which emissions will be imported. You can only select an emission period if:

---

[1] API PUBL 4679 Amine Unit Emissions Model AMINECalc Version 1.0

[2] www.gastechnology.org

- The **Hours of Operation** have been specified in the **Data Request** tab of the **Calculator Parameters & Requests** panel, and
- The period has not been set to **Zero Emissions**

8. Click **Next**.
9. Review the summary of the selections made. If all information is correct, click **Finish** to complete the import.

The imported emission rates values will be displayed in the **Emission Factors** tab of the **Calculator Parameters & Requests**. After the page is refreshed, the file will be displayed in the **Attached Files** panel (as seen in Figure 32). From here, you can download the file by clicking on the filename link in the **Download** column or view its contents by clicking the **View** option in the **Actions** column.

After the emission rates have been imported, the emissions can be calculated as they would be for any other process by clicking **Calculate** in the **Calculated Emissions** panel (for more details see Section 3.2.13).

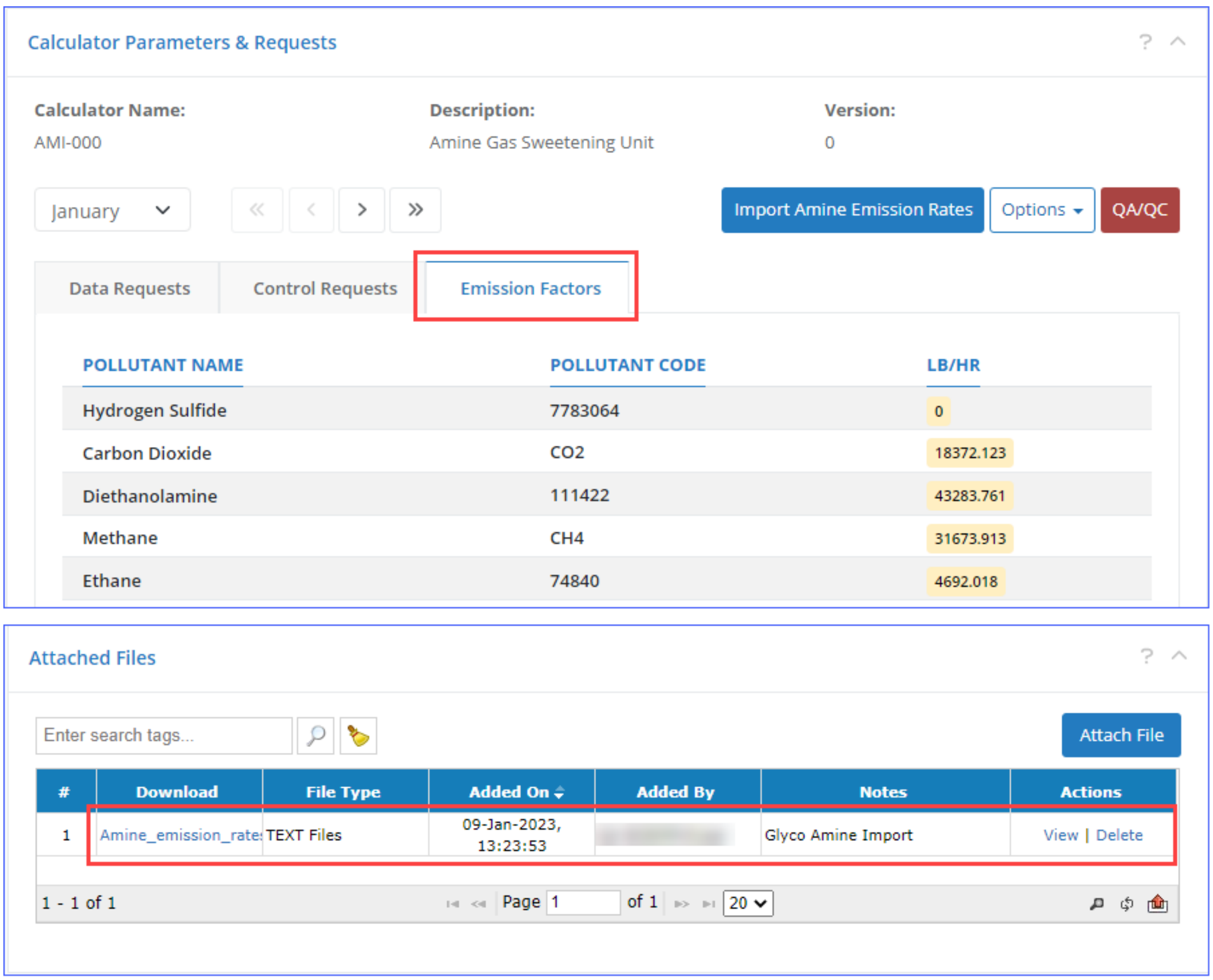


Figure 32. Amine import

3.2.4 Selecting Fugitives Leak Detection Approach

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Select Fugitive Emission Unit

When a fugitive emission unit is first created (and for any fugitive emission units that have been previously created), it is assumed that no leak detection program is used, and the default calculator uses the component count and average emission factor approach to calculate emissions. To account for any leak detection efforts, this approach may be changed to one of the following once the emission unit is created:

- Screening Ranges Approach
- Import Emissions Approach

The **Screening Ranges** approach is used when the number of leaking components is known. BOEM's Screening Ranges methodology and approach is consistent with the U.S. Environmental Protection Agency's (USEPA's) Screening Ranges Approach as detailed in EPA-453/R-95-017. Please refer to the "OCS AQS: Fugitives - Leak Detection Technical Recommendations for Implementation" documentation uunder the **Public Documents** section of the **Documents** module.

The **Import Emissions** approach is used if the emissions were obtained by other USEPA-approved methods and not calculated in OCS AQS.

To apply a leak detection approach, click the **Apply Leak Detection Approach** button at the top of the **Calculator Parameters & Requests** Panel (Figure 33).

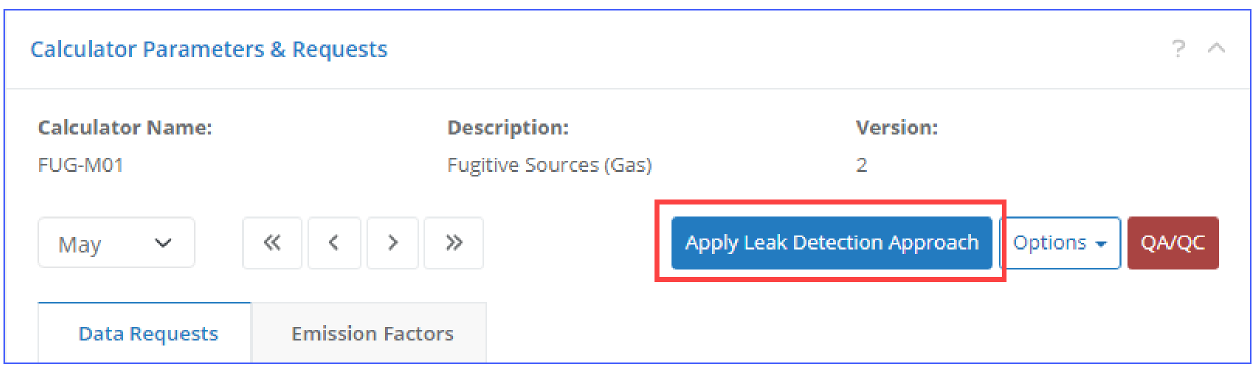


Figure 33. Apply leak detection approach

Changing the leak detection approach will change which parameters have to be specified for the **Data Request**.

> ***IMPORTANT:*** You cannot use different approaches for different months. You must use a <u>single</u> approach for the entire year.

3.2.4.1 Screening Ranges Approach

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Select Fugitive Emission Unit

The screening ranges approach can be used if the number of leaking components is known (using a USEPA-approved monitoring instruments).

To switch to a screening ranges approach:

1. Click the **Apply Leak Detection Approach** button above the **Data Request** tab of the **Calculator Parameters & Requests** panel (Figure 33).
2. In the **Leak Detection Selection Approach** step, check the **Screening Ranges** option and click **Next**.
3. In the **Supplemental Documents Upload** step, you have two options:
    a. If supporting documentation is available, click **Select File** to navigate to and select the appropriate files.
    b. If supporting documentation is not yet available, check the **Skip** option.

    IMPORTANT: Supporting documentation must be provided when using the screening ranges approach. While you will be able to calculate emissions without the documentation, you will not be able to submit the inventory. This documentation can be uploaded during the wizard, or at a later date in the **Attached Files** panel in the **AEM**.

4. In the **Summary** step, review the information to verify that all selections are correct. Click **Finish**.

Before the screening ranges approach is applied, only one set of component parameters has to be specified in the **Data Request** panel—the **Total Components**. After the screening ranges approach is applied, a second set of parameters has to be specified—the **Leaking Components** (Figure 34). A component is considered “leaking” if the component’s screening value is greater than or equal to 10,000 ppmv.[3] The number of Leaking Components cannot exceed the number of Total Components.

> ***NOTE:*** If you change the leak detection approach to anything other than **Screening Ranges** after entering the leaking component counts, these values will be deleted.

The calculator will subtract the number of leaking components from the total number of components to obtain the number of non-leaking ones. The calculated emissions combine emissions from the leaking and non-leaking components.

[3] References: 1) *OCS AQS: Fugitives - Leak Detection Technical Recommendations for Implementation* documentation under the **Public Documents** section of the **Documents** module; 2) *Protocol for Equipment Leak Estimates* (EPA 453/R-95-017)

Figure 34. List of leaking components for screening ranges approach

After changing the activity data, you must calculate emissions (Section 3.2.13).

3.2.4.2 Import Emissions Approach

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Select Fugitive Emission Unit

The import emissions approach can be used if the emissions values for the fugitive process were acquired by other USEPA-approved data acquisition means.

> ***IMPORTANT:*** While this approach allows you to bypass having to calculate emissions based on the parameters in the **Data Request** tab, this information must still be provided for the inventory to be eligible for submittal.

To switch to the import emissions approach:

1. Click **Apply Leak Detection Approach** button above the **Data Request** tab of the **Calculator Parameters & Requests** panel.
2. In the **Leak Detection Approach Selection** step, check the **Import Emissions** option.
3. Click **Next**.
4. In the **Supplemental Documents Upload** step, you have two options:
    a. If supporting documentation is available, click **Select File** to navigate to and select the appropriate files.
    b. If supporting documentation is not available yet, check the **Skip** option.

> ***IMPORTANT:*** Supporting documentation must be provided when using the import emissions approach. You will not be able to submit the inventory unless there is supporting documentation included. This documentation can be uploaded during the wizard, or at a later date in the **Attached Files** panel in the **AEM**, as described further below.

5. Click **Next**.
6. In the **Export/Import Fugitive Emissions Template** step, click the **Click Here to Download Fugitive Emissions Template File** (Figure 35). This will generate an Excel file specific to the currently selected fugitive process.

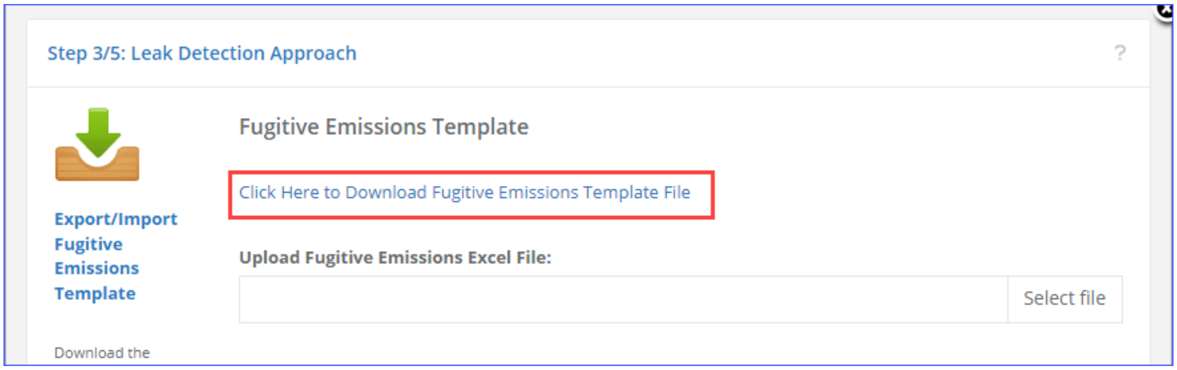


Figure 35. Download fugitive emissions template file

7. Download and open the generated file.

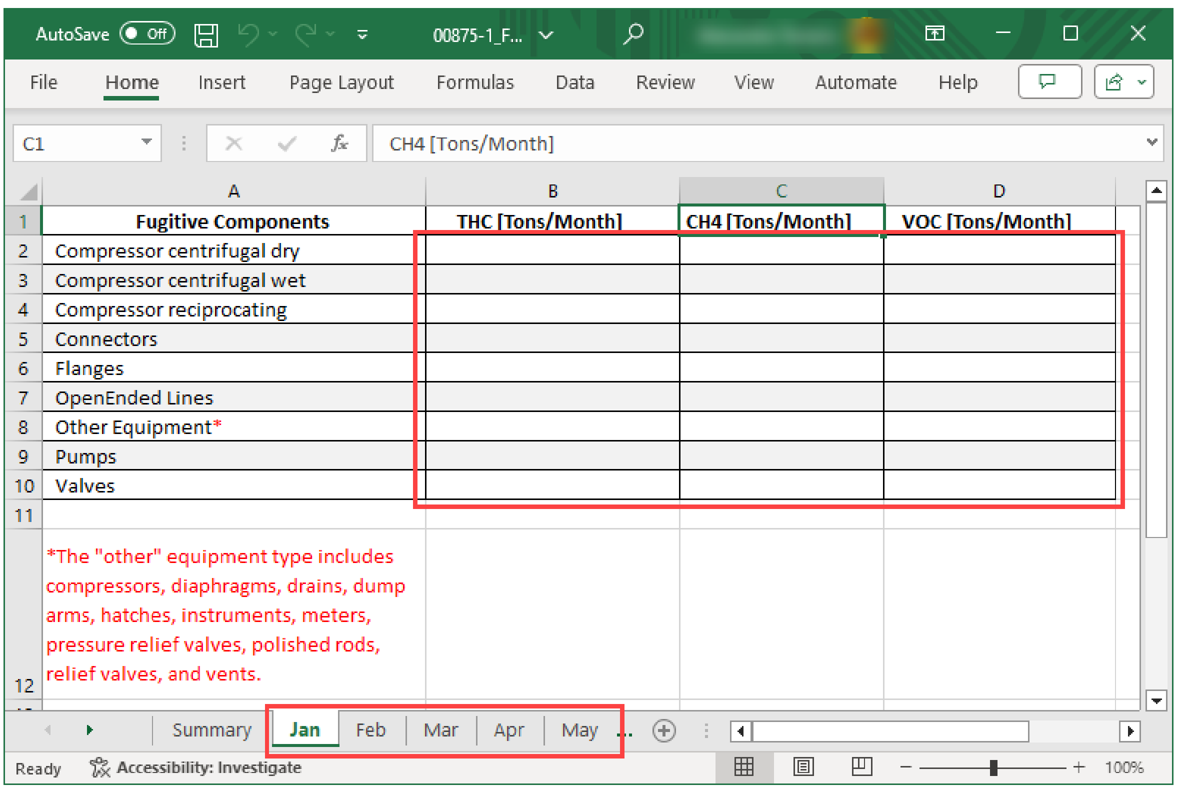


Figure 36. Enter fugitive emissions data

8. Enter the emissions values for each month in its designated tab (Figure 36) and save the file.

IMPORTANT: Do not change the information in the **Summary** tab of the Excel file. If this information is changed, you will not be able to use the file to import emissions.

9. Back in the **Export/Import Fugitive Emissions Template** step of the **Leak Detection** wizard click **Select file** button.
10. Navigate to and select the updated emissions file (Figure 37).

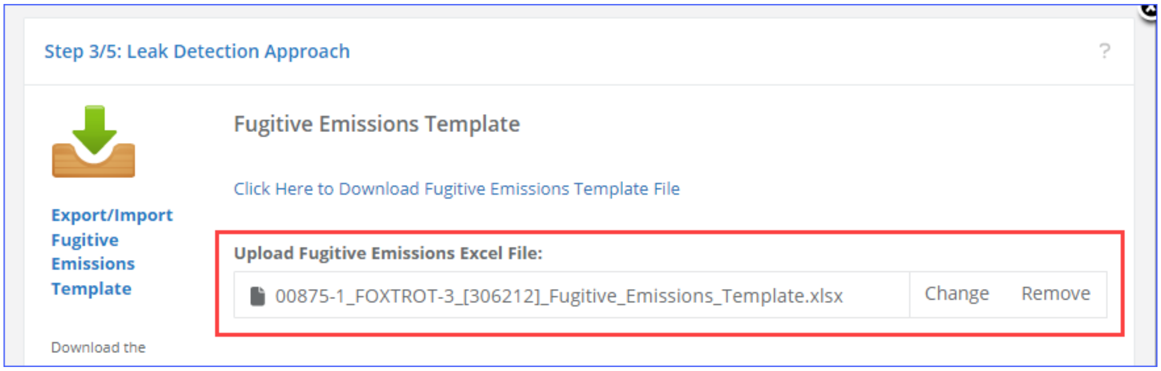


Figure 37. Select fugitive emissions file

11. Click **Next**.
12. In the **Emissions Period Selection** step, check the box for each month for which you wish to import emissions (Figure 38).

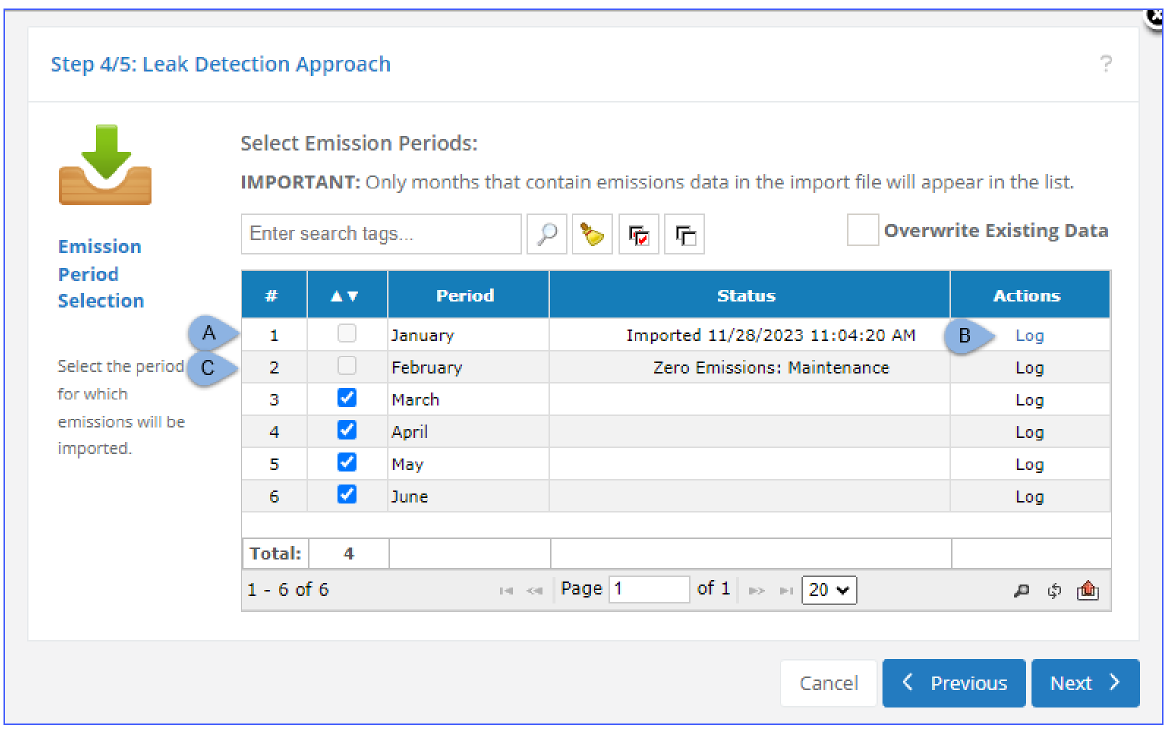


Figure 38. Select fugitive emission periods

Regarding the period selection:

- Only months that have data in the Excel file will be displayed in the list (January to June in Figure 38)
- If data for a specific month has been previously imported, it will be displayed in the list, but you will not be able to select it (tag **A** in Figure 38). This is done to prevent overwriting existing data by accident. The **Log** link (tag **B** in Figure 38) in the **Actions** column contains the history of import activity for that month. If you still wish to import emissions for that month, check the **Overwrite Existing Data** option above the table. This will activate the check box for all emission periods.
- If the fugitive process is set to "zero emissions" for a specific month, it will be displayed in the list, but you will not be able to select it (tag **C** in Figure 38). This is done to prevent accidentally importing emissions where there should be none. If you still wish to import emissions for that month, check the **Overwrite Existing Data** option, which will activate all months. <u>Importing emissions for a "zero emissions" month will reactivate the month in question</u>.

13. Click **Next**.
14. In the **Summary** step, verify that all selections are accurate and review the data that will be imported in the **Emissions to be imported** table. If everything is correct, click **Finish**.

Once the **Import Emissions** approach has been applied, the **Calculate** button is no longer available in the **Calculated Emissions** panel, and the panel itself displays imported emissions. Please verify that emissions displayed in OCS AQS match your imported emissions.

3.2.4.2.1 Importing Additional Emissions Data

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Select Fugitive Emission Unit

It is not necessary to import emissions for the entire year at the same time. Additional emission data can be imported at a later date, as they become available.

To import additional emission data:

1. Update and save the template file you originally downloaded with new data.
2. Click **Apply Leak Detection Approach** button above the **Data Request** tab of the **Calculator Parameters & Requests** panel.
3. In the **Leak Detection Approach Selection** step, check the **Import Additional Data** option (this option is only available if the leak detection approach is already set to **Import Emissions**) (Figure 39).

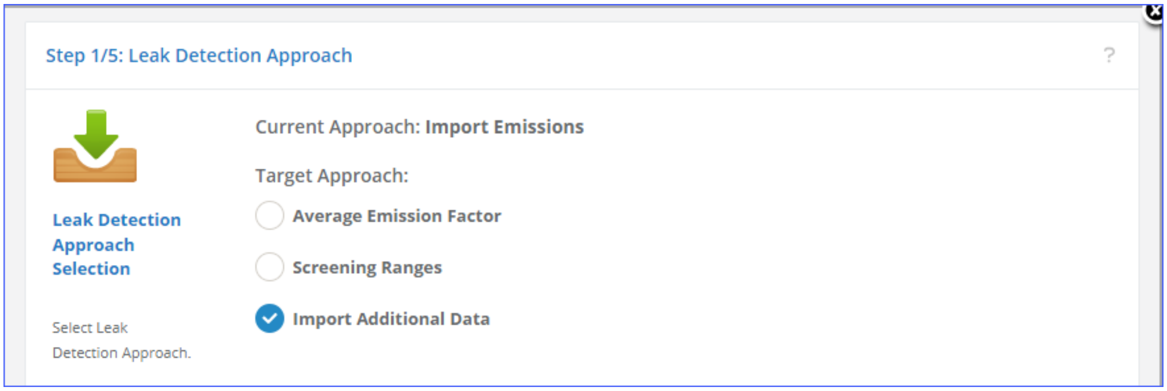


Figure 39. Import additional fugitive emissions data

4. Click **Next**.
5. In the **Export/Import Fugitive Emissions Template** step, click the **Select file** button.
6. Navigate to and select the updated emissions file.
7. Click **Next**.
8. Select the new emission periods.

   NOTE: If you are importing new emissions data for the months for which you had previously imported data, you will have to check the **Overwrite Existing Data** option to make these months available, as described above.

9. Click **Next**.
10. In the **Summary** step, verify that all selections are accurate and review the data that will be imported in the **Emissions to be imported** table. If everything is correct, click **Finish**.

3.2.4.3 Resetting to Default – No Leak Detection – Average Emission Factor Approach

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Select Fugitive Emission Unit

If, after applying a leak detection approach, you decide not to use it, you can reset to the original Average Emission Factor calculation method.

To do so:

1. Click the **Apply Leak Detection Approach** button above the **Data Request** tab of the **Calculator Parameters & Requests** panel.
2. In the **Leak Detection Selection Approach** step, check the **Average Emission Factor** option and click **Next** (Figure 40).

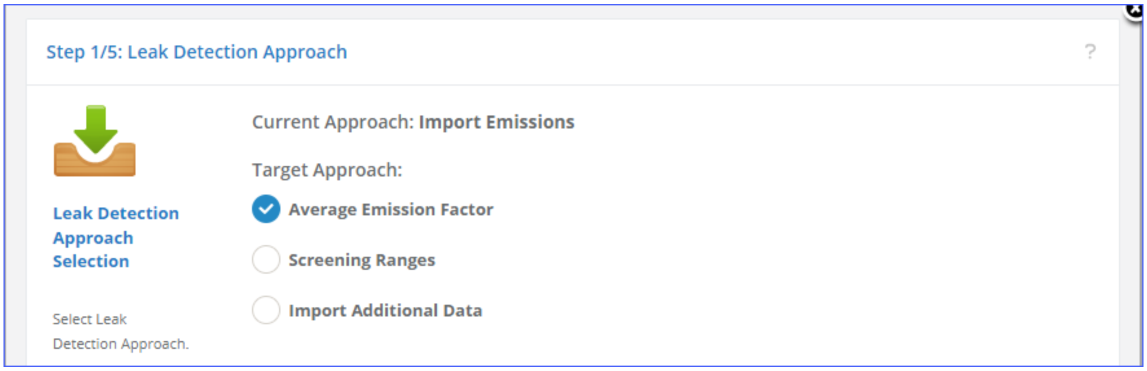


Figure 40. Reset default leak detection approach

3. In the **Summary** step, click **Finish**.

   IMPORTANT: You must re-calculate emissions after changing the leak detection approach.

3.2.4.4 Importing Supplemental Documents

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Select Fugitive Emission Unit

If you did not import supplemental documentation during the **Leak Detection** wizard for either the Screening Ranges or Import Emissions approaches, you can do so in the **Attached Files** panel in the **AEM**.

To import supplemental documents:

1. In the **Activity & Emissions Manager**, scroll down to the **Attached Files** panel.
2. Click the **Attach File** button.
3. In the **Attach New File** dialog that opens, click **Select file**.
4. Navigate to and select the supplemental documentation file.
5. In the **File Type** field select “Leak Detection Supplemental Documents” (Figure 41).

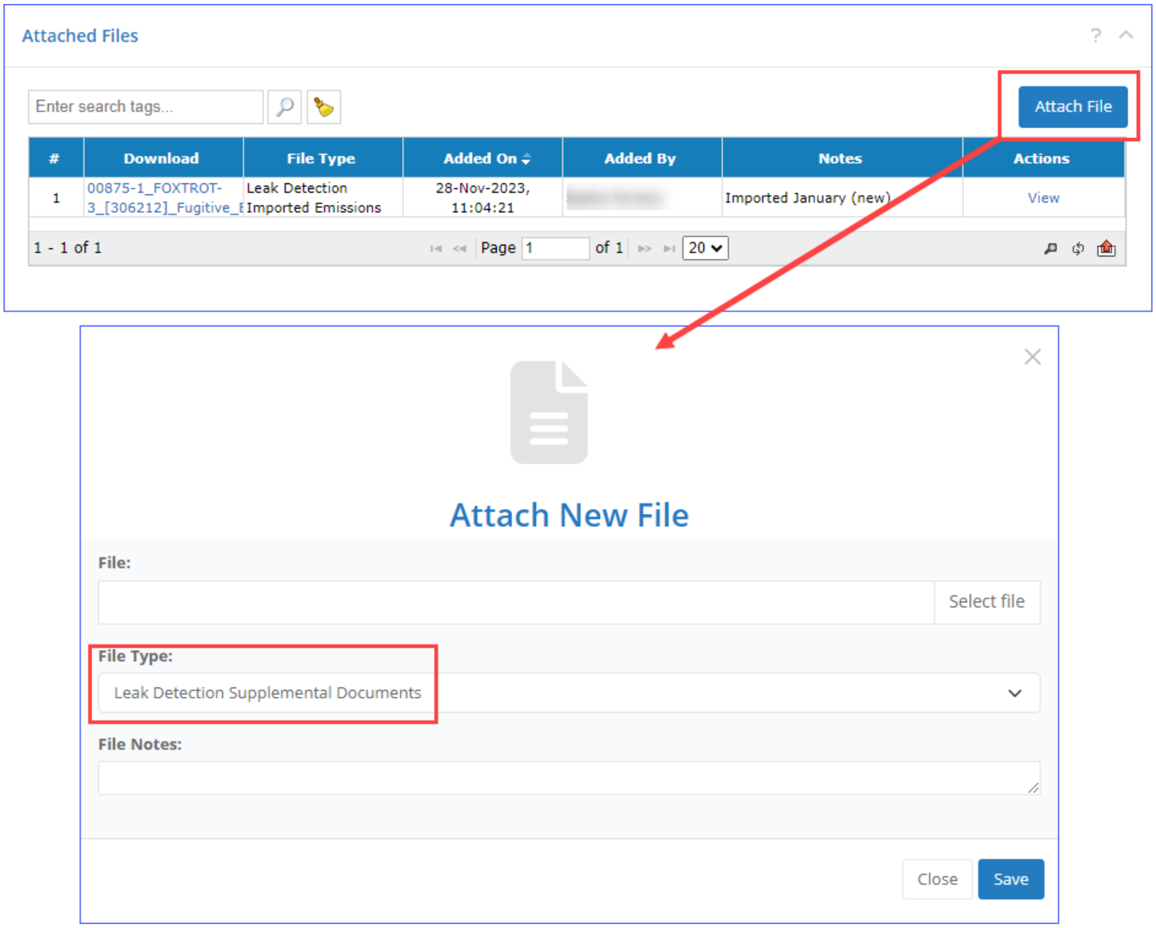


Figure 41. Attach leak detection supplemental documents

6. Add any additional information in the **File Notes** field.
7. Click **Save**.
8. Repeat the procedure with any remaining documents.

3.2.5 Updating Facility Details

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

To check structure details such as design specifics, sales gas composition, and location click on the **Facility** name hyperlink above the **Emission Units & Processes** table as shown in Figure 42. A window will pop up with facility details. Scroll down to review available facility details.

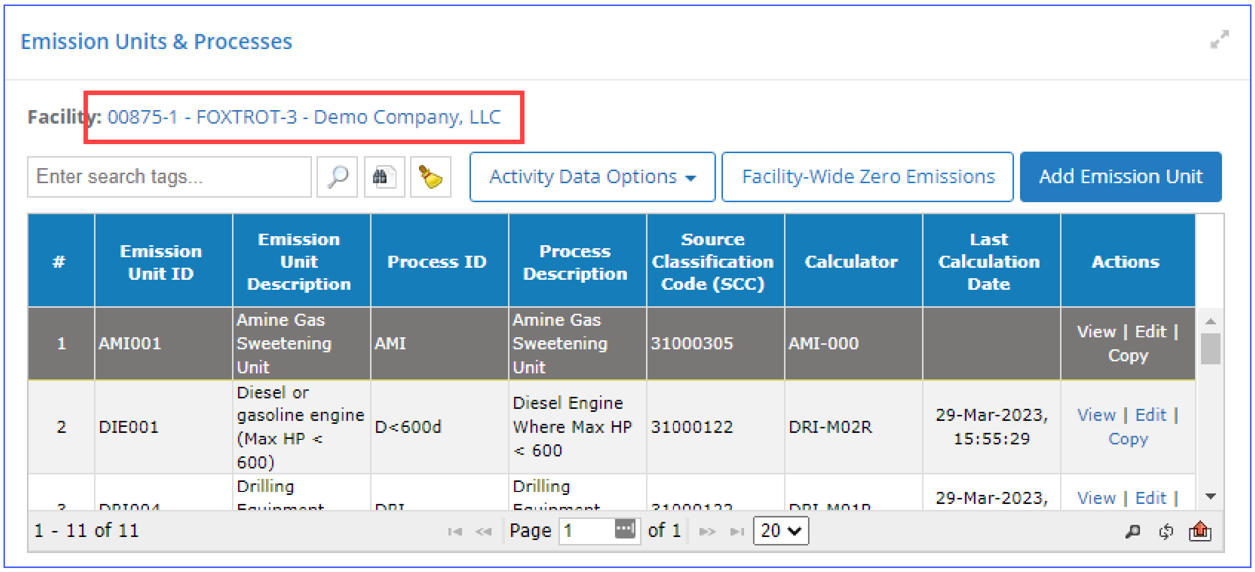


Figure 42. Facility details link location

To edit information about the facility, click **Edit** in the top or bottom right corner of the window to enter the edit mode. Click **Save** to complete the updates.

> ***IMPORTANT:*** Fields colored in green are required (Figure 43), and you will not be able to save any changes if any of the green fields are blank.

Production Rates and **Sales Gas Composition** can be edited in this window, as well as the individual windows described in Sections 3.2.2.1 and 3.2.2.2 respectively.

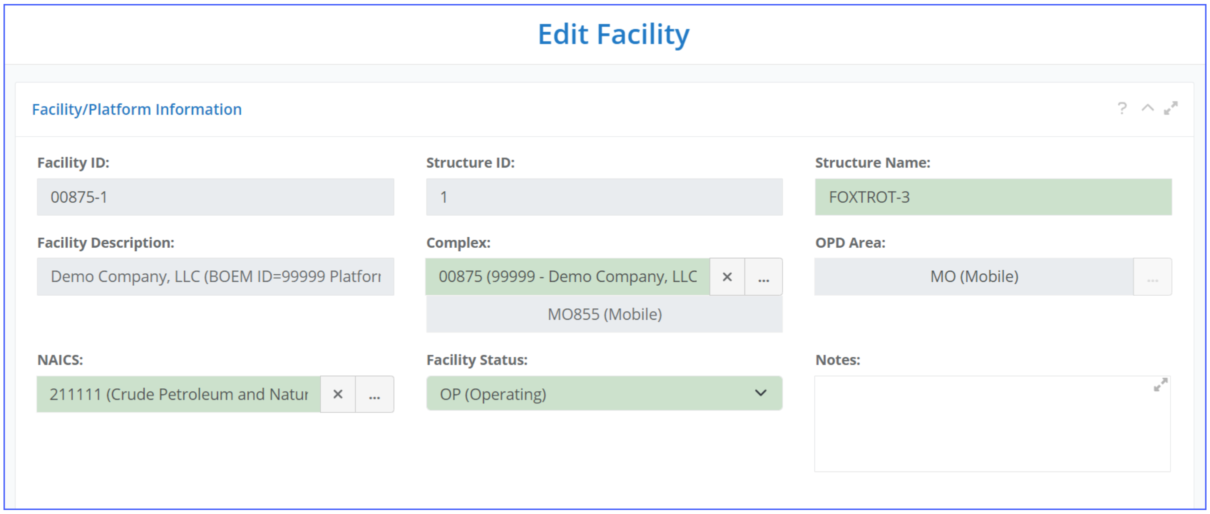


Figure 43. Facility/platform information editor

3.2.5.1 Structure Details

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > View Facility Details

The **Facility Details** page allows you to enter physical parameters associated with the platform structure, including:

- Distance from Shore
- Water Depth
- Structure Type
- Authority Type
- Platform X Length
- Platform Y Length
- Platform Angle

Platform X Length should be the dimension closest to the east-west orientation and **Platform Y Length** should be the dimension closest to the north-south axis.

The **Platform Angle** is the offset angle of the platform from true north.

3.2.5.2 Platform Building Downwash Parameters

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > View Facility Details

For the 2023 reporting period, operators are required to submit structure data, which is essential for running the platform downwash algorithm incorporated into American Meteorological Society (AMS)/Environmental Protection Agency (EPA) Regulatory Model (AERMOD) air dispersion module within OCS AQS.

> ***NOTE:*** Air dispersion module is not available to the operators. The modeling is performed by BOEM based on activity, release point, and platform data reported by the operators.

This data should specifically include the three parameters found in the **Platform Building Downwash Parameters** panel:

- **Platform Base Height Above MSL (ft):** Defined as the elevation of the structure's base measured from Mean Sea Level (MSL)
- **Maximum Height of Building Above MSL (ft):** Represents the altitude of the highest point of the structure, measured from MSL
- **Shortest Building Width (ft):** Refers to the smallest width of the platform footprint.

The Platform Base Height should be measured from MSL up to the structure's lowermost point. The Maximum Building Height refers to the highest enclosed structure's altitude measured from MSL. Notably, fixtures mounted on the structure, such as satellite dishes, cranes, or other open frames, should be excluded from the measurements. Refer to Figure 44 for measurement references. Figure 44 and the above definitions were referenced from the USEPA's *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*.

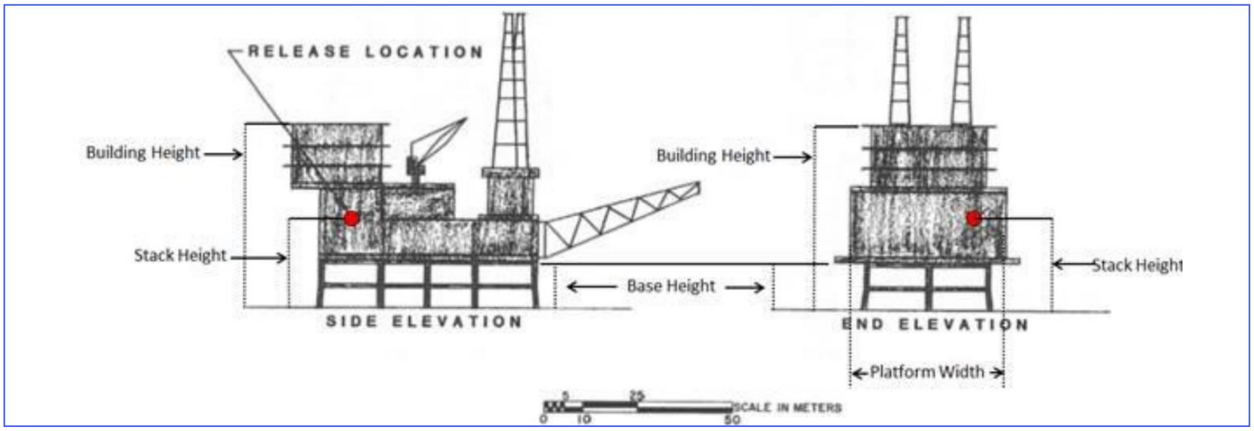


Figure 44. Measuring references for structure parameters[3]

These parameters must be specified for every structure to pass the submittal QA/QC.

3.2.6 Emission Units & Processes

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

The **Emissions Units & Processes** table includes all emission units and a summary of key information including:

- Process ID and description of each emission unit
- Source Classification Code (SCC)
- Assigned calculator
- Date and time of the last emission calculation (if applicable)

3.2.6.1 Select Emission Unit

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Emission units associated with a particular facility are shown in the table at the top of the **AEM Details** page. To view the details of any emission unit process, click anywhere in the row for that emission unit *other than the hyperlinks* to select it, as shown in Figure 45. This will update the **Process** section under the table. Clicking on the **View** or **Edit** in the **Actions** column will open the **Details of Emission Unit** window for viewing emission unit information.

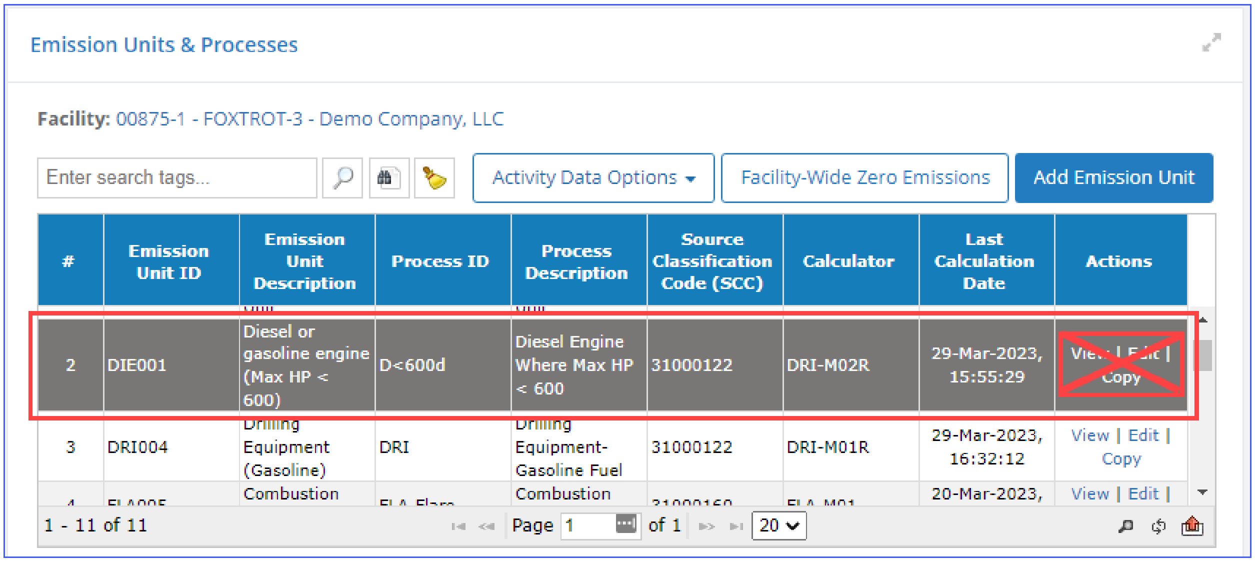


Figure 45. View process details

3.2.6.2 View/Edit an Emission Unit

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

To view the details of an emission unit, click **View** in the **Actions** column (Figure 46). Edit the emission unit by selecting **Edit** in the **Actions** column. Green field(s) shown in Figure 47 represent required data that must be included before you can save the item. Click **Save** to save changes.

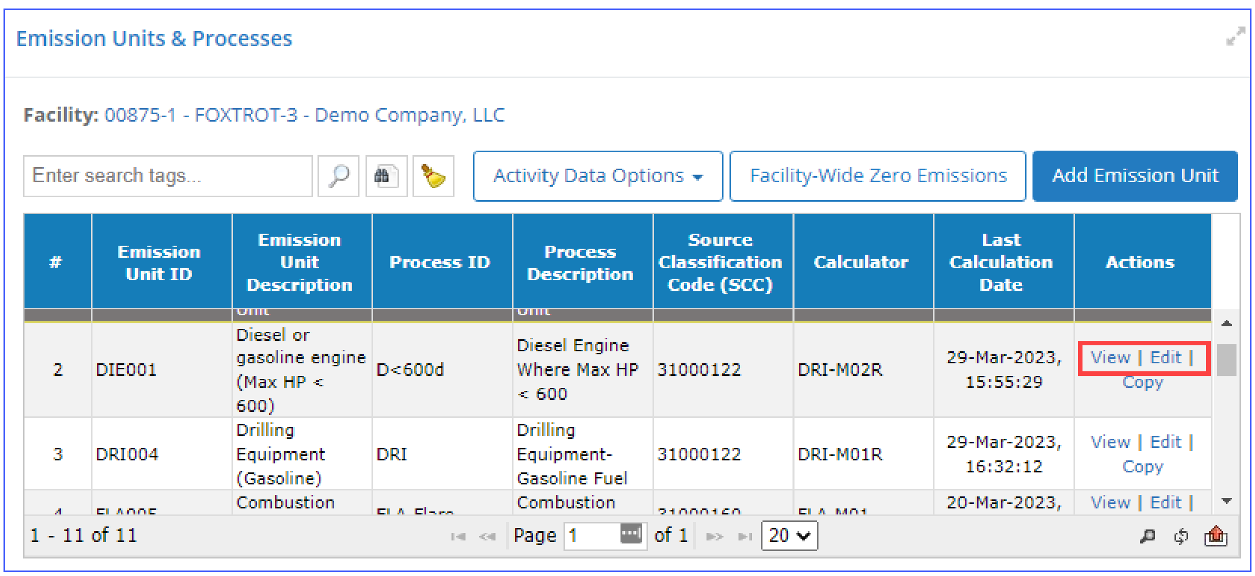


Figure 46. View emission unit details

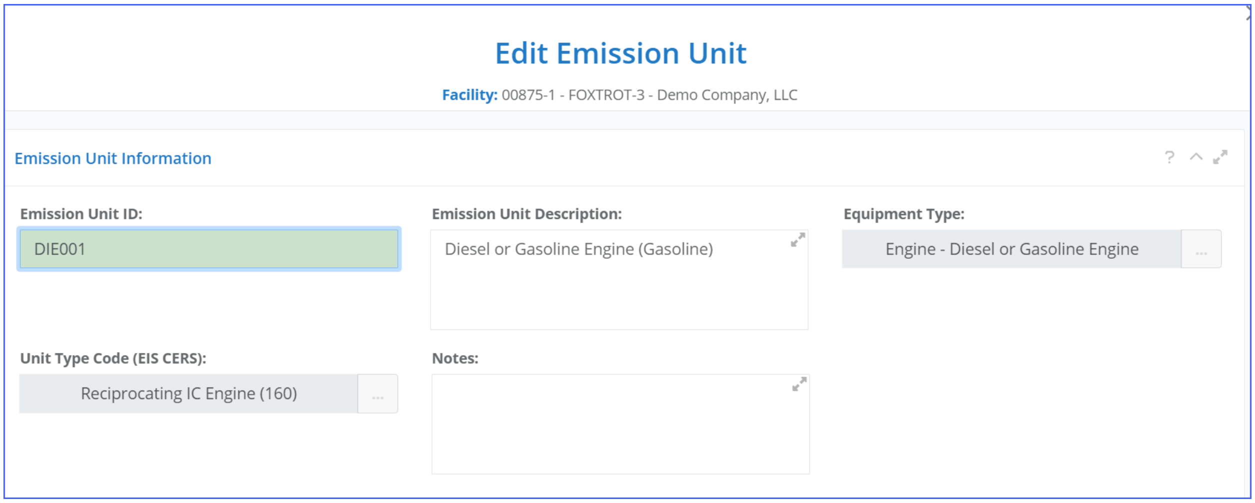


Figure 47. Edit emission unit

3.2.6.3 Add an Emission Unit

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Adding a new emission unit will also create the associated process and automatically assign an appropriate calculator based on a template.

To add a new emission unit:

1. Click **Add Emission Unit** above the **Emission Units & Processes** table. A wizard will begin, starting with **Emission Unit Template Selection**.
   The table on this page lists all emission unit types for which templates have been created. A template will determine what process is created for the new emission unit and the emissions calculator that will be assigned to that process based on the emission unit type and description.
2. Select the template that best fits the emission unit you wish to create.
3. Click **Next**.
4. Fill out the necessary data (fields colored in green) for the emissions unit. You may need to scroll down to reach all necessary fields.
5. Click **Next**.
6. The next step allows you to specify a release point for the new emission unit. You MUST define a release point before you can calculate emissions, but you do not have to do it to finish the wizard. There are three options you can use:
   a. Use an **Existing Release Point**. If you check this option, select a release point from the list of ones already defined for the structure and click **Next**.
   b. Create a **New Release Point**. If you check this option, enter all required parameters (green fields) and click **Next**.
      TIP: To be created, a release point must be properly georeferenced. If you do not know the exact coordinates of the release point, click **From Facility Location** in the **Georeference** panel to assign the release point the same coordinates as the structure.
   c. **Skip Release Point**. You can finish the wizard without creating a release point, but you will not be able to calculate emissions for the new emission unit until you specify a point of release for it. Click **Next**.
7. Review selected options and click **Finish** to create the new release unit.

The new unit will be available for selection from the **Emission Units & Processes** table, and the assigned release point (if this was done during the procedure) will be displayed in the **Release Point & Apportionment** panel.

When you create an emission unit, the associated process will have the appropriate calculator assigned based on the template defined by BOEM. Calculators have been prepared for the following processes found on platforms, as shown in Table 1.

> ***IMPORTANT:*** If you accidentally create an emission unit with the wrong process/calculator, simply create another emission unit with the correct one. Follow the procedure described in Section 3.2.6.5 to remove the erroneous emission unit.

A description of each calculator and **Data Request** and **Control Request** input fields is provided in Appendix A.

Table 1. Available platform calculator types

Code	Description
AMI	Amine gas sweetening unit
BOI	Boilers
DIE	Diesel and gasoline engines
DRI	Drilling equipment
FLA	Flares
FUG	Fugitive emissions
GLY	Glycol dehydrators
LOA	Loading operation emissions
LOS	Losses from flashing
MUD	Mud degassing
NGE	Natural gas engines
NGT	Natural gas/diesel dual-fuel turbines
PNE	Pneumatic pumps
PRE	Pneumatic controllers
STO	Storage tanks
VEN	Cold vents

3.2.6.4 Copy an Emission Unit

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

To copy an emission unit, click **Copy** under the **Actions** column, and a short wizard will guide you through the process. The fields will all copy from the original emission unit; however, you are required to change the **Emission Unit ID**, as shown in Figure 48. Click **Next** to move to the next step. The summary step allows you to review the specified information. Click **Finish** to create the new emission unit.

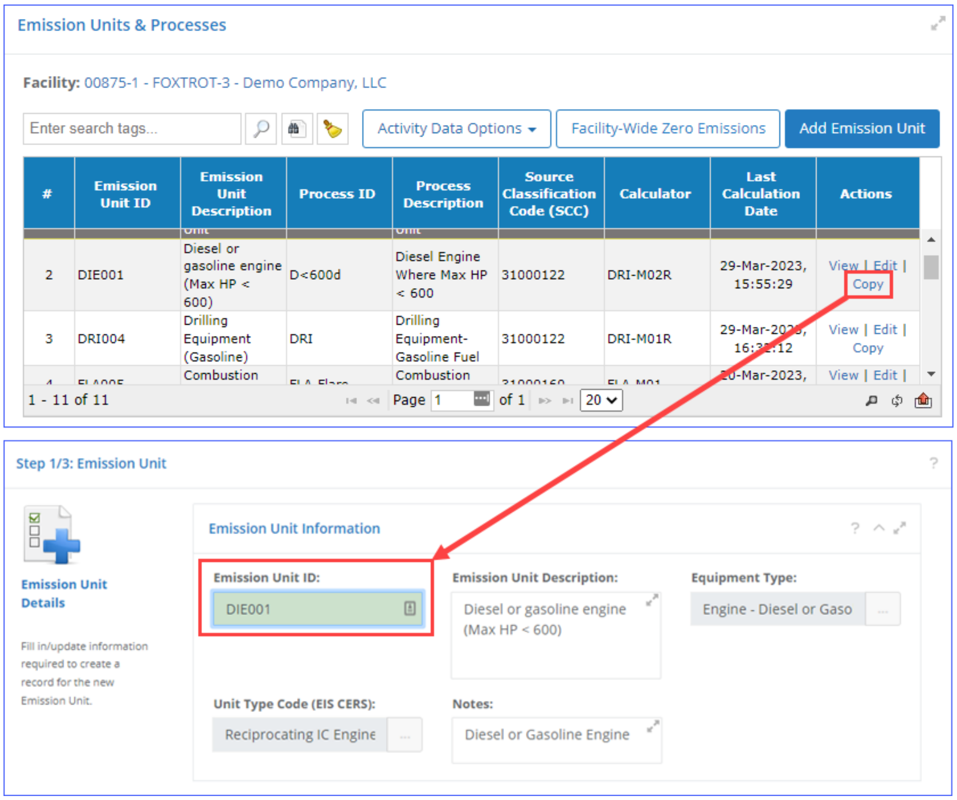


Figure 48. Copy emission unit

3.2.6.5 Delete Emission Unit

As an operator, you cannot directly delete an emission unit.

If you need to remove an emission unit from the structure, follow the steps below:

1. Set the emission unit in question to zero emissions (Section 3.2.11) with the applicable reason (if removing unit because the record was created by mistake, select "Other" as the reason and leave an appropriate comment).
2. Contact OCS AQS technical support at OCS.AQS_Support@webLakes.com to request that the emission unit be deleted. Make sure to include the following information:
   a. Company name
   b. Facility ID
   c. Emission Unit ID
   d. Process IDs associated with the unit
   e. Reason for removal

3.2.6.6 Bulk Import/Export

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Parameters required to calculate emissions produced by various units can be easily reviewed and updated by exporting them into an Excel spreadsheet and then importing them back into OCS AQS. This is done by clicking on **Activity Data Options** above the table of the **Emission Units & Processes** and is described below in Section 3.2.10.1.

3.2.6.7 Facility-Wide Zero Emissions

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

If no emissions are generated for the entire facility for a specific month (or months) due to inactivity, maintenance, or natural disaster, you can zero out emissions for all sources by month without updating each unit individually.

Click **Facility-Wide Zero Emissions** above the **Emission Units & Processes** table to load the **Facility-Wide Zero Emissions** dialog as shown in Figure 49.

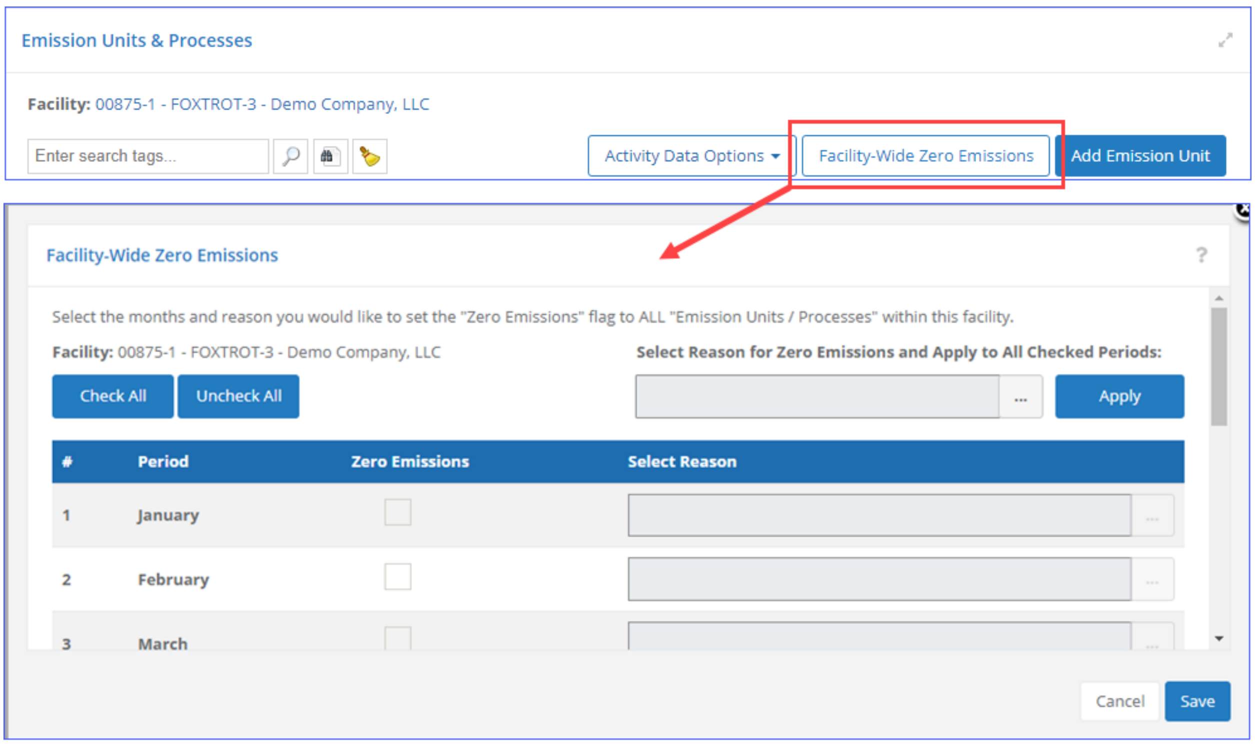


Figure 49. Facility-wide zero emissions window

Check the box for the month (or months) of zero emissions that took place for the entire facility and click **[…]** to load the list of reasons why the facility did not produce emissions. Select the appropriate reason and click **OK**. Repeat the procedure for all months the facility has been idle. Click **Save** to commit the changes. A verification message allows you to confirm the selection. Figure 50 illustrates the process.

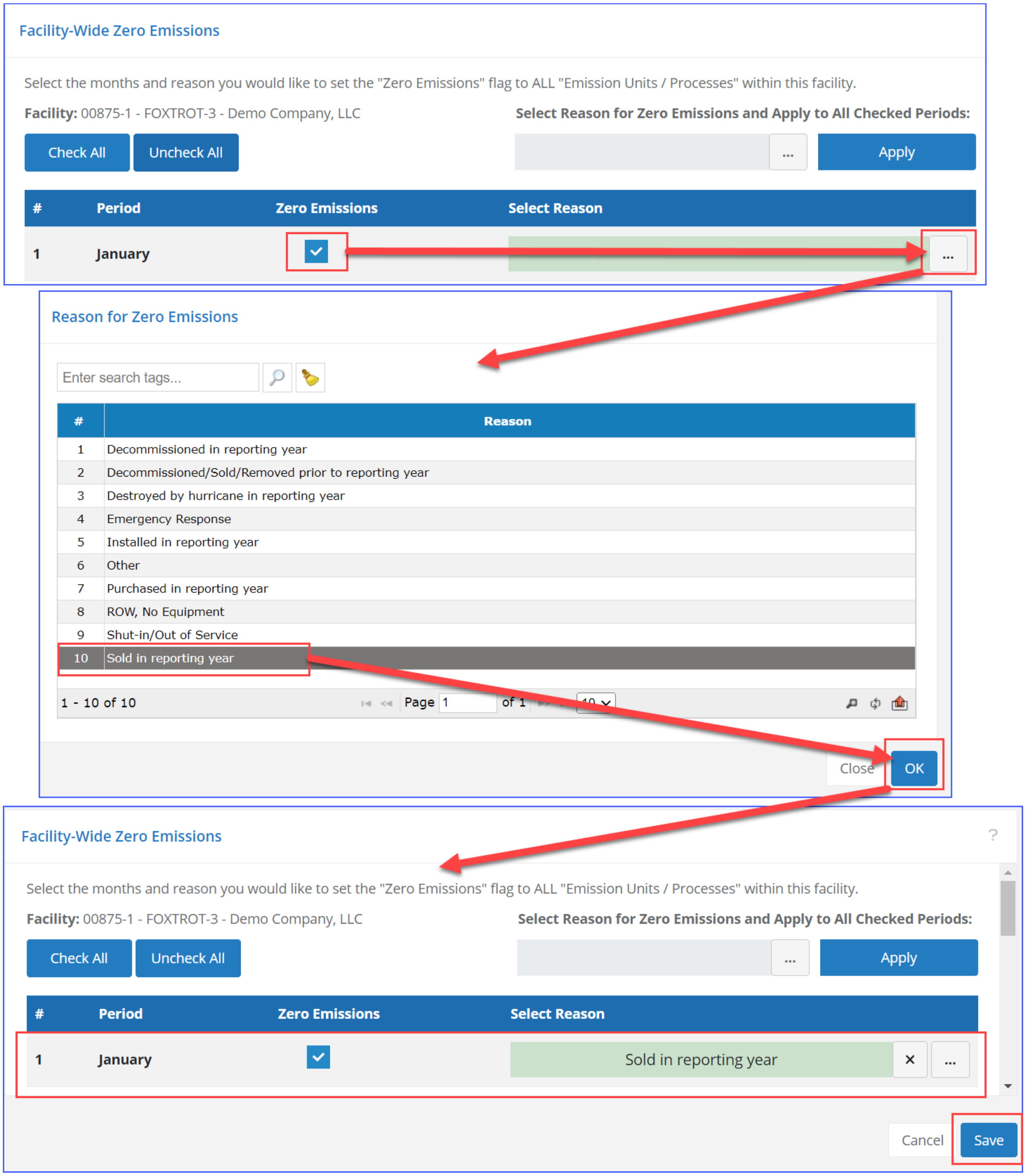


Figure 50. Set facility-wide zero emissions

> ***IMPORTANT:*** If you need to show zero emissions for a particular emission unit, you can do that in the **Calculator Parameters & Request** section as described in Section 3.2.11.

If the facility has not been producing for the entire year (e.g., been decommissioned or sold), you can select all months at the same time by clicking **Check All**; set the same reason by selecting it in the selection at the top of the dialog and click **Apply** as seen in Figure 51. After you commit the changes, all processes will be set to zero emissions for all months.

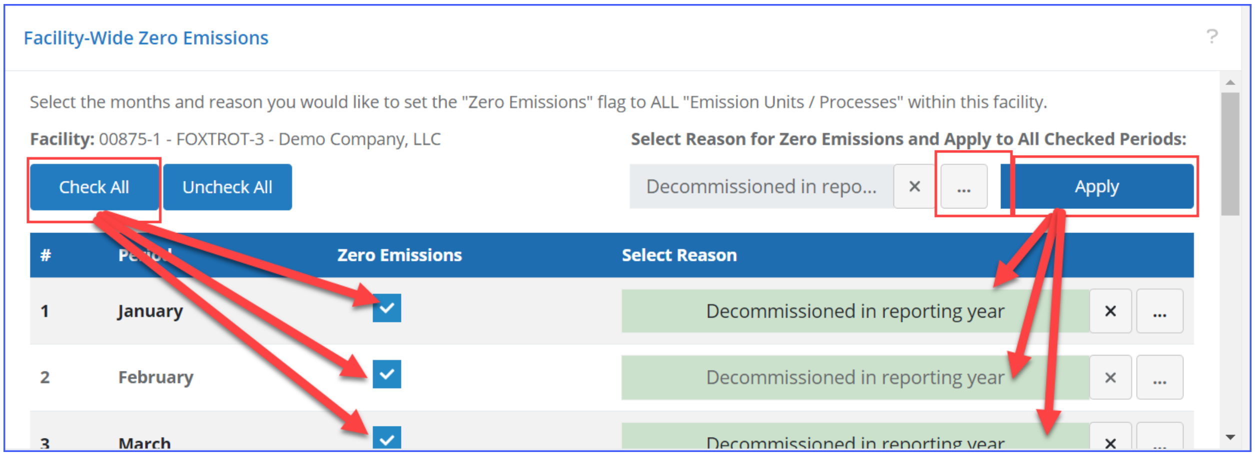


Figure 51. Facility-wide zero emissions for all months

> ***IMPORTANT:*** This procedure sets the emissions for all processes and emissions periods for this facility to 0 and deactivates data entry for the **Calculator Parameters & Requests** panel. If you then reactivate a specific process for a specific month, the Facility-Wide Zero Emissions setting for that month will be removed, but the other processes at the facility will still be set to zero emissions for that month.

3.2.6.7.1 Facility-Wide Zero Emissions During Facility Transfer

When a facility is transferred from one operating company to another, a duplicate facility is created by OCS AQS in the receiving operator’s inventory. The month during which the transfer took place remains active for the facility in both inventories. The months from January up to, but not including, the month of transfer are zeroed out for that facility in the receiving operator’s inventory (because that operator did not yet take possession of the facility and was not responsible for its emissions). The months from, but not including, the month of transfer until the end of the year are zeroed out for the facility in the former operator’s inventory (because the facility is no longer in their possession).

The reason for zero emissions in this case is automatically set to **Ownership transfer** and disabled against further editing.

> ***IMPORTANT:*** The "Ownership transfer" reason is not available for users to select. OCS AQS will automatically assign this reason when a facility is transferred from one company to another within reporting year. For the facility at the previous company, the months following the transfer will be zeroed out with the "Ownership transfer" reason automatically applied. Similarly, for the receiving company, the months prior to the transfer will be zeroed out with the "Ownership transfer" reason automatically applied.

3.2.7 Decommissioned Facilities

If a facility had been decommissioned in a previous year and has not been generating emissions in the reporting year, it can be set to **(PS) Permanently Shutdown**. When a facility's status is set to **(PS) Permanently Shutdown**, the **Facility-Wide Zero Emissions** feature will automatically set emissions to zero for all emission units/processes for the entire inventory year and exclude the facility from the next reporting period.

IMPORTANT: If a facility was decommissioned/set to **(PS) Permanently Shutdown** between the reporting years, it will still appear in the next reporting year's inventory. This is because each reporting year's inventories are based on the previous reporting year's inventories. Any changes made to the off-year inventories are not carried forward.

To set a facility to **(PS) Permanently Shutdown**, perform the following steps:

1. Click the facility name above the table of **Emission Units & Processes**.

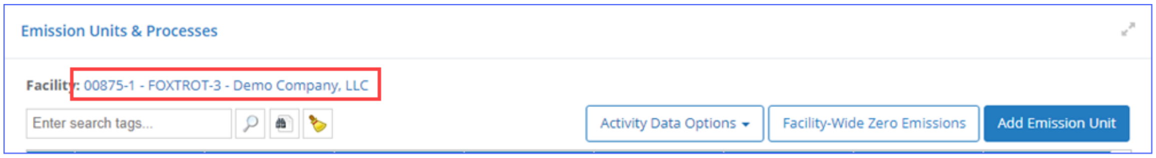


Figure 52. Select facility to edit details

2. Click **Edit** to edit facility details.
3. Set the **Facility Status** to "(PS) Permanently Shutdown".

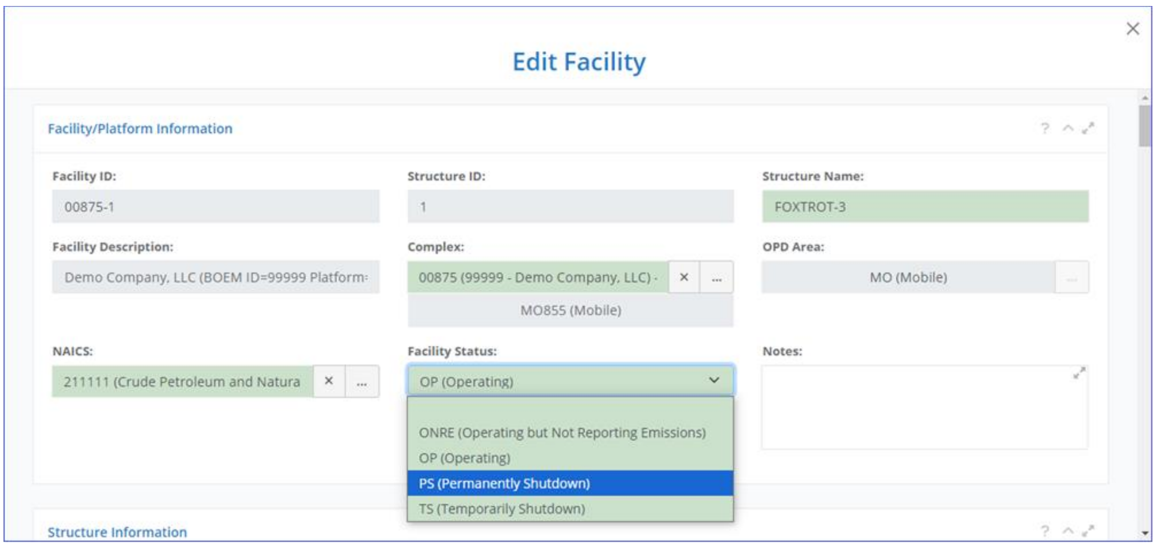


Figure 53. Select facility status

4. Click **Yes** in the confirmation message to proceed.

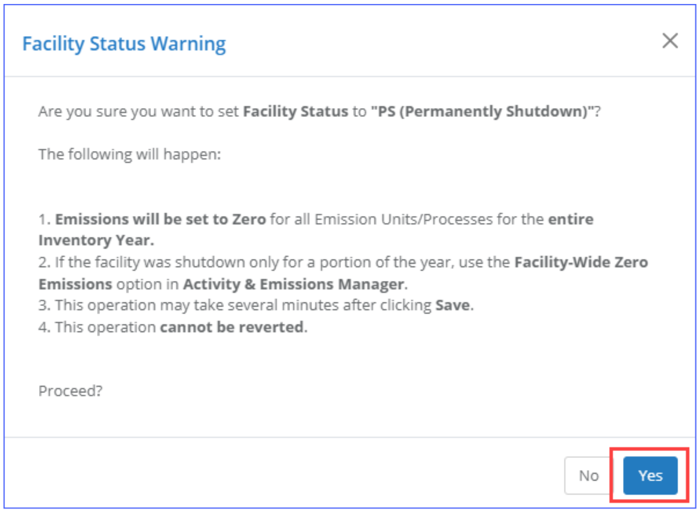


Figure 54. Confirm shutdown

5. Enter the year status took effect and click **Save**.

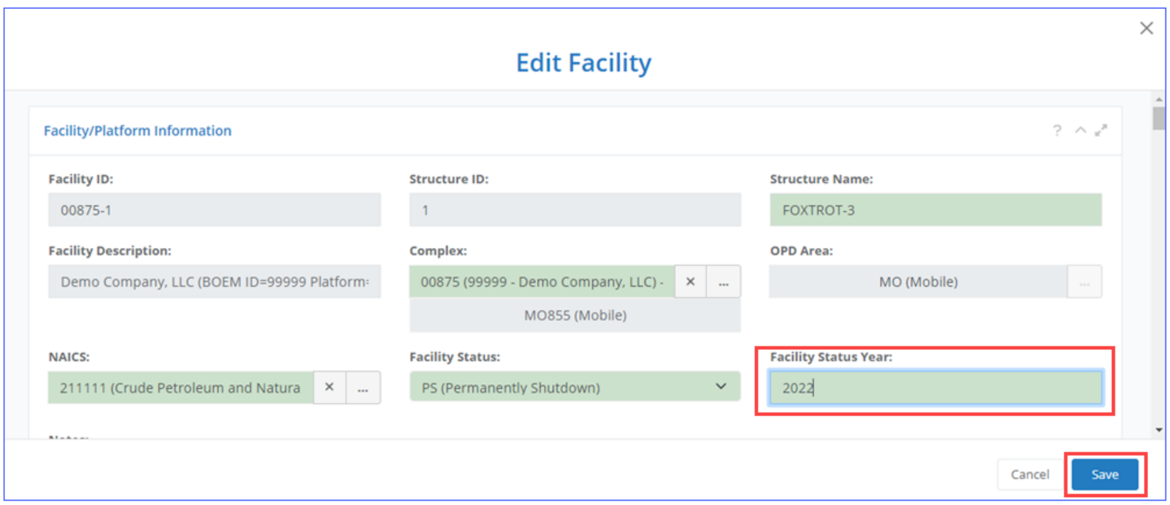


Figure 55. Specify status year

Depending on how many emission units a platform has, the procedure of setting all processes to zero emissions for all 12 months may take time. Once it is complete, the facility details will be shown in View mode.

You can verify the zero emissions settings by closing the facility details and clicking the **Facility-Wide Zero Emissions** button.

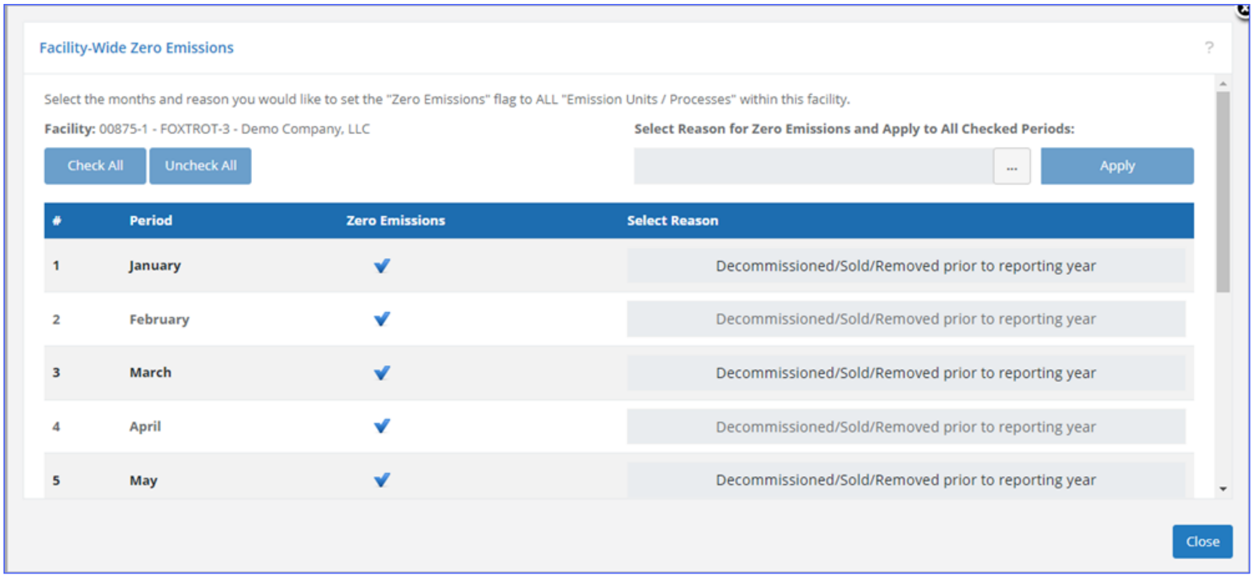


Figure 56. Facility-wide zero emissions for permanently shutdown platform

Note that all controls in this dialog have been disabled, and you cannot uncheck the zero emissions settings or apply a different reason.

3.2.8 Release Point & Apportionment

Release points are used to designate where emissions transfer from a process into the atmosphere and are required for source characterization. All elevations for release points are measured from MSL.

Apportionment refers to the amount of emissions generated by a process that is sent to an individual release point. In OCS AQS, all apportionments are assumed to be 100%, meaning that all emissions from an emission unit goes to one release point.

> ***IMPORTANT:*** Emissions will not be calculated for any emission unit/process that is not connected to a release point. Make sure that a release point is specified before calculating emissions.

3.2.8.1 Assign Release Point to an Emission Unit

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

To assign a release point to an emission unit, perform the following steps (Figure 57):

1. Select the emission unit you want to assign by choosing it in the **Emissions Unit & Processes** table.
2. Scroll down to the **Release Point & Apportionment** panel.
3. To create a new release point for the emission unit, click **New Release Point** and fill in the required information (Section 3.2.8.4).
4. To remove the release point currently associated with the process, click the X button to the right of the field. This will not delete the release point but will sever the connection between it and the process. Remember that you need to have a release point assigned to the process to be able to calculate emissions for it.
5. To select an existing release point, click the **[…]** to the right of the field and select a release point from the list of available ones (Section 3.2.8.2).

6. If needed, after a release point is specified, you can edit its information by clicking **Details/Edit** (Section 3.2.8.3).

Figure 57. Release point options

3.2.8.2 Select an Existing Release Point

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

If a release point that the emission unit vents to already exists, you can select it as follows:

1. Click **[…]** to the right of the field (Figure 57).
2. Highlight the release point you wish to use.
3. Click **Select**.

The release point ID will now appear in the **Release Point** field.

3.2.8.3 Edit a Release Point

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

When a release point is selected, a **Details/Edit** button will appear (Figure 57). Click this button to view details about the selected release point. You can edit the release point by clicking **Edit** at the top or bottom of the screen.

3.2.8.4 Create New Release Point

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

To create a new release point:

1. Click **New Release Point** (Figure 57).
2. The **Add Release Point** window will open.
3. Complete the required information in green fields. You may need to scroll down to access all data panels.
   Some required data depends on the **Release Type** you select:
   - For all types except **Fugitive**, the following parameters are required:
     - **Stack Height** in ft
     - **Stack Diameter** in ft
     - **Exit Temperature** in deg F
     - **Exit Velocity** in ft/s
     - **Flow Rate** in ft^3/s

TIP: You only need to enter two parameters of the **Stack Diameter**, **Exit Velocity**, and **Flow Rate**. The remaining value can be calculated by pressing the button on the right side of the field using the following relationship:

$$Vs = 4V/\pi d^2$$

where:
Vs is **Exit Velocity**
V is **Flow Rate**
d is **Stack Diameter**

- If the stack type is a **Fugitive**, the following parameters are required:
  - **Release Height** in ft
  - **Type** of the fugitive release
  - **Length of X side** (closest to east-west axis) in ft
  - **Length of Y side** (closest to north-south axis) in ft
  - **Orientation Angle** in degrees from true north

The geometry of the fugitive release point is shown in Figure 58.

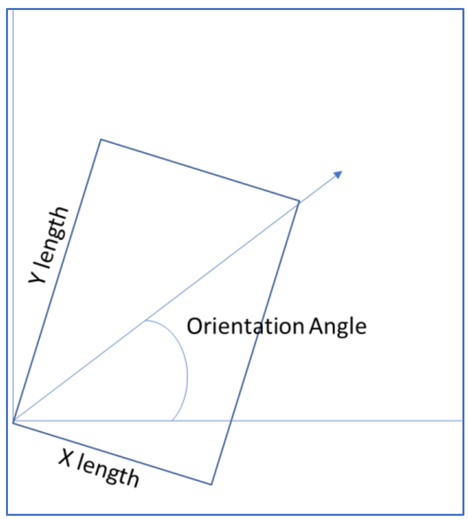


Figure 58. Geometry of a fugitive release point

4. In the **Georeference** section, you can use latitude/longitude coordinates in decimal degrees instead of Universal Transverse Mercator (UTM) coordinates. OCS AQS automatically converts one coordinate system to the other.
5. You MUST specify the coordinates for the release point. If you do not know the coordinates of the release point, **From Facility Location** fills in the coordinates with default facility value, as shown in Figure 59. You can update these coordinates at any point, should the exact coordinates become available.

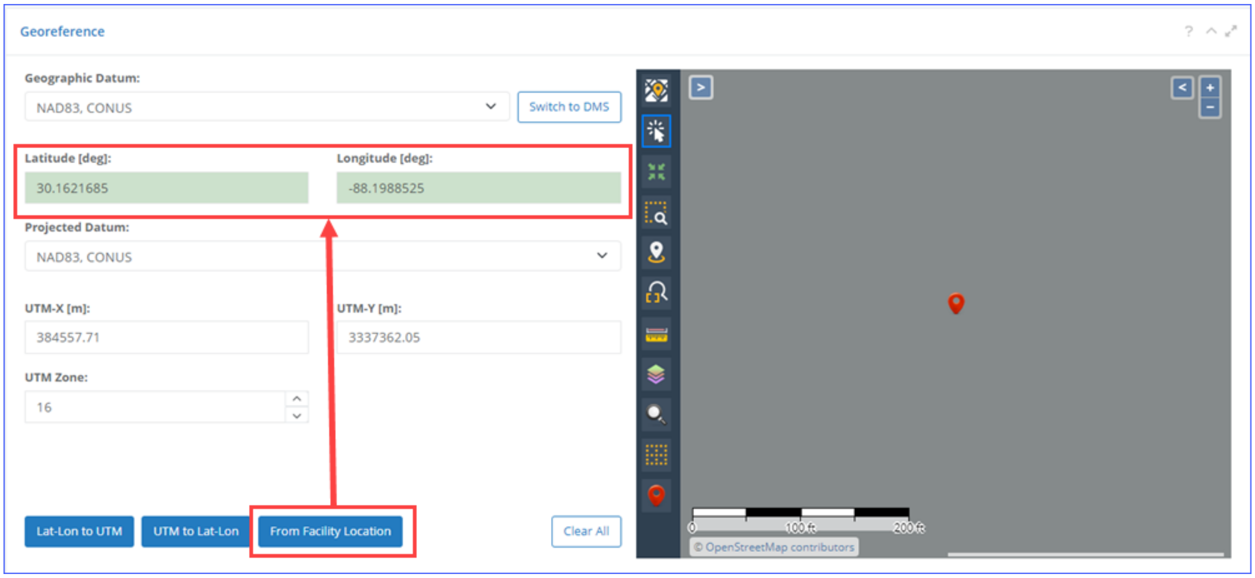


Figure 59. Set coordinates from facility

6. Click **Save** to save the release point information.

Though not required, it is recommended to provide a release point description to make it easier to identify.

3.2.8.5 Orphaned Release Points

Release points can be made but not assigned to sources. These unassigned, or orphaned, release points have no impact on emission calculations but should be either used or deleted. A report is available to identify orphaned release points in the **Reports** module (Section 9), under **Other Reports**. If you wish to bulk-delete unassigned release points, use the **Remove Unassigned Release Points** tool in the **Emissions** module. See Section 3.6 for a detailed process description.

3.2.9 Calculator Parameters & Requests

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

In the **Process** section, the **Calculator Parameters & Requests** panel contains the main functionality of the AEM. It allows you to set the following parameters for each emission unit by month:

- Select input and physical parameters by month
- Copy inputs from a month to one or more other months
- Assign zero emissions for a month
- Enter required throughput and calculation parameters in required fields (green boxes) and optional fields (white boxes)
- Provide process control information
- View emission factors for each pollutant
- Perform range checks and other QA for input parameters

Each emission unit has different input parameters based on the assigned calculator. For example, the input parameters for a combustion flare will differ significantly from the input parameters for fugitive emissions.

Input parameters used for emission calculations and process descriptions are called **Data Requests**, while parameters used to describe the pollution control technology are described under **Control Requests**. Each field allows annotation and comments with the **QA** button to the right of the field as shown in Figure 60 below.

The following tabs are available, to be described further in the sections that follow.

- **Data Requests** allow input of required and optional data used for emissions calculations and process metadata.
- **Control Requests** are used to provide input data that describes the pollution control technology used for an individual source (if applicable).
- **Emission Factors** provide engineering parameters to calculate individual pollutant emissions.

3.2.9.1 Data Requests

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

A typical **Data Requests** tab is shown in Figure 60. Green backgrounds indicate fields that are required, while white backgrounds indicate optional fields. Most processes contain some green fields.

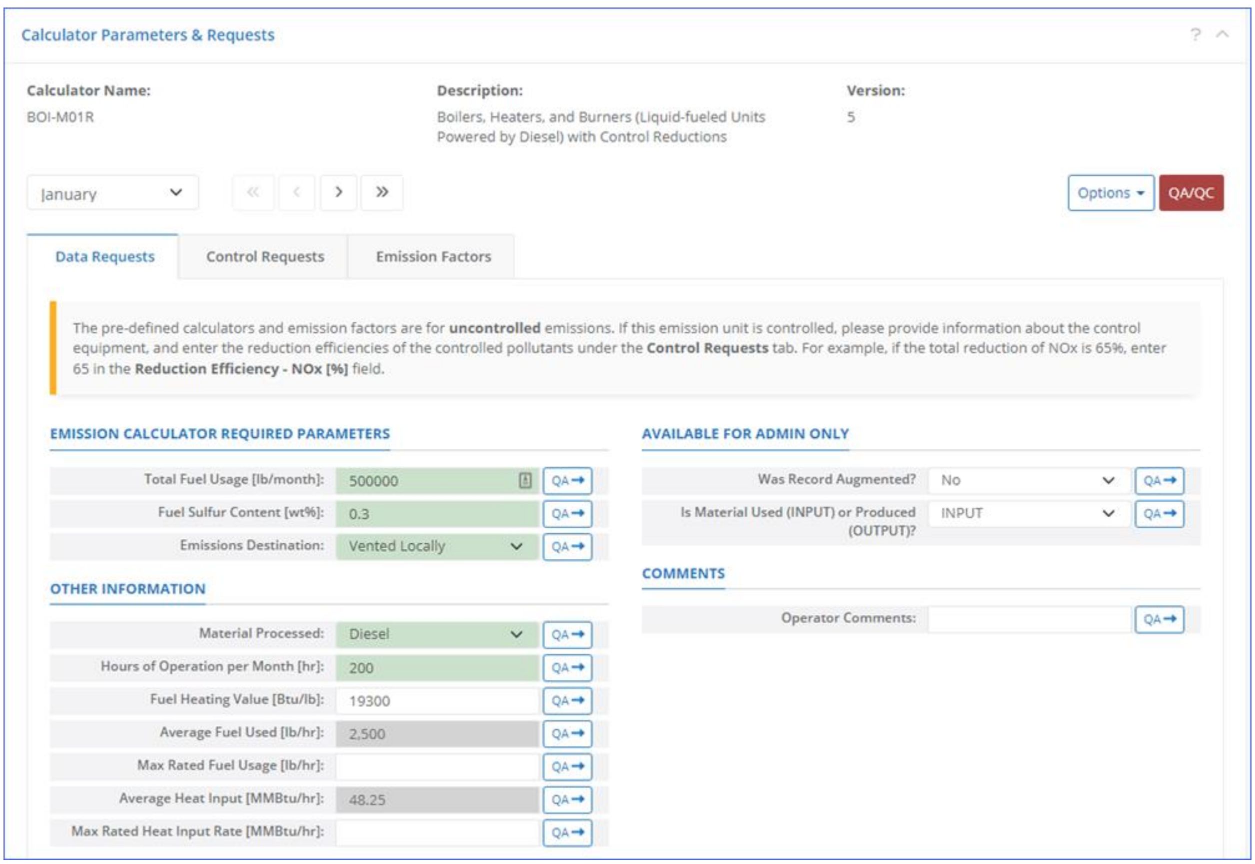


Figure 60. Data Request tab

IMPORTANT: Although it is recommended that you complete as much information as possible, you can save your data even if not all information is complete. If only partial data is available, you can still enter it and save the changes to the process. You will not be able to calculate emissions for a particular month unless you have entered all required information for that month.

Please note that certain grey fields will auto-calculate results based on inputs to the required fields; for example, the **Average Fuel Used** shown in Figure 60 is calculated using the following formula:

$$Average\ Fuel\ Used = \frac{7.5 * Total\ Fuel\ Usage * Fuel\ Heating\ Value}{Operating\ Horsepower * Hours\ of\ Operation\ per\ Month}$$

Equation 1: Average fuel used calculation

The calculated result will appear automatically when the required input fields are filled.

Some input fields have drop-down menus with selection associated with the process, such as **Emissions Destination** and **Material Processed** shown in Figure 60. If a selection is not available for your process, contact the OCS AQS Support Team and let them know what additional options are required.

Finally, certain fields have pre-defined ranges of inputs to prevent out-of-range values or values with the wrong format (text in a numerical field). All field values must be within the defined ranges and format before they can be saved. A list of fields with ranges and the range values is provided for each calculator in **Appendix A – Calculator Descriptions**, but you can check the available range for any field by moving the mouse pointer over the field in question as shown on Figure 61.

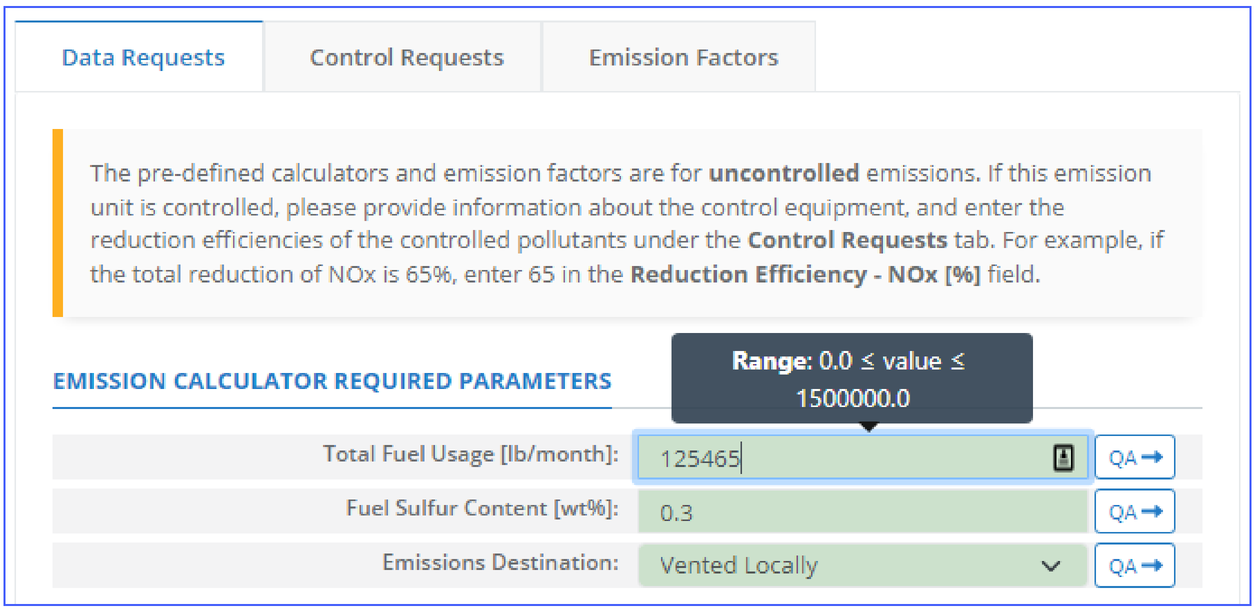


Figure 61. View field value range

3.2.9.2 Control Requests

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Click Control Request tab

Control requests only capture information regarding pollution control technology used by the individual source. Unlike the **Data Requests** tab, **Control Requests** tab has a set number of input fields with reduction efficiencies for six pollutants: particulate matters [PM_{10} and $PM_{2.5}$], carbon monoxide [CO], sulfur oxide [SO_x], nitrogen oxide [NO_x], and volatile organic compounds [VOCs]). For some calculators, only VOC reduction efficiency is requested since the process does not involve combustion or chemical transformation. A typical **Control Request** tab is shown in Figure 62.

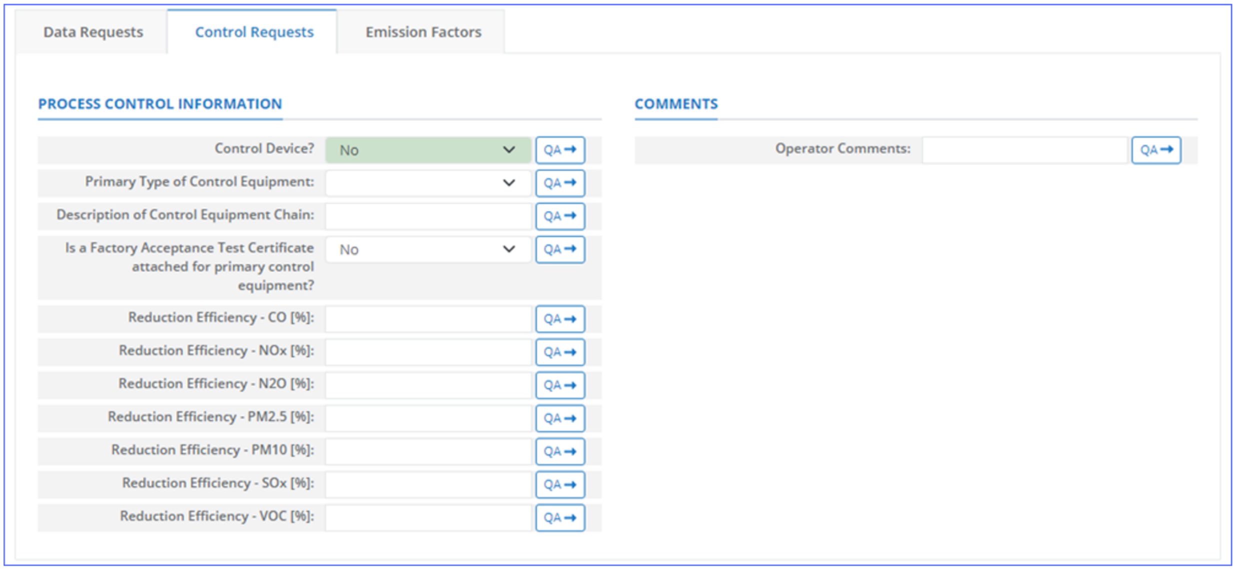


Figure 62. Control Requests tab

Control Request tab input fields include the following:

- **Control Device?**: Is a control device or end of pipe treatment included in the process? This is a Yes/No question.
- **Primary Type of Control Equipment:** If a control device is part of the process, what kind of device or technology is it? A drop-down menu is provided for most processes to select the primary type of equipment. If the equipment is not on the list, select **Other (Explain in Comments)** and describe it in the **Operator Comments** field (Figure 63).

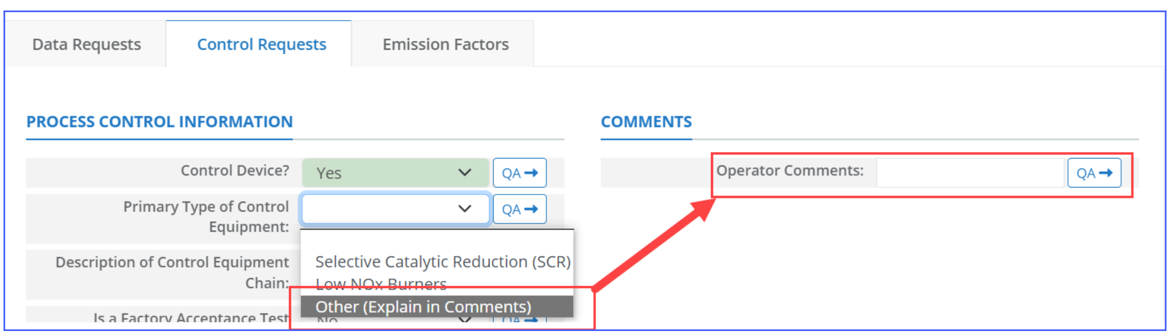


Figure 63. Describe "Other" type of control equipment

- **Description of Control Equipment Chain:** This field allows you to describe the control equipment chain if more than one type of technology is used.
- **Is a Factory Acceptance Test Certificate attached for primary control equipment?:** This field allows you to specify if functionality certification paperwork is available for the control equipment. You can attach the supporting documentation under the facility in the AEM using the **Supporting Documents** function (Section 3.2.16).

- **Reduction Efficiency – pollutant [%]:** This describes the average reduction of emitted pollutant using the control technology. If the total reduction of VOCs using a vapor recovery unit is 65%, enter “65” in the field.

  ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

3.2.9.3 Emission Factors

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Click Emission Factors tab

Emission factors are assigned to each calculator based on published values from USEPA AP-42 or other BOEM-approved references. The values cannot be updated by operators. An example is shown in Figure 64.

Data Requests | Control Requests | Emission Factors

POLLUTANT NAME	POLLUTANT CODE	LB/HR
Hydrogen Sulfide	7783064	0
Carbon Dioxide	CO2	18372.123
Diethanolamine	111422	43283.761
Methane	CH4	31673.913
Ethane	74840	4692.018
Propane	74986	1953.112
Isobutane	75285	634.373
N-Butane	106978	748.807
Isopentane	78784	480.574
N-Pentane	109660	319.207
Hexane	110543	280.502
N-Heptane	142825	66.757
N-Dodecane	112403	823.925
Benzene	71432	72.159
Toluene	108883	49.259
Ethyl Benzene	100414	1.922
Xylenes (Mixed Isomers)	1330207	13.328

Figure 64. Emission Factors tab

A pollutant can have one of the following values:

- **Numeric value**:
  - **For Amine and Glycol units:** This value has been imported from an external source and cannot be changed inside the system. Imported values are highlighted in yellow (Figure 64).
  - **For all other units:** This value has been specified by BOEM and cannot be changed.
- **Implicit**: This code is displayed when the value has been incorporated into the calculator equation. This usually takes place if there is a conditional statement in the algorithm that uses two or more emission factors, depending on the process condition.

3.2.10 Updating Monthly Data

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Input parameters can be updated for each emission source on a month-by-month basis. OCS AQS provides two different ways to update data:

- Batch updates using the **Activity Data Options Import/Export** tool (see below)
- Manual updates using the **Calculator Parameter & Requests** feature (described above)

3.2.10.1 Download Monthly Data Using the Import/Export Tool

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

To use the import/export tool, it is advisable to **export** the existing parameters first:

1. After selecting the facility and arriving at the **AEM Details** page, click **Activity Data Options** in the above the **Emission Units & Processes** table as shown in Figure 65.

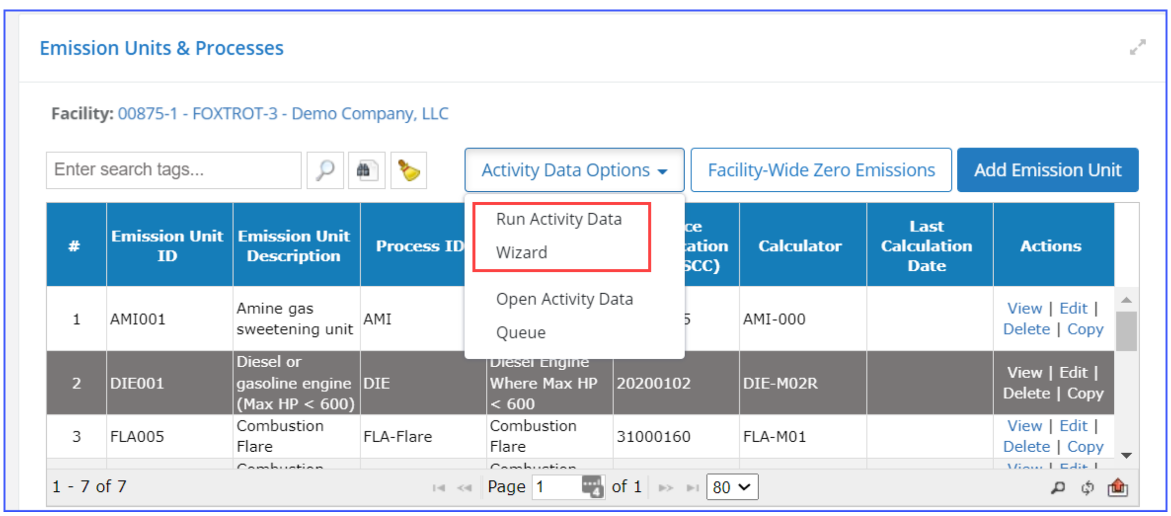


Figure 65. Import/export activity data selection

2. Select **Run Activity Data Wizard** from the drop-down box.
3. Select **Export** from the **Import/Export Activity Data** wizard mode selection. Click **Next** in the bottom right corner of the wizard window.
4. Select the emission sources to be exported by checking the square for each source or select all sources available at the facility by clicking on the  box near the search bar. When completed,

select **Finish** on the bottom right corner to process the request, **Previous** to go to the previous step, or **Cancel** to abort the operation.

5. Select the processed request from the **Job Queue** – **Activity Data** page by selecting the **Files** hyperlink under the **Actions** column as shown in Figure 66. The most recent request will be at the top of the table, but the table can be sorted or searched to find a specific request.

   IMPORTANT: To come back to the **Job Queue**, select **Open Activity Data Queue** from the drop-down box shown previously in Figure 65.

6. To save the processed Excel file to your computer, click **Files** in the **Actions** column. The link will take you to a **Job Files** page.
7. Click **Download** and save the file to your computer. Please note that most browsers support file renaming, so users can enter the specific filename they want to use. If the browser does not allow changing filenames, save using the default name and rename using the **File Explorer**; click twice (not double-click) and rename the file.

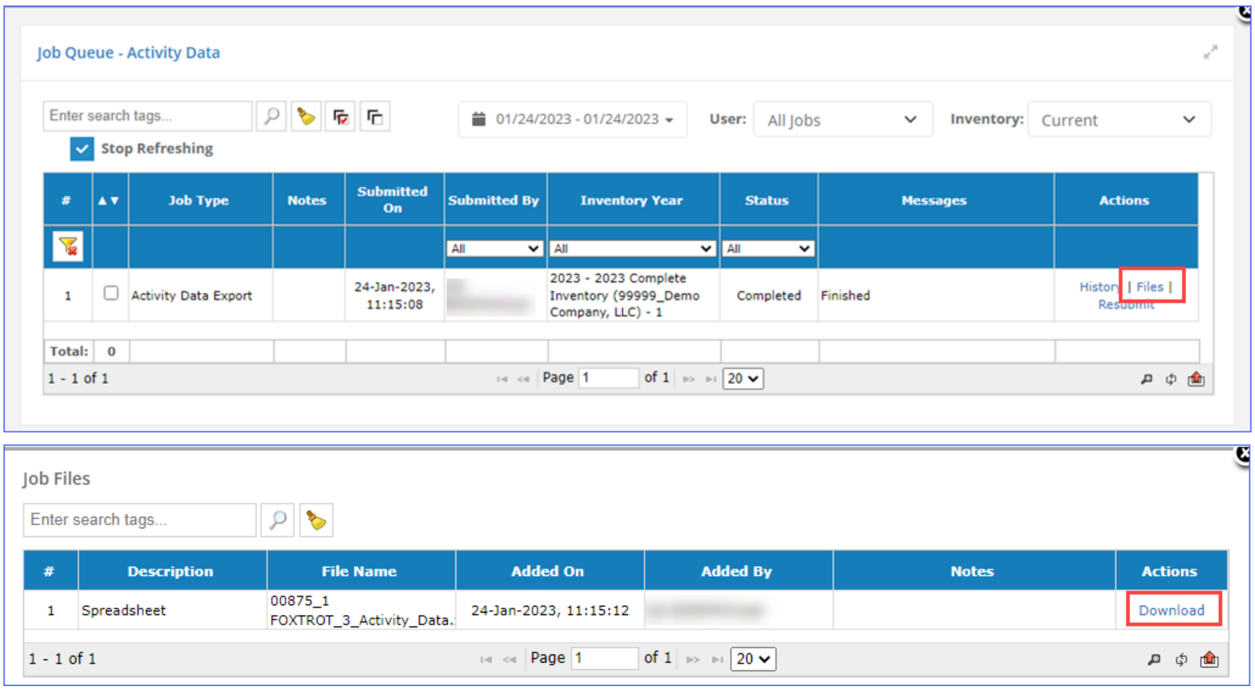


Figure 66. Export activity data – queue and download pages

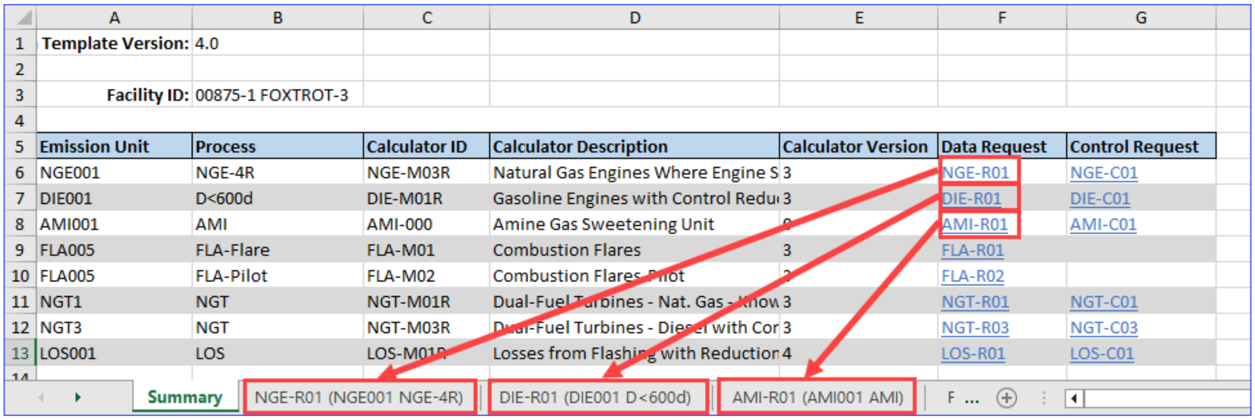
3.2.10.2 Update Monthly Activity Data Using the Import/Export Template

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Export Activity Data

After you have downloaded the Excel sheet with your facility's emission sources, update the monthly activity data with the following steps:

1. Open the Excel file for the emission source you want to update. The file has individual data tabs for each source data request and a tab for each control request that is used by at least one source. The **Summary** sheet provides hyperlinks to go to the individual emission source data and control requests (Figure 67).

   IMPORTANT: Do not change the data on the **Summary** sheet. Changing the **Summary** sheet may cause import errors.



	A	B	C	D	E	F	G
1	Template Version:	4.0					
2							
3	Facility ID:	00875-1 FOXTROT-3					
4							
5	Emission Unit	Process	Calculator ID	Calculator Description	Calculator Version	Data Request	Control Request
6	NGE001	NGE-4R	NGE-M03R	Natural Gas Engines Where Engine S	3	NGE-R01	NGE-C01
7	DIE001	D<600d	DIE-M01R	Gasoline Engines with Control Redu	3	DIE-R01	DIE-C01
8	AMI001	AMI	AMI-000	Amine Gas Sweetening Unit	0	AMI-R01	AMI-C01
9	FLA005	FLA-Flare	FLA-M01	Combustion Flares	3	FLA-R01	
10	FLA005	FLA-Pilot	FLA-M02	Combustion Flares Pilot	3	FLA-R02	
11	NGT1	NGT	NGT-M01R	Dual-Fuel Turbines - Nat. Gas - Know	3	NGT-R01	NGT-C01
12	NGT3	NGT	NGT-M03R	Dual-Fuel Turbines - Diesel with Cor	3	NGT-R03	NGT-C03
13	LOS001	LOS	LOS-M01R	Losses from Flashing with Reduction	4	LOS-R01	LOS-C01

Figure 67. Export summary sheet

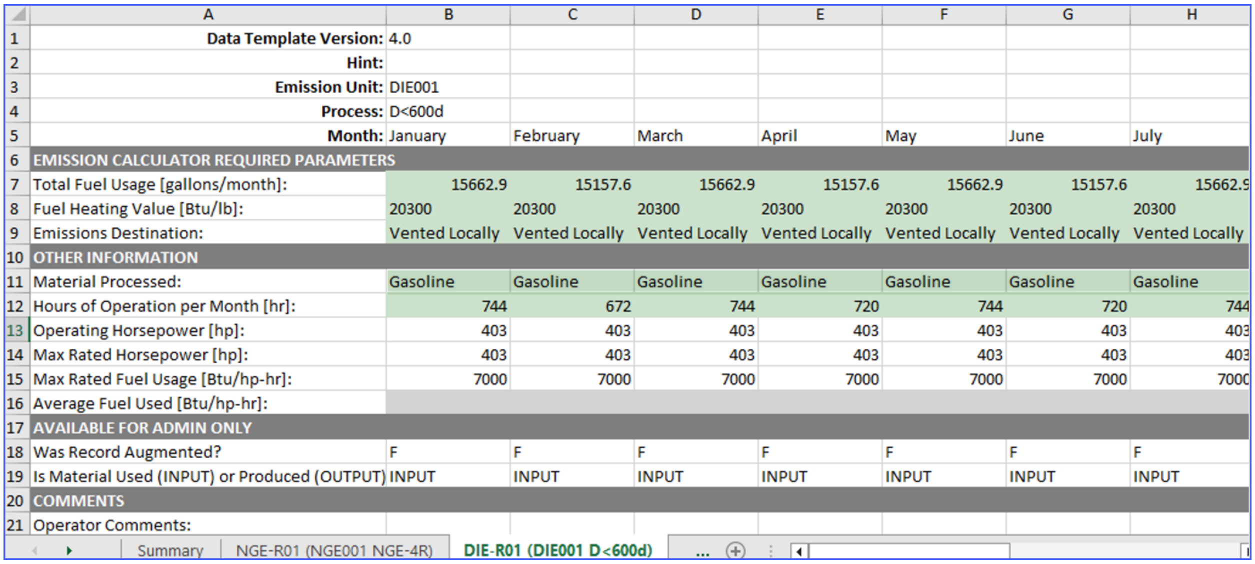
2. Update parameters by month as shown in Figure 68. Note that the required fields for the emission calculators are listed in the top rows between **EMISSION CALCULATOR REQUIRED PARAMETERS** and **OTHER INFORMATION** in column A. The cells for the monthly values for these parameters are colored in green and must be filled.

   IMPORTANT: Match input values to the units of measure shown in the description column of the spreadsheet. For example, input parameters for percentages [%] mean that a value of 0.05% should be entered as "0.05".

   IMPORTANT: For Yes/No responses, the template uses "T" for Yes (True) and "F" for No (False).

   IMPORTANT: The fields colored in light grey are auto-calculated. Regardless of the value in these fields at the time of import, it will be replaced by a calculated value based on the formula specified in the application.

   TIP: The last two columns in each spreadsheet are **Value Range** and **Lookup Values** and display information that will allow you to properly fill in the data. For the lookup values, make sure that you copy and paste the appropriate selection to avoid typos that would prevent you from importing the file.



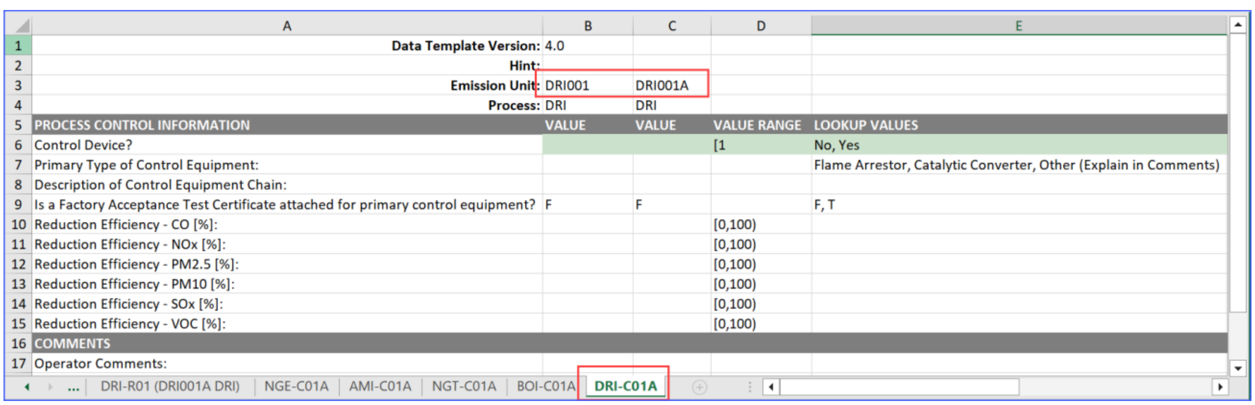
	A	B	C	D	E	F	G	H
1	Data Template Version:	4.0						
2	Hint:							
3	Emission Unit:	DIE001						
4	Process:	D<600d						
5	Month:	January	February	March	April	May	June	July
6	EMISSION CALCULATOR REQUIRED PARAMETERS							
7	Total Fuel Usage [gallons/month]:	15662.9	15157.6	15662.9	15157.6	15662.9	15157.6	15662.9
8	Fuel Heating Value [Btu/lb]:	20300	20300	20300	20300	20300	20300	20300
9	Emissions Destination:	Vented Locally	Vented Locally	Vented Locally	Vented Locally	Vented Locally	Vented Locally	Vented Locally
10	OTHER INFORMATION							
11	Material Processed:	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
12	Hours of Operation per Month [hr]:	744	672	744	720	744	720	744
13	Operating Horsepower [hp]:	403	403	403	403	403	403	403
14	Max Rated Horsepower [hp]:	403	403	403	403	403	403	403
15	Max Rated Fuel Usage [Btu/hp-hr]:	7000	7000	7000	7000	7000	7000	7000
16	Average Fuel Used [Btu/hp-hr]:							
17	AVAILABLE FOR ADMIN ONLY							
18	Was Record Augmented?	F	F	F	F	F	F	F
19	Is Material Used (INPUT) or Produced (OUTPUT)	INPUT	INPUT	INPUT	INPUT	INPUT	INPUT	INPUT
20	COMMENTS							
21	Operator Comments:							

Figure 68. Data request sheet

3.2.10.3 Updating Control Data Using the Import/Export Tool

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Export Activity Data

The **Control Request** sheets do not have monthly columns like the **Data Request** sheets because it is assumed that conditions will not change significantly over the inventory reporting period. An example **Control Data** sheet is shown in Figure 69.



	A	B	C	D	E
1	Data Template Version:	4.0			
2	Hint:				
3	Emission Unit:	DRI001	DRI001A		
4	Process:	DRI	DRI		
5	PROCESS CONTROL INFORMATION	VALUE	VALUE	VALUE RANGE	LOOKUP VALUES
6	Control Device?			[1	No, Yes
7	Primary Type of Control Equipment:				Flame Arrestor, Catalytic Converter, Other (Explain in Comments)
8	Description of Control Equipment Chain:				
9	Is a Factory Acceptance Test Certificate attached for primary control equipment?	F	F		F, T
10	Reduction Efficiency - CO [%]:			[0,100)	
11	Reduction Efficiency - NOx [%]:			[0,100)	
12	Reduction Efficiency - PM2.5 [%]:			[0,100)	
13	Reduction Efficiency - PM10 [%]:			[0,100)	
14	Reduction Efficiency - SOx [%]:			[0,100)	
15	Reduction Efficiency - VOC [%]:			[0,100)	
16	COMMENTS				
17	Operator Comments:				

Figure 69. Control request sheet

The assigned calculator shown on the **Summary** sheet will show which control is assigned to each emission unit. The calculator ID is similar to the Control ID, except the calculator has an M while the Control has a C (for example: BOI-M01 is the calculator, and BOI-C01 is the Control).

Like the Data Request fields, Yes/No fields should be entered as “T” for Yes and “F” for No. Percentages should be entered as written without the percent symbol (e.g., “98.5” for 98.5%).

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

3.2.10.4 Importing Monthly Data Using the Import/Export Tool

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility > Export Activity Data > Update Activity Data Spreadsheet

After updating the parameters in the exported file, you will need to import it back into OCS AQS (Figure 70):

1. Save the updated file with your revised parameters.
2. Click **Activity Data Options** in the above the **Emission Units & Processes** table as shown in Figure 65 and select **Run Activity Data Wizard**.
3. Select **Import** in the **Import/Export Activity Data** wizard mode selection. Click **Next** on the bottom right corner of the wizard window.
4. Click **Select file**, then navigate to and select the Excel file to upload from your computer. To upload multiple facilities, select the corresponding facility files. The files should be in the same directory. Click **Finish** to import.
5. In the **Job Queue – Activity Data**, click **OK** to close it or check the uploaded job files by clicking on **Files** in the **Action** column.
6. If you click on **Files** (Figure 70**)**, you will open a **Job Files** window that shows the files imported, as well as an **Import log** spreadsheet. Download any of the files by clicking on **Download** next to the file in the **Download** column.

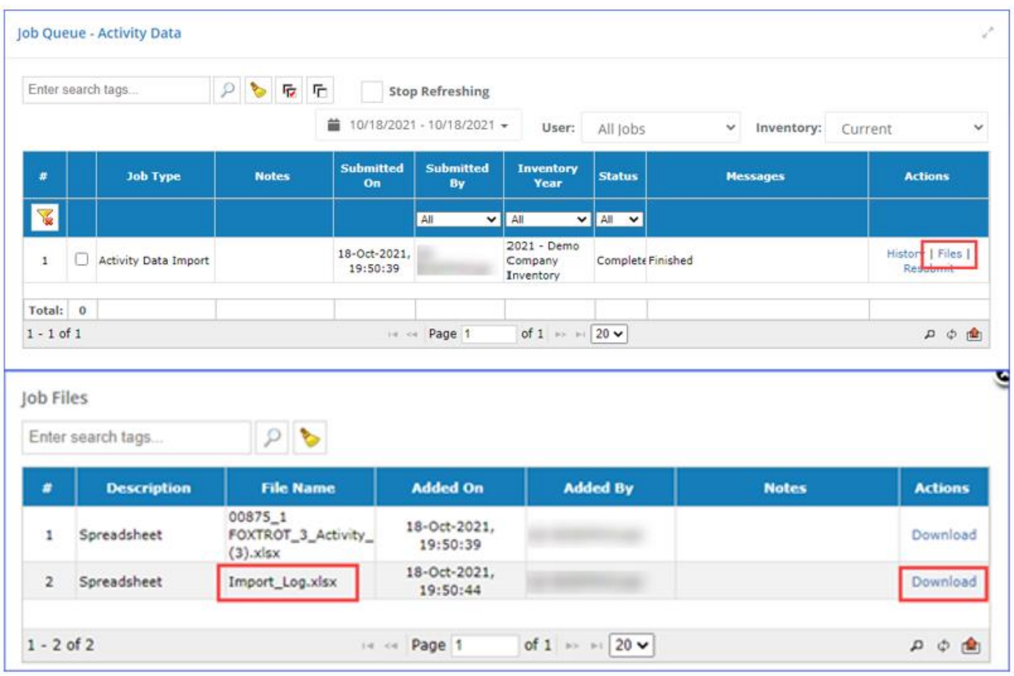
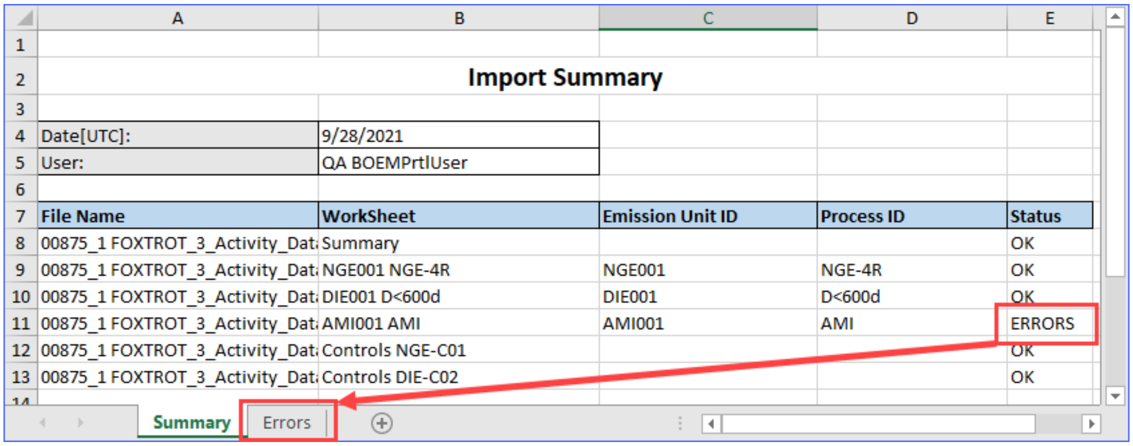


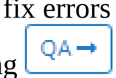
Figure 70. Import Activity Data – Queue and Download pages

7. The import log file, **Import_Log.xlsx**, will show the status of each imported source and the results of the QA/QC check. A summary of errors will be identified for the source and section (Summary, Data Requests, and/or Control Requests) on the Summary sheet as shown in Figure 71. Individual errors and location in the source worksheet are shown in the **Errors** sheet.



	A	B	C	D	E
1					
2	Import Summary				
3					
4	Date[UTC]:	9/28/2021			
5	User:	QA BOEMPrtlUser			
6					
7	File Name	WorkSheet	Emission Unit ID	Process ID	Status
8	00875_1 FOXTROT_3_Activity_Dat	Summary			OK
9	00875_1 FOXTROT_3_Activity_Dat	NGE001 NGE-4R	NGE001	NGE-4R	OK
10	00875_1 FOXTROT_3_Activity_Dat	DIE001 D<600d	DIE001	D<600d	OK
11	00875_1 FOXTROT_3_Activity_Dat	AMI001 AMI	AMI001	AMI	ERRORS
12	00875_1 FOXTROT_3_Activity_Dat	Controls NGE-C01			OK
13	00875_1 FOXTROT_3_Activity_Dat	Controls DIE-C02			OK

Figure 71. Example of import log with errors

It is highly recommended to fix errors and re-import before trying to calculate emissions. Comment on errors in the AEM by clicking  by the parameter in question.

3.2.10.5 Updating Using the Calculator Parameters & Requests Feature

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

For individual emission sources or small updates, **Calculator Parameters & Requests** allows fast and easy editing.

1. On the **AEM Details** page, select the emission source for editing and scroll down to the **Calculator Parameters & Requests** feature. The data is already in **Edit** mode and available for updating.
2. Select the month you want to update using the drop-down menu or the control arrows as shown in Figure 72.

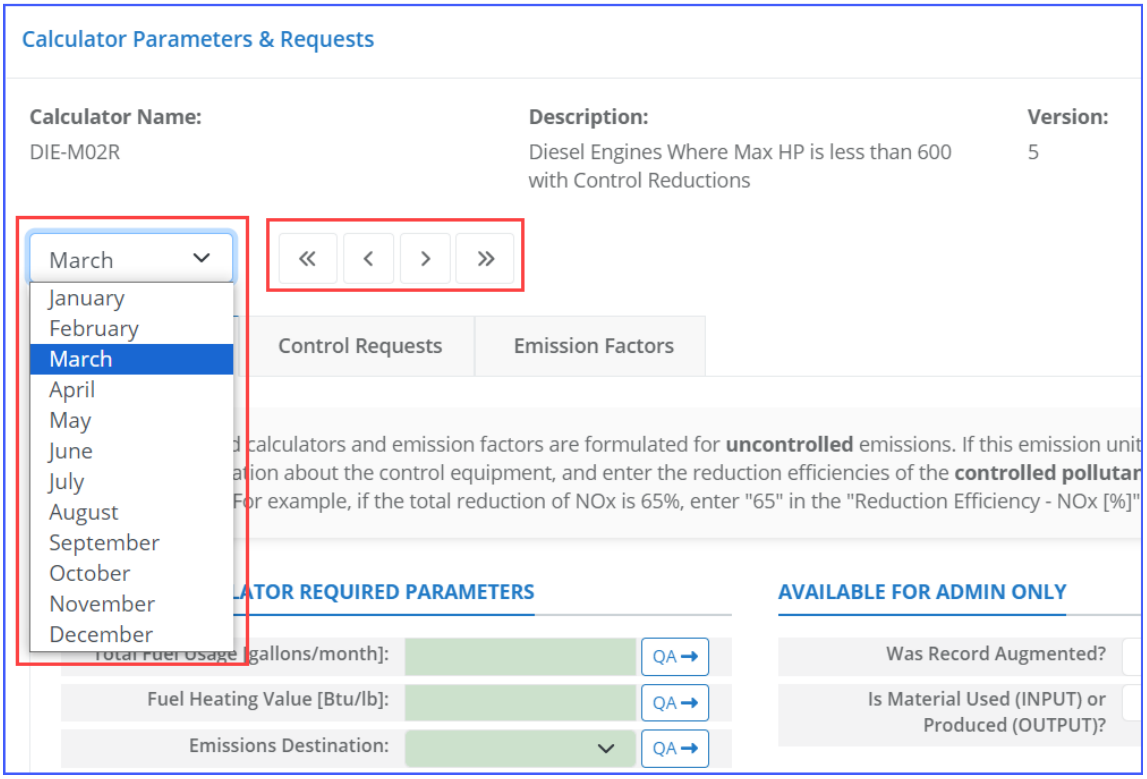


Figure 72. Month selection controls

3. For the selected month, update the parameters by completing the data fields. Green fields indicate required data and must be filled in. White fields are optional data. A QA → button is available to the right of each field to add optional notes and comments regarding the specified value for each field.
4. Confirm the input parameters meet range and input requirements by clicking on the red **QA/QC** button, as shown in Figure 73. If there are no issues, a blue message will appear stating that there are no QA/QC issues for the emission source under edit. If there are errors, the specific field and month for the error will be identified similar to the example shown in Figure 73. In this example, a required field (**Total Fuel Usage**) is out of range in the **Data Requests** tab, and the **Average Fuel Used** value (which is calculated using **Total Fuel Usage**) is invalid.

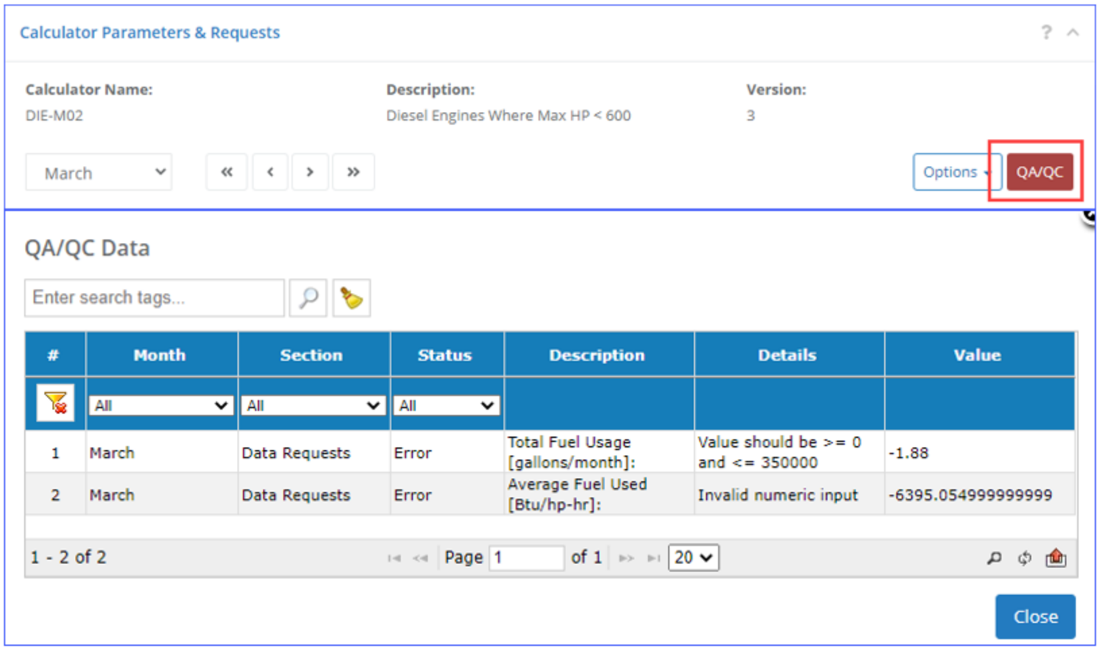


Figure 73. Example QA/QC report for emission source

5. Save the updated values by clicking **Save**. To return to Edit mode, click **Edit**.

3.2.11 Zero Emissions

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

This section describes how to specify that a certain emission unit did not produce emissions during specific months in the inventory year. If you wish to indicate that the entire facility did not produce emissions, see Section 3.2.6.7.

To report zero emissions from an emission source for a month (or months):

1. On the **AEM Details** page, select the emission unit for editing and scroll down to the **Calculator Parameters & Requests** feature.
2. Select the **Options** pull-down menu next to the QA/QC button as shown in Figure 74 and select **Zero Emissions**.

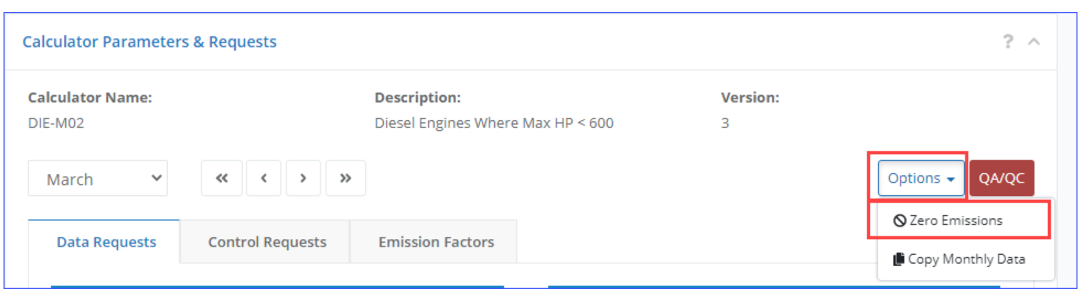


Figure 74. Options selection for zero emissions

3. Check the box for each month you want to declare as zero emissions.
4. After a month is selected, the corresponding **Select Reason** box will be activated. Click on **[…]** (extra options) on the right of the box to open a list of possible reasons why the month has zero

emissions. Select the most appropriate reason from the available choices for all months that have been marked as "zero emissions" (Figure 75).

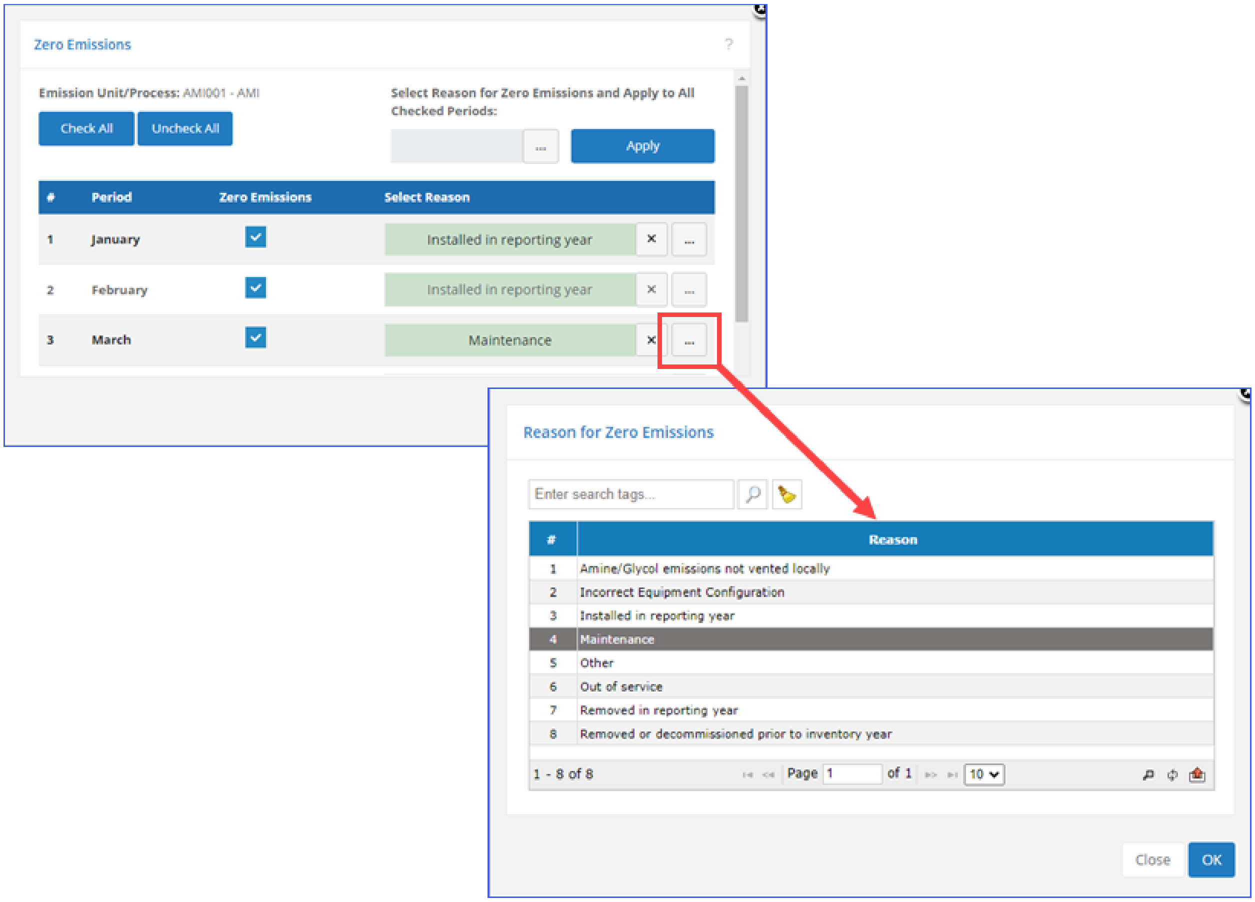


Figure 75. Emission unit zero emissions

5. Click **Save** to save changes. A confirmation message will be displayed to ensure that appropriate number of months are zeroed for the specified process.
6. After selecting the months that should be zeroed out and closing the **Zero Emissions** dialog, all calculated emissions will be set to 0 for the selected months.

3.2.12 Copying Months

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Emission source parameters from one month can be quickly copied to all months or any individual month. This tool copies all parameters.

1. On the **Activity & Emissions Manager Details** page, select the emission source for editing in the **Emission Units & Processes** table and scroll down to the **Calculator Parameters & Requests** section.
2. Select the **Options** pull-down menu next to the **QA/QC** button as shown in Figure 76 and select **Copy Monthly Data**.

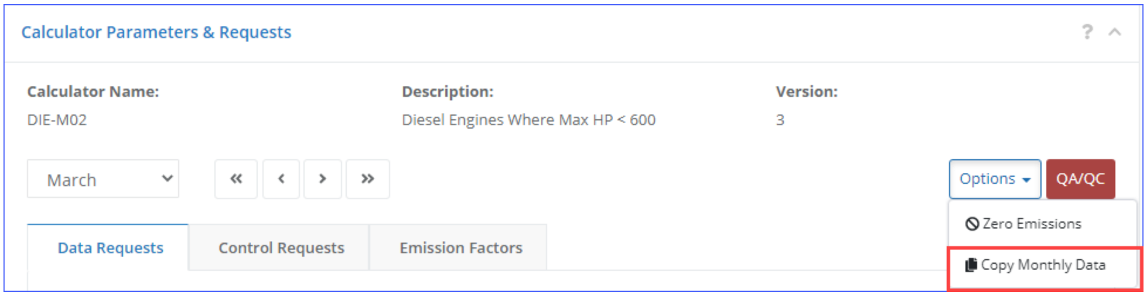


Figure 76. Options selection for copying monthly data

3. The **Copy Monthly Data** window will open. Select the month to copy activity data parameters FROM (you can choose only one).
4. Select the months or months to copy data TO. A **Select All** button is available to copy to all months. Click **Copy** to complete the action. An example is shown in Figure 77. In the example, the month of January is copied to February and March.

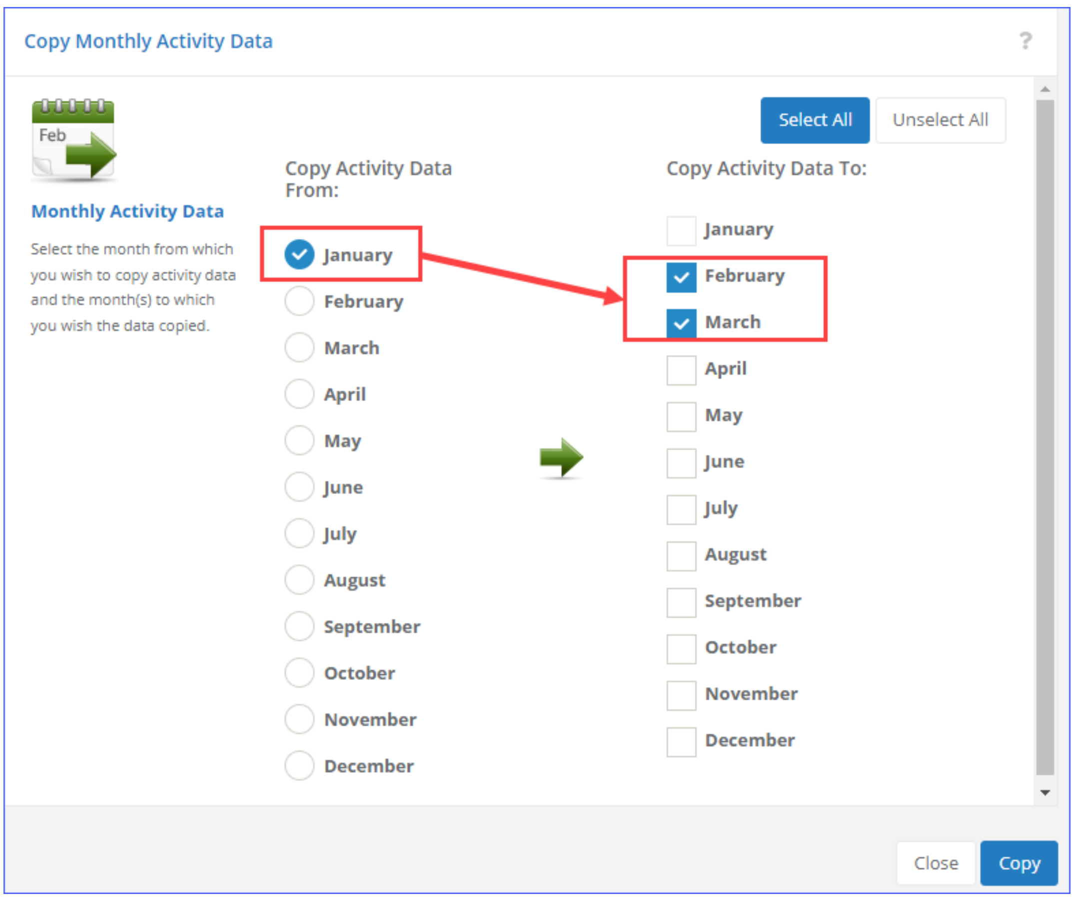


Figure 77. Example to copy data to months

IMPORTANT: The values for the **Hours in a Month** and **Days in a Month** parameters will not be copied and will need to be entered manually.

3.2.13 Calculate Emissions

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Emissions from a source can be calculated within the **Activity & Emission Manager** by month using the input parameters from the assigned calculators and the information provided in the **Data Requests**, **Control Requests**, and **Emission Factors** tabs.

The assigned calculator is shown at the top of the **Calculator Parameters & Requests** section. More information about the individual calculator used, such as the actual equations and input variables used, can be found by running an **Emissions Equation Description** report under the **Calculators** section in the **Reports** module.

IMPORTANT: You will only be able to calculate emissions if you have filled in all required parameters and specified a release point for the emission unit/process.

To calculate emissions with an existing calculator:

1. On the **Activity & Emissions Manager Details** page, select the emission source for which you wish to calculate emissions and scroll down to the **Calculated Emissions** section near the bottom of the page.
2. If emissions have never been calculated, you will see a **Calculate** button. If emissions have been previously calculated, you will see a **Re-Calculate** button. Selecting either **Calculate** or **Re-Calculate** will give you two options as shown in Figure 78.

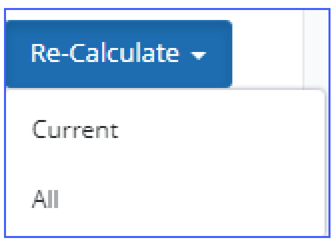


Figure 78. Calculate/re-calculate options

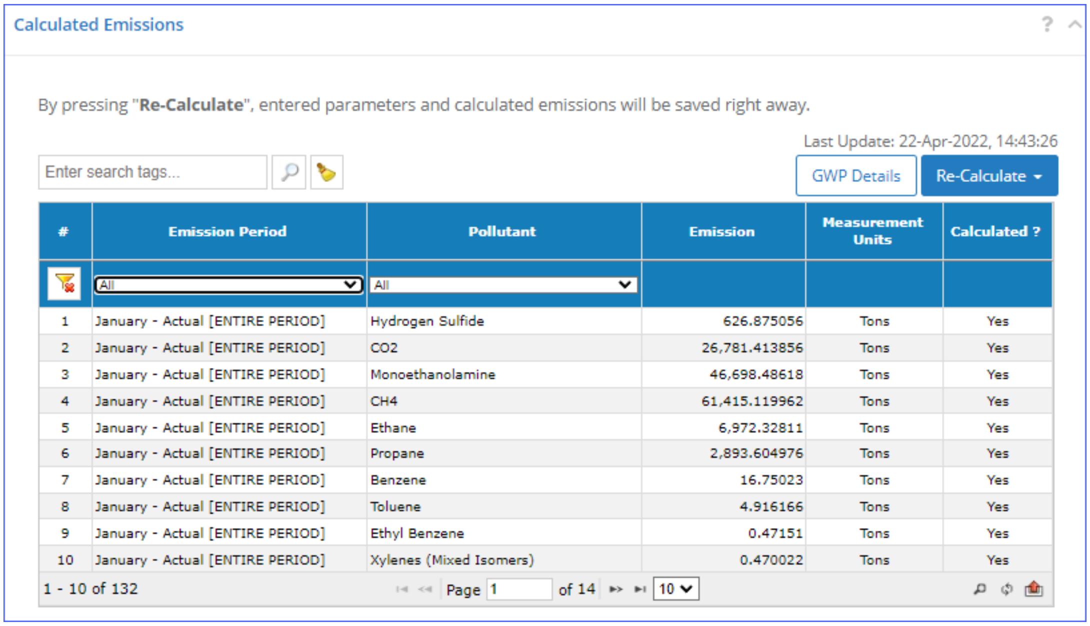
   a. **Current**: This option allows operators to calculate only the active source you are working on. It is recommended when making updates only to a specific emission source.
   b. **All**: This option allows operators to calculate emissions for all sources assigned to the facility/platform.

IMPORTANT: If either **Current** or **All** is not available, it means that the months for which you are trying to calculate emissions are set to zero emissions.

WARNING: Previous emission values will be lost and overwritten when the selection is made. For **Current** calculations, only the emissions for the active month will be overwritten.

IMPORTANT: You can only calculate emissions when in the **Edit** mode.

3. The calculations may take several seconds to process depending on the number of pollutants reported for the emission source.
4. A table will appear with calculated monthly emissions as shown in Figure 79.



#	Emission Period	Pollutant	Emission	Measurement Units	Calculated ?
1	January - Actual [ENTIRE PERIOD]	Hydrogen Sulfide	626.875056	Tons	Yes
2	January - Actual [ENTIRE PERIOD]	CO2	26,781.413856	Tons	Yes
3	January - Actual [ENTIRE PERIOD]	Monoethanolamine	46,698.48618	Tons	Yes
4	January - Actual [ENTIRE PERIOD]	CH4	61,415.119962	Tons	Yes
5	January - Actual [ENTIRE PERIOD]	Ethane	6,972.32811	Tons	Yes
6	January - Actual [ENTIRE PERIOD]	Propane	2,893.604976	Tons	Yes
7	January - Actual [ENTIRE PERIOD]	Benzene	16.75023	Tons	Yes
8	January - Actual [ENTIRE PERIOD]	Toluene	4.916166	Tons	Yes
9	January - Actual [ENTIRE PERIOD]	Ethyl Benzene	0.47151	Tons	Yes
10	January - Actual [ENTIRE PERIOD]	Xylenes (Mixed Isomers)	0.470022	Tons	Yes

Figure 79. Table showing calculated monthly emissions

3.2.14 Global Warming Potential Details

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM) > Select Facility

Global Warming Potential (GWP) values are a measure of how much energy the emissions of 1 ton of gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO_2). The GWPs used in the application were acquired from Second and Fourth Intergovernmental Panel on Climate Change Assessment Reports.

OCS AQS allows BOEM to create sets of GWP values that can then be assigned to operator inventories and used to calculate carbon dioxide equivalent (CO_2e) values.

> ***IMPORTANT:*** Operators cannot create or edit GWP values, sets, or assign these sets to inventories.

You can view the set of GWP values assigned to the inventory by clicking **GWP Details** in the **Calculated Emissions** section, as shown in Figure 80.

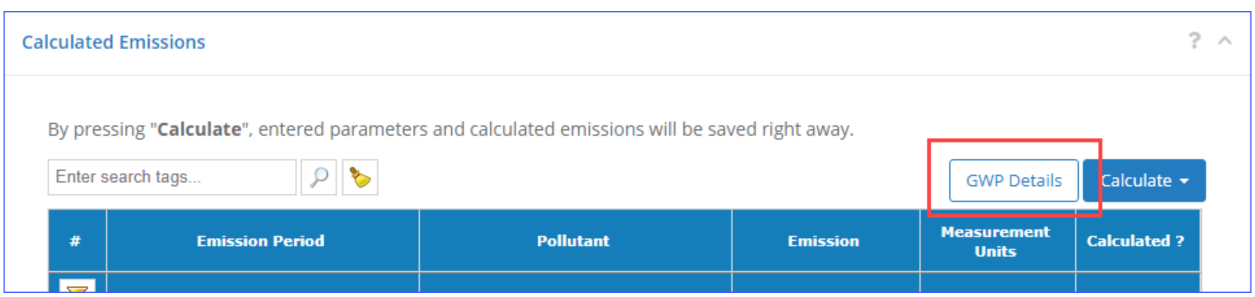


Figure 80. GWP Details button

Doing so will load the details of the GWP set used for calculations in the current inventory (Figure 81).

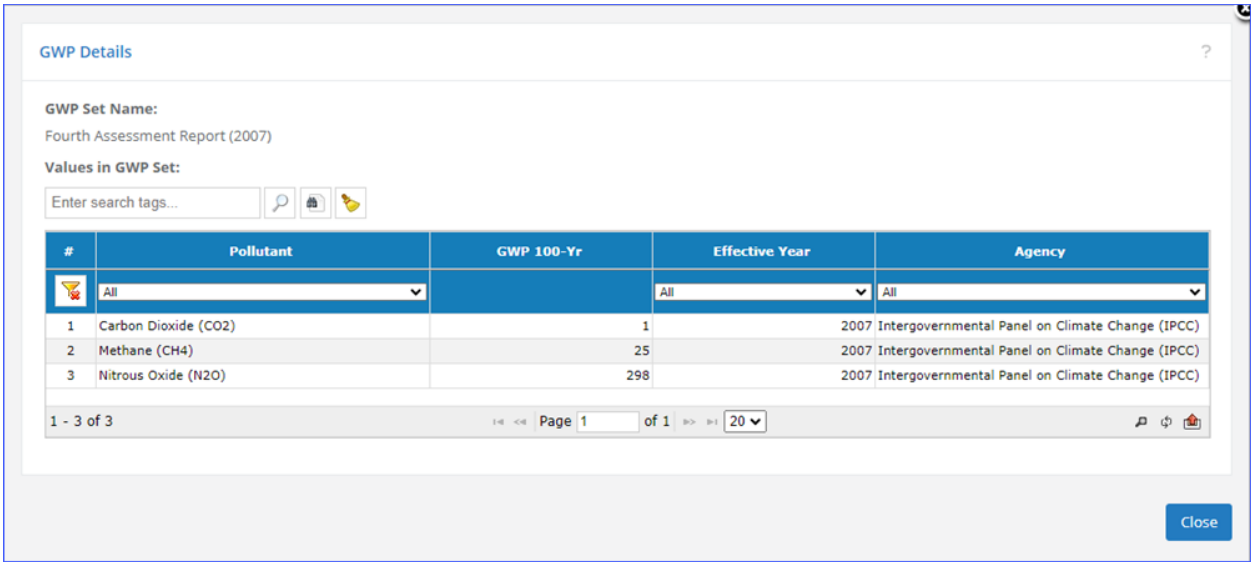


Figure 81. GWP set details

For each standard in the set the table displays the following information:

- **Pollutant**: The pollutant with which the standard value is associated
- **GWP 100-Yr**: Standard value used to calculate CO_2e
- **Effective Year**: Year the standard was implemented
- **Agency**: Name of the agency that established the standard

3.2.15 Combustion Flares

OCS AQS breaks down each stationary emission source into a release point and an emission unit. The release point is the physical transfer location of emissions from a process to the atmosphere. For most processes, the release point is the top of a smokestack. For flares and open flames, it is the exterior surface of the flame as shown in Figure 82. Estimation of the flame height and diameter can be done using pseudo-parameter calculations.

However, for OCS AQS reporting purposes, only the physical flare stack height and tip diameter are required. If the flare has multiple tips or nozzles, the combined diameters should be used.

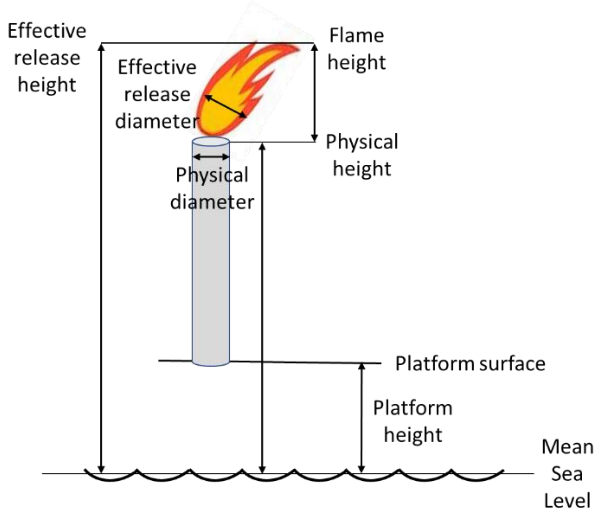


Figure 82. Flare release point parameters

For flares on platforms, the physical height assumes the height of the flare stack above MSL. This information was obtained from the **Summary of Platform BOEM Records**[4].

Users should create flares based on flare design specifications as listed in the manufacturer's information and use the total volume (including pilots under the FLA-pilot process).

3.2.16 Adding Supporting Documentation

Pathway: Emissions > Platform Sources > Activity & Emissions Manager (AEM)

On the occasions when documentation supporting certain claims (e.g., emission control reduction efficiency) is required, there are two places where you can upload these documents:

- In the **AEM** (described below)
- In the **Companies & Complexes** (described in Sections 3.5.1.1 and 3.5.4)

IMPORTANT: Each **Supporting Documentation** entry is a set, which may contain multiple documents.

To upload supporting documentation in AEM:

1. Go to the main list of facilities in the **AEM**.
    - Either go to the **Emissions** module and click the **Activity & Emissions Manager (AEM)** navicon, or
    - Click < **Facilities** in the top left corner of the AEM interface
2. Click **Supporting Documents** section in the navigation panel on the left. Depending on your previous activities, the OCS AQS may remember the last facility you worked with and filter the list of supporting documentation entries to show only documentation uploaded for this facility. In this case you will see the name of the facility above the table as shown in Figure 83.

[4] https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Gulf-of-Mexico-Region/Air-Quality/Readme-2011-Gulfwide-Platform-file.doc

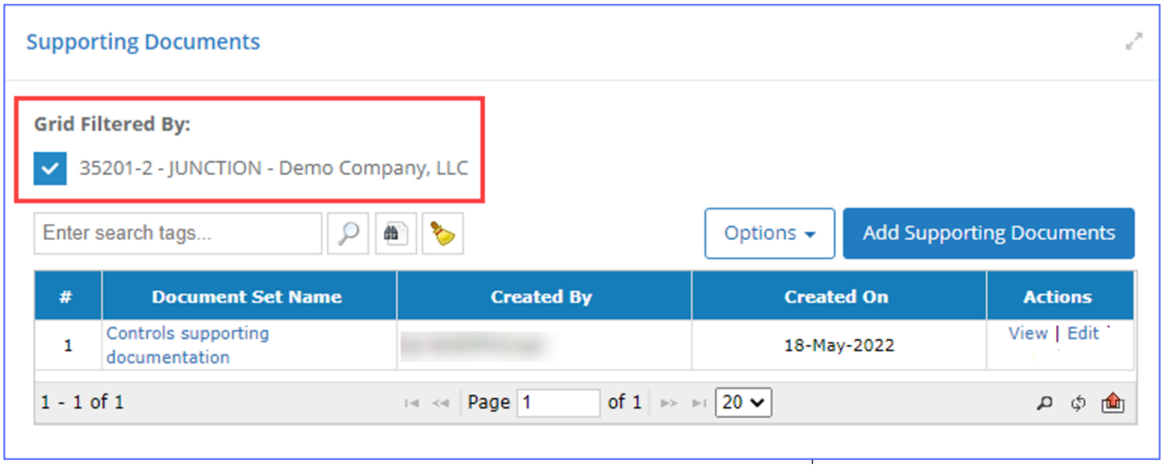


Figure 83. Documentation filtered by facility

If the filter is reset, a full list of available documentation entries grouped by facility will be shown. You can also filter this list to display a list of facilities that do not have any documents uploaded (Figure 84).

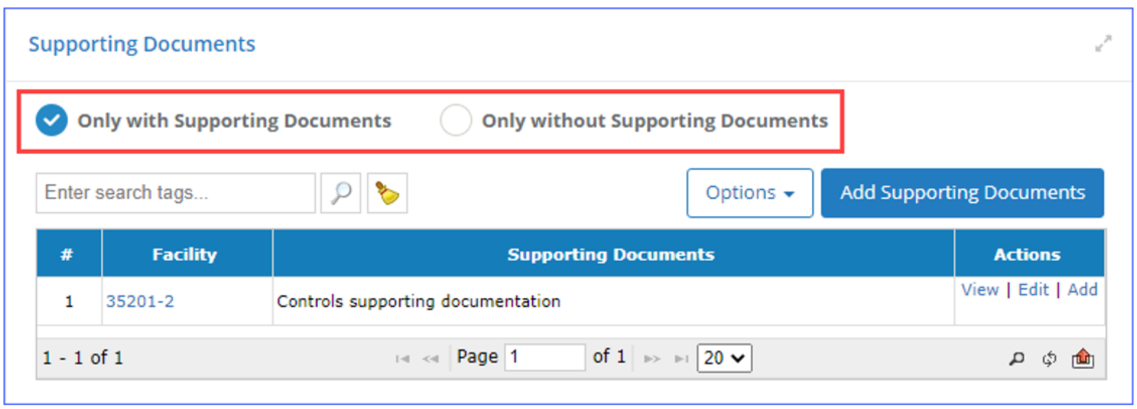


Figure 84. Unfiltered documentation list

3. Click **Add Supporting Documents** to load a wizard that will help you upload the documentation files.
4. If you are starting from a filtered list, go to step 6. If starting from an unfiltered list, the first step allows you to select the facility for which you wish to upload documentation.
5. Select a facility and click **Next**.
6. In the **Document Set Info** step, specify the **Document Set Name** (required) and a brief **Description** of the document (optional), and click **Next**.
7. In the **Specify Document Info** step, upload the files that will be included in the set as follows:
    a. Click **Select file**.
    b. Navigate to and select a documentation file you wish to include in the set.
    c. Select the file type based on the document you specified.
    d. Enter any notes associated with the file to distinguish it from others in the set.
    e. Click **Upload** to add the document to the set.
    f. Repeat with remaining documents.
8. After all documents have been specified, click **Finish**.

The specified files will be grouped under a single document set entry.

3.3 Review Activity Data

Pathway: Emissions > Platform Sources > Review Activity Data

Section 3.2 demonstrated how to enter the activity data for the processes using the **AEM**, as well as use various time saving features such as bulk importing activity data (Section 3.2.6.6), setting processes to zero emissions (Section 3.2.11), and copying activity data from one month to others (Section 3.2.12). However, using these features without proper review may introduce data entry errors that would affect the resulting emissions calculations. The **Review Activity Data** tool allows you to screen for certain data entry issues.

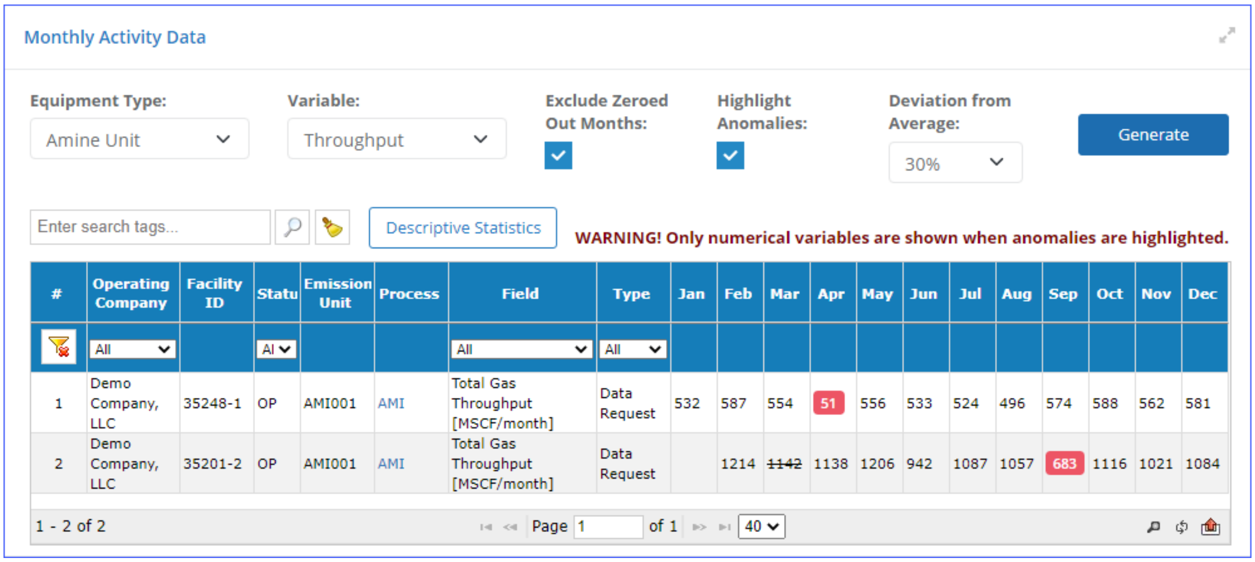


Figure 85. Review activity data tool

Using the **Review Activity Data** tool, you can perform the following QA/QC analysis:

1. Screen for missing values (Section 3.3.1)
2. View for which months the emissions have been zeroed out (Section 3.3.2)
3. Screen for anomalous activity values (Section 3.3.3)
4. View descriptive parameter statistics (Section 3.3.4)

3.3.1 General Data Overview

Pathway: Emissions > Platform Sources > Review Activity Data

The top portion of the screen contains the following controls:

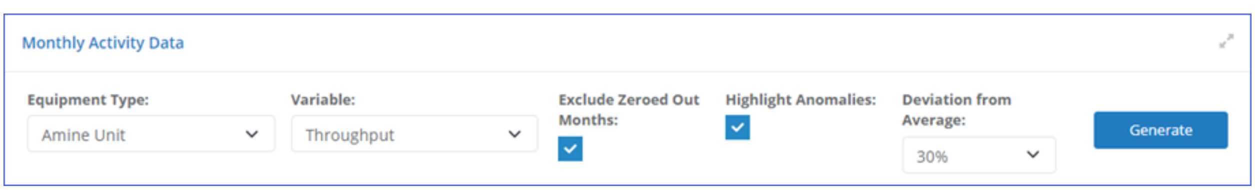


Figure 86. Review activity data controls

- **Equipment Type:** Filter the list to show only activity data for emission units of a specific type.
- **Variable:** Select **All** or **Throughput**. **All** setting will display all activity data parameters, and **Throughput** will only display the throughput activity for the selected equipment type.

- **Exclude Zeroed Out Months:** Checking this box will put a ~~strikethrough~~ the activity value entered for any month that has been set to “zero emissions.” Example is the throughput value for the month of March for the amine unit at Facility ID# 35201-2 (Figure 85).
- **Highlight Anomalies:** Checking this box will highlight in red any values that fall outside the range defined by **Deviation from Average** (Figure 85).
- **Deviation from Average** is the percent value by which the activity value can deviate from the average of the monthly values before being considered anomalous. This selection box only becomes available when the **Highlight Anomalies** option is checked.
- **Generate:** Once all the settings have been configured, click this button to generate the table.

Even before using the any of the special features in this tool, the table can show you gaps in the activity data. For example, the cell for January throughput for the amine unit at the Facility ID# 35201-1 in Figure 85 is blank, which means that this value was not entered.

3.3.2 View Months with Zero Emissions

Pathway: Emissions > Platform Sources > Review Activity Data

You can highlight the months that were set to “zero emissions” by checking the **Exclude Zeroed Out Months** option in the controls. This will put a strikethrough the activity value, as shown in Figure 87. No emissions are calculated using these activity values.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
532	587	554	51	556	533	524	496	574	588	562	581
	1214	~~1142~~	1138	1206	942	1087	1057	683	1116	1021	1084

Figure 87. Activity for months with zero emissions

3.3.3 Highlight Anomalous Activity Values

Pathway: Emissions > Platform Sources > Review Activity Data

You can highlight the values that do not fall withing a certain range around the average. In the example shown in Figure 88 below, the average over the monthly values is 511.5. A 30% of 511.5 is 153.45. Based on these settings, the acceptable range is between 358.05 and 664.95. The highlighted number (51) falls outside this range.

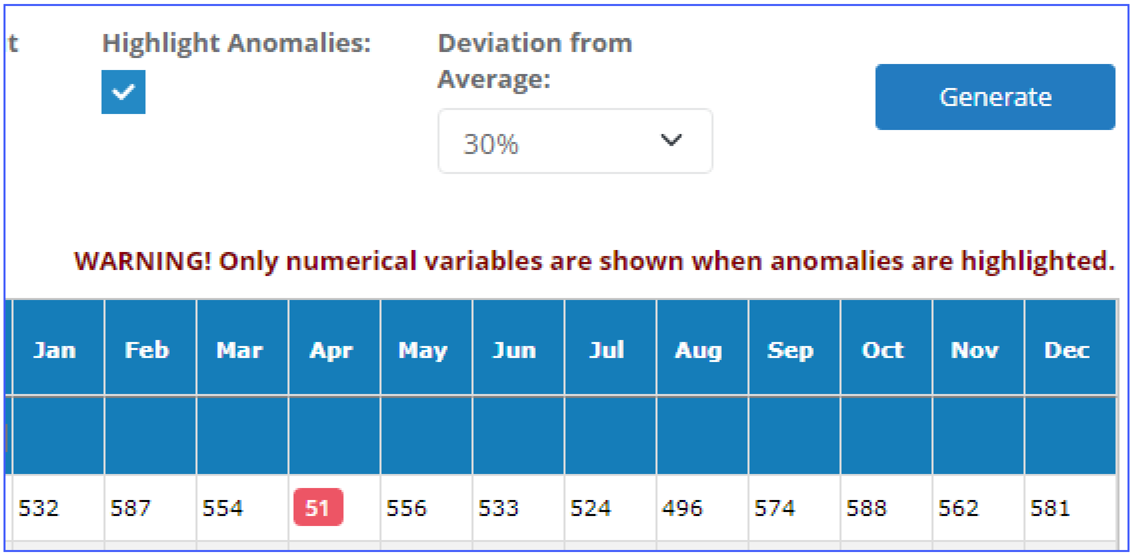


Figure 88. Highlighted anomalous activity value

3.3.4 View Descriptive Statistics

Pathway: Emissions > Platform Sources > Review Activity Data

The descriptive statistics, including **Mean**, **Max**, **Min**, and **Total**, are only available when a single **Variable** is selected. Therefore, they will not be available if **All** option is selected under **Variable**.

To view descriptive statistics, click **Descriptive Statistics** button above the table (Figure 89).

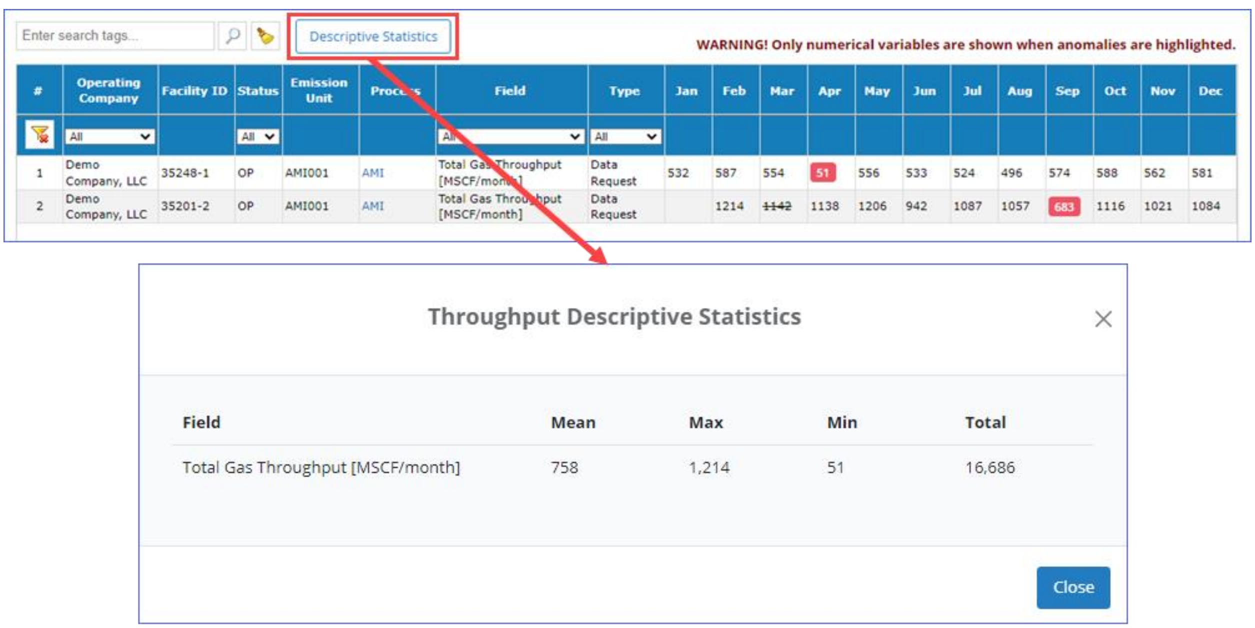


Figure 89. Activity data descriptive statistics

3.4 Batch Emissions Calculator (BEC) – Platform Sources

Section 3.2.13 showed how to calculate emissions for a single emission unit over the reporting period. The BEC allows for the emissions from all emission units within a facility (or a collection of facilities) to be calculated together.

3.4.1 View Previous Facility Calculations

Pathway: Emissions > Platform Sources > Batch Emissions Calculator (BEC) - Platform Sources

The **Summary List** shown in Figure 90 shows all previously run calculations. Historical results can be viewed by selecting **View Files** under the **Actions** column. If there is no link, that means a calculation is taking place.

IMPORTANT: If the link does not appear after several minutes, refresh the screen.

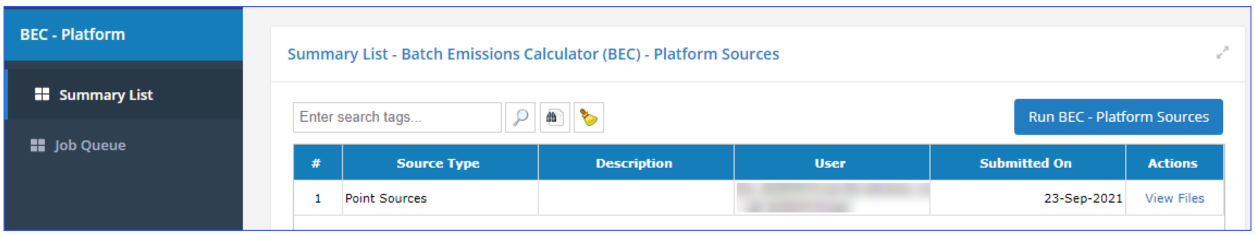


Figure 90. BEC summary page

Downloaded files include the following:

- **Emission calculations tabs**: Tab for each emission period (JAN, FEB, MAR, etc.) that contains parameters used to calculate the emissions for each process and the calculated total
- **BEC Calculation Status tab**: A list of individual steps in the BEC run
- **ERRORS:** List of errors encountered during calculations
- **CloudJobLog:** Log of details of the processing job

3.4.2 Run New Facility-Wide Calculations

Pathway: Emissions > Platform Sources > BEC – Platform Sources

To run a new calculation, click **Run BEC – Platform Sources** above the **Summary List** table. This will take you to a wizard that will guide your selections.

1. Check the box for each facility for which you want to calculate.
2. Click **Next** to continue.
3. Select the time periods for which you wish to calculate the emissions. You can either check individual months or check the **Select All** option.
4. Add any notes related to the calculation run.
5. Click **Next** to continue.
6. Review your input selection.
   IMPORTANT: The **Create Missing Emission Period** option allows you to indicate that you want to calculate emissions for all time periods, even if emission periods are not defined for some months. This option is enabled by default.
7. Click **Finish** to begin the calculation process.

3.4.3 BEC Job Queue

Pathway: Emissions > Platform Sources > BEC – Platform Sources > Job Queue

You can follow the status of the calculations by going to the **Job Queue – Batch Emission Calculation** page (Figure 91). Select **Job Queue** in the Navigation Panel.

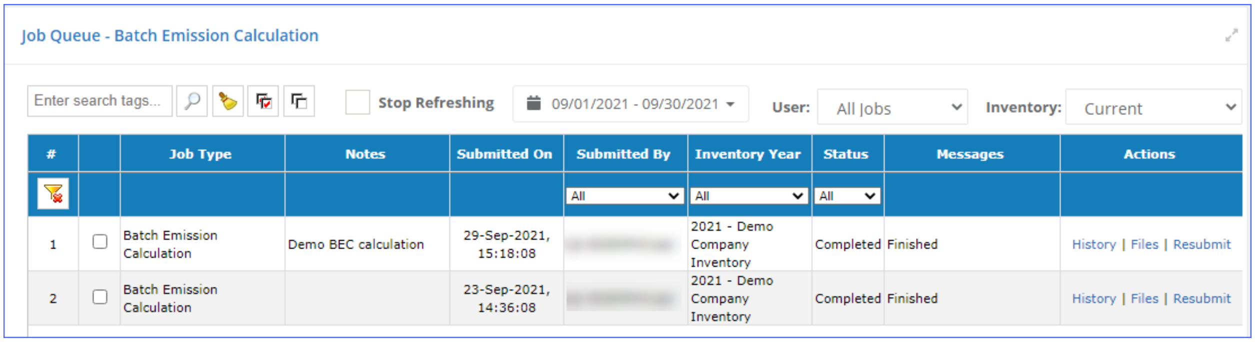


Figure 91. BEC job queue

3.5 Companies & Complexes

Pathway: Emissions > Platform Sources > Companies & Complexes

Selecting the **Companies & Complexes** navicon under the **Emissions** module allows you to view and manage operating companies and complexes.

3.5.1 Companies

Pathway: Emissions > Platform Sources > Companies & Complexes

After you click on the **Companies & Complexes** navicon, you are taken to the page that displays the active company in your current inventory.

- View the company details by clicking either the link in the **Company Name** column or the **View** option in the **Actions** column.
- View the list of complexes that belong to the company by clicking **Complexes** in the Navigation Panel. An operator will only see complexes that belong to their company, while an administrative-level user will see all complexes in the database.
- View the list of facilities operated by the company by clicking **Facilities** in the Navigation Panel. An operator will see all facilities that belong to their company (not filtered by a specific complex), while an administrative-level user will see all facilities in the database.
- View the list of supporting documentation entries by clicking **Supporting Documentation** in the Navigation Panel. You can filter this list to view all **Supporting Documentation** entries or a list of facilities that do not have any documentation uploaded.

3.5.1.1 Company Details

Pathway: Emissions > Platform Sources > Companies & Complexes > Select Company

Selecting a company from the list (or clicking on the **View** option) will open the detailed editor page that provides information related to the company, including the list complexes and associated facilities. From this page, you can edit the information and add contacts by clicking **Edit**. Figure 92 shows an example of the detailed editor.

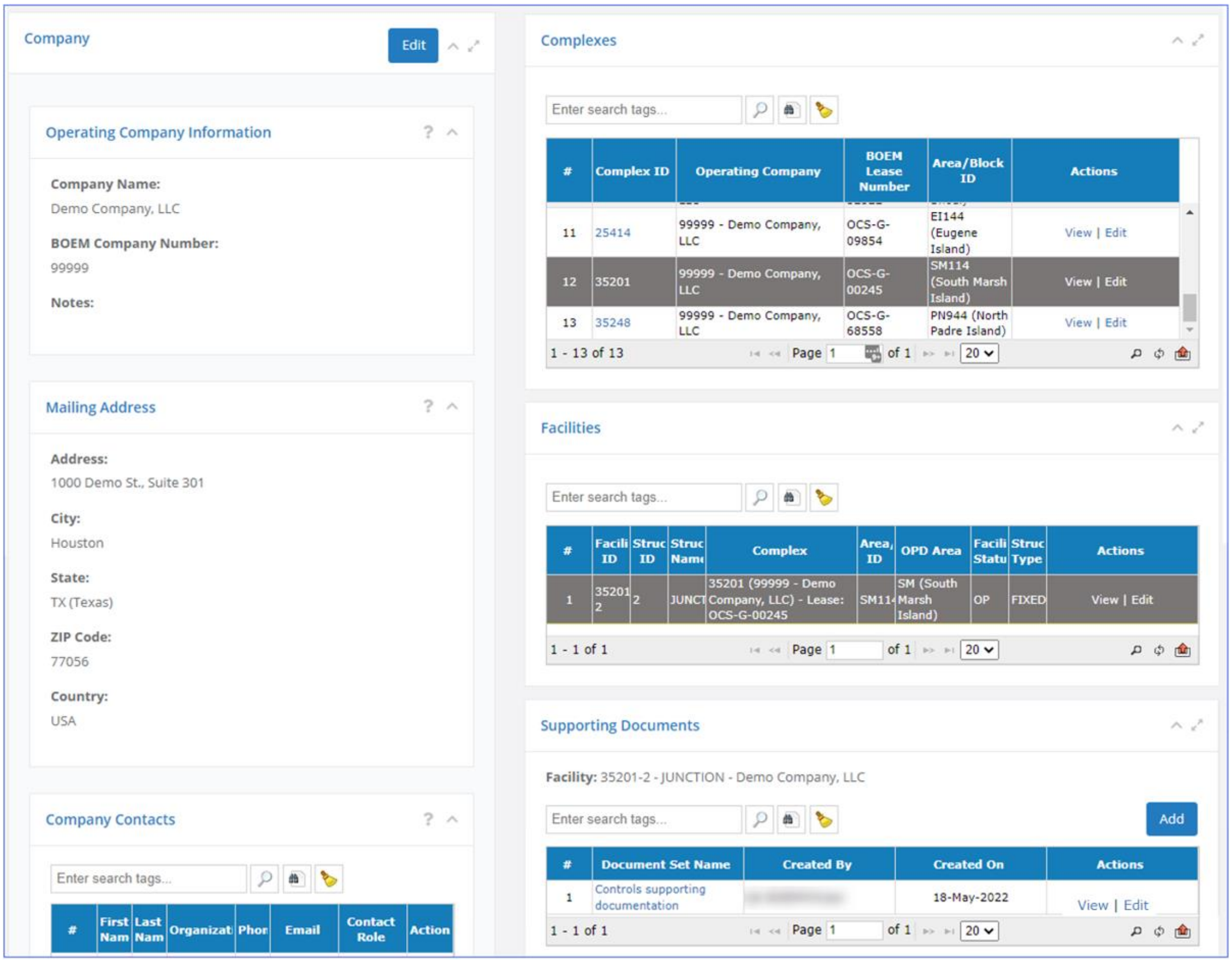


Figure 92. Company information page

In the detailed editor you can perform the following functions shown in Table 2.

Table 2. Edit company details

Detail	Action	Directions
Company	Edit Details	Edit company details (including adding Company Contacts [Section 3.5.1.2]) by clicking Edit in the Company panel. *IMPORTANT:* The BOEM Company Number parameter must be a five-digit number. If the number is less than five digits, it must be padded with leading zeroes (e.g., 00123).
Complexes	View Details	View the details of an existing complex by clicking the link in the Complex ID column or the View link in the Actions column.
Complexes	Edit Details	Edit the details of an existing complex by clicking Edit in the Actions column.
Complexes	View Associated Facilities	View facilities located within the complex by selecting (highlighting) the complex in the table.
Facilities	View Details	View the details of an existing facility by clicking the link in the Facility ID column or the View link in the Actions column.
Facilities	Edit Details	Edit the details of an existing facility by clicking Edit in the Actions column.
Support Documentation	Upload New	Upload a new set of documents for the facility highlighted in the Facilities table by clicking Add above the list of documents. See detailed upload instructions below.
Support Documentation	View Details	View the details of an existing document set by clicking the link in the Document Set Name column or the View link in the Actions column.
Support Documentation	Edit Details	Edit the details of an existing document set by clicking Edit in the Actions column.

To upload a new document set:

1. Select the facility for which you wish to upload the documents in the **Facilities** table.
2. Click **Add** in the **Supporting Documentation** table.
3. In the **Document Set Info** step, specify the **Document Set Name** (required) and a brief **Description** of the document (optional) and click **Next**.
4. In the **Specify Document Info** step, upload the files that will be included in the set as follows:
    a. Click **Select file**.
    b. Navigate to and select a documentation file you wish to include in the set.
    c. Select the file type based on the document you specified.
    d. Enter any notes associated with the file to distinguish it from others in the set.
    e. Click **Upload** to add the document to the set.
    f. Repeat with remaining documents.
5. After all documents have been specified, click **Finish**.

3.5.1.2 Add Company Contacts

Pathway: Emissions > Platform Sources > Companies & Complexes > Select Company

To add (or delete) contacts, click **Edit** in the top right corner of the **Company** details panel to go into edit mode and scroll down to and click **Add Contact** in the **Company Contacts** panel as shown in Figure 93.

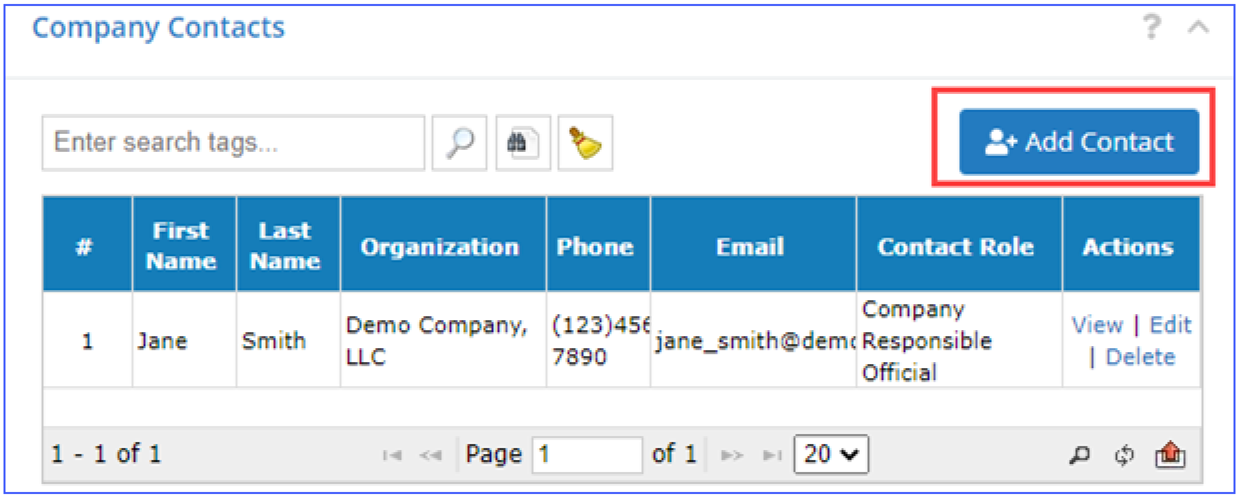


Figure 93. Company contacts panel

The **Add Contact** data entry form will load the following:

1. **Existing Contact**: Select the name from the **Contact** list by clicking **[…]** and opening the option table. Select the **Contact Role**.
   TIP: One person can have multiple roles, but you must create a separate **Company Contact** record for each role for that person.
2. **New Contact**: Complete the contact information and assign a **Contact Role**.
3. Click **Save** to save entry.

Available **Contact Roles** are:

- Company Responsible Official
- Complex Responsible Official
- Contractors
- Facility Responsible Official
- Inventory Preparer
- Inventory Reviewer
- BOEM Representative
- BSEE Representative

  ***IMPORTANT:* Contact Roles** refer only to the person's involvement with the OCS Emissions Inventory and should not be confused with the actual job or job title of the person.

3.5.1.3 Edit/Delete Company Contacts

Pathway: Emissions > Platform Sources > Companies & Complexes > Select Company

To edit or delete contacts, go into Edit mode for the company and select **Edit** or **Delete** under the **Actions** column for the contact you want.

If you are editing the contact, the contact details data entry form will load. Make edits and click **Save** to commit your changes.

3.5.2 Complexes

Pathway: Emissions > Platform Sources > Companies & Complexes > Complexes > Select Complex

In the **Companies & Complexes** Navigation Panel, click on the **Complexes** option. The page will display a list of complexes that belong to the operating company. Select the complex you want to view from the list. This will take you to the **Complex Details** editor page similar the one shown below in Figure 94.

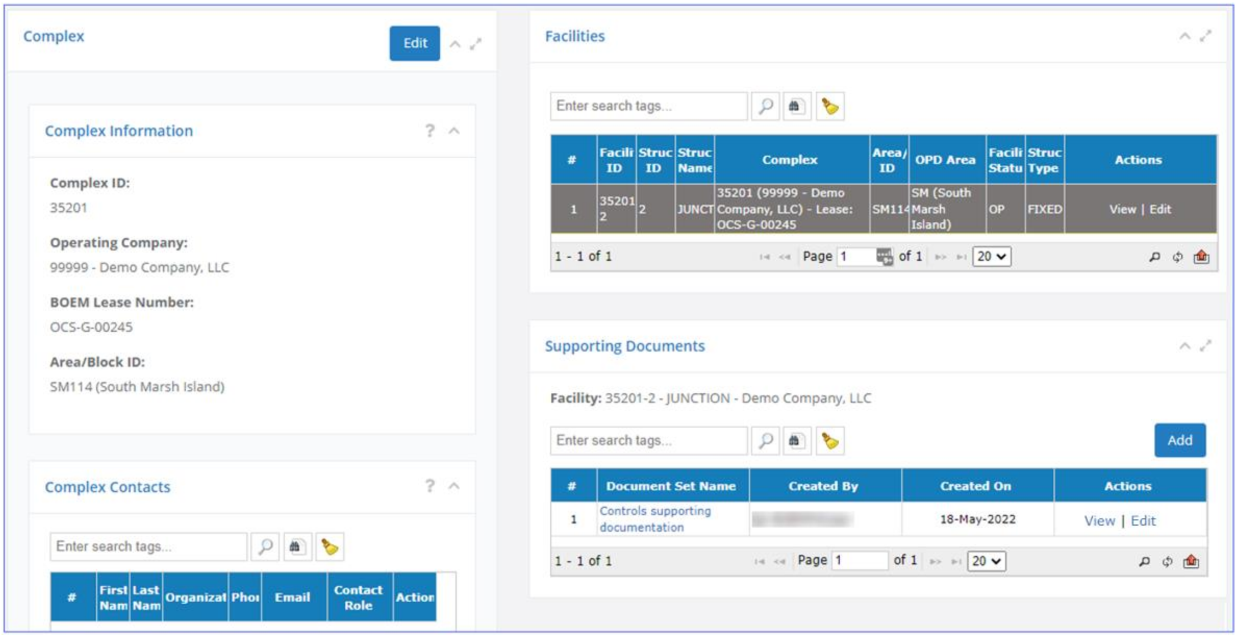


Figure 94. Complex Details page

This page functions in a similar way to the **Company Details** page described in Section 3.5.1.1. In this detailed editor, you can perform the following functions shown in Table 3.

Table 3. Edit complex details

Detail	Action	Directions
Complex	Edit Details	Edit complex details (including adding **Complex Contacts** [Section 3.5.1.2]) by clicking **Edit** in the **Complex** panel.
Facilities	View Details	View the details of an existing facility by clicking the link in the Facility ID column or the View link in the Actions column.
Facilities	View Associated Facilities	View facilities located within the complex by selecting (highlighting) the complex in the table.
Support Documentation	Upload New	Upload a new set of documents for the facility highlighted in the Facilities table by clicking Add above the list of documents. See detailed upload instructions below.
Support Documentation	View Details	View the details of an existing document set by clicking the link in the Summary column or the View link in the Actions column.

Detail	Action	Directions
Support Documentation	Edit Details	Edit the details of an existing document set by clicking Edit in the Actions column.

For more information on how to upload supporting documentation, see Section 3.5.1.1.

> ***IMPORTANT:*** Please make sure that each facility has a **Company Responsible Official** contact.

3.5.3 Facilities

Pathway: Emissions > Platform Sources > Companies & Complexes > Facilities

In the **Companies & Complexes** Navigation Panel, click on the **Facilities** option. The page will display a list of facilities that belong to the operating company. This list is not filtered by complex in which the facilities are located, but this information is available in the table, in the **Complex** column.

From this table, you can

- View facility details by clicking either **Facility ID** or **View** in the **Actions** column for the facility in question.
- Open facility details in edit mode by clicking **Edit** in the **Actions** column.

3.5.4 Supporting Documentation

Pathway: Emissions > Platform Sources > Companies & Complexes > Supporting Documentation

In the **Companies & Complexes** Navigation Panel, click on the **Supporting Navigation** option. The page will display a list of document sets that have been uploaded for the company's facilities. This list can be filtered by a specific facility, in which case the facility name and ID will be displayed above the table, or the list can be unfiltered. In an unfiltered list, you can either display all document sets in the inventory or display all facilities that have no documentation uploaded.

From this table, you can

- View document set details by clicking either the document set name or **View** in the **Actions** column for that entry.
- Open document set details in edit mode by clicking **Edit** in the **Actions** column.
- Delete a document set by clicking **Delete** in the **Actions** column.
  WARNING: Deleting a document set will delete all documents in that set.
- Upload additional documents by clicking **Add Supporting Documentation**. The procedure is the same as in **Activity & Emissions Manager** (see Section 3.2.16 for more details).

3.6 Remove Unassigned Release Points

Pathway: Emissions > Platform Sources > Remove Unassigned Release Points

The **Remove Unassigned Release Points** tool (Figure 95) allows you to bulk-delete release points that have been defined in the system but are no longer used and are not attached to a specific emission unit/process.

To access this wizard, click on the **Remove Unassigned Release Points** navicon. This will display a table of all release points that are currently not assigned to any emission unit/process.

Do the following to remove unassigned release points:

1. Check the box for every release point you wish to delete. Use the **Search** bar above the table and the filter in the **Facility** column to narrow down the available release points.
2. Click **Finish** to delete the release points.

A confirmation message will display the final number of selected release points.

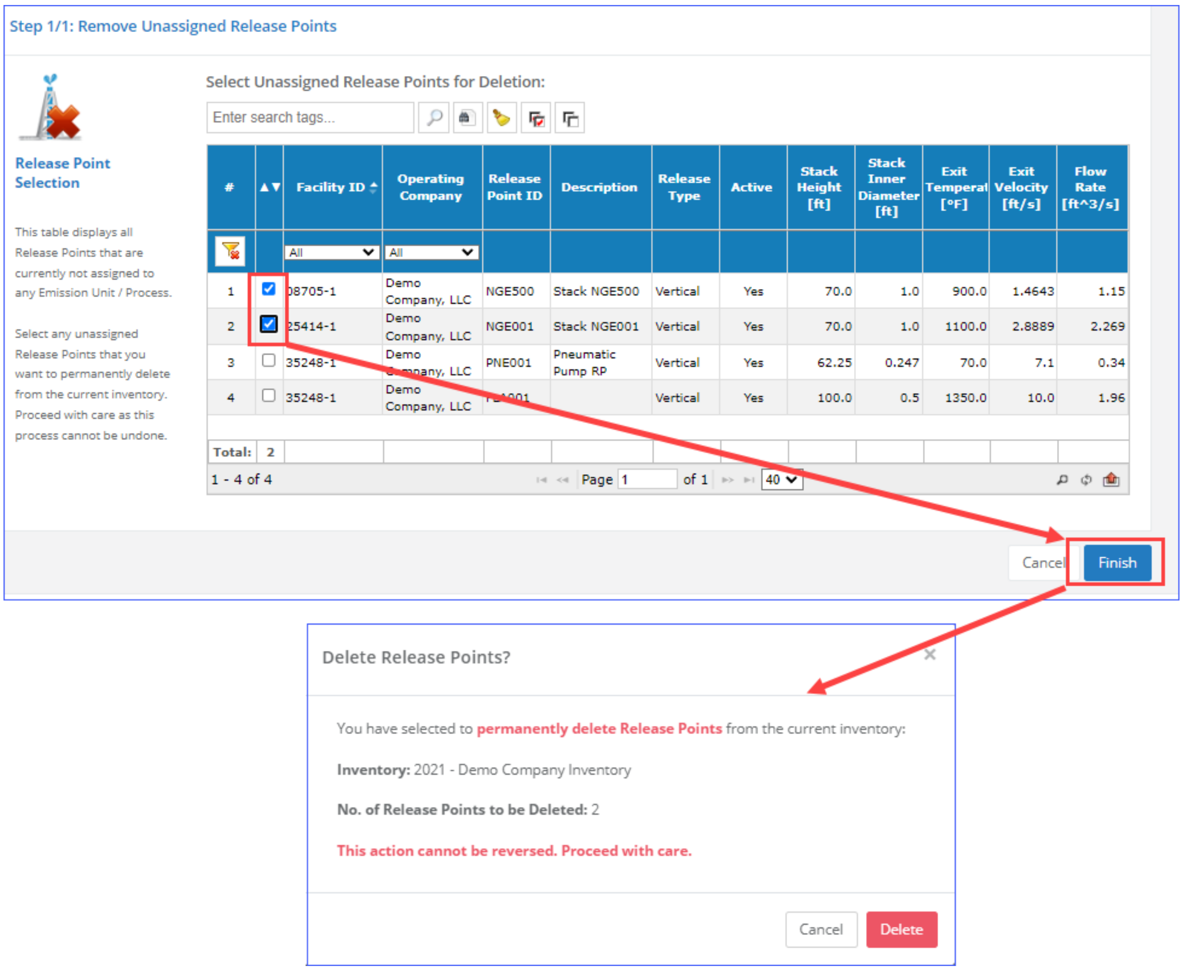


Figure 95. Remove unassigned release points

IMPORTANT: Deleting release points will permanently remove them from the inventory. This action cannot be reversed.

4 Emissions: Lease Operations

Pathway: Emissions > Lease Operations

Operators are required to account for emissions from non-platforms operation if they any of the following:

- Drilling rigs for crude oil exploration / production wells
- Drilling rigs for natural gas exploration / production wells
- Domestic and foreign self-propelled drilling rigs
- Installation support vessels (CSV)
- Well stimulation vessels (WS)
- Non-platform combustion flares (including the flare pilot process)
- Non-platform mud degassing

> ***IMPORTANT:*** Decommissioning activities do not have to be reported.

Beginning with the 2023 emissions submittal effort, leases with drilling sources will be imported using the BSEE eWell Data to the **Leases** grid under the **Lease Operation Emissions Manager**.

> ***IMPORTANT:*** Only leases with drilling sources will be automatically imported to OCS AQS. Any leases that do not have drilling sources, such as those involving a Well Stimulation Vessel or a Platform Construction Vessel without any drilling operations, must be created manually and entered into OCS AQS.

Although these prepopulated lease and source records have been created based on existing drilling data, this list may not be all inclusive of what is required to be reported under lease operations.

Operators must ensure that all drilling rig types listed below are reported (except PA operations, which is used for decommissioning), including

- BG – Barge
- BR – Barge Rig
- CT – Coil Tubing Unit
- DS – Drillship
- HW – Hydraulic Workover Unit
- JU – Jackup
- LB – Lift Boat
- PF – Platform Rig
- PL – Pipeline Lay
- SB – Snubbing Unit
- SD – DP Semisubmersible
- WI – Well Intervention
- WL – Wireline

All rig modes listed below must be reported, including

- CHZ – Change Zone
- DRL – Drilling
- Other – Other Operation
- WO – Workover

Examples

- A DS rig with CHZ rig mode **MUST** be reported.
- A DS rig with PA rig mode **DOES NOT** need to be reported.

The functions available to operators for lease operations are shown in Figure 96 and can be accessed by first clicking on the **Lease Operations** section in the **Emissions** module Navigation Panel.

Figure 96. Lease operations map

4.1 Manage Lease Operations

All <u>leases with drilling sources</u> registered within the BSEE have been imported into OCS AQS. Any leases that do not have drilling sources, such as those involving a Well Stimulation Vessel or a Platform Construction Vessel without any drilling operations, must be created manually and entered into OCS AQS.

To create and manage non-drilling sources, go to Section 4.1.1. To update drilling sources imported from eWell database, go to Section 4.1.2.

> ***NOTE:*** It is best to review/update imported leases BEFORE new leases are created, to avoid confusion.

4.1.1 Create and Edit Non-Drilling Leases and Sources

Lease operations can be managed using a process summarized in Figure 97.

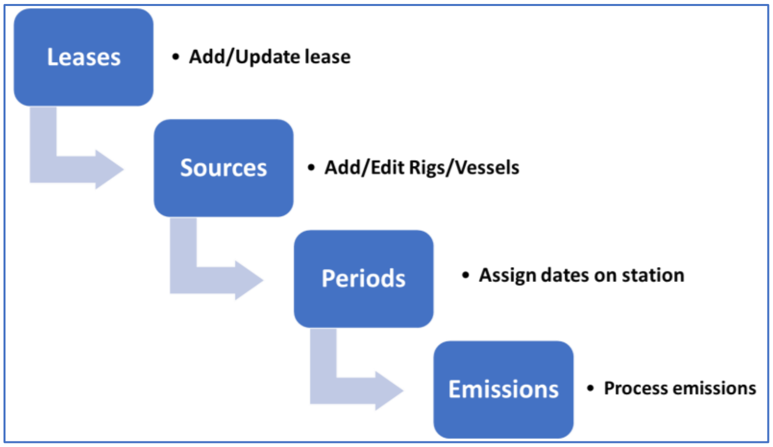


Figure 97. Summary of lease operations emissions

4.1.1.1 Add a New Lease

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager

If a lease is not imported, it must be added using the **Add Lease** button. Only official BOEM leases can be added.

In the **Leases** page, select **Add Lease**, which is located in the upper right corner of the page shown in Figure 98.

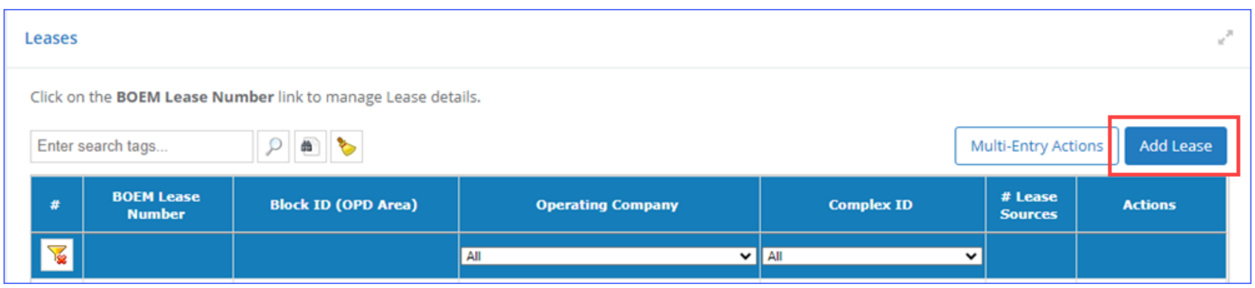


Figure 98. Add Lease button

This will load to the **Add Lease** page as shown in Figure 99.

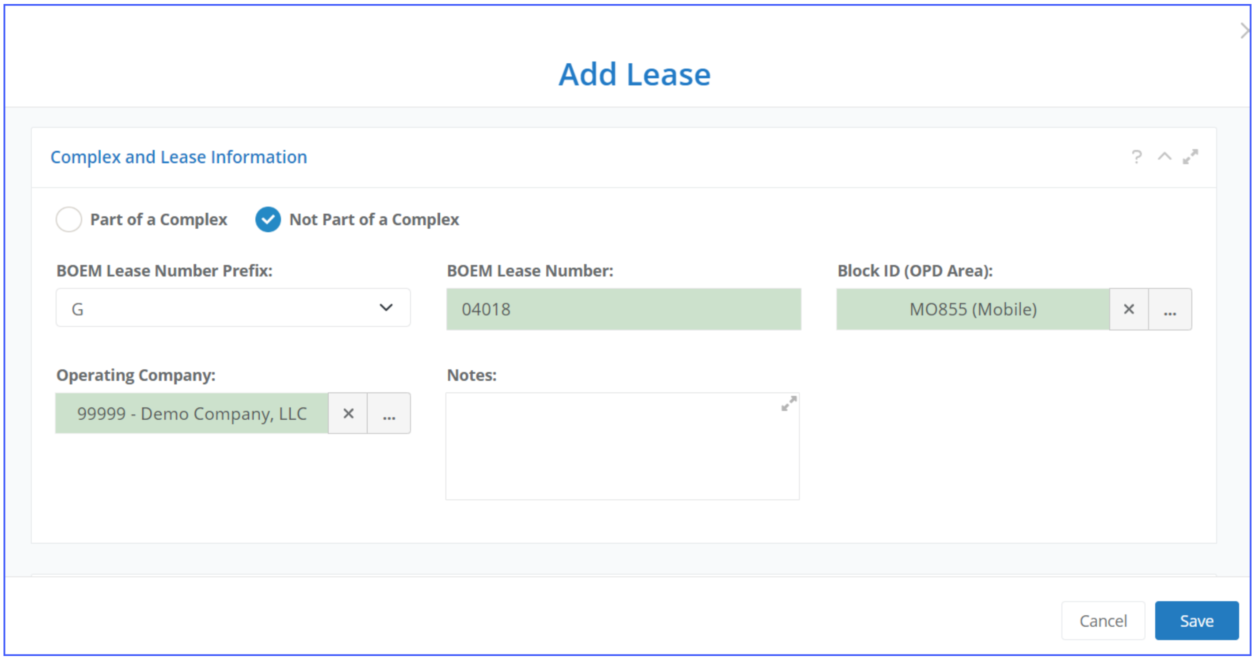


Figure 99. Add Lease page

If you wish to specify sources under an existing lease associated with a complex, check the **Part of a Complex** option, and select the appropriate complex by clicking **[…]** for the **Complex ID**. The **Operating Company** field will then be automatically filled with the appropriate information. Fill in the remaining required fields.

If you wish to define a brand-new lease, check the **Not Part of a Complex** option and fill in the required information manually.

> ***NOTE:*** If your lease has a "G" prefix, make sure to select it in the **BOEM Lease Number Prefix** field. This field is not required, therefore the application will allow you to save the lease record without it.

Save the new lease by clicking **Save**. The new record will be added to the list of available leases and the **Lease Operation Emissions Manager Details** screen will load with the new lease automatically selected.

4.1.1.2 Lease Operation Emissions Manager

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Create/Select Lease

The **Lease Operation Emissions Manager** is similar to the **Activities & Emissions Manager (AEM)** (Section 3.2.1) used in **Platform Sources**. However, this tool is specifically used to calculate emissions for non-platform sources such as drilling rigs connected to the seabed and installation support vessels when performing installation activities. You can create a lease operation process based on existing templates and enter parameters that describe the process activity. Then you can calculate the emissions generated by these non-point processes.

To use the **Lease Operation Emissions Manager**, select the **Lease Operations** option from the Navigation Panel of the **Emissions** module and then click on the **Lease Operation Emissions Manager** navicon. This will take you to the **Leases** page, similar to what is shown in Figure 100.

Click on the lease number in the **BOEM Lease Number** column of the Leases table or **View** in the **Actions** column to view the details of the lease and associated sources.

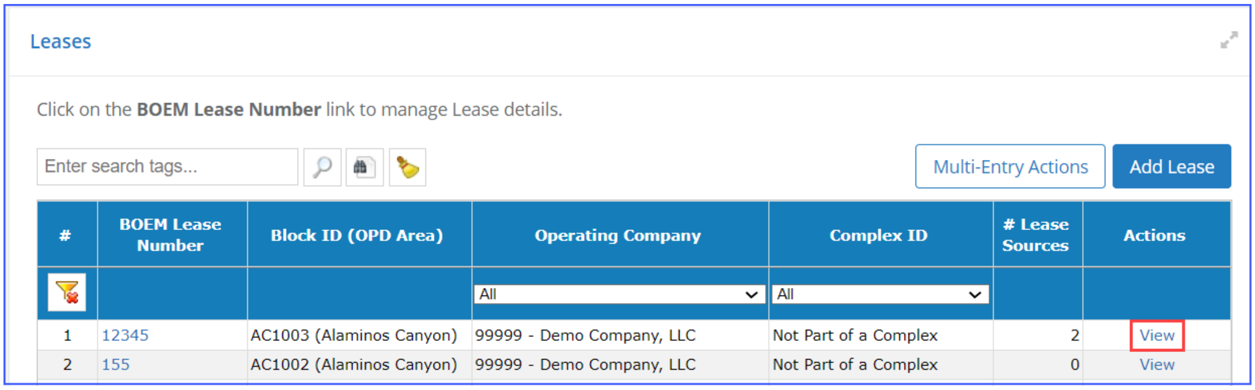


Figure 100. Leases page and selecting BOEM lease number

4.1.1.2.1 Lease Source vs Emission Process

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Create/Select Lease

The top portion of the **Lease Operation Emissions Manager** displays the **Lease Sources & Processes** table, which contains information for two types of elements in the database: lease operation sources and their associated processes.

A **Lease Source** is a preconfigured source for a particular type of operation. In OCS AQS, there are eight main types of lease operations sources:

- Installation Support Vessel
- Drilling Rig for Crude Oil Exploration / Production Wells
- Drilling Rig for Natural Gas Exploration / Production Wells
- Self-Propelled Drill Rig - US Flagged (Domestic)
- Self-Propelled Drill Rig - Foreign Flagged
- Well Stimulation Vessel
- Combustion Flare
- Mud Degassing

There are processes associated with each source type, as described in **Error! Reference source not found.** below.

Table 4. Processes created based on operation source type

Operation Type	Process ID	Process Description	SCC
Installation Support Vessel	DIE-M02R-LO	Diesel Engine Where Max HP less than 600	2280002201
Installation Support Vessel	DIE-M03R-LO	Diesel Engine Where Max HP greater than or equal to 600	2280002201
Drilling Rig - Crude Oil	DIE-M03R-DO	Crude Oil Production Well Drilling - Diesel Engine	2280002201
Drilling Rig - Natural Gas	DIE-M03R-DG	Natural Gas Production Well Drilling - Diesel Engine	2280002201
Self-Propelled Drill Rig - US Flagged	C1C2-DRILL-LO	Drilling from C1/C2 Vessels (U.S. Flagged)	2280002201
Self-Propelled Drill Rig - Foreign Flagged	C1C2-DRILL-LO-F	Drilling from C1/C2 Vessels (Foreign Flagged)	2280002201
Well Stimulation Vessel	DIE-M02R-LO	Diesel Engine Where Max HP less than 600	2280002201
Well Stimulation Vessel	DIE-M03R-LO	Diesel Engine Where Max HP greater or equal to 600	2280002201
Combustion Flare	FLA-Flare-LO	Combustion Flare	31000160
Combustion Flare	FLA-Pilot-LO	Combustion Flare - Pilot	31000160
Mud Degassing	MUD-M01-LO	Mud Degassing	31000101

The **Non-Point Lease Operations (NPLO) Process** (also known as **Lease Source Process**) allows you to add an additional activity type not accounted for by the basic source. For example, in a CSV, if you have additional diesel engines operating independent of the main shipboard engines, you can add them to the source using this mechanism.

Each line in the **Lease Sources & Processes** table displays a specific process AND the source to which it belongs, as shown in Figure 101.

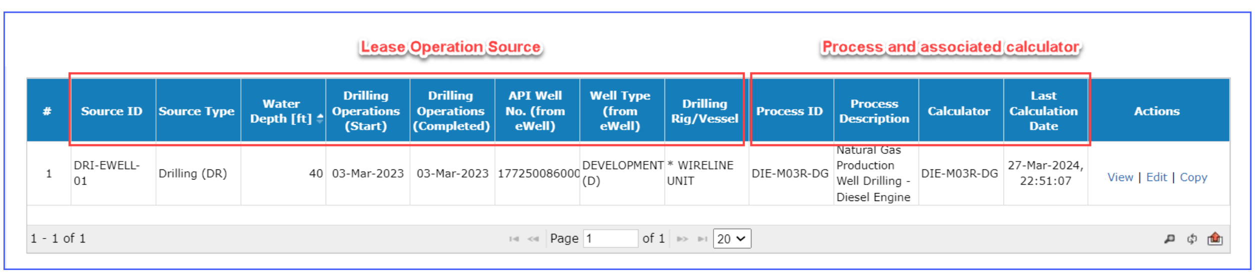


Figure 101. Lease operations and processes

The options in the **Actions** column apply to the lease operation source.

4.1.1.2.2 Add Lease Operation Source

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Select Lease

To add a lease operation source, click **Add Lease Source** above the **Lease Sources & Processes** table.

Follow the steps below to set up your new lease operations source.

1. Select the applicable **Lease Source Template**. The following equipment sources are provided for lease operations in **Error! Reference source not found.**.

Table 5. Sources for lease operations

Source ID	Source Type	Source Description
CSV-PC	Platform Construction (PC)	Installation Operations
DRI-Crude	Drilling (DR)	Drilling Rig for Crude Oil Exploration/Production Wells
DRI-NG	Drilling (DR)	Drilling Rig, Natural Gas Exploration and Production Wells
DRI-SP-DOM	Drilling (DR)	Self Propelled Drill Rig - U.S. Flagged (Domestic)
DRI-SP-4N	Drilling (DR)	Self Propelled Drill Rig - Foreign Flagged
CSV-WS	Well Stimulation Vessel (WS)	Well Stimulation
FLA-LO	Platform Construction (PC)	Combustion Flare
MUD-LO	Platform Construction/Removal (PC)	Mud Degassing

NOTE: Drilling sources should only be added if they were not imported from the eWell database. See Section 4.1.2 on how to review, verify, and update imported leases and lease sources.

2. The following step allows you to specify required information regarding the drilling rig, support vessel, or well stimulation vessel based on the type of operation you selected as shown in Figure 102.
   - For **Drilling Rigs:** In the **Drilling Rig Information** panel, click **[…]** and select a rig from the list of existing ones. The list displays the general configuration and specifications of the rig. More specific information is provided in the **Process** details after the source and associated processes have been created. If the rig you wish to add is not on the list, contact OCS AQS support team and request that it be added.
   - For **Support Vessels:** In the **Construction Support Vessel Information** panel, type in the name of the vessel. There is no list to select from.
   - For **Well Stimulation Vessels**: In the **Construction Support Vessel Information** panel, type in the name of the vessel. There is no list to select from.

If the georeferenced location of the source is unknown, an estimate can be generated by clicking **From Area Block Location** (highlighted in red in Figure 102). This provides the center point of the block the lease is assigned to.

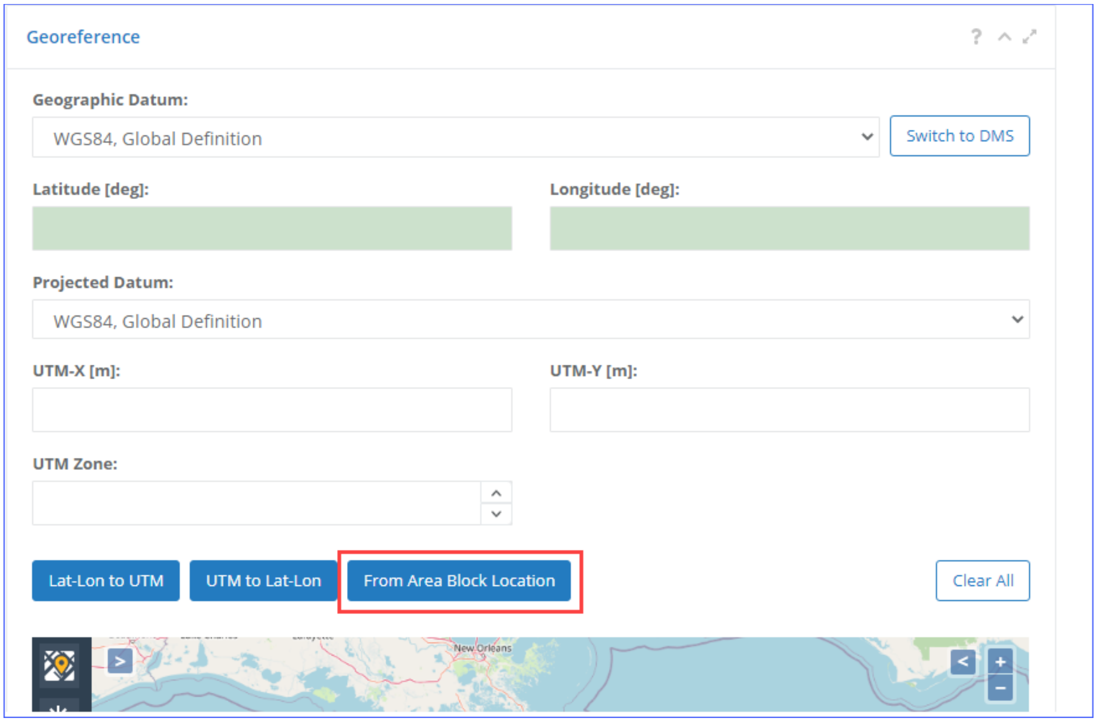


Figure 102. Lease source location

3. Click **Finish** to save changes. OCS AQS will automatically generate processes associated with the operation you selected as shown in **Error! Reference source not found.**.

   IMPORTANT: The processes that are automatically generated are default processes that each operation source type should have. You can add processes as needed (Section 4.1.1.2.3).

4.1.1.2.3 Add Lease Operation Processes

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Select Lease

To **Add** an NPLO process associated with an existing lease operation source, click **Add NPLO Process**, as shown in Figure 103.

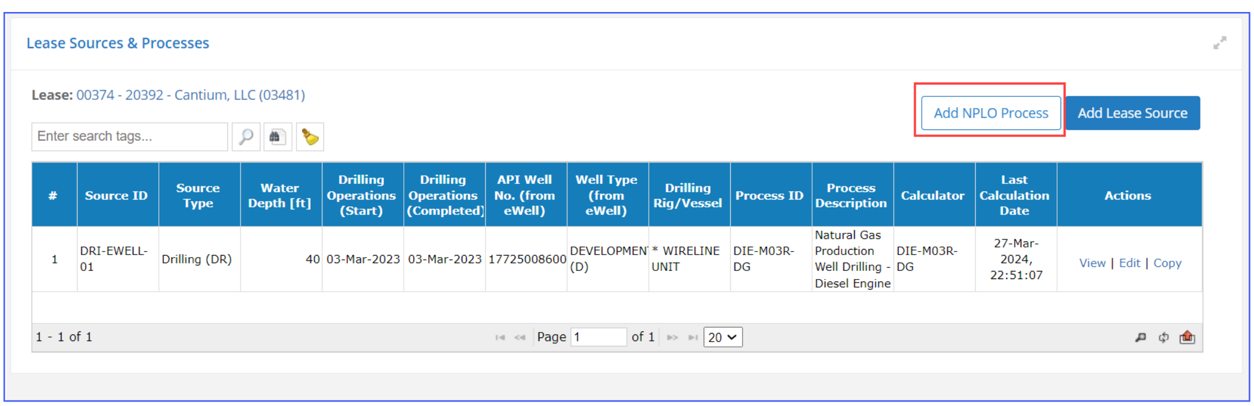


Figure 103. Add NPLO Process button

A one-step wizard (Figure 104) allows you to specify all the information required to create the process:

1. Select the **Source** for which you wish to create the process.
2. From the table of available calculation methods, select the one that will be used to calculate emissions for this process.
3. The **Process ID** will be updated to match the **Name** of the estimation method, and the **Process Description** will be updated to match the **Description** of the same method.
4. Click **Finish**.

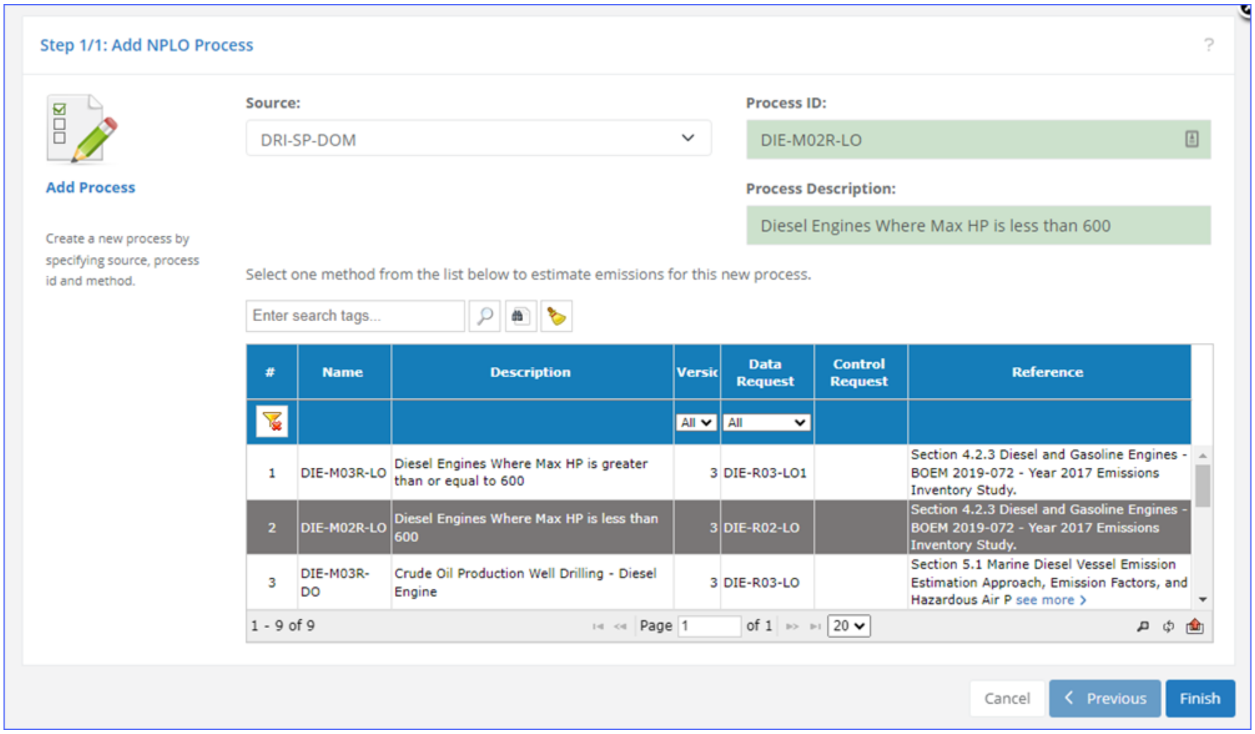


Figure 104. Add lease operation process

Specify the activity data in the **Data Request** tab of the **Calculator Parameters & Requests** panel for the pre-assigned calculators (Section 4.1.1.2.4) and then calculate the emissions (Section 4.1.1.2.5).

4.1.1.2.4 Calculator Parameters & Requests

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Select Lease > Select Lease Source with assigned calculator

To calculate the emissions generated by the lease process, you must first specify the activity data for it. In the **Process** section, the **Calculator Parameters & Requests** panel contains the main functionality of the **Lease Operation Emissions Manager**. It allows you to set the following parameters for each process by period (time between **Drilling Operations (Start)** and **Drilling Operations (Completed)**):

- Select input and physical parameters.
- Enter required calculation parameters in required fields (green boxes) and optional fields (white boxes).
- View emission factors for each pollutant.
- Perform range checks and other QA checks for input parameters.

Each process has different input parameters based on the assigned calculator. For example, the input parameters for a diesel engine will differ from those used in a propelled drill rig process.

Input parameters used for emission calculations and process descriptions are called **Data Requests**. Each field allows annotation and comments with the **QA** button to the right of the field as shown in Figure 105.

A description of lease operation calculator and **Data Request** input fields is provided in **Error! Reference source not found.**.

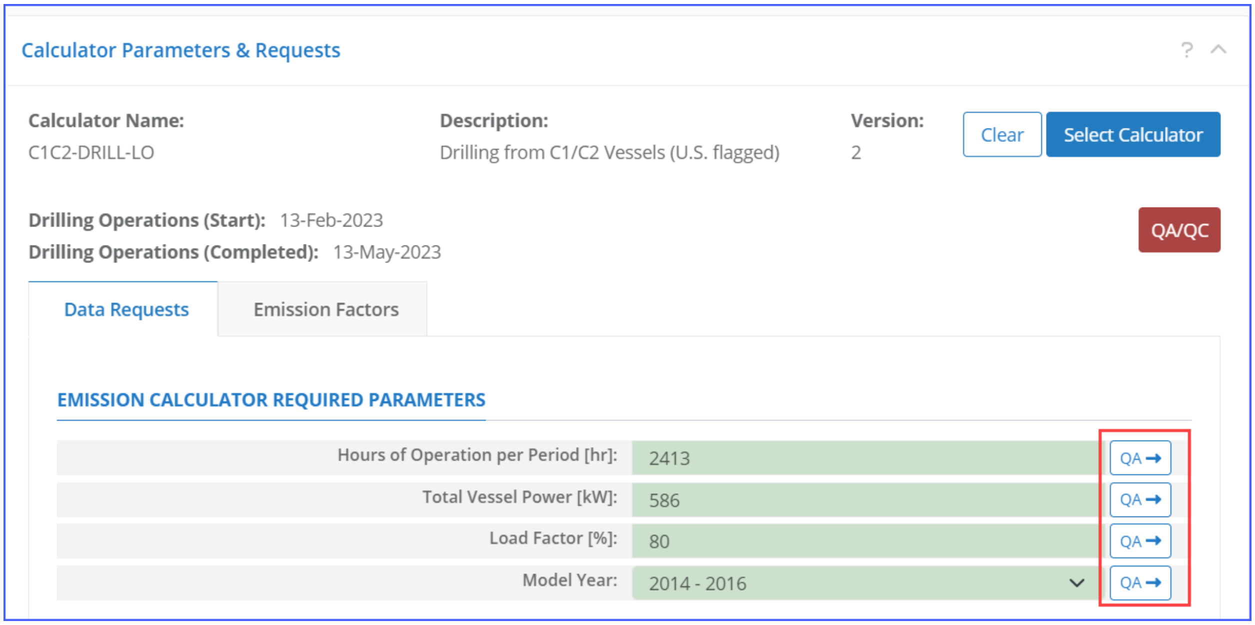


Figure 105. Lease Operations Data Request tab

The following tabs are available:

- **Data Requests** allow input of required and optional data used for emissions calculations (Section 3.2.9.1).
- **Emission Factors** provide engineering parameters to calculate individual pollutant emissions (Section 3.2.9.3).

4.1.1.2.5 Calculate Lease Operation Emissions

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Select Lease> Select Lease Source with Assigned calculator

Emissions can be calculated for the reporting periods (Figure 106) after all required data request fields are filled in. Check completeness and input ranges by clicking on the red **QA/QC** button. If input data is filled and within range expectations, a blue status message will be displayed. Erroneous/incomplete data fields will be highlighted with a red border and a pop-up window will load with the list of errors.

Click **Calculate** (or **Re-Calculate**, if emissions had been previously calculated) when all input parameters are error-free. Depending on the calculator and the number of months in the period, the processing may take several minutes. Calculated emissions will appear in the table under the **Calculate/Re-Calculate** button.

Click **GWP Details** to review the global warming potential standards used to calculate the CO_2e values. For more information on **GWP Details**, see Section 3.2.14.

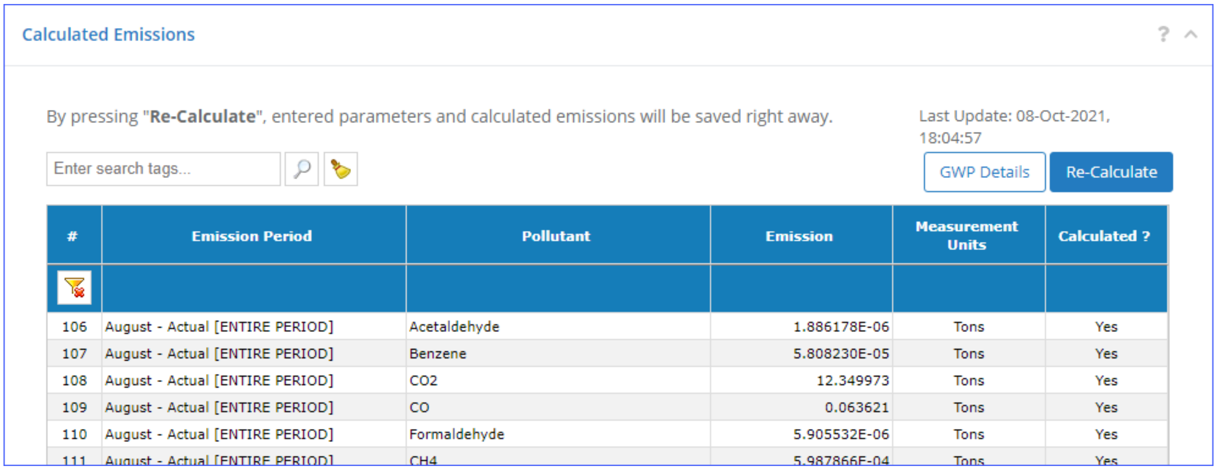


Figure 106. Lease sources calculated emissions

4.1.2 Update Imported Drilling Sources

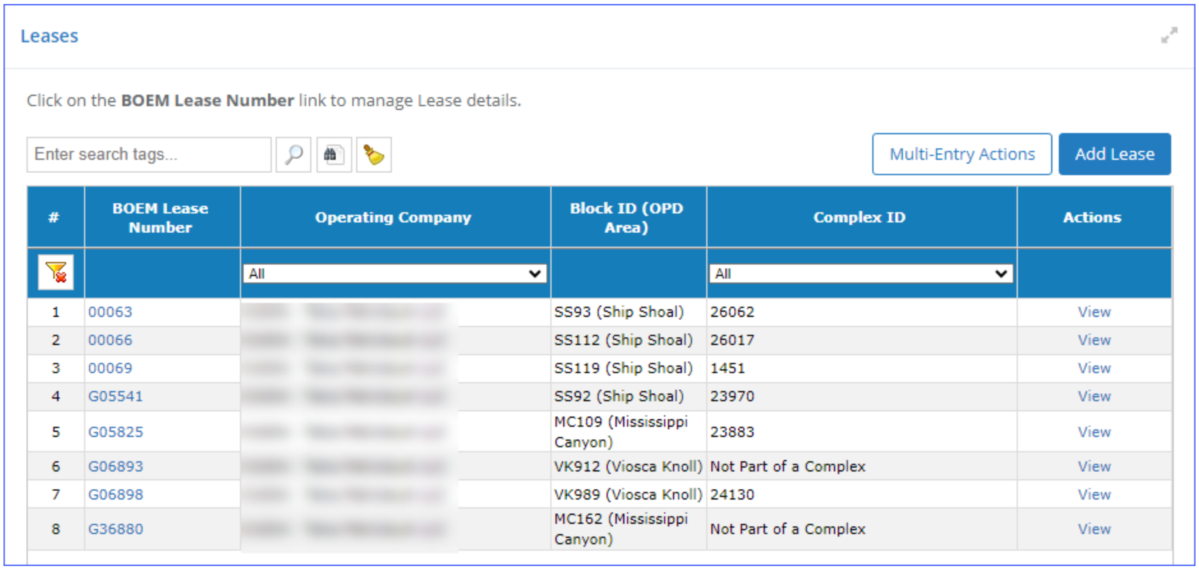
Starting in 2023, the bulk of drilling sources are no longer created by the operators but imported from the BSEE eWell database. Although these lease and source records have been created based on existing drilling data, there may be some discrepancies and gaps in the prepopulated lease and source data that must be corrected. The following steps are needed get the imported drilling lease source ready for submittal once the lease and source information has been verified: select an appropriate calculator, specify activity data, and calculate emissions.

> ***NOTE:*** It is best to review this information before new leases are added.

4.1.2.1 Review and Update Lease Information

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager

When the **Lease Operation Emissions Manager** is first loaded, the list of existing leases is loaded (Figure 107). If this is a new inventory, and no leases have been added yet, all existing leases will have been imported from the BSEE eWell database.



Leases

Click on the **BOEM Lease Number** link to manage Lease details.

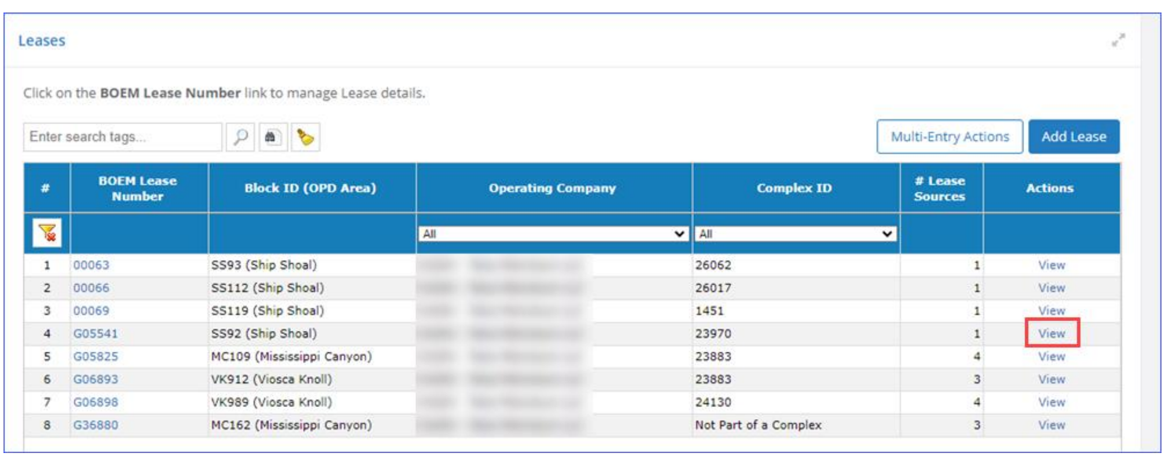
Enter search tags...

Multi-Entry Actions | Add Lease

#	BOEM Lease Number	Operating Company	Block ID (OPD Area)	Complex ID	Actions
		All		All	
1	00063		SS93 (Ship Shoal)	26062	View
2	00066		SS112 (Ship Shoal)	26017	View
3	00069		SS119 (Ship Shoal)	1451	View
4	G05541		SS92 (Ship Shoal)	23970	View
5	G05825		MC109 (Mississippi Canyon)	23883	View
6	G06893		VK912 (Viosca Knoll)	Not Part of a Complex	View
7	G06898		VK989 (Viosca Knoll)	24130	View
8	G36880		MC162 (Mississippi Canyon)	Not Part of a Complex	View

Figure 107. List of imported leases

1. For each lease on the list, verify the completeness and accuracy of the following:
    a. Are there any leases in the list that should not be there?
    b. Are all leases with drilling sources present?
    c. **BOEM Lease Number**
    d. **Block ID (OPD Area)**
    e. **Complex ID**
    f. If **Complex ID** is set to "Not Part of a Complex"—is this correct?
2. If the answer to 1**a** is "yes," please contact OCS AQS Technical Support via ocs.aqs_support@weblakes.com with the details of the leases in question.
3. If the answer to 1**b** is "no," please create the leases manually using the **Add Lease** button.
4. If there are issues with items 3**c** through 3**f**, they can be corrected by editing lease details.
5. To correct errors in lease information, click **View** in the **Actions** column of the lease in question (Figure 108).



Leases

Click on the **BOEM Lease Number** link to manage Lease details.

Enter search tags...

Multi-Entry Actions | Add Lease

#	BOEM Lease Number	Block ID (OPD Area)	Operating Company	Complex ID	# Lease Sources	Actions
			All	All		
1	00063	SS93 (Ship Shoal)		26062	1	View
2	00066	SS112 (Ship Shoal)		26017	1	View
3	00069	SS119 (Ship Shoal)		1451	1	View
4	G05541	SS92 (Ship Shoal)		23970	1	View
5	G05825	MC109 (Mississippi Canyon)		23883	4	View
6	G06893	VK912 (Viosca Knoll)		23883	3	View
7	G06898	VK989 (Viosca Knoll)		24130	4	View
8	G36880	MC162 (Mississippi Canyon)		Not Part of a Complex	3	View

Figure 108. Click view to load the lease

6. In the **Lease Operation Emissions Manager Details** screen, click the **Lease** link above the table of **Lease Sources & Processes** to load the lease details (Figure 109).

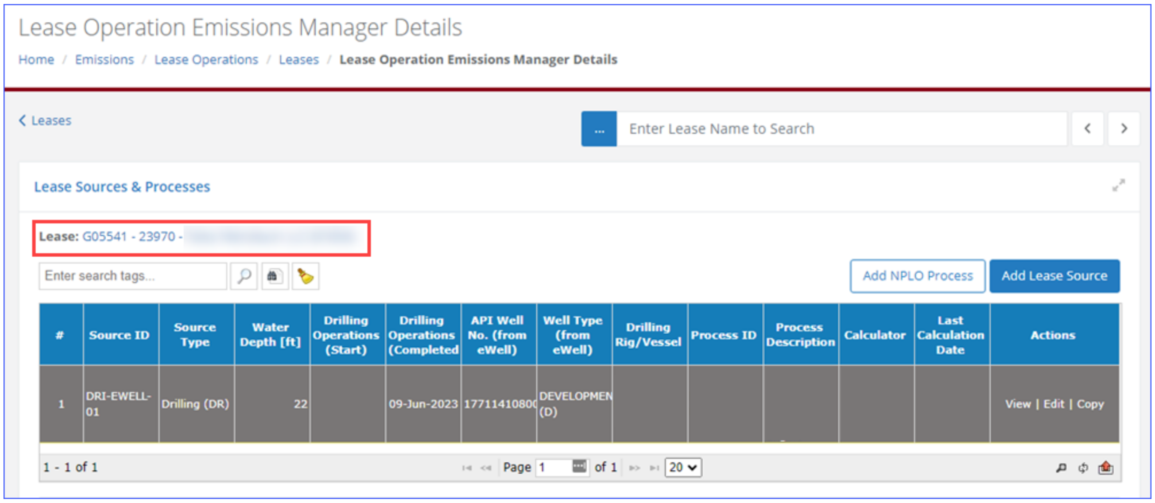


Figure 109. Select the lease to view lease details

7. Click the **Edit** button to edit lease details (Figure 110).

Figure 110. Click edit to edit lease details

8. Edit the lease information and click **Save** to update the record (Figure 111).

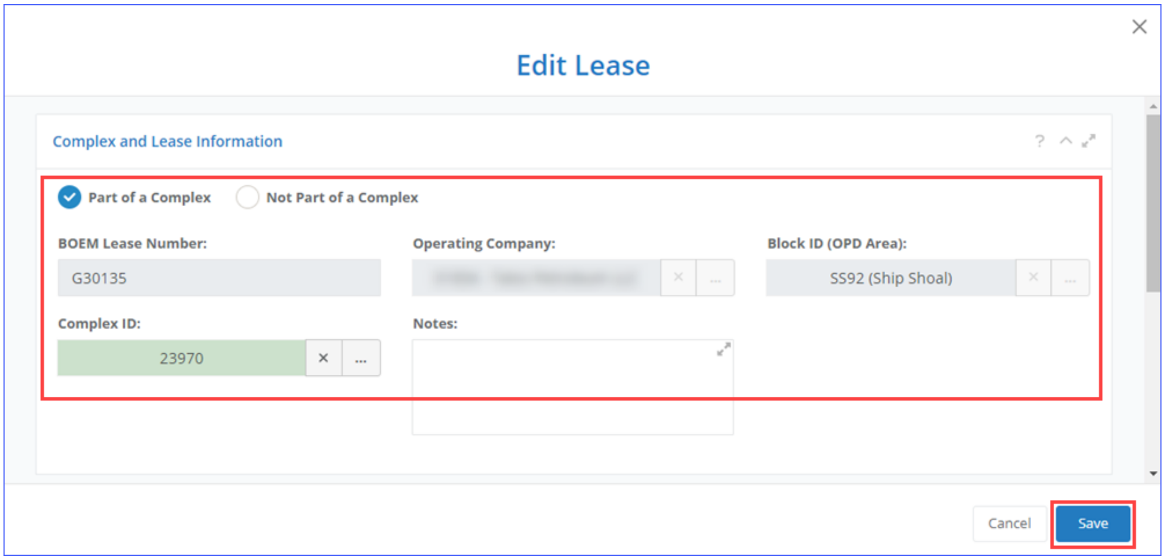


Figure 111. Edit lease details and save

Once the information for the lease has been verified, the same must be done for the associated drilling sources (see next section).

4.1.2.2 Review and Update Drilling Sources

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager

Once lease information has been verified, the lease sources need to be reviewed.

To verify the completeness and accuracy of a drilling source and update it accordingly:

1. In the list of **Leases**, select a lease with imported drilling sources (click the **BOEM Lease Number** link or **View** in the **Actions** column). If you have already selected a lease, move to step 2.

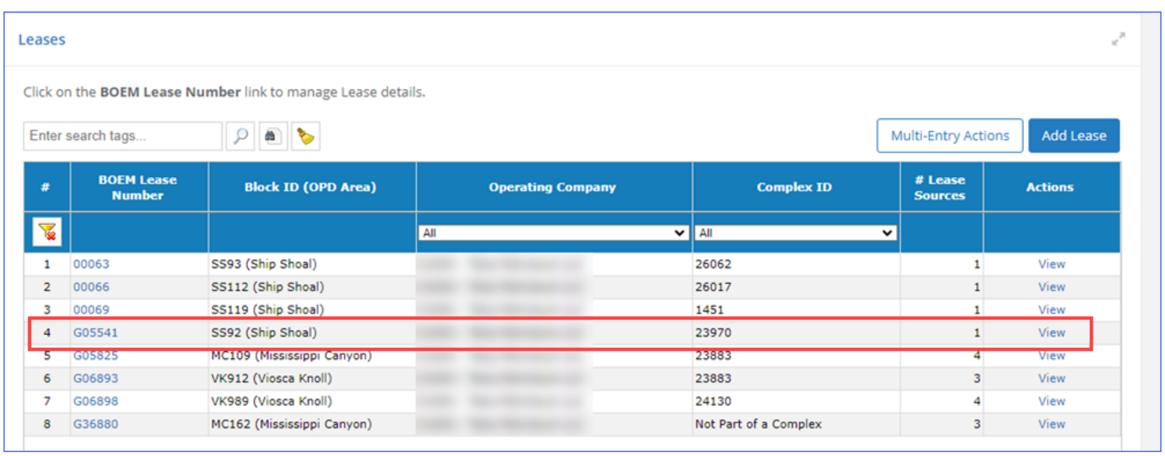


Figure 112. Select lease to review

2. In the **Lease Sources & Processes** table, verify the completeness and accuracy of the following:

   a. All drilling sources are associated with the currently selected lease and operating company
   b. All drilling lease sources are present

3. If the answer to 2**a** is "no," please refer to Section 4.1.2.6 for instructions on how to have this source removed.
4. If the answer to 2**b** is "no," please refer to Section 4.1.1.2.2 for instructions on how to add a new lease source.
5. Click **Edit** in the **Actions** column of each imported source (Figure 113).

   NOTE: All sources that were imported from the eWell database have the **Source ID** as **DRI-EWELL-XX**, where "**XX**" is a sequentially incremented counter based on the number of sources imported for a specific lease (e.g., DRI-EWELL-01, DRI-EWELL-02)

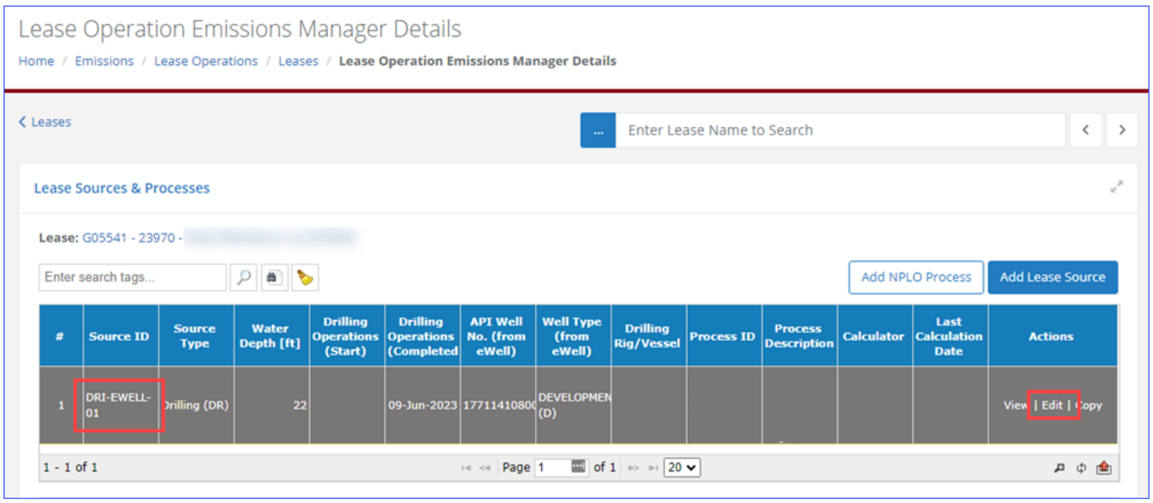


Figure 113. Edit lease source

6. Review, verify, and update the following information (Figure 114):

   a. **Water Depth (ft)**
   b. **Drilling Operations (Start)**
   c. **Drilling Operations (Completed)**
   d. **Reporting Status** (if anything but **Subject to Reporting**, make sure to specify the **Reporting Status Justification –** see Section 4.1.2.6 for more details)
   e. **Drilling Rig**

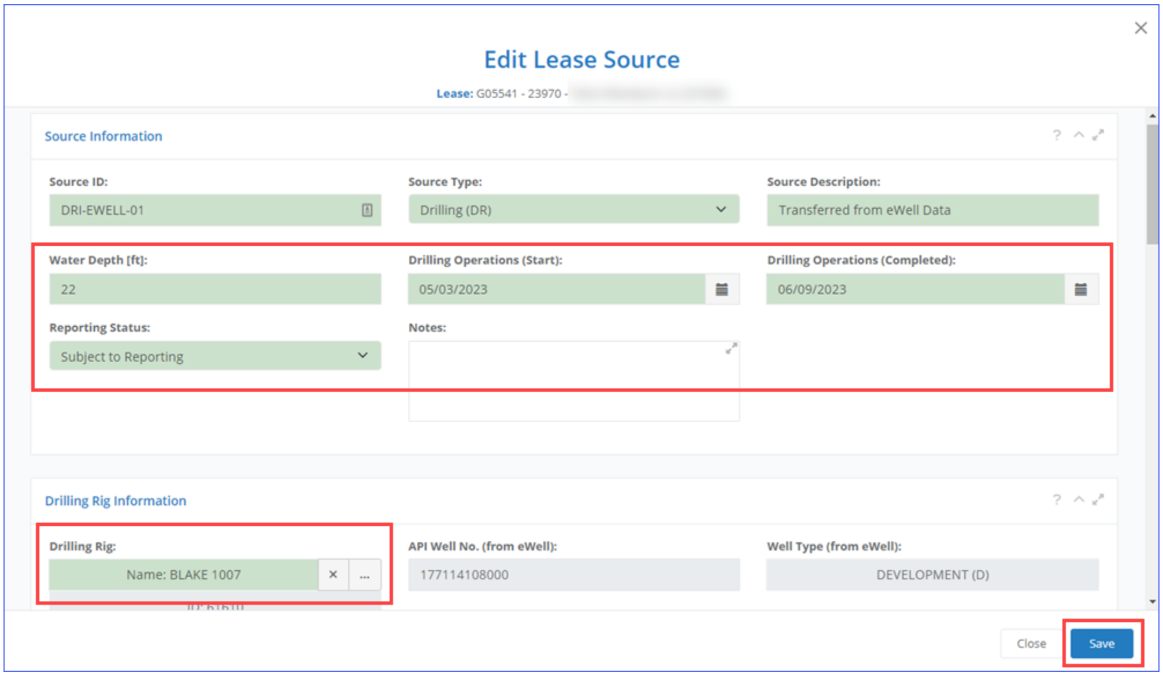


Figure 114. Verify lease source information

7. Click **Save** to update the lease source record.

Once the source information has been updated, the relevant calculator can be selected.

> ***NOTE:*** Any non-drilling sources that are covered by the imported lease will need to be manually created using the **Add Lease Source** button under that lease, as long as the **BOEM Lease Number**, **Block ID**, and **Complex ID** match. DO NOT create a new lease unless those parameters are different. See Section 4.1.1.2.2 for more information on how to create a new lease source.

4.1.2.3 Select the Emissions Calculator

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Select Lease

To be able to specify the activity data and calculate emissions generated by the source, an appropriate calculator must be selected.

To specify the emissions calculator associated with the drilling source:

1. Highlight the drilling source/process in the **Lease Sources & Processes** table (Figure 115). Note that the **Process ID**, **Process Description**, and **Calculator** fields are empty.

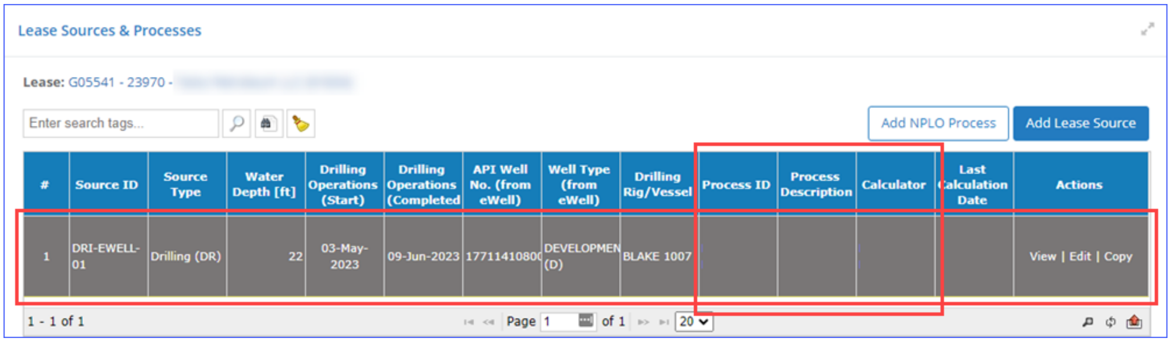


Figure 115. Select lease without a calculator

2. Click the **Select Calculator** button in the **Calculator Parameters & Requests** panel (Figure 116).

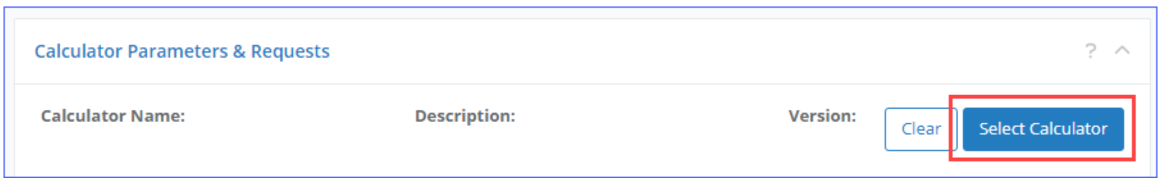


Figure 116. Click Select Calculator button

3. Type “DRI” in the **Search** bar to filter the list to only display drilling calculators (Figure 117).

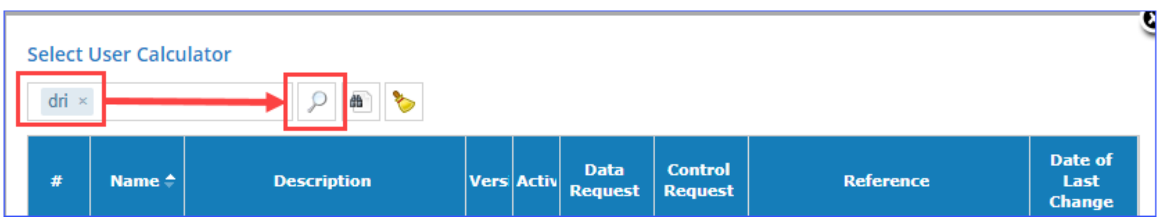


Figure 117. Use search to locate calculator

4. Select the relevant calculator and click **Save** to apply it to the drilling process (Figure 118).

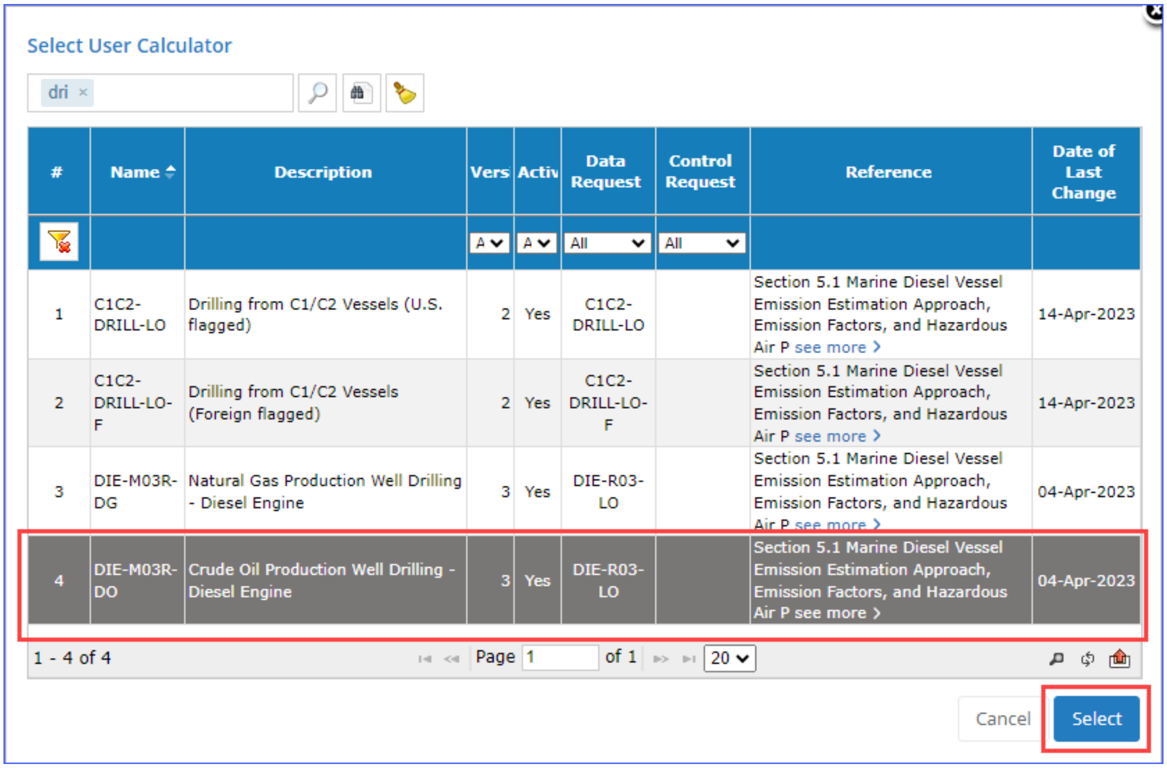


Figure 118. Select calculator

Note that the selected calculator is now displayed in the **Calculator Parameters & Requests**. The **Process ID**, **Process Description**, and **Calculator** fields have also been filled in the source/process record in the **Lease Sources & Processes** table, however you <u>must refresh the page</u> to see this (Figure 119).

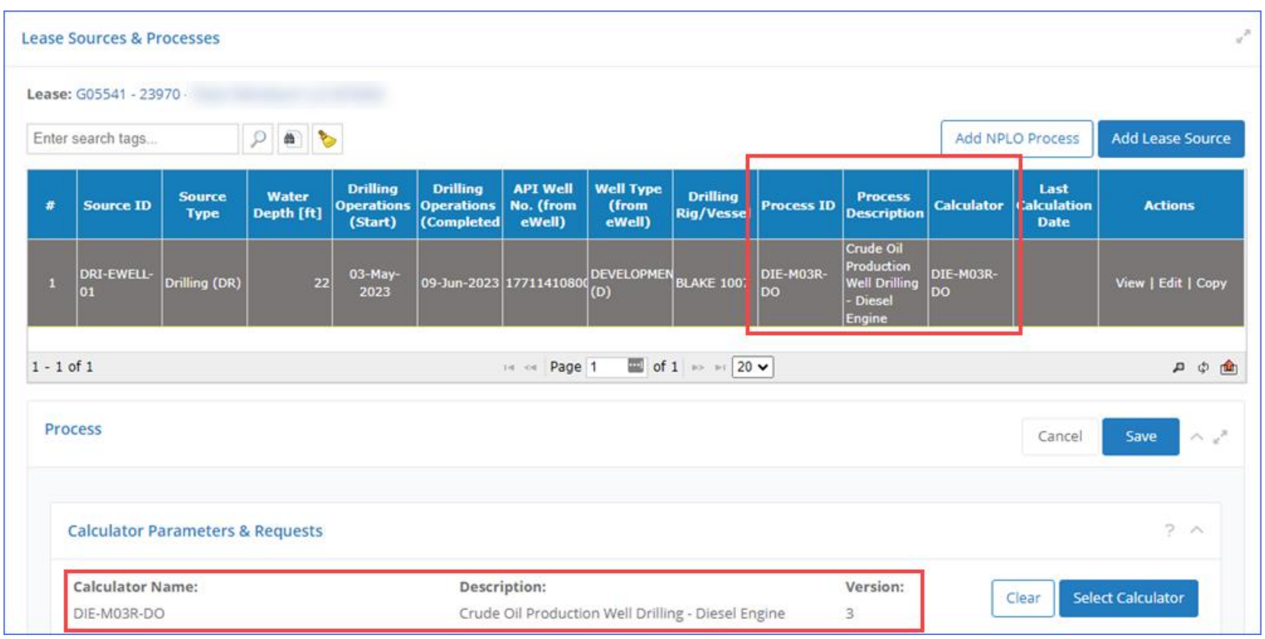


Figure 119. Verify calculator has been selected

Once the calculator has been specified, the activity data fields under the **Data Request** tab become available and can be filled.

4.1.2.4 Enter Activity Data

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Select Lease > Select Source with assigned calculator

For the emissions generated by the lease source to be calculated, the activity data for the source must be specified for the assigned calculator (Section 4.1.2.3).

To specify the activity data:

1. Verify that the **Drilling Operations (Start)** and **Drilling Operations (Completed)** dates are present and match the **Lease Sources & Processes** table (Figure 120).

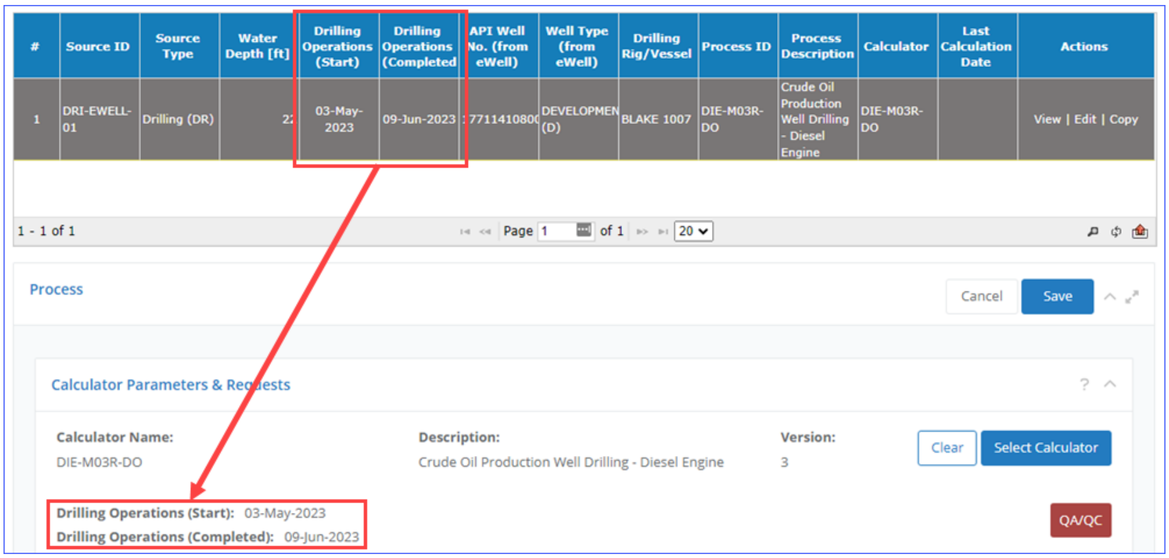


Figure 120. Verify lease period start and end dates

2. Enter the activity data parameters using the fields available under the **Data Request** tab (Figure 121).

   NOTE: Moving the mouse pointer over a data field will display a hint with the range of acceptable values. If you enter a value that is outside this range, click the **QA** button beside the field and enter the reason why an out-of-range value was used.

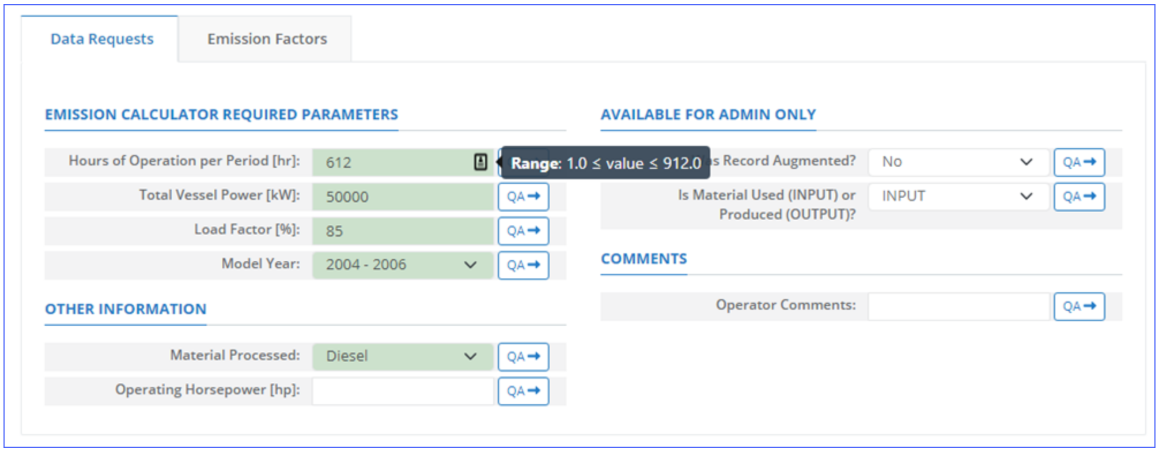


Figure 121. Enter lease source activity data

NOTE: The number and types of activity data fields will depend on the selected calculator.

Once the activity data has been specified, the emissions produced by the source during the lease period can be calculated.

4.1.2.5 Calculate Lease Source Emissions

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Select Lease > Select Source with assigned calculator and complete activity data

To be able to submit a lease source, the emissions for all sources within that lease must be calculated. To calculate emissions, scroll down to the **Calculated Emissions** panel and click **Calculate** (Figure 122).

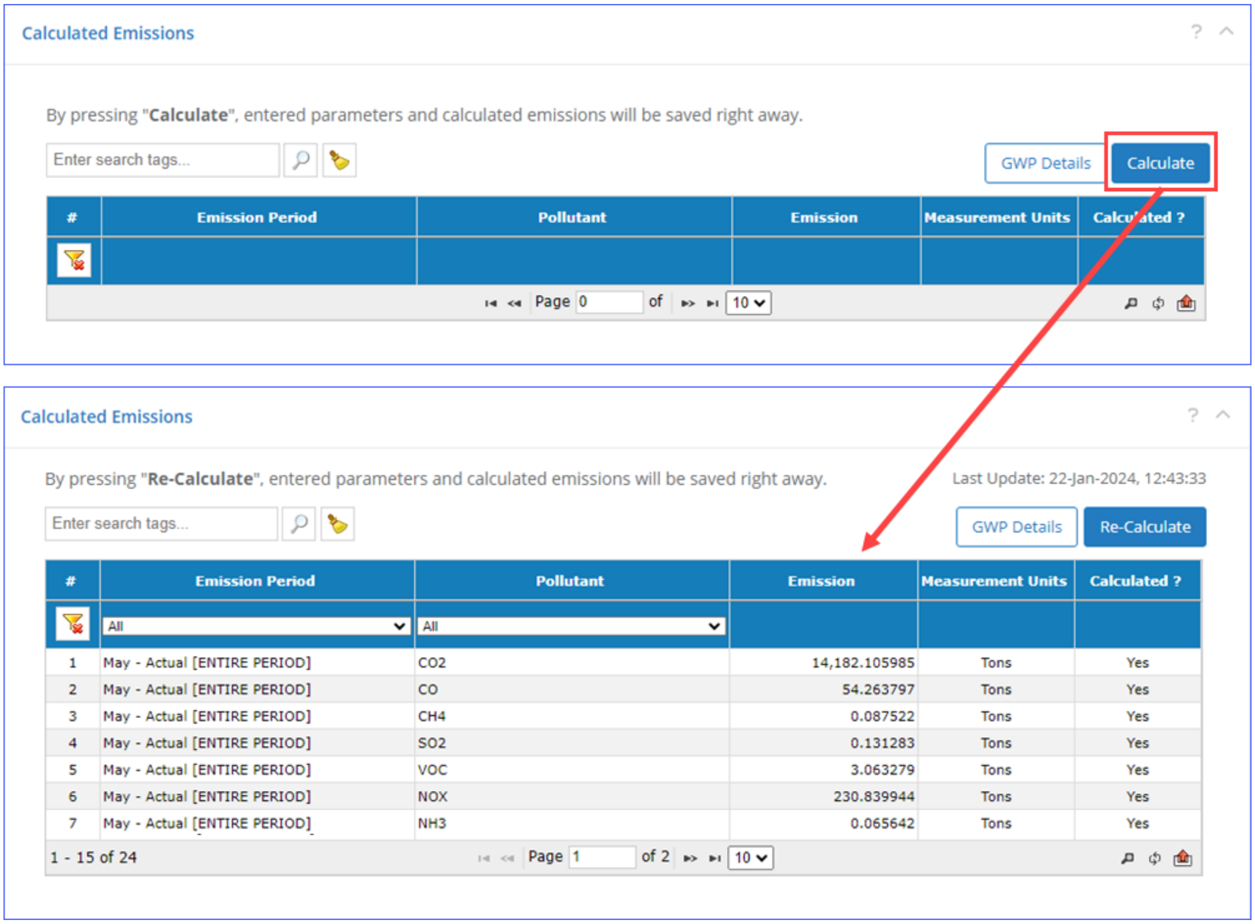


Figure 122. Calculate lease source emissions

Note that the **Last Calculation Date** field of the source record in the **Lease Sources & Processes** has also been filled (Figure 123).

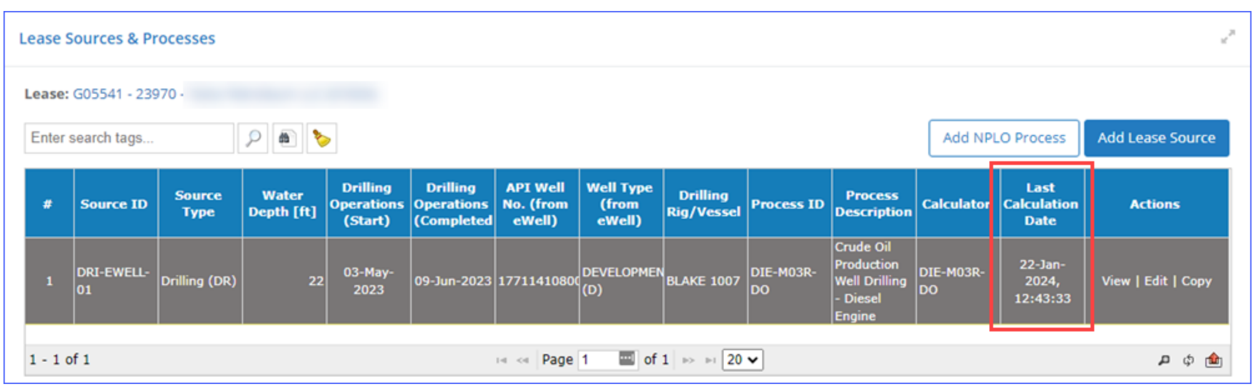


Figure 123. Verify last calculation date

The procedure described in Section 4.1.2 must be performed for every lease and drilling source imported using the BSEE eWell data.

4.1.2.6 What To Do If You See a Lease Source That Does Not Belong to Your Operating Company

Pathway: Emissions > Lease Operations > Lease Operation Emissions Manager > Select Lease

If you find a lease source that does not belong to your operating company, please do the following <u>for each source</u>:

1. Click **Edit** for the lease source in the **Lease Sources & Processes** table to load lease source details in edit mode (Figure 124).

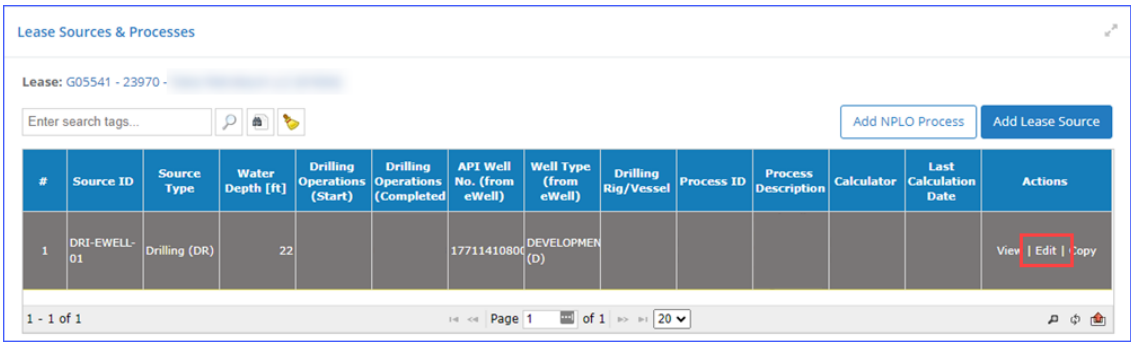


Figure 124. Report unknown lease source - edit source

2. Under **Reporting Status** select "Unrecognized Lease Source" (Figure 125).

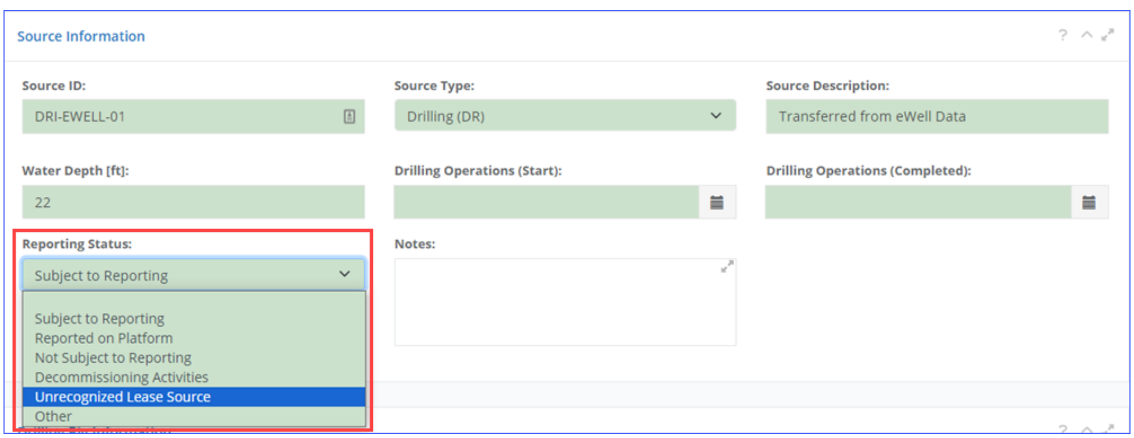


Figure 125. Report unknown lease source - set reporting status

3. Under **Reporting Status Justification** enter any relevant details regarding the lease source (Figure 126).

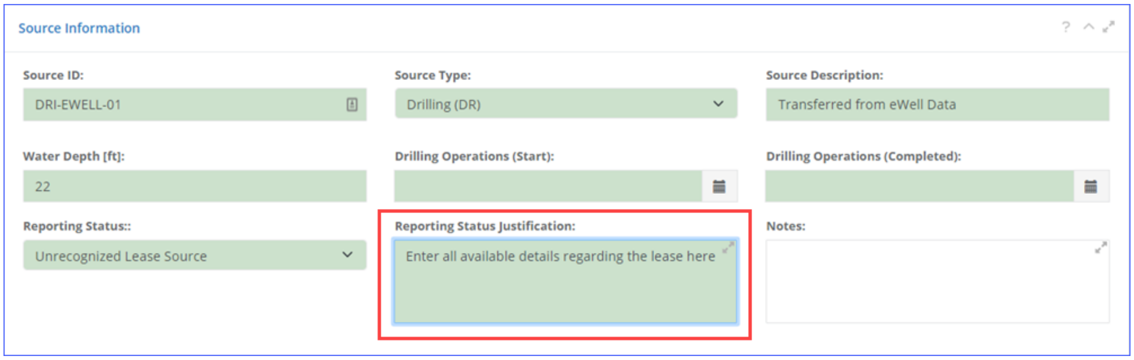


Figure 126. Report unknown lease source - enter justification

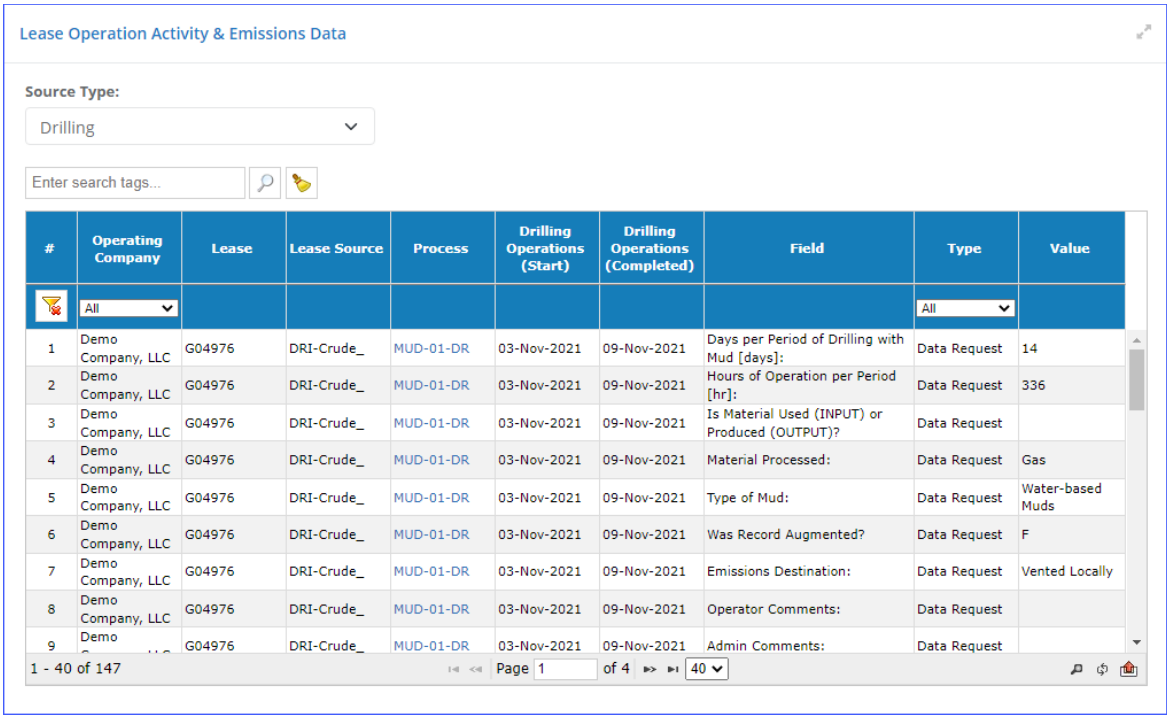
4. Contact OCS AQS Technical Support via ocs.aqs_support@weblakes.com with the details of the lease source in question.

   NOTE: While the **Reporting Status** and **Reporting Status Justification** must be specified for each individual source, the technical support email should include all unrecognized sources (i.e., you do not need to write a separate email for each unrecognized source).

4.2 Review Lease Operation Activity Data

Pathway: Emissions > Lease Operations > Review Lease Operation Activity data

Section 4.1 demonstrated how to enter the activity data for the lease operations using the **Lease Operation Emissions Manager**. The **Review Lease Operation Activity Data** allows you to review the entered data.



#	Operating Company	Lease	Lease Source	Process	Drilling Operations (Start)	Drilling Operations (Completed)	Field	Type	Value
1	Demo Company, LLC	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Days per Period of Drilling with Mud [days]:	Data Request	14
2	Demo Company, LLC	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Hours of Operation per Period [hr]:	Data Request	336
3	Demo Company, LLC	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Is Material Used (INPUT) or Produced (OUTPUT)?	Data Request	
4	Demo Company, LLC	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Material Processed:	Data Request	Gas
5	Demo Company, LLC	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Type of Mud:	Data Request	Water-based Muds
6	Demo Company, LLC	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Was Record Augmented?	Data Request	F
7	Demo Company, LLC	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Emissions Destination:	Data Request	Vented Locally
8	Demo Company, LLC	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Operator Comments:	Data Request	
9	Demo	G04976	DRI-Crude_	MUD-01-DR	03-Nov-2021	09-Nov-2021	Admin Comments:	Data Request	

Figure 127. Review Lease Operations Activity tool

The **Source Type** drop-down box above the table allows you to select the type of the source for which you wish to review data. Only one source type can be selected at a time.

Once you have selected the source type, the activity data for all processes of that type will be displayed in the table.

If any issues are detected, clicking the process ID link in the **Process** column will open the details of that process in **Lease Operations Activity Manager** in a new tab, allowing you to make changes.

5 Emissions: Tools

The **Tools** section of the **Emissions** module provides a number of different tools that help manage emission sources. Figure 128 shows the options available in this section.

Figure 128. Other emissions module functions

5.1 Facility Activity Data Import/Export

Pathway: Emissions > Tools

While you can import and export activity data for a specific emission unit directly in **AEM** (Section 3.2.10.1), you can also perform a batch import or export of activity data for all processes for multiple existing facilities.

To export activity data:

1. Click the **Facility Activity Data Import/Export** navicon.
2. Click **Import/Export Facility Activity Data**.
3. Check the **Export** option and click **Next**.
4. Check the box for each facility for which you wish to export activity data. The activity data for <u>all</u> processes at those facilities will be included.
5. Click **Finish** to complete the wizard and generate the data file.
6. You will be taken to the **Job Queue – Activity Data** page, which shows the progress of your export, as shown on Figure 129. When the export is completed, the **Status** of the export is updated to **Complete**, and the generated files can be downloaded.

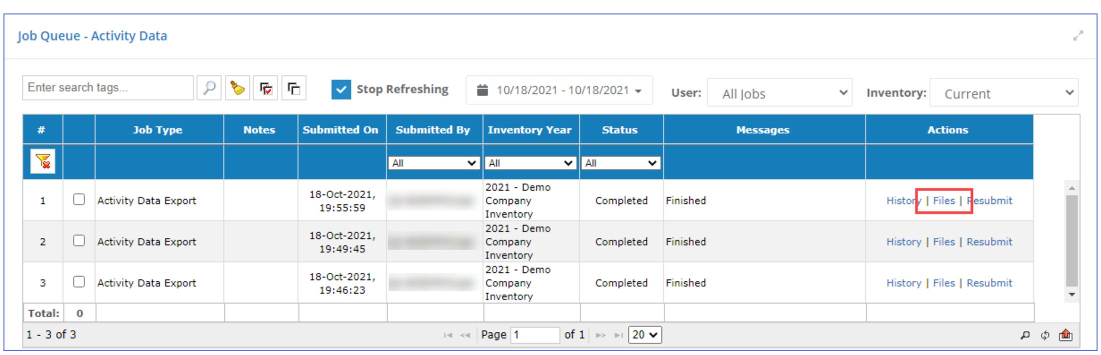


Figure 129. Facility activity data queue

7. In the **Actions** column of the table, click **Files** to view the exported file(s).

8. The **Job Files** dialog is shown. Click **Download** as shown in Figure 130 to save the file to your computer.

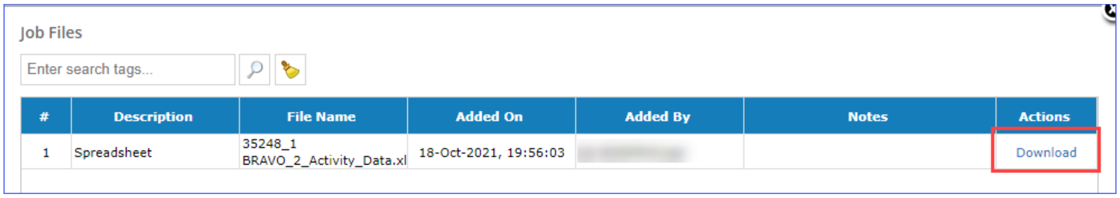


Figure 130. Activity data download link

After the file is on your hard drive, you can open it and edit the values as needed. When finished, you can import the file to update the activity data.

To import activity data:

1. Click the **Facility Activity Data Import/Export** navicon.
2. Check the **Import** option and click **Next**.
3. Click **Select file**, then navigate to and select the file that contains activity data.
4. If multiple files are being imported, repeat step 3 until all files have been specified.
5. Click **Finish** to complete the wizard and upload the activity data.

5.2 Complex e-GGRT Export

Pathway: Emissions > Tools > Complex e-GGRT Export

The USEPA's electronic Greenhouse Gas Reporting Tool (e-GGRT) supports complex and supplier reporting for the USEPA Greenhouse Gas Reporting Program (GHGRP). OCS AQS contains a tool capable of generating an e-GGRT file in the appropriate XML format for submission to USEPA for a single any complex that exceeds 25,000 metric tons per year of CO_2e combined emissions from all facilities in the complex.

> ***IMPORTANT:*** An e-GGRT report can <u>only</u> be generated if <u>all sources</u> in the complex have passed the submittal QA/QC (Section 2.2.1).

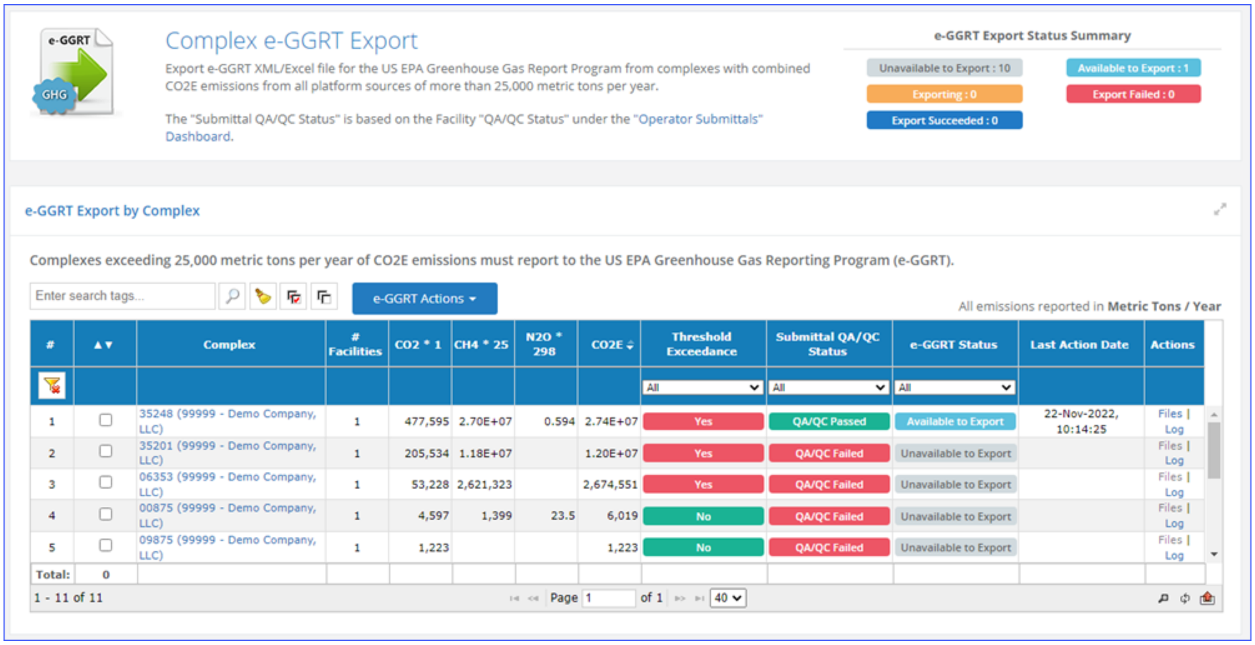


Figure 131. Complex e-GGRT export

The summary above the table displays the number of the e-GGRT jobs in each status.

- **Unavailable to Export:** The e-GGRT for the complex cannot be exported at this moment. This is likely due to the fact that the QA/QC has not been run or has failed.
- **Exporting:** This is a temporary status while the export job is being processed.
- **Export Succeeded:** Export job has completed successfully, and you can download the generated files.
- **Available to Export:** The complex data is ready for export.
- **Export Failed:** Export job did not complete successfully. This is most likely due to an issue with the export process; please try again in a few minutes. If the export continues to fail, contact the OCS AQS support team.

The table displays the following information for each complex in the inventory:

- **Complex:** Shows the Complex ID. Clicking the link in this column will open the QA/QC status breakdown for the facilities at this complex. All facilities at the complex must pass the QA/QC check before e-GGRT can be exported.
- **# Facilities:** Number of facilities at the complex.
- **CO2 * 1:** CO_2e contribution from CO_2 emissions from all sources at the complex.
- **CH4 * 25:** CO_2e contribution from methane emissions from all sources at the complex.
- **N2O * 298:** CO_2e contribution from nitrous oxide emissions from all sources at the complex.
- **CO2E:** Combined CO_2e for the complex.
- **Threshold Exceedance:** Flag that indicates if the complex has generated over the 25,000 metric tons of CO_2e during the inventory year.
- **Submittal QA/QC Status:** Flag indicating if <u>all</u> facilities at the complex have passed the submittal QA/QC check. If at least one facility has failed the check or the check has not been run, the status will be set to **QA/QC Failed**.
- **e-GGRT Status:** Status of the e-GGRT export job (refer to the list above).
- **Last Action Date:** Last time an e-GGRT export job was started.
- **Actions:**

- **Files:** Click to load the list of files ready to download.
- **Log:** Click to load the list of previous export jobs. This list shows when the export was previously run, the status of the previous export jobs, and the user who ran it.

To export a single or multiple e-GGRT file(s), follow the steps below:

1. Click **Complex e-GGRT Export** navicon
2. Check the box for each complex for which you wish to export e-GGRT.
3. Click **e-GGRT Actions** button above the table and select **Generate Report**.
4. The dialog that loads displays a list of all selected complexes. If you selected any invalid complexes, these complexes will be marked as **Unavailable to Export** in the **Validation Message** column. The e-GGRT for these complexes will not be exported.
5. Click **Finish**.
6. Once the **e-GGRT Status** reads **Export Succeeded**, click the **Files** link in the **Actions** column.
7. Click the link in the **Download** column for the most recent archive.

The downloaded file is in a .zip format with an Excel spreadsheet that contains a summary of the export report and an XML file that that can be submitted to the USEPA (Figure 132).

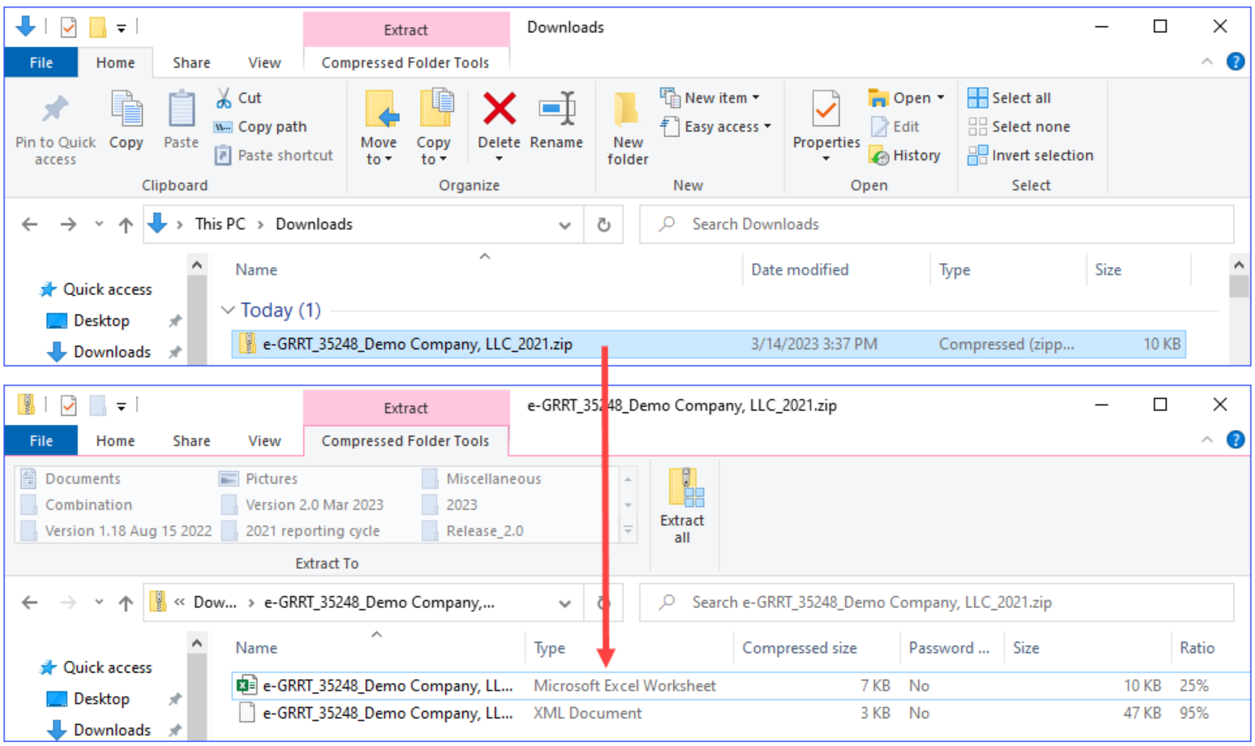


Figure 132. Generated e-GGRT .zip file and its contents

The Excel file is made up of three major parts (Figure 133):

- **e-GGRT QA Report:** List of any issues encountered when generating the report.
- **Complex ID:** Summary of the relative contributions from CO_2, CH_4, and N_2O to the overall calculated CO_2e emissions and operating hours broken down by equipment type.

  IMPORTANT: There may be a discrepancy between the total emissions displayed in the OCS AQS table (Figure 131) and the Excel worksheet. This happens because the OCS AQS table displays the total emissions from all emission units in the complex, whereas the complex worksheet displays only emissions from the emission units that are required to be exported to the e-GGRT report.

- **Facility ID:** All subsequent worksheets represent the emission contributions by each facility in the complex.

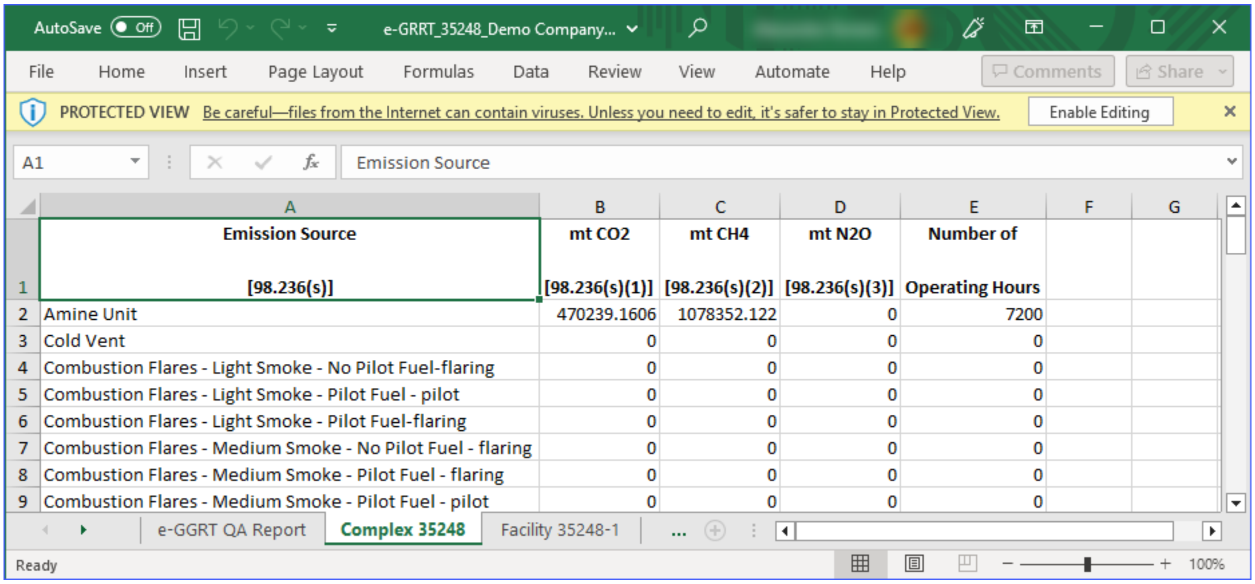


Figure 133. e-GGRT Excel summary file

5.3 Facility Metadata Export

Pathway: Emissions > Tools > Facility Metadata Export

OCS AQS contains a tool capable of generating an XML file containing metadata for emissions inventory submissions to BOEM.

> ***IMPORTANT:*** The facility metadata report is required for submittal and will be included with the QA/QC files during the submittal procedure.

To export a metadata report for a particular facility:

1. Click the **Facility Metadata Export** navicon.
2. In the **Summary List – Facility Metadata Export** screen (Figure 134), click **Export Facility Metadata**.

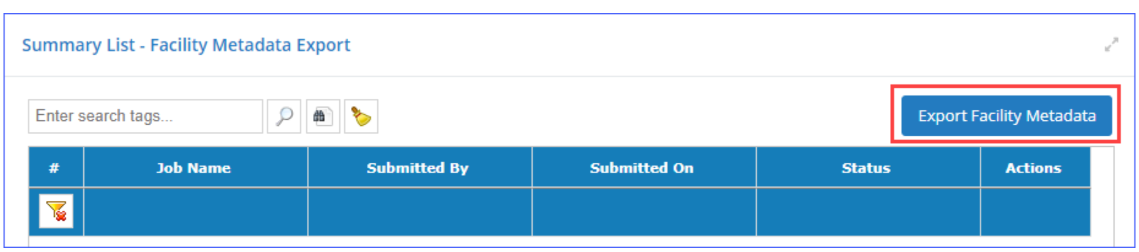


Figure 134. Metadata report page

3. Check the box for each facility (or facilities) for which you wish to generate a report. Individual reports will be generated for each facility.
4. Click **Next**.

5. In the **Summary** page, confirm that the correct number of facilities is displayed and click **Finish** to complete the wizard and begin export.
6. You will be taken to the **Job Queue – Facility Metadata Export,** which shows the progress of your export, as shown in Figure 135. When the export is completed, the **Status** of the export is updated to **Completed**, and the generated files can be downloaded.

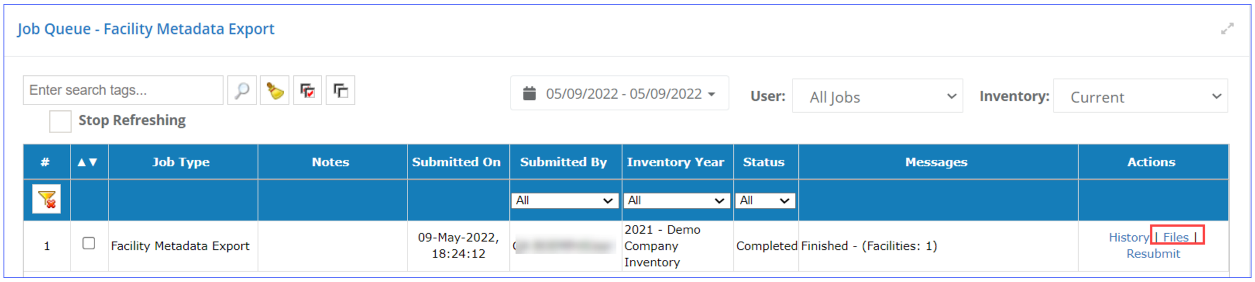


Figure 135. Metadata export queue

7. In the **Actions** column of the table, you can click **Files** to view the exported file(s).
8. Click **Download** in the Job Queue to save the file to your computer.

The downloaded file is in a .zip format with an Excel spreadsheet that contains an export report and individual XML files for each facility.

6 Documents

The **Documents** module allows you to access supplementary documentation, as well as any files uploaded into, downloaded from, or generated by the application.

6.1 Documents

Pathway: Documents > General

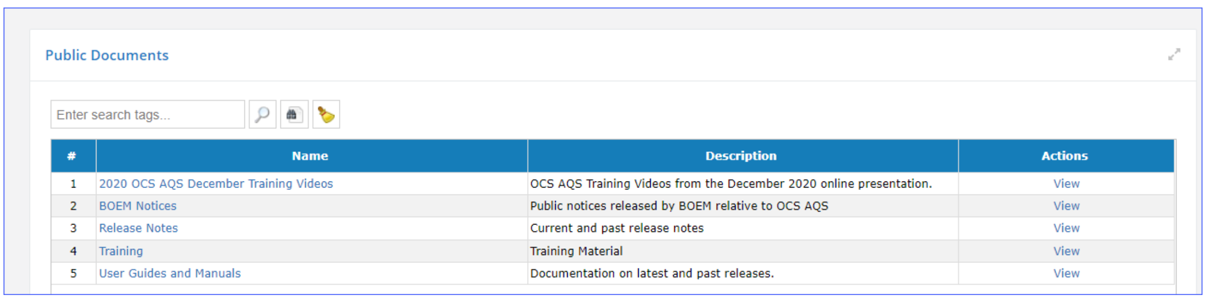
Click the **Documents** navicon to access the following features available in this section:

- **Public Documents:** Supplementary documentation uploaded by BOEM, such as the user guide. As an operator, you will not be able to manage files in this section, only view/download them.
- **My Documents:** Files imported into, exported from, or generated by the system.

6.1.1 Public Documents

Pathway: Documents > General > Documents > Public Documents

On the **Public Documents** page, you will see a list of available supporting documentation (Figure 136).

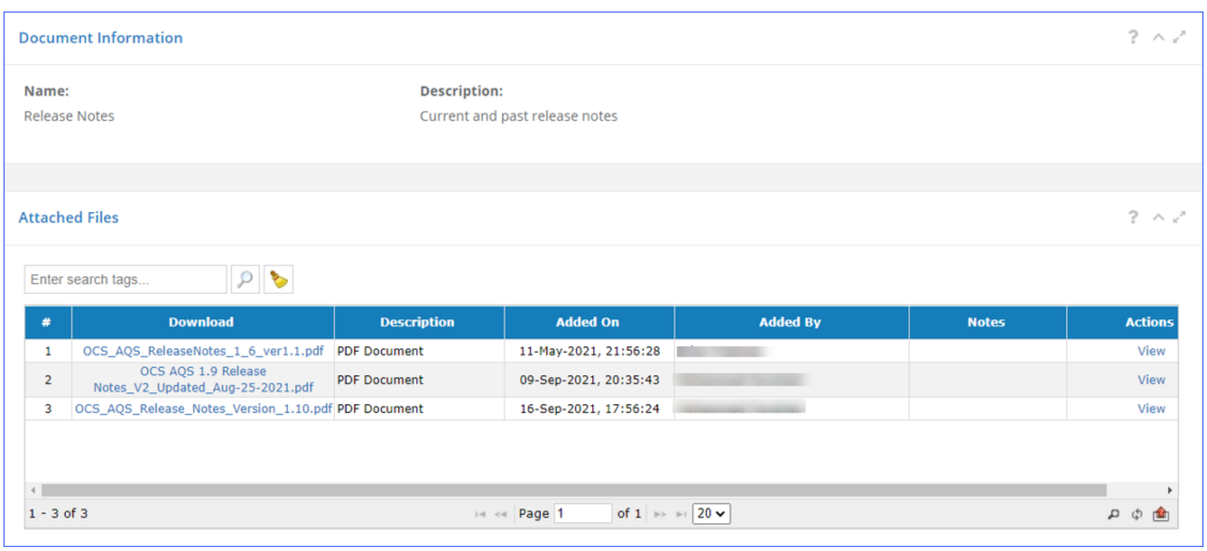

Public Documents

Enter search tags...

#	Name	Description	Actions
1	2020 OCS AQS December Training Videos	OCS AQS Training Videos from the December 2020 online presentation.	View
2	BOEM Notices	Public notices released by BOEM relative to OCS AQS	View
3	Release Notes	Current and past release notes	View
4	Training	Training Material	View
5	User Guides and Manuals	Documentation on latest and past releases.	View

Figure 136. Public documents list

To view a document in the **Public Documents** section, click **View** in the **Actions** column (Figure 137).


Document Information

Name:
Release Notes

Description:
Current and past release notes

Attached Files

Enter search tags...

#	Download	Description	Added On	Added By	Notes	Actions
1	OCS_AQS_ReleaseNotes_1_6_ver1.1.pdf	PDF Document	11-May-2021, 21:56:28	[redacted]		View
2	OCS AQS 1.9 Release Notes_V2_Updated_Aug-25-2021.pdf	PDF Document	09-Sep-2021, 20:35:43	[redacted]		View
3	OCS_AQS_Release_Notes_Version_1.10.pdf	PDF Document	16-Sep-2021, 17:56:24	[redacted]		View

1 - 3 of 3 Page 1 of 1 20

Figure 137. Documents in a set

Click on the link in the **Download** column to access the individual documents within the group. In some cases, there may be only one document in the group.

The PDF files will be loaded into a viewer. Use the toolbar above the document to navigate between the pages. To download the document, select the download icon in the document viewer as shown in Figure 138.

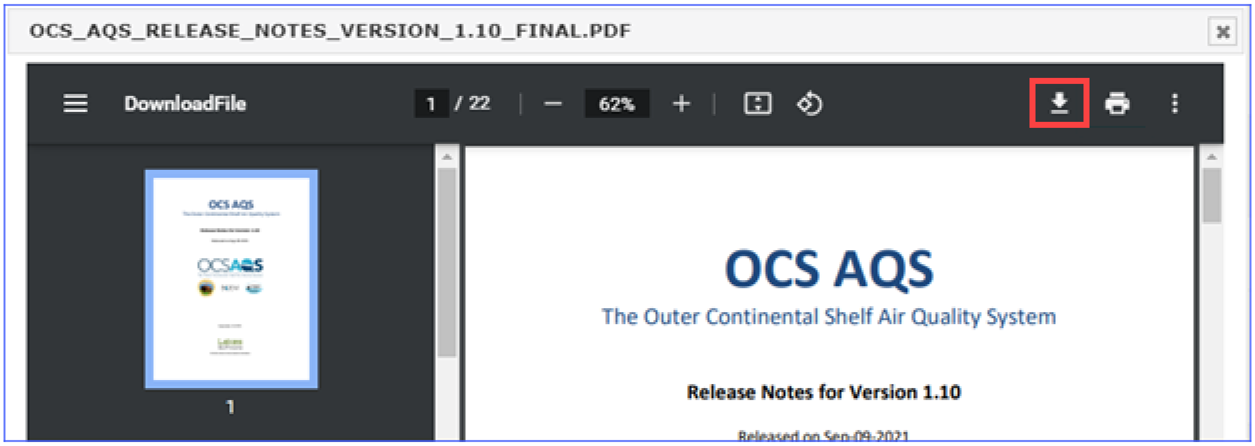


Figure 138. Document viewer

6.1.2 My Documents

Pathway: Documents > General > Documents > My Documents

OCS AQS keeps copies of all files imported, exported, and generated by the system. These files can be downloaded and reviewed at any time by going to the **My Documents** section of the **Documents** module (Figure 139).

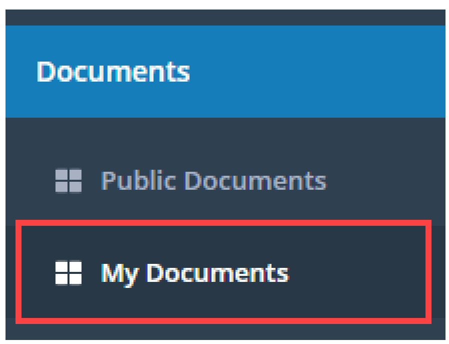
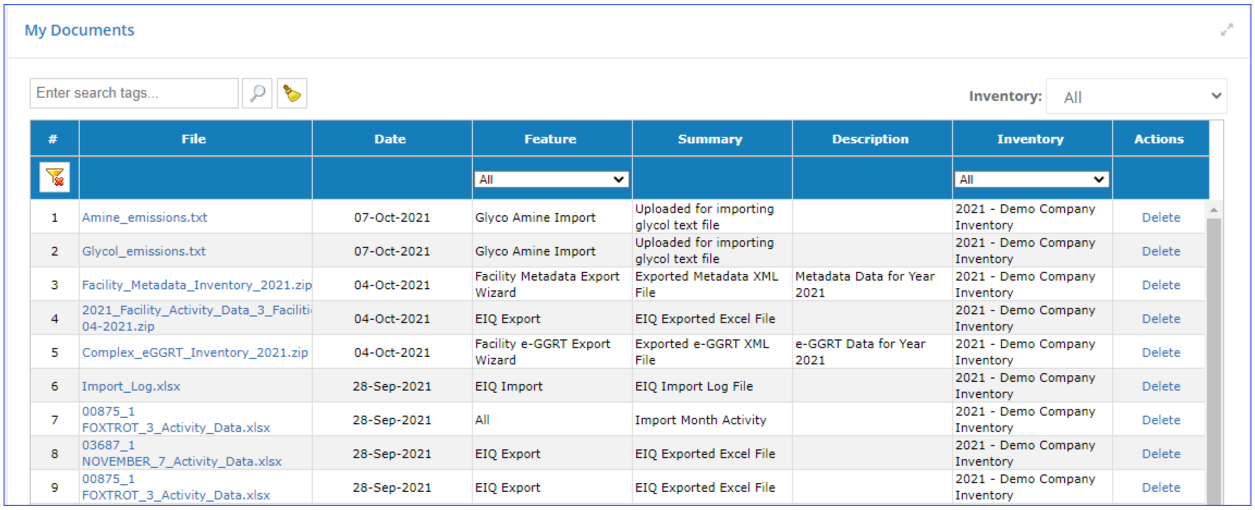


Figure 139. Documents – My Documents

The **My Documents** list displays all files that have been uploaded into the system, exported from the system, or generated by the system (Figure 140).

> ***IMPORTANT:*** The documents in this section are user-specific and are not visible to other users.



My Documents

Enter search tags... Inventory: All

#	File	Date	Feature	Summary	Description	Inventory	Actions
			All			All	
1	Amine_emissions.txt	07-Oct-2021	Glyco Amine Import	Uploaded for importing glycol text file		2021 - Demo Company Inventory	Delete
2	Glycol_emissions.txt	07-Oct-2021	Glyco Amine Import	Uploaded for importing glycol text file		2021 - Demo Company Inventory	Delete
3	Facility_Metadata_Inventory_2021.zip	04-Oct-2021	Facility Metadata Export Wizard	Exported Metadata XML File	Metadata Data for Year 2021	2021 - Demo Company Inventory	Delete
4	2021_Facility_Activity_Data_3_Faciliti 04-2021.zip	04-Oct-2021	EIQ Export	EIQ Exported Excel File		2021 - Demo Company Inventory	Delete
5	Complex_eGGRT_Inventory_2021.zip	04-Oct-2021	Facility e-GGRT Export Wizard	Exported e-GGRT XML File	e-GGRT Data for Year 2021	2021 - Demo Company Inventory	Delete
6	Import_Log.xlsx	28-Sep-2021	EIQ Import	EIQ Import Log File		2021 - Demo Company Inventory	Delete
7	00875_1 FOXTROT_3_Activity_Data.xlsx	28-Sep-2021	All	Import Month Activity		2021 - Demo Company Inventory	Delete
8	03687_1 NOVEMBER_7_Activity_Data.xlsx	28-Sep-2021	EIQ Export	EIQ Exported Excel File		2021 - Demo Company Inventory	Delete
9	00875_1 FOXTROT_3_Activity_Data.xlsx	28-Sep-2021	EIQ Export	EIQ Exported Excel File		2021 - Demo Company Inventory	Delete

Figure 140. My documents list

Click the name link in the **File** column to download the file for review or click **Delete** in the **Actions** column to remove the file from the records.

> ***IMPORTANT:*** The file cannot be recovered after it has been deleted.

7 Map

Pathway: Maps

The OCS AQS **Map** module provides a graphical display of all georeferenced objects, such as platforms, on a map of the Gulf of Mexico or Alaska regions for the inventory selected. It also allows you to display gridded emissions, custom shapefiles, and query the database to locate and display specific objects. When the **Map** module is first loaded, it will display a default view showing all facilities and release point available in the current inventory.

An overview of features is shown in Figure 141.

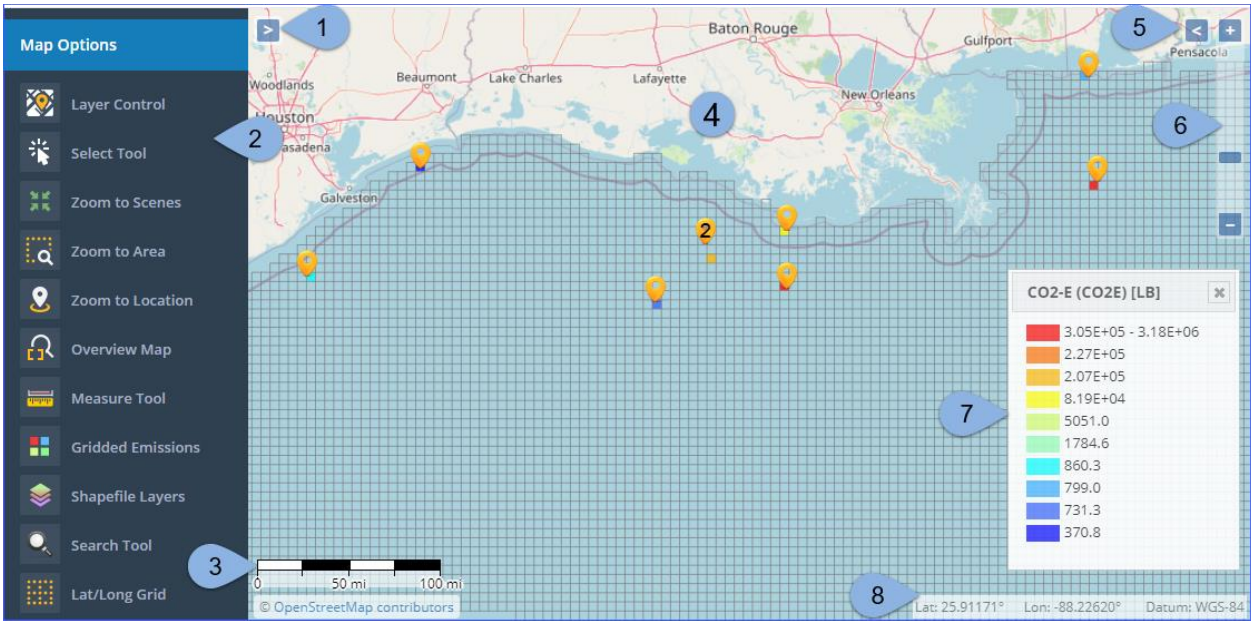


Figure 141. Map features

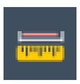
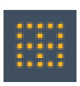
The map includes the following elements:

1. **Select Base Map:** Expand to specify what background map overlay will be used.
2. **Map Options:** A collection of tools that allows you to navigate through various elements on the map and customize the map view. See below for the full list of available tools.
3. **Scale Bar:** Bar that displays relative scale of the map.
4. **Main Map Window:** Main map display.
5. **Overview Map:** Activates a minimap that shows the location currently displayed in the main window.
6. **Zoom Controls:** Slider that allows you to control the zoom level of the map.
7. **Color Legend:** Legend of the colors used by various elements displayed on the map. ***IMPORTANT:*** The legend does not include colors of the base map or the location markers.
8. **Location:** Current coordinates of the tip of the mouse pointer.

You can move the map area by holding the cursor over the map and dragging it with the left mouse button. You can also zoom in and out using the mouse wheel.

The **Map** module also provides a number of useful tools that are accessed from the **Viewer Toolbar**. These options are summarized below, and their use is illustrated in the sections that follows in Table 6.

Table 6. Viewer toolbar tools

Icon	Tool	Description/Instructions
	**Layer Control**	Access different layers by selecting or de-selecting layer boxes.
	**Select Tool**	Pick a feature by clicking on it.
	**Zoom to Layers**	Zoom to the extents of the layers currently selected (checked) in the **Layer Control**.
	**Zoom to Area**	Click and draw a rectangle on the map to set it as zoom extents.
	**Zoom to Location**	Click this tool and then click on the map where you wish to center the zoom area to load the **Zoom to Location** dialog, where you can specify the exact location coordinates and the **Zoom Radius**.
	**Overview Map**	Click to activate a display of a map overview with a red rectangle delineating the area currently being displayed on the map.
	**Measure Tool**	Measure the distance between two points by clicking on the points or measure the area by defining a polygon.
	**Gridded Emissions**	Configure display of gridded emissions on the map (Section 7.2)
	**Shapefile Layers**	Select a shapefile and an associated attribute to display it on the map.
	**Search Tool**	Search the map for objects containing a specified search string.
	**Lat/Long Grid**	Toggle display of meridians and parallels on and off.

7.1 Using the Map Module

The steps below will help illustrate the map functionalities summarized above:

> ***IMPORTANT:*** The images displayed in this walkthrough will look different from the ones you see, because the displayed data is inventory specific.

1. Click the **Map** module (Figure 142).
2. The map display appears automatically centered on the Gulf of Mexico. You can zoom and pan using the method described in the previous section. You can also use the various **Zoom** tools available in the **Map Options**.

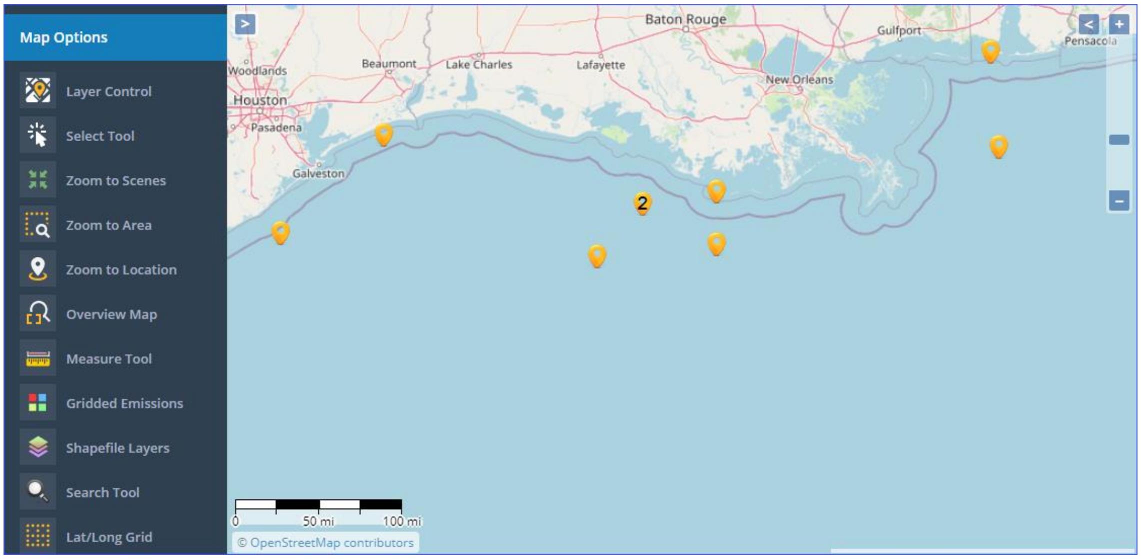


Figure 142. Map general view

3. In the **Map Options** panel to the left of the map, click the **Layer Control**. This opens a dialog that shows a list of layers available in the map. Turn off all layers except the *Facility* layer and the *Base Layers*. For the *Base Layers*, you can click the + in the left-hand side to turn layers on and off, similar to what is shown in Figure 143.

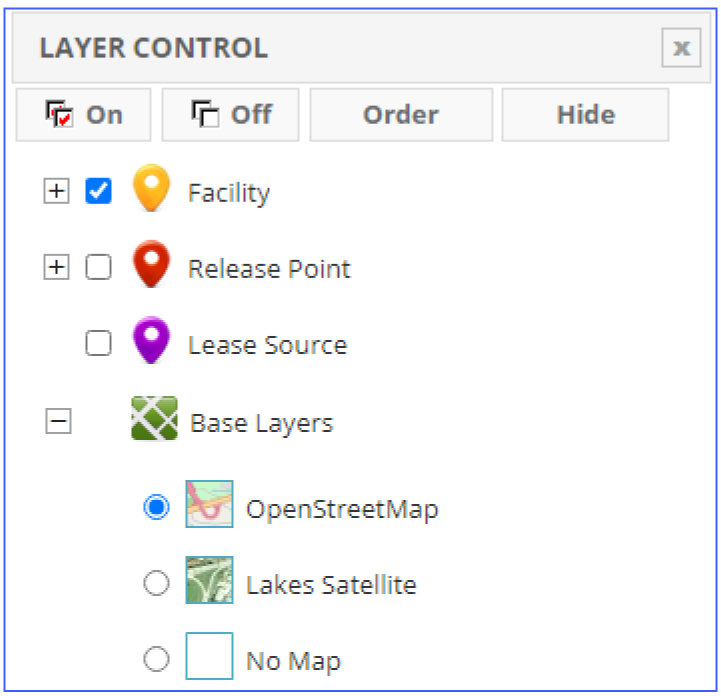


Figure 143. Layer control

4. You can switch between **Lakes Satellite** and **Open Street Map** views here, but also by clicking on the > button (1 in Figure 141) in the upper left-hand.
5. Take a moment to experiment with some of the other graphical tools in the **Map Options** such as the **Select Tool**, **Zoom to Scenes**, **Zoom to Area**, **Measure Tool.**
6. Under the **Map Options**, click **Shapefile Layers**.

7. The **Shapefile Layers** dialog is displayed. This dialog lists shapefiles which have been imported into OCS AQS, as well as the corresponding map **Layer Name**.
8. Within the dialog, click on the *OPD Area* shapefile layer and then click **Apply** as shown on Figure 144. When finished, close the dialog.

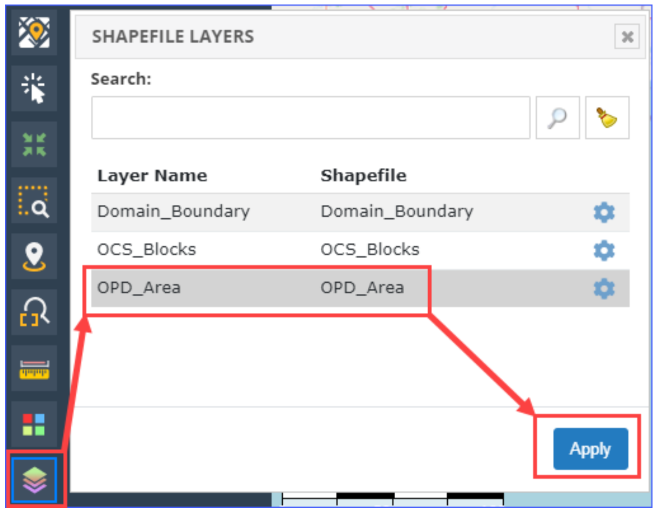


Figure 144. Display shapefile

9. The OPD areas are now visible on the map display. Additionally, the **OPD Area** map layer is now available in the **Layer Control** dialog (Figure 145). Move the cursor over **OPD Area** in the list of layers and several options are available to you to the right of the layer name in the list, including the **Zoom to Scene** option, which adjusts the zoom level of the map to fit the **OPD Area** shapefile comfortably into the map display area.

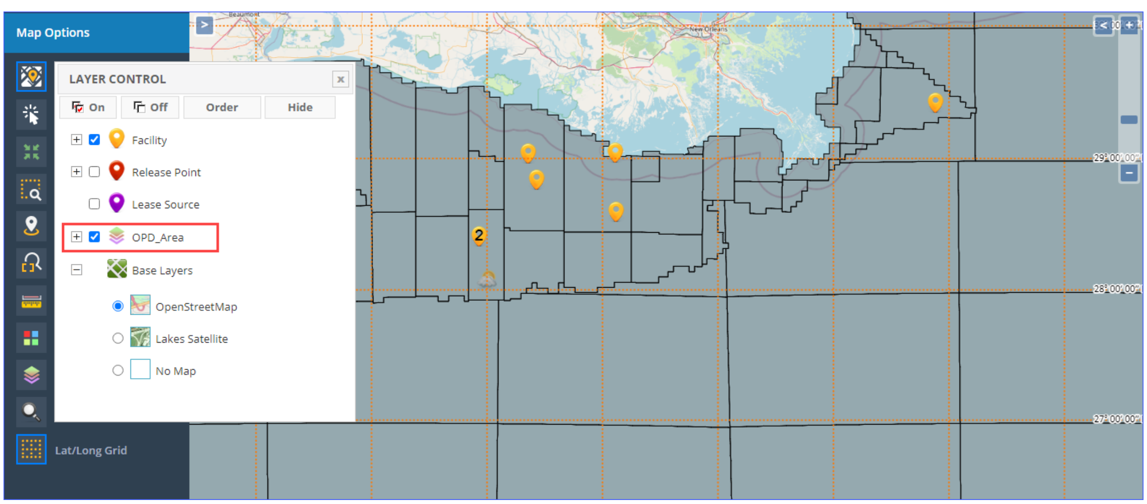


Figure 145. OPD area shapefile displayed

10. Close the **Layer Control** and **Shapefile Layers** dialogs if they are still open.
11. Under the **Map Options**, click the **Search Tool**.
12. The **Search Tool** dialog is displayed. Enter the name of a facility you know is in your inventory. The search tool will list all available facilities with that term in the name.
13. Highlight a facility entry in the list and click the button to zoom in to it as shown in Figure 146.

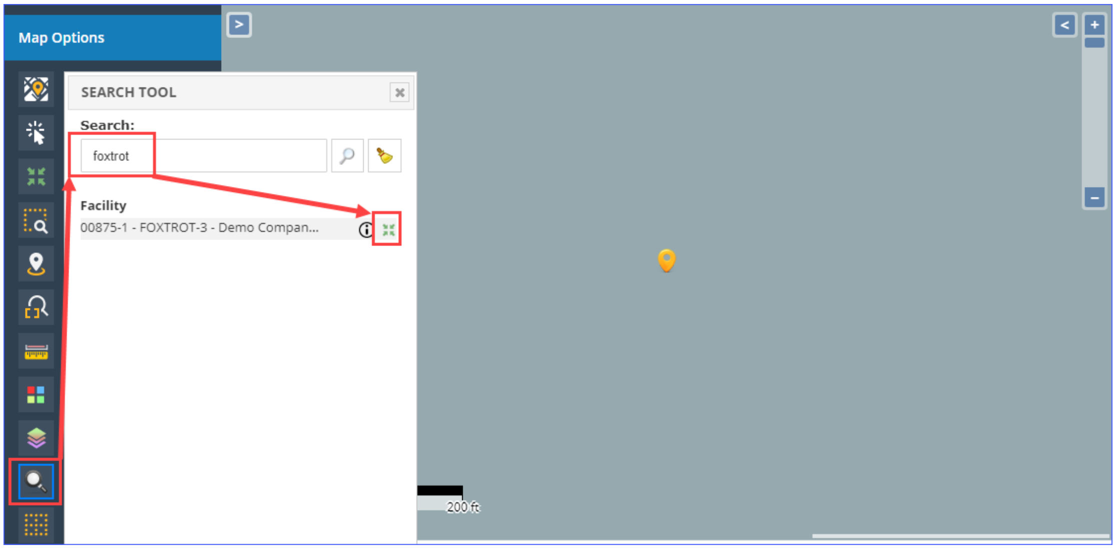


Figure 146. Using the search tool in maps

7.2 Gridded Emissions

The **Map** module allows you to display gridded emissions based on the monthly reported values for all pollutants in the inventory.

1. Under the **Map Options**, select **Gridded Emissions.**
2. The **Gridded Emissions** dialog contains many different options and selections to allow you to graphically represent your emissions. These options are reviewed below:
   a. **Emissions**: Allows you to select the type of source that produced the emissions that will be displayed.
   b. **Grid Type**: Gridded emissions can be graphed by **Uniform Cells**, **OPD Area**, or **OCS Blocks**. Select **OCS Blocks**.
   c. **Cell Size** (and **Units**): This allows you to determine the size of each cell if you selected **Uniform Cells**; otherwise, this field is disabled.
   d. **Emission Units**: Unit of measure to use for graphing the emissions. Select **TONS**.
   e. **Pollutant Group**: This option allows you to narrow down the list of pollutants to choose from.
   f. **Period Class**: The period for which emissions are displayed. Select **January**. Note that this applies to active inventory year; since our example is an inventory in 2023, this means we will show emissions for January 2023. For an entire year, select **January–December**.
   g. **Method**: Determines if emissions are displayed on the map based on the facility location or the release point. This will often have little impact on results, but for some cases it can make a difference, especially when zoomed out. The recommended method is by **Point of Release**, as it attributes emissions produced by processes associated with a specific release point (source) as being emitted from the location of that source. Aggregating emissions by **Facility** will combine emissions from all sources at that facility at the coordinates assigned to that facility in the database.
   h. **# of Levels**: Number of value ranges the emissions will be split into.
   i. **Equipment Type**: Allows you to display/export gridded emissions produced by a specific type of equipment for example, by **Combustion Flares**.

3. The bottom of the **Gridded Emissions** dialog shows a list of all available pollutants in the emissions inventory. For this exercise, select **Carbon Monoxide (CO)** in the table. You can <u>only display gridded emissions for one pollutant at a time</u>.
   IMPORTANT: Depending on screen resolution, you might not see the table with pollutants. Scroll down in the **Gridded Emissions** dialog until you reach the table of pollutants.
   IMPORTANT: If you do not see any pollutants in the table, check to see that the emissions have been calculated in the **AEM**.
4. Now that you have made your selections, click **Apply** above the table of pollutants and close the **Gridded Emissions** dialog by clicking **[x]** in the top right corner. While you do not have to close the dialog, it is big and obscures a large portion of the map.
5. The steps described above and the gridded emissions displayed as a result are shown in Figure 147. At first the details can be hard to see; it will help to zoom in on the facility locations.
6. After zooming in, it is easier to see the individual cells. Cells with no emissions in the current inventory have no coloring and simply show the base map (satellite or OpenStreetMaps). Cells with emissions are colored according to the color ramp at the bottom right of the map display. Notice that the cells which are colored correspond to the locations of facilities on the map (yellow markers), as would be expected.

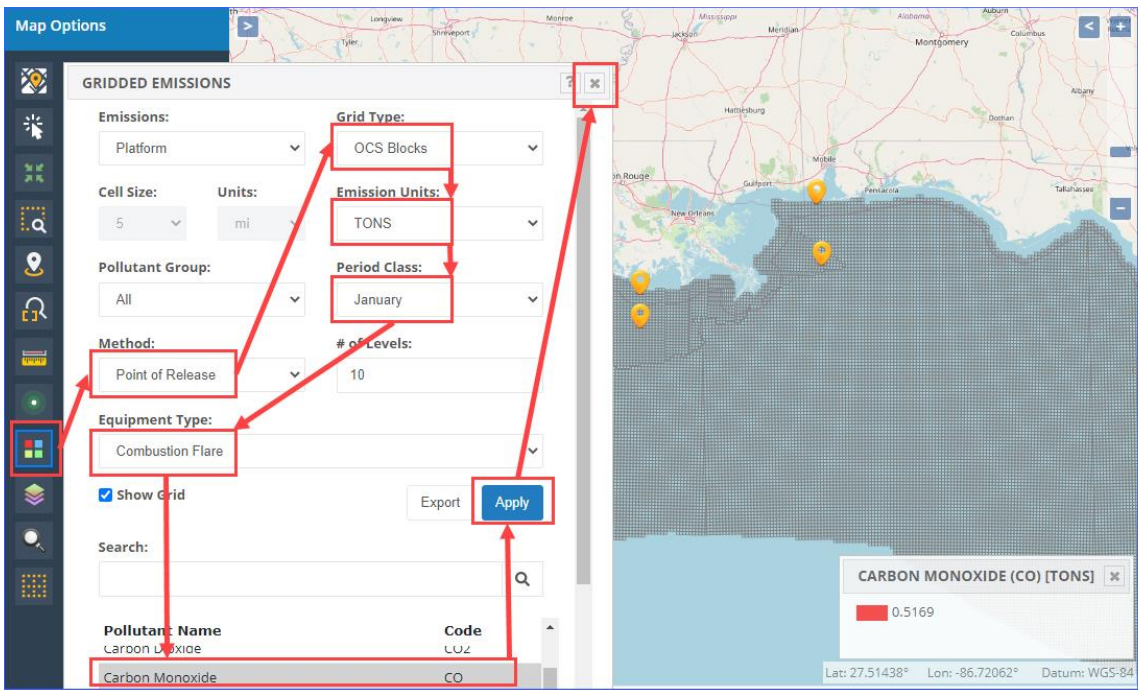


Figure 147. Map with gridded emissions

7. Take a moment to open the **Gridded Emissions** dialog and try out some of the other options available to you.
8. To get the numerical values of the emissions on each grid cell, open the **Gridded Emissions** dialog box and select **Export** (next to **Apply**). A Microsoft Excel file with the values will be downloaded automatically to your **Download** folder. The spreadsheet columns include the cell center coordinates in Latitude and Longitude and the cell grid emission value in the units selected.

7.3 Displayed Feature Information

To get information on a facility, release point, or any displayed map feature, click on the **Select Tool** in the **Map Options** panel. After selection, click the feature you wish to examine. A box will appear with a list of items under the pointer as shown in Figure 148. Clicking will load the **Details** page for the selected item.

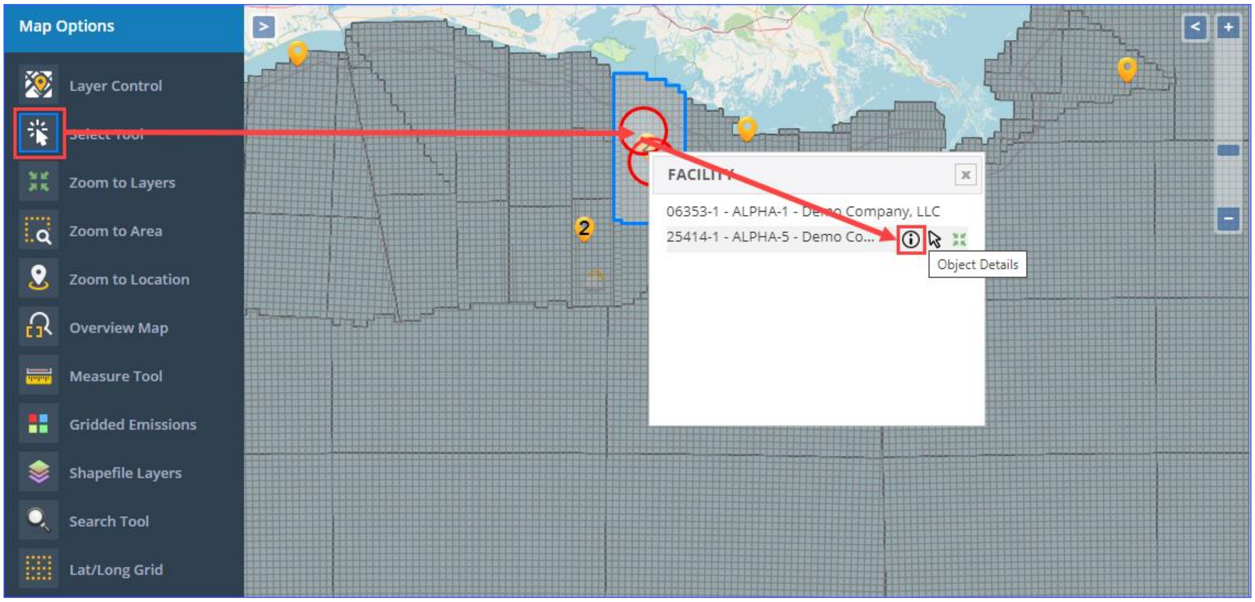


Figure 148. Select tool information

7.4 Additional Map Layers

Additional map layers can be added to the Map module by sending the appropriate SHP and SHX files to the BOEM OCS AQS administrator. Uploaded maps layers will be located under the **Shapefile Layers** option of the map.

8 Analytics

Pathway: Analytics

The analytics module contains a collection of graphical and tabular analysis tools. These tools allow you to review data across the entire inventory. You can use these tools while calculating emissions and populating activity data, or after completing and submitting the inventory. The **Analytics** tools enable you to filter emissions and activity data based on specific elements – pollutants, equipment type, or parameter type.

8.1 General

8.1.1 Search Analytics Tools

You can find any tool available in the **Analytics** module by using the search bar at the top of the list. Simply start typing a search term and the list of possibilities will be progressively refined as you type. The search function considers both the title and description of the tool.

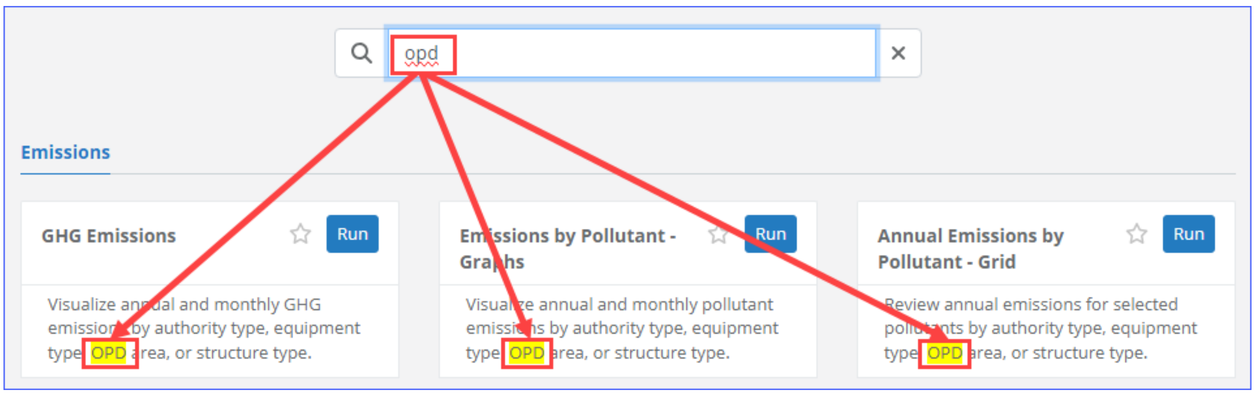


Figure 149. Search analytics tools

> ***IMPORTANT:*** The search feature is available in every section of the **Analytics** module. While in any specific section, the search feature will <u>only</u> search the tools in <u>that</u> section. To include all tools in the search you must be in the **Search All** section.

8.1.2 Favorites

The **Favorites** section provides convenient access to the tools that you use on regular basis. This section only becomes available once at least one tool has been marked as "favorite."

To add a tool to the list of favorites, simply click the white "star" ( ) icon (Figure 150).

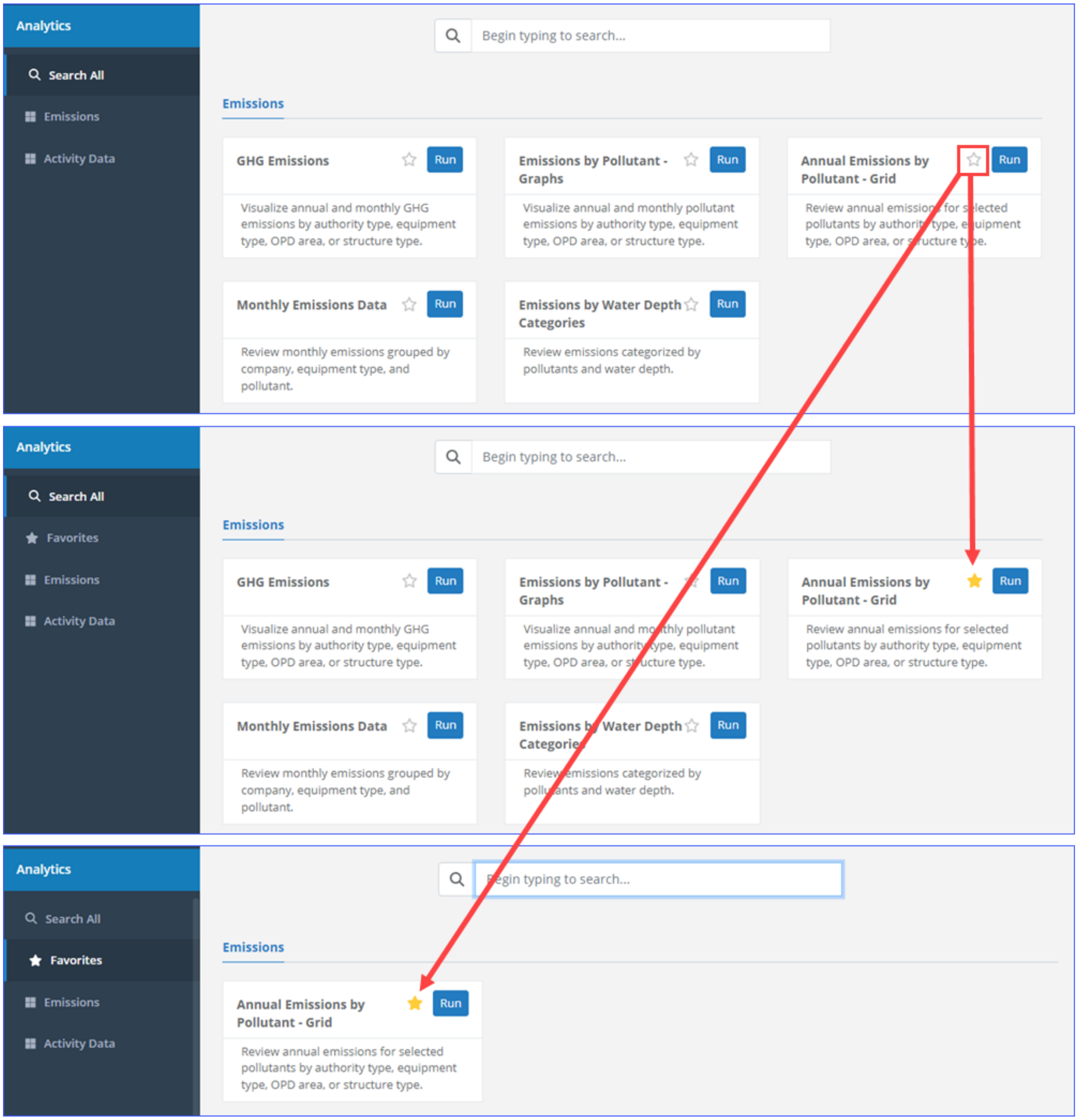


Figure 150. Favorite tools

To “unfavorite” a tool, click the star icon again.

Once there is at least one tool in the **Favorites** section, this section will be the one loaded when you navigate to the **Analytics** module.

8.1.3 Chart Customization and Export

Any bar chart or time series in the system can be exported as an image. The datasets used to create these charts can also be exported as an Excel file. Prior to exporting the chart images, the appearance of certain elements (such as main title and axis titles) can be customized.

8.1.3.1 Chart Customization

To customize the appearance of the chart, click the icon in the top right corner of the chart. The **Chart Customization** dialog will load, as shown in Figure 151.

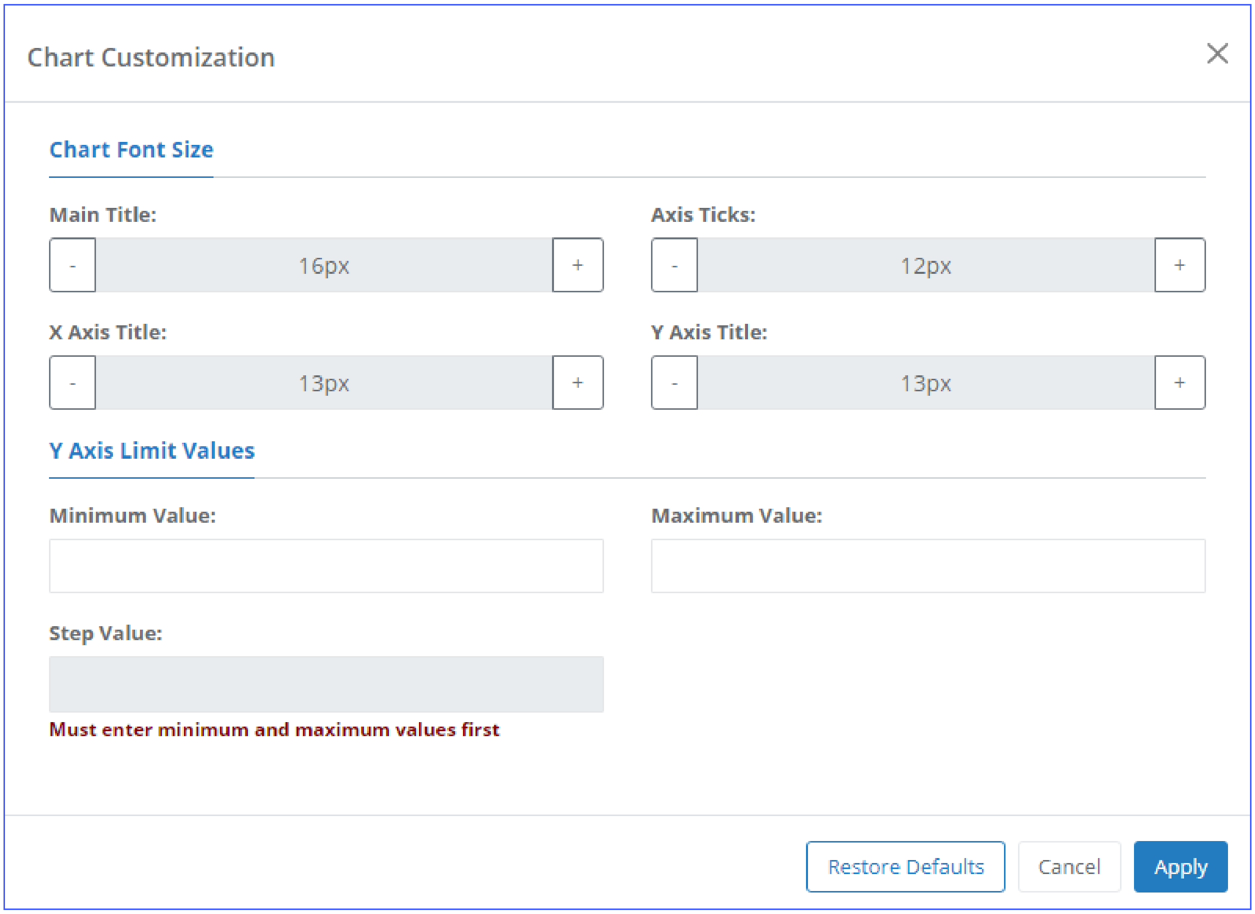


Figure 151. Chart Customization dialog

The top half of the dialog allows you to customize the font size for the main chart title, the X- and Y-axis titles, and the axis "ticks" (the numbers on the axis). Use the [+] and [-] buttons to increase or decrease the font size.

The bottom half of the chart allows you to customize the scale and interval of the Y-axis using the following parameters:

- **Minimum Value:** Smallest number that appears on the Y-axis. This value will be placed at the X-axis level.
- **Maximum Value:** Largest number that appears on the Y-axis.
- **Step Value:** Interval between numbers on the Y-axis. This parameter cannot be specified until you have entered the **Minimum** and **Maximum Value** first.

  NOTE: When the chart is regenerated using different criteria, the values for the Y axis are automatically reset to accommodate the maximum value for the new parameter, and the **Y Axis Limit** Values in the **Chart Customization** are cleared.

The buttons at the bottom allow you to do the following:

- **Restore Defaults:** Restore all parameters in the dialog to their default values without closing the dialog.
- **Cancel:** Close the dialog without applying or saving the customized values.
- **Apply:** Apply the customized values and close the dialog.

8.1.3.2 Export Charts

You can export any chart by clicking the ☰ icon in the top right corner of the chart. The resulting menu allows you to select if you wish to export the chart as an .SVG, .PNG, or .JPG image, or as an Excel worksheet.

8.2 Emissions

The emissions tools allow you to review calculated emissions in the inventory.

8.2.1 Greenhouse Gas (GHG) Emissions

Pathway: Analytics > Emissions > GHG Emissions

This tool allows you to visualize the total annual GHG emissions as a bar chart as well as a monthly time series.

Figure 152. Analytics - GHG emissions

The following options are available:

- **Emissions Group:** Select the attribute you wish to use to group the emissions.

The following graphs are displayed:

- **GHG Annual Emissions by *Attribute*:** A stacked bar chart showing annual emissions grouped by the attributed selected on the **Emissions Group** field.
- **GHG Monthly Emissions by *Attribute*:** A time series showing total emissions from all sources grouped by the selected attribute for each month.

8.2.2 Emissions by Pollutant – Graphs

Pathway: Analytics > Emissions > Emissions by Pollutant – Graphs > Detailed Charts

This tool allows you to visualize emissions for individual pollutants. There are two types of charts: the **Detailed** and **Pie Chart**.

8.2.2.1 Detailed Charts

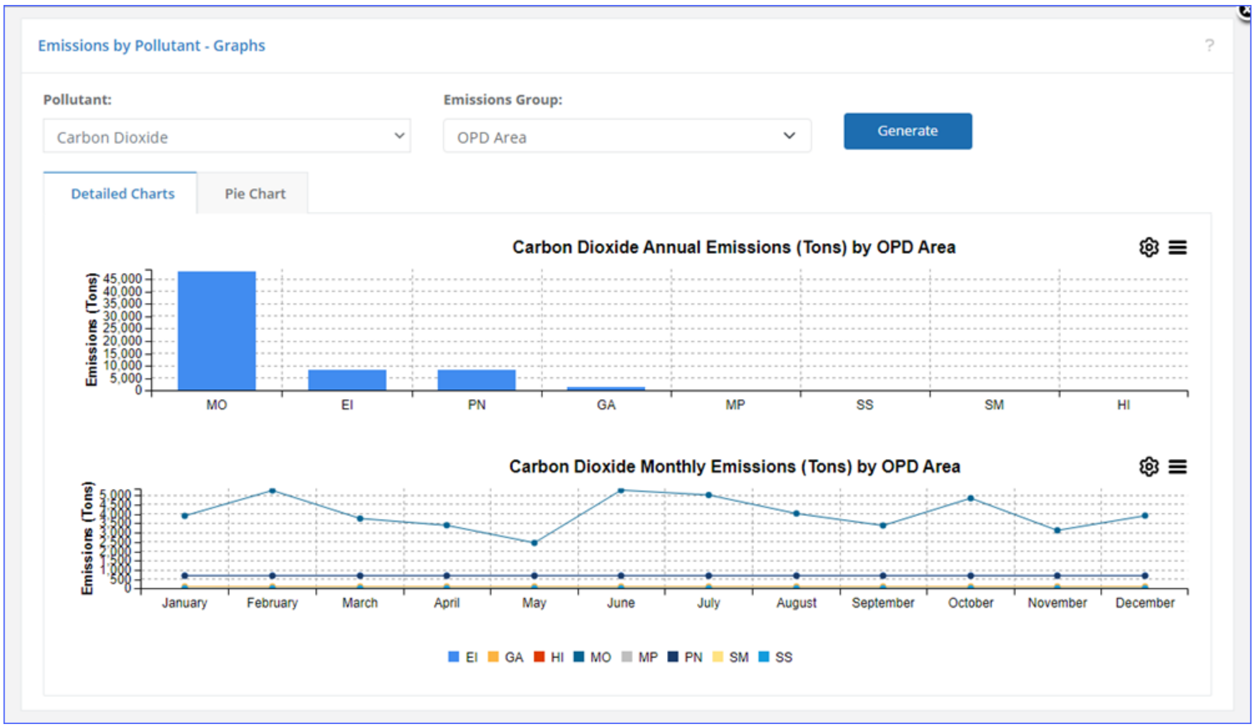


Figure 153. Analytics - emissions by pollutant - detailed charts

The following options are available:

- **Pollutant:** Select the pollutant you wish to plot.
- **Emissions Group:** Select the attribute you wish to use to group the emissions.

Click **Generate** to apply the selected options.

The following graphs are displayed:

- ***Pollutant* Annual Emissions by *Attribute*:** A bar chart showing annual emissions grouped by the attributed selected on the **Emissions Group** field.
- ***Pollutant* Monthly Emissions by *Attribute*:** A time series showing total emissions from all sources grouped by the selected attribute for each month.

8.2.2.2 Pie Chart

Pathway: Analytics > Emissions > Emissions by Pollutant – Graphs > Pie Chart

The pie chart has the same data selection options as the annual emissions/time series chart and displays the total annual emissions grouped by attribute represented by color wedges of the chart.

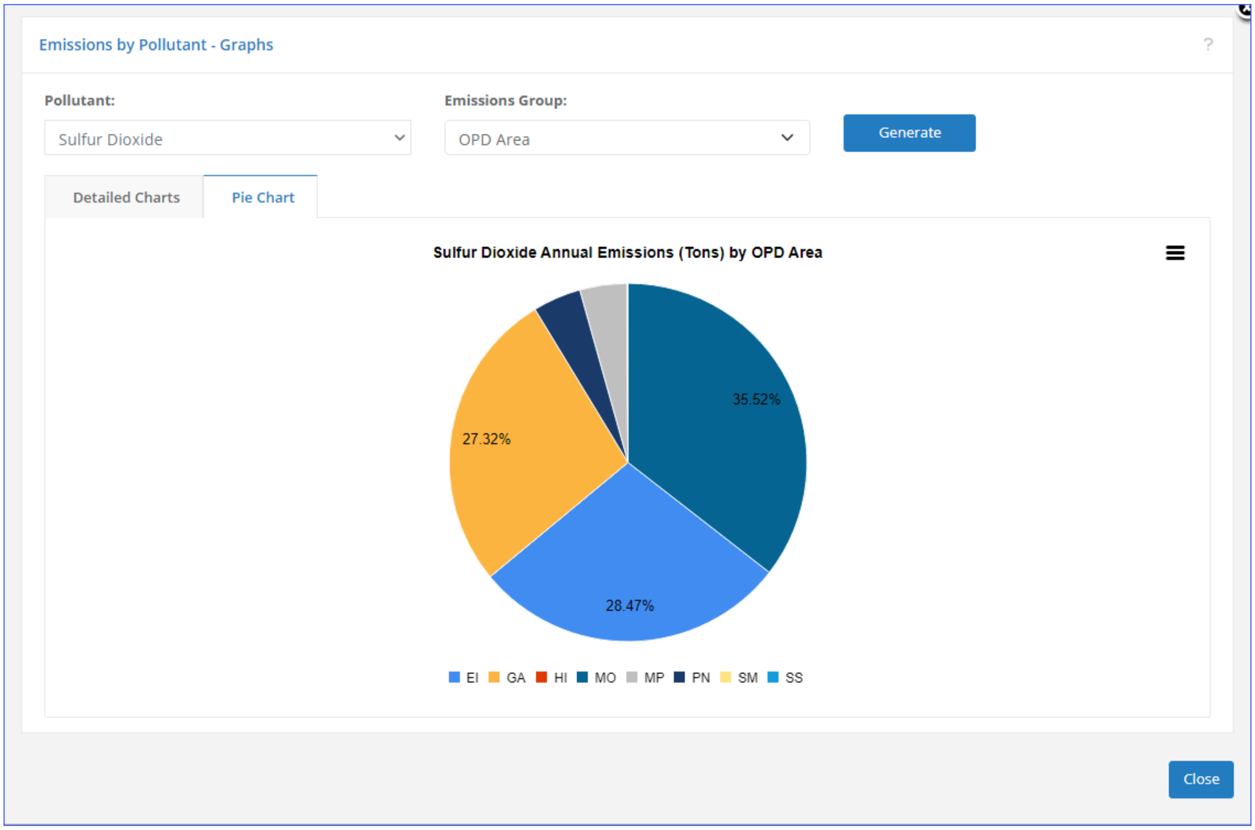


Figure 154. Analytics - emissions by pollutant - pie chart

8.2.3 Annual Emissions by Pollutant – Grid

Pathway: Analytics > Emissions > Annual Emissions by Pollutant - Grid

This tool allows you to generate a table of annual emissions for multiple pollutants.

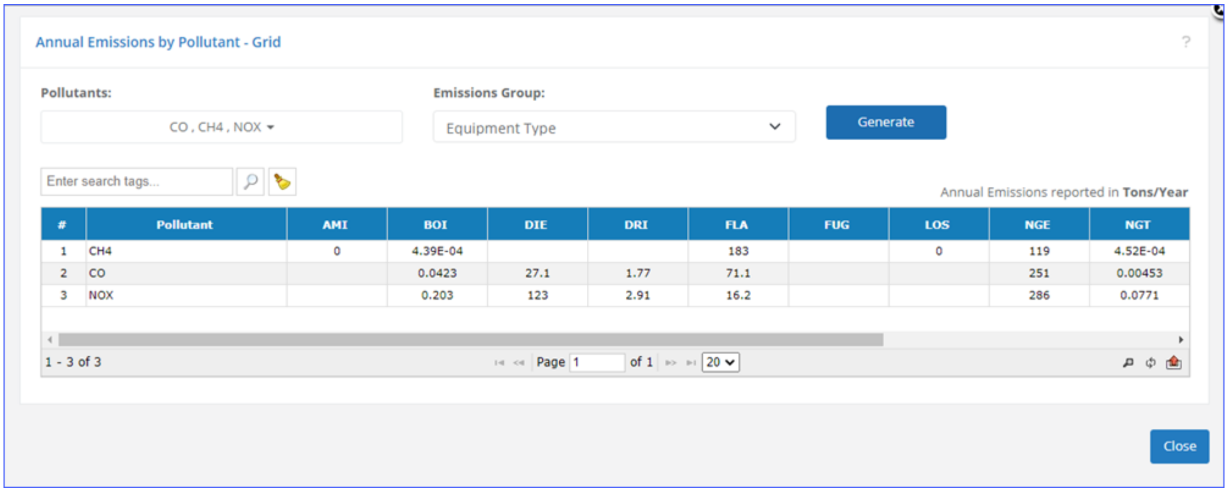


Figure 155. Analytics - annual emissions by pollutant - grid

The following options are available:

- **Pollutants:** Select the pollutants you wish to display. You can select multiple pollutants by checking the box for each one.
- **Emissions Group:** Select the attribute you wish to use to group the emissions.

Click **Generate** to apply the selected options.

8.2.4 Monthly Emissions Data

Pathway: Analytics > Emissions > Monthly Emissions Data

This tool allows you to generate a table of combined monthly emissions for any equipment type/pollutant combination.

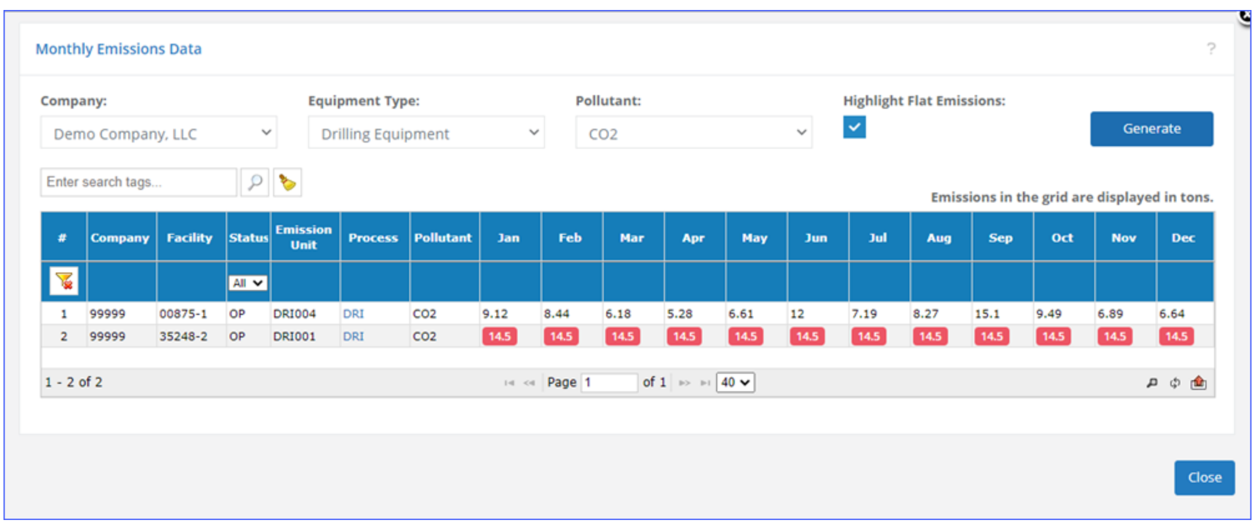


Figure 156. Analytics - monthly emissions data

The following options are available:

- **Company:** Displays the company name for the current inventory.
- **Equipment Type:** Select the type of equipment for which you wish to see the emissions.

- **Pollutant:** Select the pollutant you wish to display.
- **Highlight Flat Emissions:** Highlight non-zero emission values that remain the same month-to-month. This indicates that the activity data has been copied in the AEM (Section 3.2.12), but not adjusted to include the month-to-month variations.

Click **Generate** to apply the selected options.

8.2.5 Emissions by Water Depth Categories

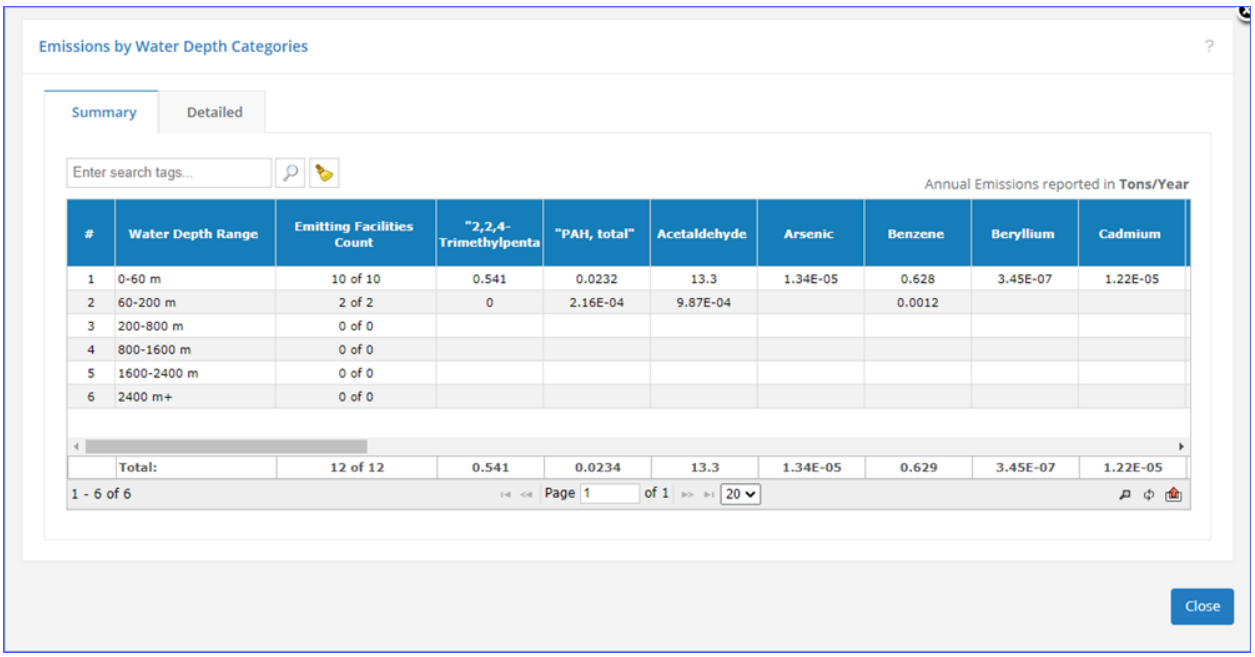
Pathway: Analytics > Emissions > Emissions by Water Depth Categories

This tool allows you to view annual emissions produced by the structures based at different depths.

8.2.5.1 Summary

Pathway: Analytics > Emissions > Emissions by Water Depth Categories > Summary

This table displays the combined annual emissions produced by the structures in each depth range.



#	Water Depth Range	Emitting Facilities Count	"2,2,4-Trimethylpenta	"PAH, total"	Acetaldehyde	Arsenic	Benzene	Beryllium	Cadmium
1	0-60 m	10 of 10	0.541	0.0232	13.3	1.34E-05	0.628	3.45E-07	1.22E-05
2	60-200 m	2 of 2	0	2.16E-04	9.87E-04		0.0012		
3	200-800 m	0 of 0							
4	800-1600 m	0 of 0							
5	1600-2400 m	0 of 0							
6	2400 m+	0 of 0							
	Total:	12 of 12	0.541	0.0234	13.3	1.34E-05	0.629	3.45E-07	1.22E-05

Figure 157. Analytics - emissions by water depth categories – summary

8.2.5.2 Detailed

Pathway: Analytics > Emissions > Emissions by Water Depth Categories > Detailed

This table displays annual emissions for each selected pollutant produced by the combined structures in the selected depth range.

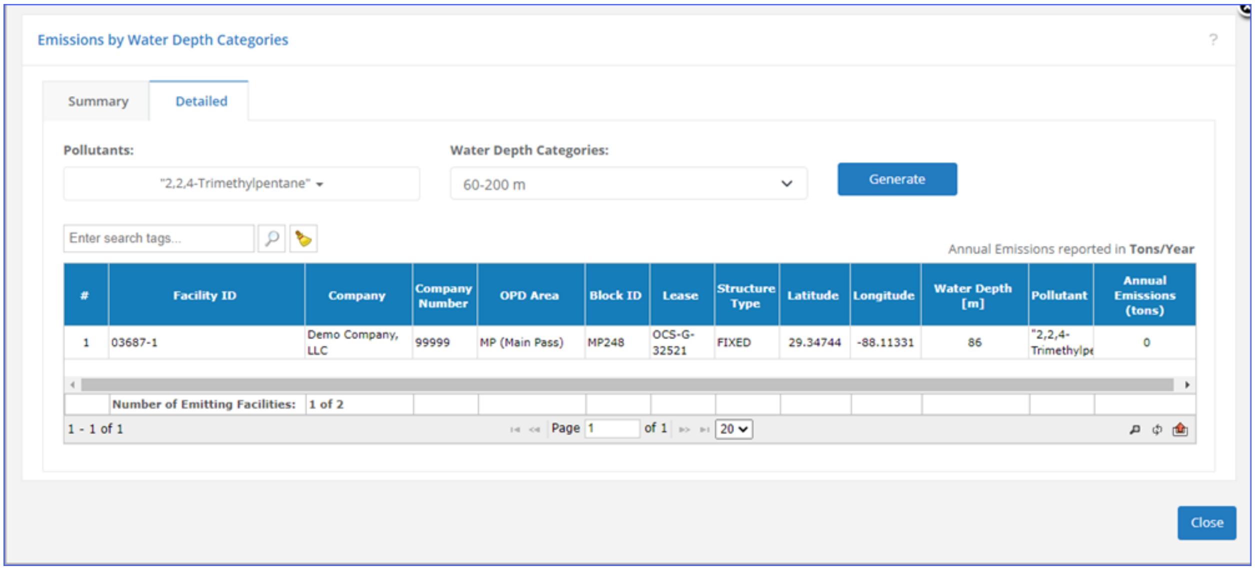


Figure 158. Analytics - emissions by water depth categories - detailed

The following options are available:

- **Pollutants:** Select the pollutants you wish to display. You can select multiple pollutants by checking the box for each one.
- **Water Depth Categories:** Select the depth range from which you wish to include structures.

Click **Generate** to update the table.

8.2.6 Annual Facility Emissions – Inventory Comparison

Pathway: Analytics > Emissions > Annual Facility Emissions – Inventory Comparison

This tool allows you to compare emissions produced by a specific facility (or multiple facilities) in two different reporting years.

8.2.6.1 Graph

Pathway: Analytics > Emissions > Annual Facility Emissions – Inventory Comparison

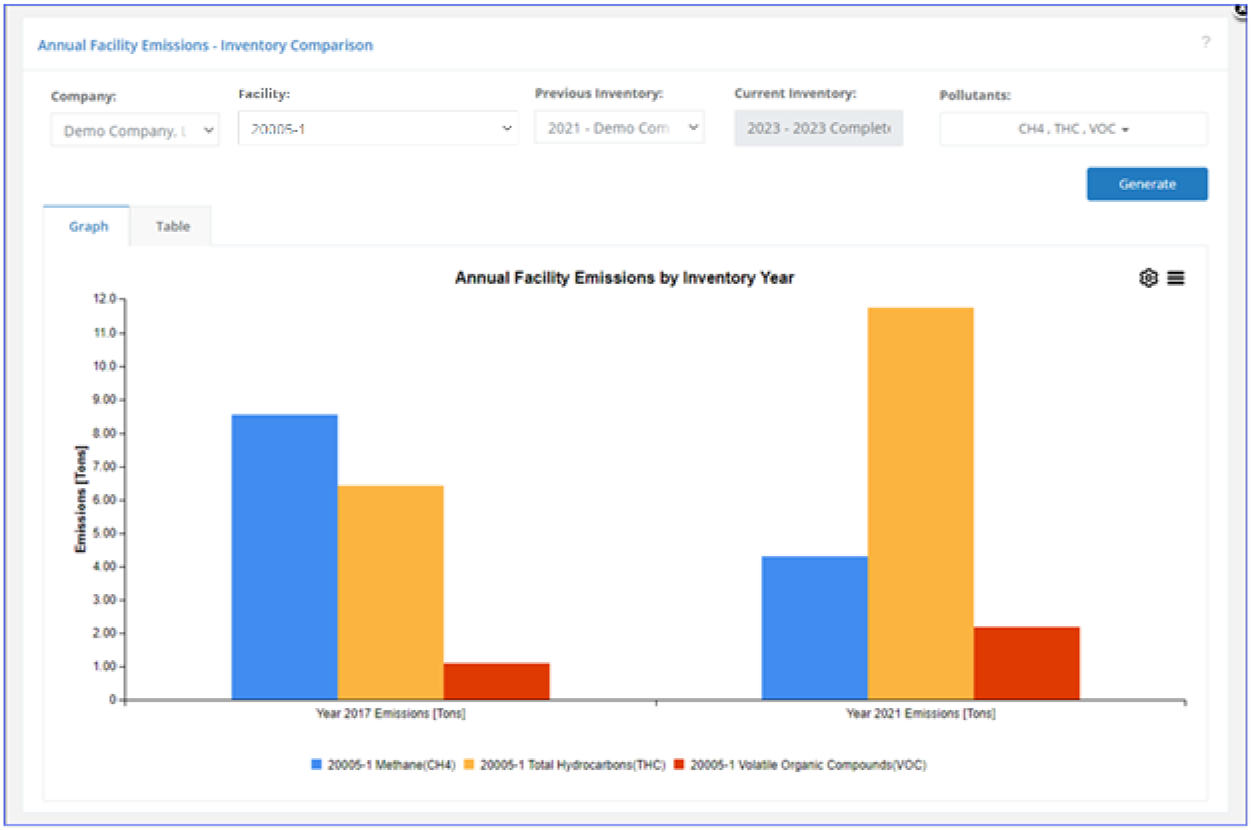


Figure 159. Annual facility emission - inventory comparison – chart

The following options are available:

- **Company:** Select the company for which you wish to view the comparison. The **Facilities** list will be filtered to only display the facilities under that company.
- **Facility:** Select the facility for which you wish to compare emissions. The **Pollutants** list will be filtered to display only pollutants generated by that facility.
- **Previous Inventory:** Select a past inventory for comparison. Only inventories available from the earlier years will be available in this list.
- **Current Inventory:** Shows the inventory you are currently in. This inventory cannot be changed using the analytics card controls. To change the **Current Inventory,** you must do so using **Settings | Inventory Configuration** (Section 10.1.1).
- **Pollutants:** Select the pollutants you wish to review. Only pollutants for which emissions have been calculated for at least one facility/inventory year will be displayed in the list.

Click **Generate** to apply the selected options. Two sets of bar charts—the earlier year and the current year—will be displayed. Each bar represents total emissions for a selected pollutant generated by each selected facility.

8.2.6.2 Table

Pathway: Analytics > Emissions > Annual Facility Emissions – Inventory Comparison > Table tab

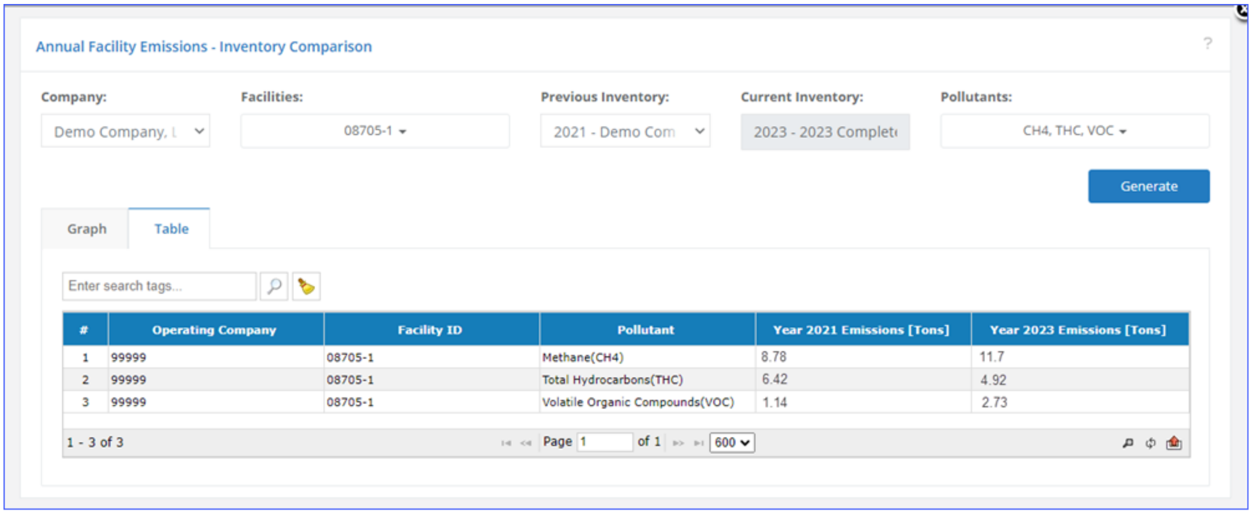


Figure 160. Annual facility emissions - inventory comparison

The table displays the values used to generate the chart.

8.3 Activity Data

Pathway: Analytics > Activity Data

The activity data tools allow you to review operator-specified activity data in the inventory.

8.3.1 Aggregated Activity Data

Pathway: Analytics > Activity Data > Aggregated Activity Data

This tool allows you to see the overview of the aggregated activity data. In the example shown in Figure 161, the **Total Fuel Usage** values from all non-zero-emissions months to obtain an annual value for each emission unit. These values are then plotted on the chart from highest to lowest.

> ***IMPORTANT:*** Only the highest 25 values will be displayed.

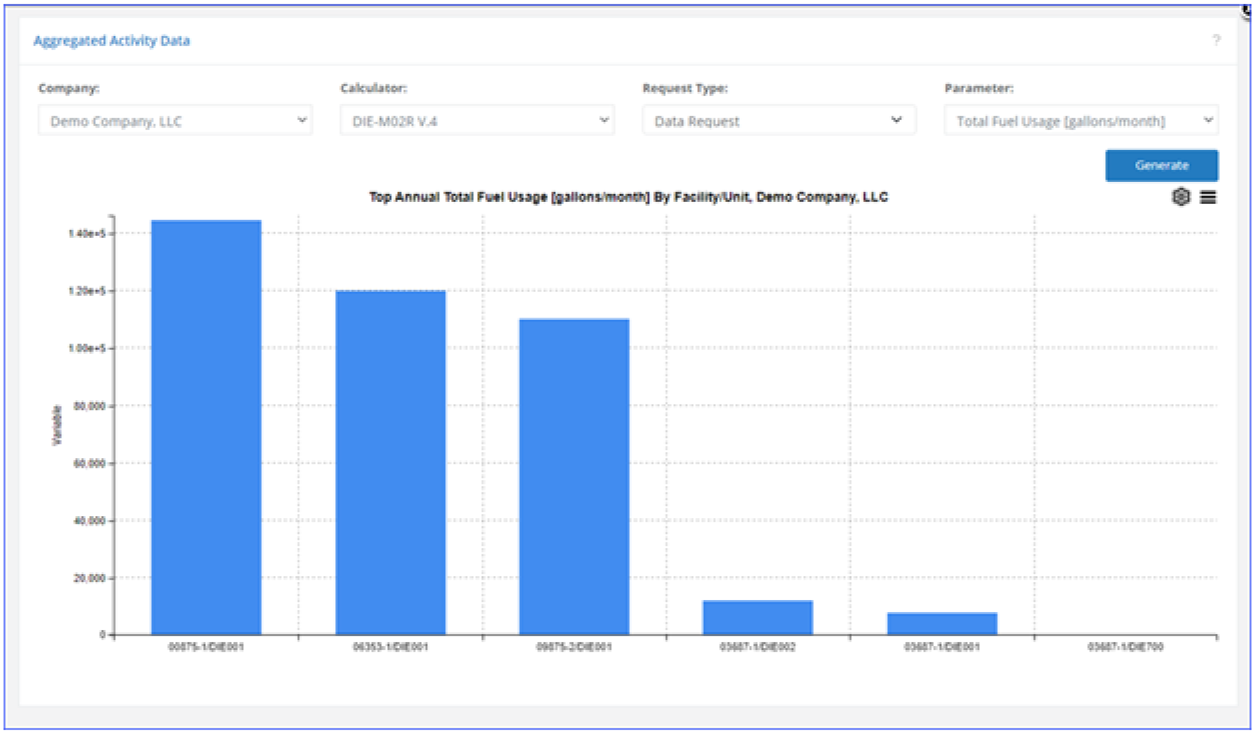


Figure 161. Analytics - aggregated activity data

The following options are available:

- **Company:** Displays the company name for the current inventory.
- **Calculator:** Select the calculator used by the desired equipment type.
- **Request Type:** Select if you wish to see activity data parameter for the **Data Request** or the **Control Request**.
- **Parameter:** Select the parameter for which you wish to review data.

Click **Generate** to update the chart.

8.3.2 Review Monthly Activity Data

Pathway: Analytics > Activity Data > Review Monthly Activity Data

This tool is the same as the one available in and described under **Emissions | Platform Sources | Review Activity Data** (Section 3.3)

8.3.3 Review lease Operation Activity Data

Pathway: Analytics > Activity Data > Review Lease Operations Data

This tool is the same as the one available in and described under **Emissions | Lease Operations | Review Lease Operation Activity Data** (Section 4.2)

9 Reports

Pathway: Reports

OCS AQS comes with a set of report functions that can be customized by the operator using OCS AQS Reports wizards to produce a variety of summary and analysis reports. These reports can then be printed or exported into an external format for ease of distribution.

> ***NOTE:*** Most report will only display data from the current inventory. If a report allows for multi-inventory comparison, only inventories you have access to will be available.

9.1 Reports Overview

To generate a report, locate the report you would like to create using the search bar, click on it, and complete the wizard steps by selecting individual search criteria or all options. Run the report by clicking **Finish** and wait for the results; this may take a few seconds to a minute based on the amount of data in your inventory.

All reports can be downloaded in a number of formats, including the following:

- MS Word
- MS Excel
- MS PowerPoint
- PDF
- TIFF
- MHTML
- CSV
- XML
- Data Feed

A typical report showing the download icon is shown in Figure 162.

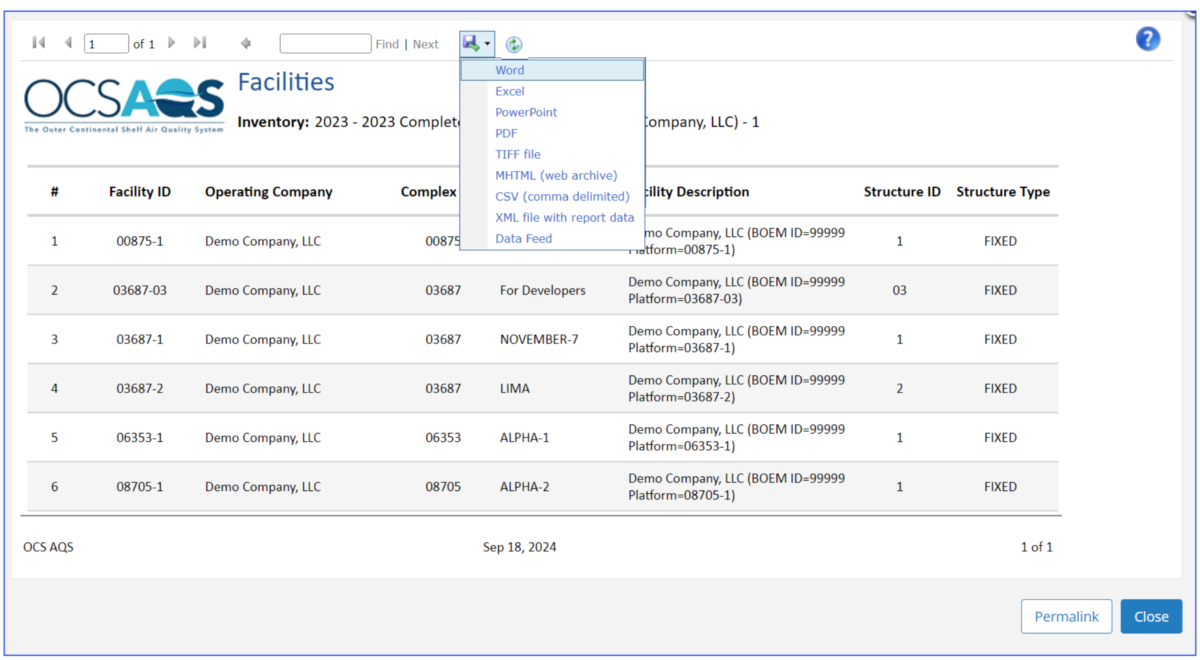


Figure 162. Report with download formats options

9.1.1 Search Reports

You can find any report available in OCS AQS by using the search bar at the top of the report list. Simply start typing a search term and the list of possibilities will be progressively refined as you type. The search function considers both the title and description of the report.

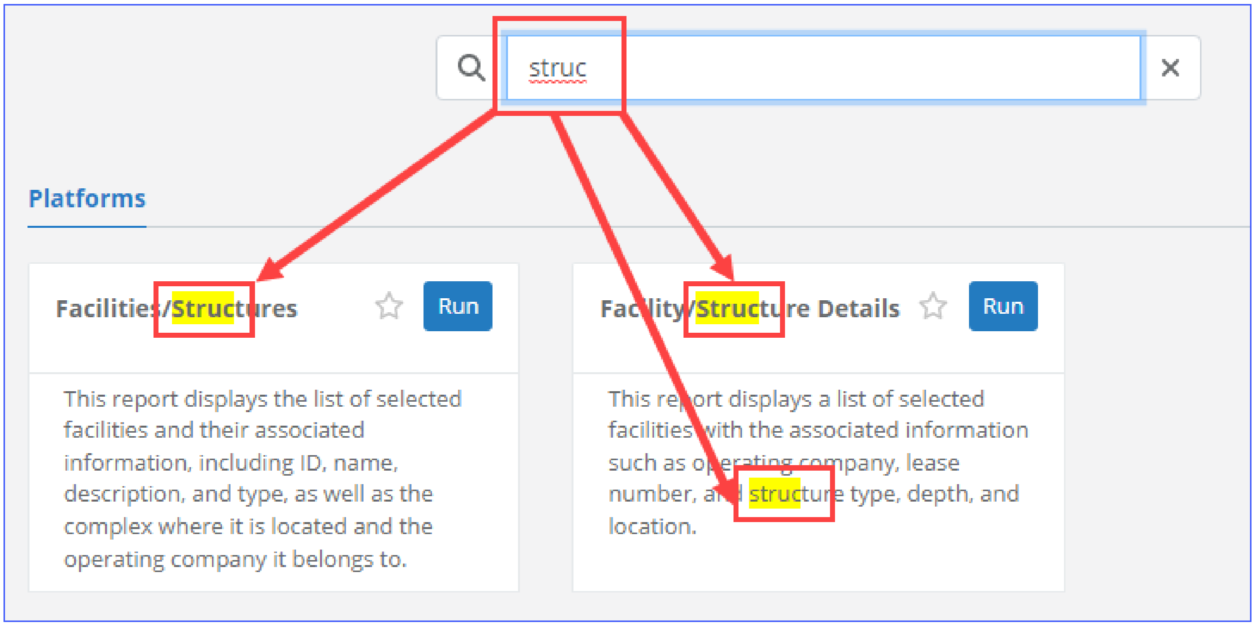


Figure 163: Search reports

> ***IMPORTANT:*** The search feature is available in every section of the **Reports** module. While in any specific section, the search feature will <u>only</u> search the reports in <u>that</u> section. To include all reports in the search you must be in the **Search All** section.

9.1.2 Favorites

The **Favorites** section provides convenient access to reports that you use on regular basis. This section only becomes available once at least one report has been marked as "favorite."

To add report to the list of favorites, simply click the white "star" (☆) icon.

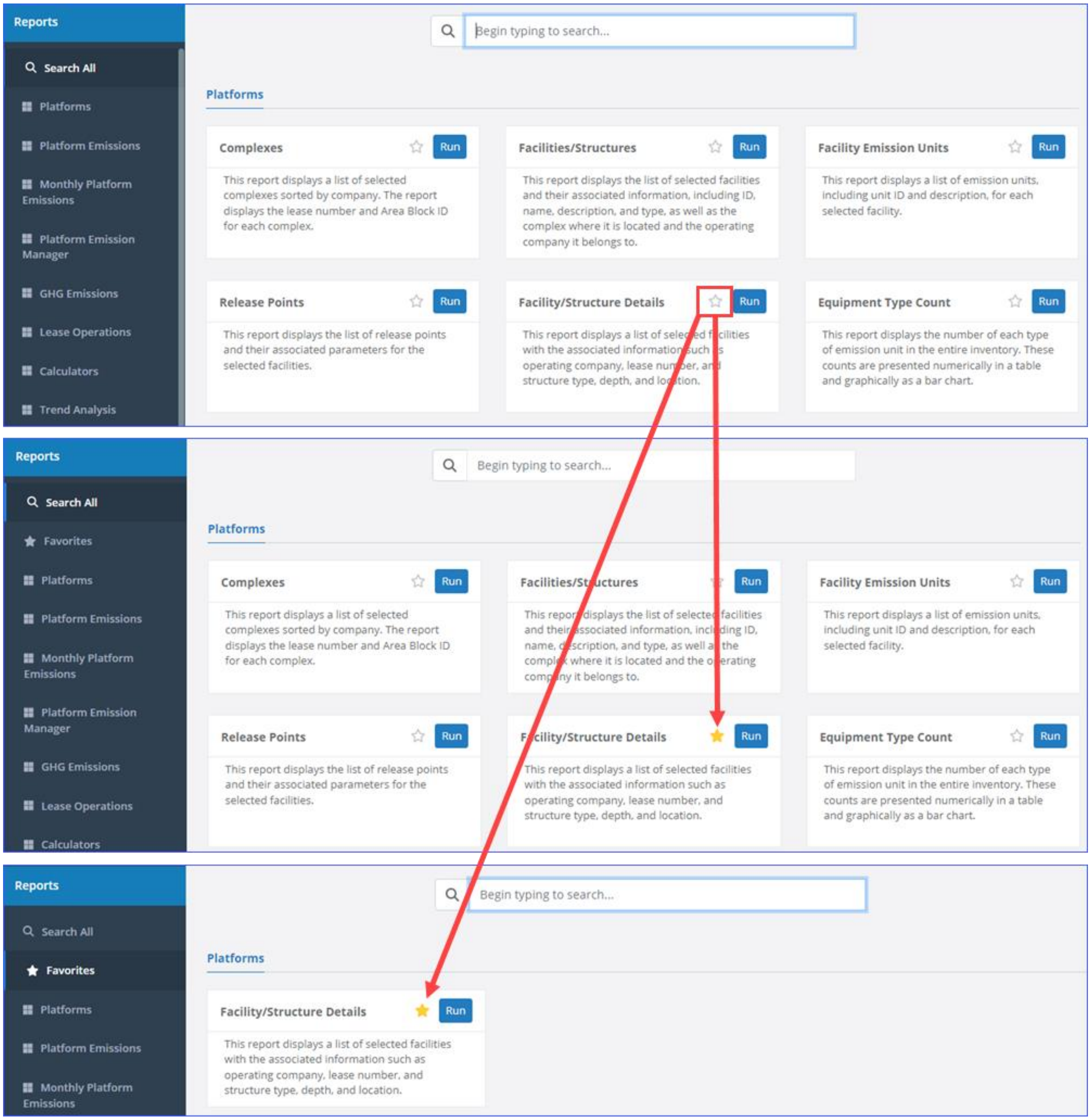


Figure 164: Favorite reports

To “unfavorite” a report, click the star icon again.

Once there is at least one report in the **Favorites** section, this section will be the one loaded when you navigate to the **Reports** module.

9.2 Report Categories

The following sections describe the types of reports available in each category listed in the Navigation Panel. Each report in OCS AQS displays a brief description of its purpose.

9.2.1 Platforms

Pathway: Reports > Platforms

Platforms reports section contains reports that provide non-emissions information regarding the sources. These include the facility structure and composition, complexes where they are located, and operating companies.

9.2.2 Platform Emissions

Pathway: Reports > Platforms Emissions

Platform Emissions reports section contain reports that allow you to present emissions information in various ways. These reports allow you view results as overall totals, totals grouped by complex or facility, monthly totals, annual totals, totals grouped by equipment type, as well as a report listing all facilities that were set to "zero emissions" for at least part of the year.

9.2.3 Monthly Platform Emissions

Pathway: Reports > Monthly Platforms Emissions

Monthly Platform Emissions reports section contains only reports pertaining to monthly emissions generated by the facilities. Grouped by facility, complex, emission unit, or equipment type, this data can be presented in tabular or graph format.

9.2.4 Platform Emission Manager

Pathway: Reports > Platforms Emission Manager

Platform Emission Manager reports allow you generate reports regarding non-emissions information related to the **AEM** for platform sources. This information includes the QA/QC comments entered for any parameters, any facilities or emission units set to "zero emissions" for at least part of the year, value ranges for parameter, comparison of calculator parameters month-to-month, and the flare gas volume emitted grouped by structure.

9.2.5 GHG Emissions

Pathway: Reports > GHG Emissions

GHG Emissions reports allow you to view the annual amounts of GHG emissions produced grouped by OPD area, structure, emission unit, and equipment type.

> ***TIP:*** If the wizard asks to select an OPD, and you do not know which one to choose, select all and move to the next step. Sometimes it is easier to select by facility than OPD.
>
> ***IMPORTANT:*** The GWP used to calculate the CO_2e values are listed for each pollutant at the top of the table.

9.2.6 Lease Operations

Pathway: Reports > Lease Operations

Lease Operation reports summarize emissions generated during lease operation activities.

9.2.7 Calculators

Pathway: Reports > Calculators

Calculators reports describe the different calculation methods and input parameters used to calculate emissions.

9.2.8 Trend Analysis

Pathway: Reports > Trend Analysis

Trend Analysis reports allow you to observe emission trends over multiple inventory years in tabular or graphical format.

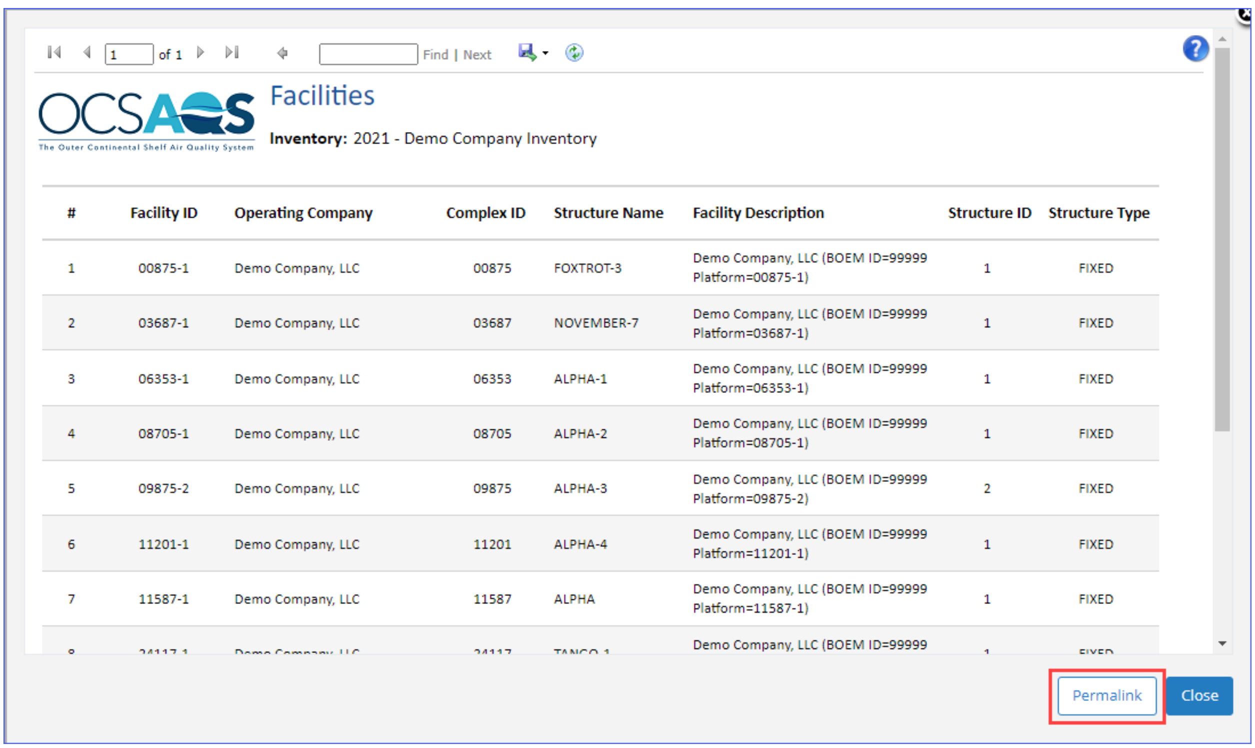
9.2.9 Other

Pathway: Reports > Other

Other reports refer to miscellaneous reports that did not fall into any specific category.

9.2.10 Using Permalinks

OCS AQS allows the user to save a report query that can be used over or sent to a colleague (who has an OCS AQS account). After running the report, click on the Permalink shown in Figure 165.



#	Facility ID	Operating Company	Complex ID	Structure Name	Facility Description	Structure ID	Structure Type
1	00875-1	Demo Company, LLC	00875	FOXTROT-3	Demo Company, LLC (BOEM ID=99999 Platform=00875-1)	1	FIXED
2	03687-1	Demo Company, LLC	03687	NOVEMBER-7	Demo Company, LLC (BOEM ID=99999 Platform=03687-1)	1	FIXED
3	06353-1	Demo Company, LLC	06353	ALPHA-1	Demo Company, LLC (BOEM ID=99999 Platform=06353-1)	1	FIXED
4	08705-1	Demo Company, LLC	08705	ALPHA-2	Demo Company, LLC (BOEM ID=99999 Platform=08705-1)	1	FIXED
5	09875-2	Demo Company, LLC	09875	ALPHA-3	Demo Company, LLC (BOEM ID=99999 Platform=09875-2)	2	FIXED
6	11201-1	Demo Company, LLC	11201	ALPHA-4	Demo Company, LLC (BOEM ID=99999 Platform=11201-1)	1	FIXED
7	11587-1	Demo Company, LLC	11587	ALPHA	Demo Company, LLC (BOEM ID=99999 Platform=11587-1)	1	FIXED

Figure 165. Permalink location

Clicking on the **Permalink** will open a window with the URL of the report as shown in Figure 166. Copy the link and use it any time you want to re-run the report with the same parameters.

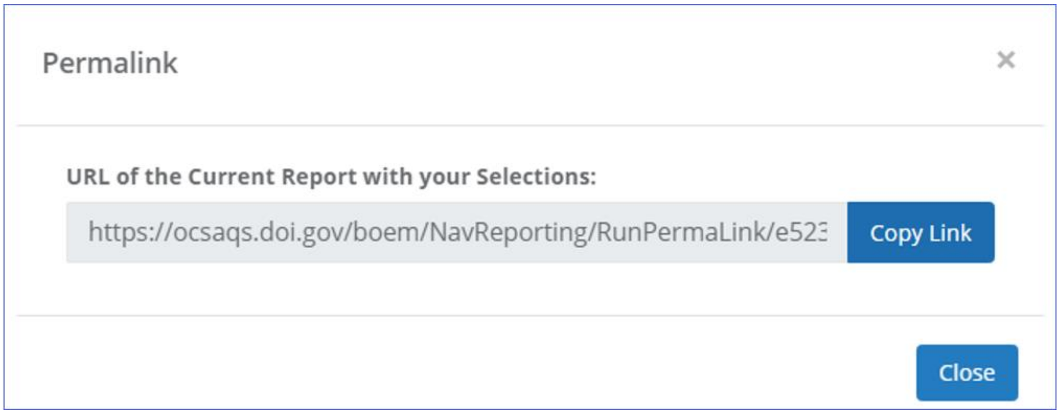


Figure 166. Permalink window

10 Settings

The **Settings** module allows you to update system configuration for yourself as well as review activities under your account. The Navigation Panel provides links for **User Options** and **Auditing** sections.

10.1 User Options

Pathway: Settings > User Options

User Options section includes the ability to change the active inventory you are working in and manage system notifications as shown in Figure 167.

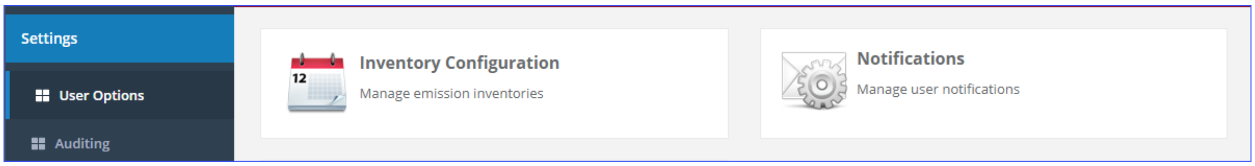


Figure 167. User Options page

10.1.1 Inventory Configuration

Pathway: Settings > User Options > Inventory Configuration

The **Inventory Configuration** page lists all inventories you have access to (Figure 168).

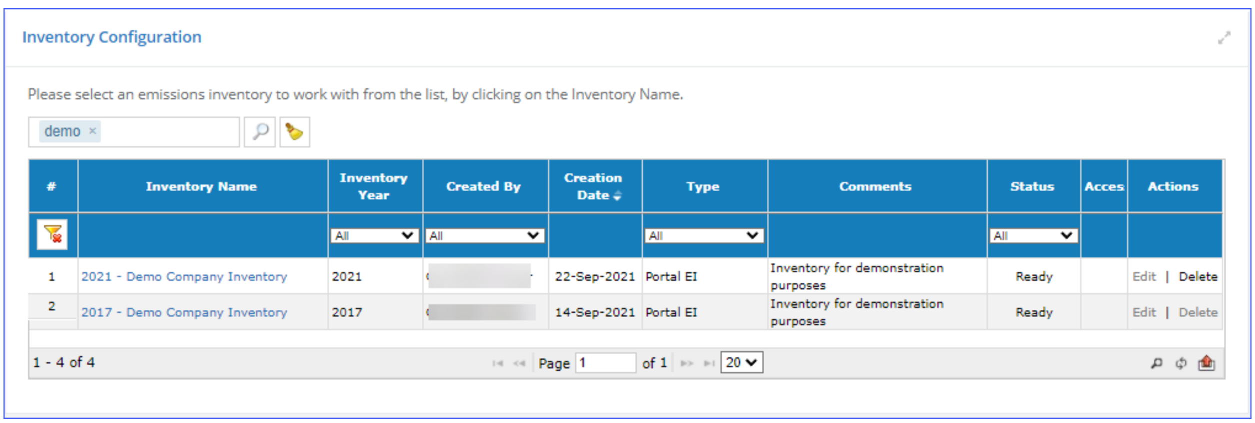


Figure 168. Inventory configuration

> ***IMPORTANT:*** The icon in the **Access** column means that the inventory is locked for editing. You can load this inventory and view its contents, but you will not be able to edit content, import new data, or run calculations.

From this screen you can:

- Click the link in the **Inventory Name** to load the inventory for viewing or editing, based on the access level.

  NOTE: Operators are given exclusive access to the inventory allocated to their specific company, while accessing inventories of other companies is not attainable.

10.1.2 Notifications

Pathway: Settings > User Options > Notifications

The **Notifications** page lists results of a variety of cloud processes you initiated (Figure 169).

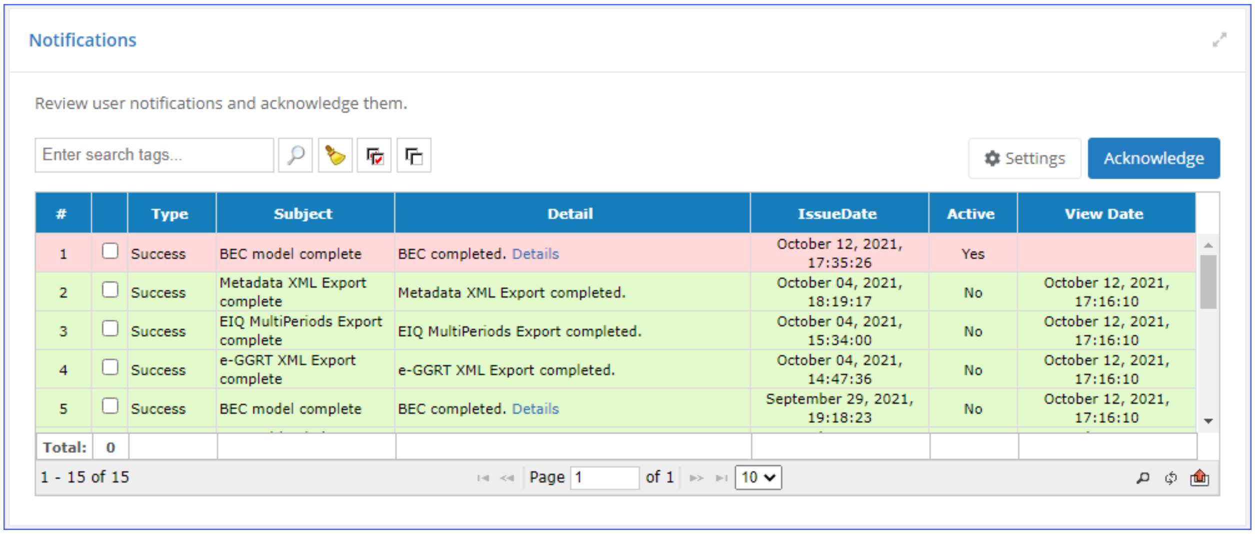


Figure 169. User notifications

The green notifications have been acknowledged, while pink notifications are new. New notifications are also shown as a number on the envelope notifications icon to the left of the user name – . To acknowledge notifications and marked them as “read”, check the box for each notification and click **Acknowledge**.

Here you can also specify how many notifications are shown when you click on the envelope button. To do so, click **Settings**, enter the desired number, and click **Save (**Figure 170).

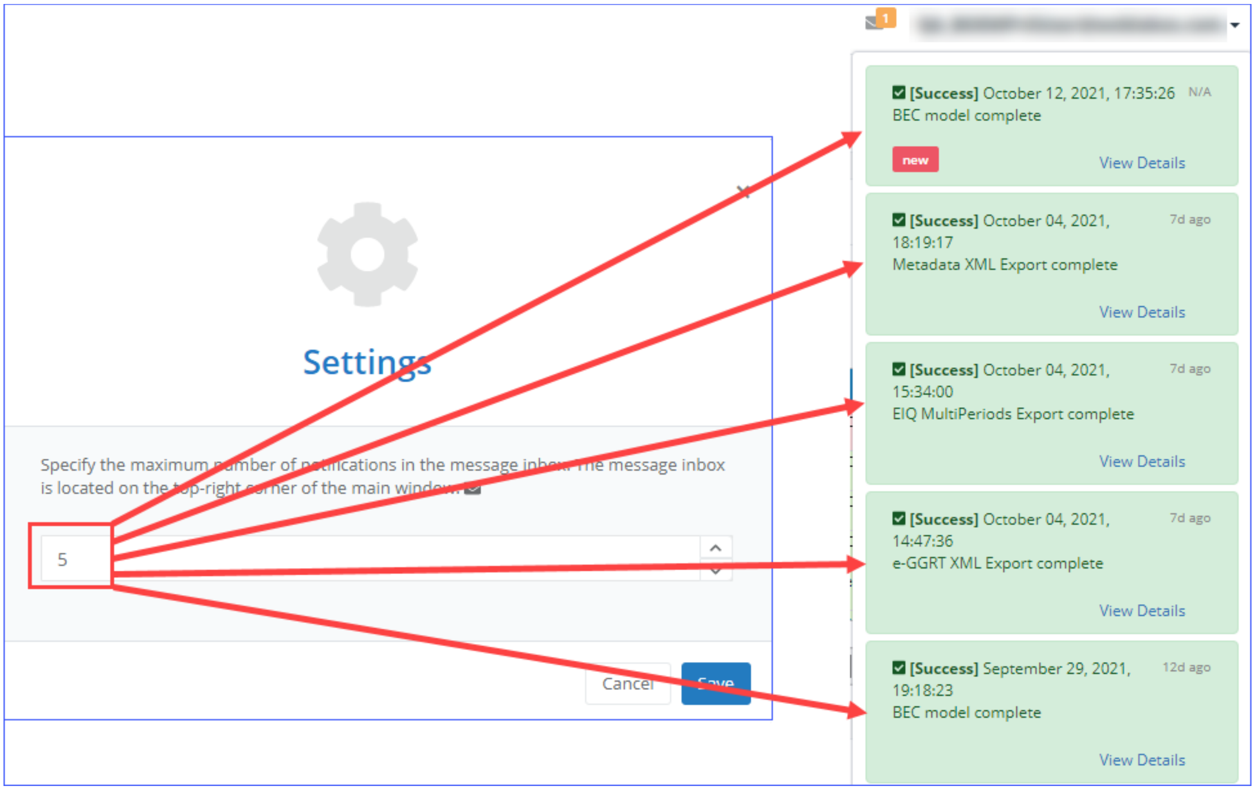


Figure 170. Notification settings

10.2 Auditing

Pathway: Settings > Auditing

The **Auditing** section allows you to review the activities and change log that took place during login. The two available navicons are shown in Figure 171.

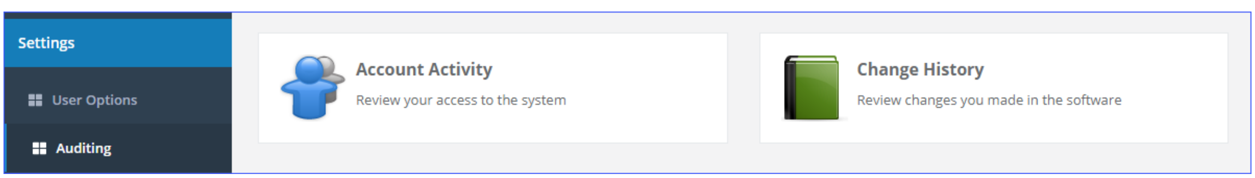


Figure 171. Auditing navicons

10.2.1 Account Activity

Pathway: Settings > Auditing > Account Activity

Account Activity displays a list of actions taken by you in the system.

Above the table you can find the following controls:

- **Time Period:** Set the time period for which you wish to view the activity. The default is **Today**.
- **Default:** This button resets the time period to the default setting.
- **Update:** This button refreshes the view.

10.2.2 Change History Report

Pathway: Settings > Auditing > Change History Report

Change History report allows you to review any changes made to the data in any inventory accessible to you (Figure 172).

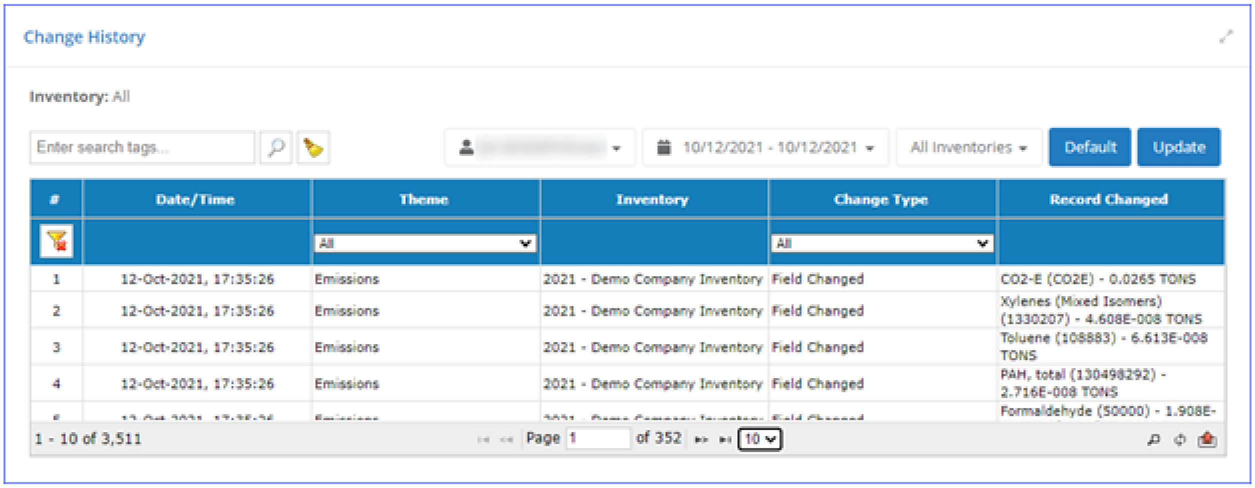


Figure 172. Change History report

Above the table you will find the following controls (Figure 173):

- **Search:** Search tool available for every list.
- **User:** Displays your user ID.
- **Time Period:** Set the time period for which you wish to view the change history. The default is **Today**.
- **Default:** This button resets the time period to the default setting.
- **Update:** This button refreshes the view.

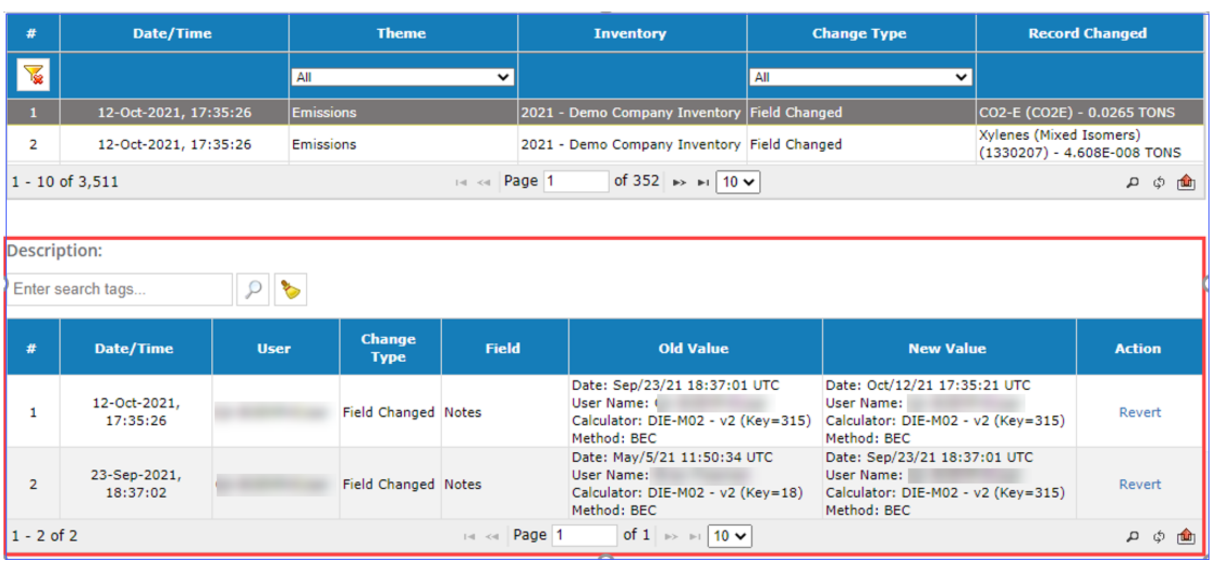


Figure 173. Change details

11 References

[API] American Petroleum Institute. 2021. Compendium of greenhouse gas emissions methodologies for the natural gas and oil industry. Washington (DC): American Petroleum Institute. 898 p. https://www.api.org/~/media/files/policy/esg/ghg/2021-api-ghg-compendium-110921.pdf

[USEPA] U.S. Environmental Protection Agency. 1995a. AP-42: compilation of air emission factors. Volume I: stationary point and area sources. Research Triangle Park (NC): U.S. Environmental Protection Agency, Office of Air and Radiation, Office of Air Quality Planning and Standards. [updated 2024 Nov; accessed 2024 Nov 27]. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors.

USEPA. 1995b. Protocol for equipment leak emission estimates. Washington (DC): U.S. Environmental Protection Agency. Office of Air Quality Planning Standards. 403 p. Report No.: EPA-453/R-95-017. https://www.epa.gov/sites/default/files/2020-09/documents/protocol_for_equipment_leak_emission_estimates.pdf

USEPA. 2015. WebFIRE. https://cfpub.epa.gov/webfire

Wilson D, Billings R, Chang R, Do B, Enoch S, Perez H, Sellers J. 2019. Year 2017 emissions inventory study. New Orleans (LA): U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. 231 p. Report No.: OCS Study BOEM 2019-072.

Appendix A – Platform Calculator Descriptions

This section provides a comprehensive overview of the calculation methods, emission factors, data requests, and control requests used in OCS AQS to estimate emissions from platform sources.

> ***NOTE:*** While the Activity & Emissions Manager (AEM) displays calculated emissions with six decimal points (where applicable), the OCS AQS calculators use the full precision of the emission factors for performing calculations.

A.1 AMI-000 (Amine Gas Sweetening Unit)

A.1.1 AMI-000 Calculation Method

The emission rates must be imported to OCS AQS using the **Amine Emission Rates Import** tool available within OCS AQS. You are required to provide the hourly emissions data as well as the hours of operation per month. The calculator AMI-000 Version 0 in OCS AQS will then calculate the monthly emissions as follows:

$$E = E_{hr} \times t \qquad (A-1)$$

where:

E = Emissions [lb/month]
E_{hr} = Hourly emissions of amine units [lb/hr]
t = Hours of operation per month [hr/month]

A.1.2 AMI-000 Data and Control Requests

The calculator AMI-000 Version 0 in OCS AQS calculates the monthly emissions from the amine gas sweetening unit using the imported hourly emission rates and the following **Data Request** fields shown in Figure A - 1.

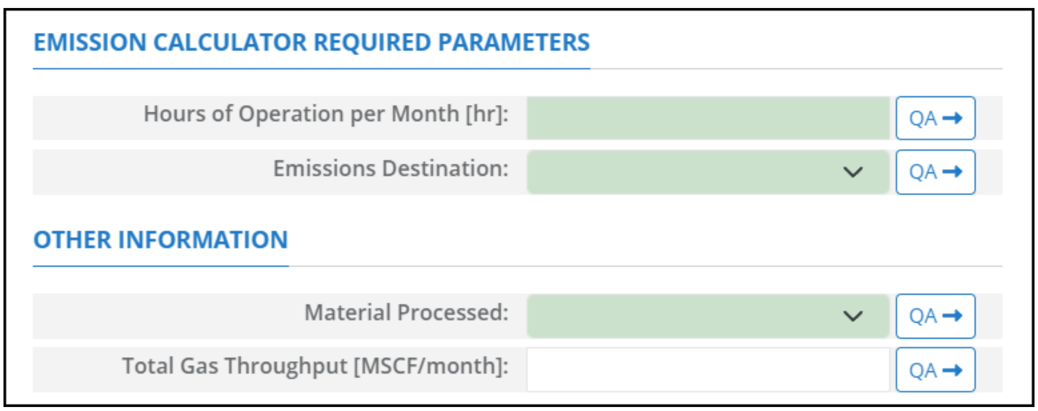


Figure A - 1. AMI-000 Data Request tab

1. Hours of Operation per Month [hr]: The total monthly hours of operation of the amine gas sweetening unit during this survey period.
2. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
3. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.

4. Total Gas Throughput [MSCF/month]: The total volume of gas processed in this amine unit during the specific monthly survey period, volume adjusted to standard temperature and pressure.

The calculator AMI-000 Version 0 in OCS AQS requires information about control devices accompanying the amine gas sweetening units using the following **Control Request** fields in Figure A - 2:

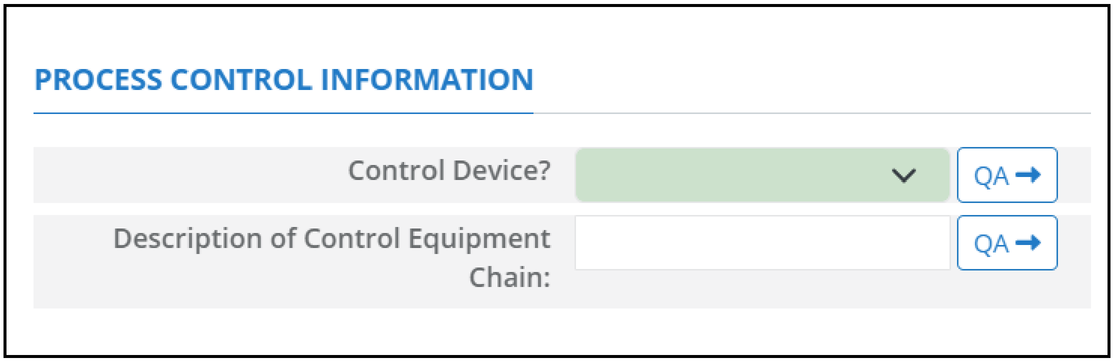


Figure A - 2. AMI Control Request tab

1. Control Device?: Is a control device or end of pipe treatment included in the process? This is a Yes/No question.
2. Description of Control Equipment: Provides a text field for details on the control equipment (if used).

A.2 BOI-M01R (Boilers, Heaters, and Burners – Diesel)

A.2.1 BOI-M01R Calculation Method

For boiler, heater, and burner units powered by diesel, the calculator BOI-M01R Version 5 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times 0.001 \times \frac{U}{7.1\ \text{lb/gal}} \qquad (A-2)$$

where:

E = Emissions [lb/month]

EF = Emission factor [lb/10^3 gal]

U = Total fuel usage [lb/month]

S = Fuel sulfur content [wt %] – This variable is not shown in the formula above but is a required field in OCS AQS and is used to obtain the sulfur dioxide (SO_2) EF – see Table A - 1 for SO_2.

Table A - 1 shows the EFs for units powered by diesel.

Table A - 1. EFs for boilers, heaters, and burners powered by diesel*

Pollutant	EF [lb/ 10^3 gal]
Volatile organic compound (VOC) †	0.2
Lead (Pb)	1.22E-03
Sulfur dioxide (SO_2) †	$142 \times S$
Nitrogen oxide (NO_x) †	24
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	0.25
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	1
Ammonia (NH_3)	0.8
Carbon monoxide (CO) †	5
Nitrous oxide (N_2O) †	0.26
Methane (CH_4)	0.052
Carbon dioxide (CO_2)	22,300
Arsenic	1.32E-03
Benzene	2.14E-04
Beryllium	2.78E-05
Cadmium	3.98E-04
Chromium VI	2.48E-04
Chromium III	5.97E-04
Ethylbenzene	6.36E-05
Formaldehyde	0.033
Mercury	1.13E-04
Toluene	6.2E-03
Xylenes	1.09E-04

[1] References: USEPA (1995a), Sections 1.3 and 1.4; USEPA (2015)

† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.2.2 BOI-M01R Data and Control Requests

The calculator BOI-M01R Version 5 in OCS AQS calculates the monthly emissions from a liquid-fueled unit powered by diesel using the following **Data Request** fields shown in Figure A - 3:

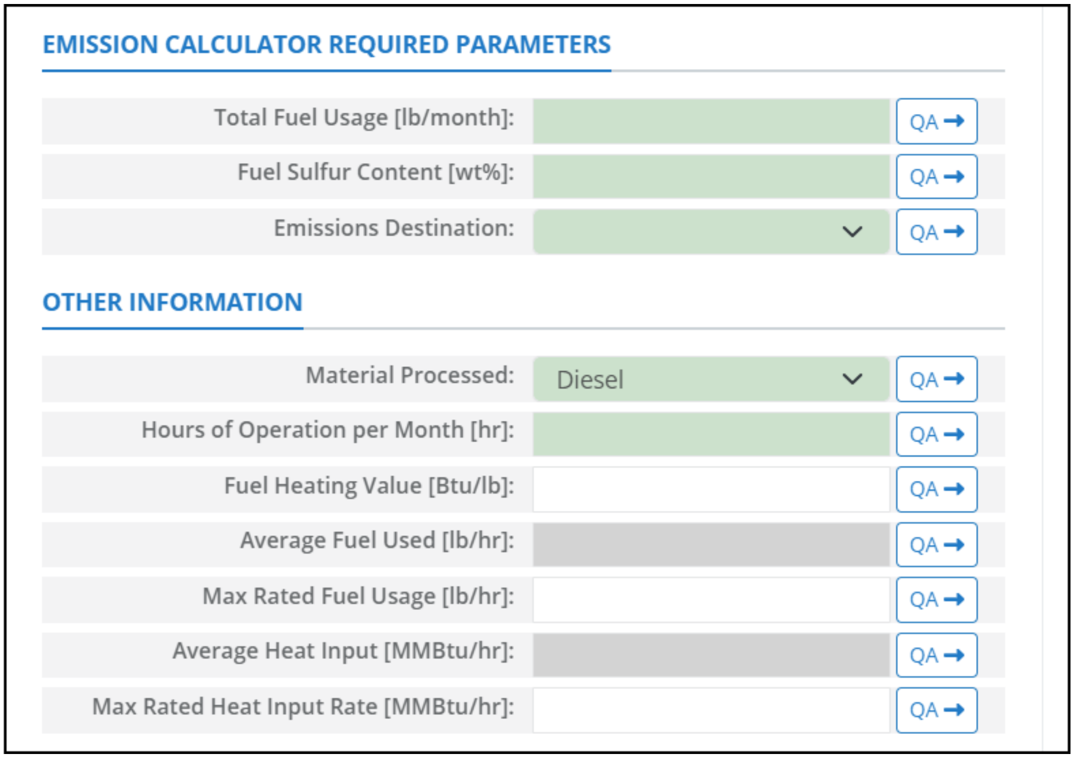


Figure A - 3. BOI-M01R Data Request tab

1. Total Fuel Usage [lb/month]: Total monthly rate of the liquid fuel used during the survey period.
2. Fuel Sulfur Content [wt%]: Weight percentage concentration of the sulfur content in the used liquid fuel. For example, if the fuel is 1.0% sulfur, then user enters 1 and not 0.01.
3. Emissions Destination: A drop-down list field to specify the emissions destination—whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit; on the other hand, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the liquid-fueled unit during the survey period.
6. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of the liquid fuel.
7. Average Fuel Used [lb/hr]: The average hourly rate of the used liquid fuel during the survey period. This field is auto-calculated.
8. Max Rated Fuel Usage [lb/hr]: The maximum hourly usage rate of the liquid fuel.
9. Average Heat Input [MMBtu/hr]: The average hourly heat input rate of liquid fuel. This field is auto-calculated.
10. Max Rated Heat Input Rate [MMBtu/hr]: The manufacturer's maximum rated heat input rate of the liquid fuel.

The calculator BOI-M01R Version 5 in OCS AQS calculates the monthly emissions with pollution control from a liquid-fueled unit powered by diesel using the following **Control Request** fields in Figure A - 4:

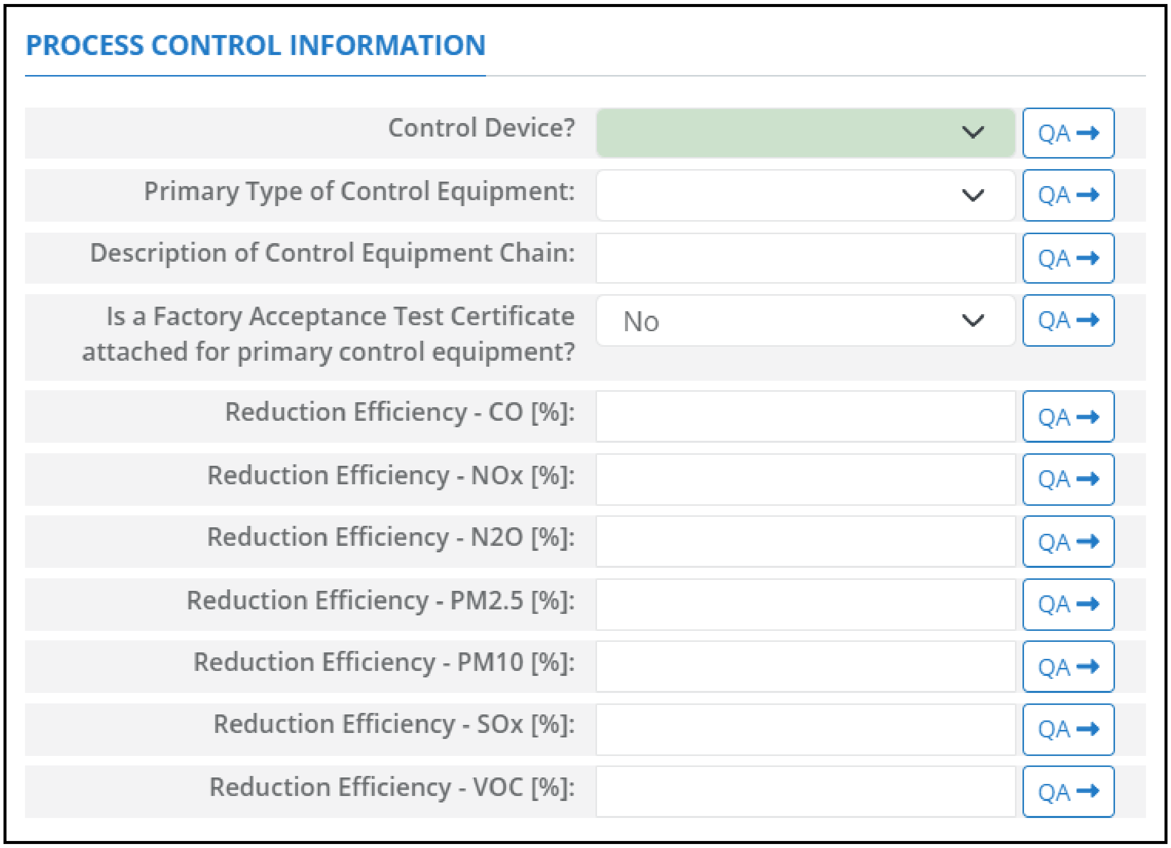


Figure A - 4. BOI-M01R Control Request tab

3. Control Device?: Is a control device or end of pipe treatment included in the process? This is a Yes/No question
4. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
5. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
6. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
7. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – N_2O [%]: This describes the average reduction of emitted N_2O using the control technology. If the total reduction of N_2O using a vapor recovery unit is 65%, enter “65” in the field
10. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
11. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.

12. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.
13. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.3 BOI-M02R (Boilers, Heaters, and Burners – Waste Oil)

A.3.1 BOI-M02R Calculation Method

For boiler, heater, and burner units powered by waste oil, the calculator BOI-M02R Version 4 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times 0.001 \times \frac{U}{7.1\ \mathrm{lb/gal}} \qquad (A-3)$$

where:

E = Emissions [lb/month]

EF = Emission factor [lb/10^3 gal]

U = Total fuel usage [lb/month]

S = Fuel sulfur content [wt %] – This variable is not shown in the formula above but is a required field in OCS AQS and is used to obtain the SO_2 EF – see Table A - 2 for SO_2.

Table A - 2 shows the EFs for units powered by waste oil.

Table A - 2. EFs for boilers, heaters, and burners powered by waste oil*

Pollutant	EF [lb/ 10^3 gal]
Volatile organic compound (VOC) †	0.28
Lead (Pb)	1.51E-03
Sulfur dioxide (SO_2) †	157 × *S*
Nitrogen oxides (NO_x) †	47
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	5.23 × *S* + 1.73
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	9.19 × *S* + 3.22
Ammonia (NH_3)	0.8
Carbon monoxide (CO) †	5
Nitrous oxide (N_2O) †	0.53
Methane (CH_4)	1
Carbon dioxide (CO_2)	24,400
Arsenic	1.32E-03
Benzene	2.14E-04
Beryllium	2.78E-05
Cadmium	3.98E-04
Chromium VI	2.48E-04
Chromium III	5.97E-04
Ethylbenzene	6.36E-05
Formaldehyde	0.033
Mercury	1.13E-04
Toluene	6.2E-03
Xylenes	1.09E-04

[1] References: USEPA (1995a), Sections 1.3 and 1.4; USEPA (2015)

† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.3.2 BOI-M02R Data and Control Requests

The calculator BOI-M02R Version 4 in OCS AQS calculates the monthly emissions from a liquid-fueled unit powered by waste oil using the following **Data Request** fields shown in Figure A - 5:

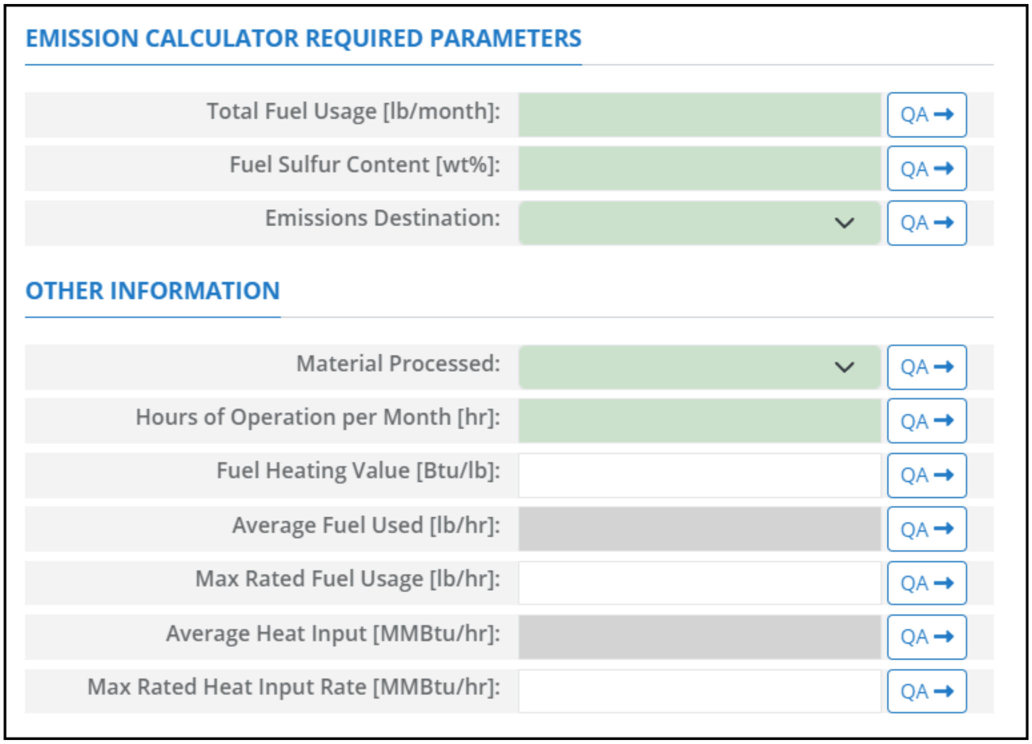


Figure A - 5. BOI-M02R Data Request tab

1. Total Fuel Usage [lb/month]: Total monthly rate of the liquid fuel used during the survey period.
2. Fuel Sulfur Content [wt%]: The weight percentage concentration of the sulfur content in the used liquid fuel. For example, if the fuel is 1.0% sulfur, then user enters 1 and not 0.01.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Crude Oil.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the liquid-fueled unit during the survey period.
6. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of the liquid fuel.
7. Average Fuel Used [lb/hr]: The average hourly rate of liquid fuel used during the survey period. This field is auto-calculated.
8. Max Rated Fuel Usage [lb/hr]: The maximum hourly usage rate of the liquid fuel.
9. Average Heat Input [MMBtu/hr]: The average hourly heat input rate of liquid fuel. This field is auto-calculated.
10. Max Rated Heat Input Rate [MMBtu/hr]: The manufacturer's maximum rated heat input rate of the liquid fuel.

The calculator BO2-M02R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a liquid-fueled unit powered by waste oil using the following **Control Request** fields in Figure A - 6:

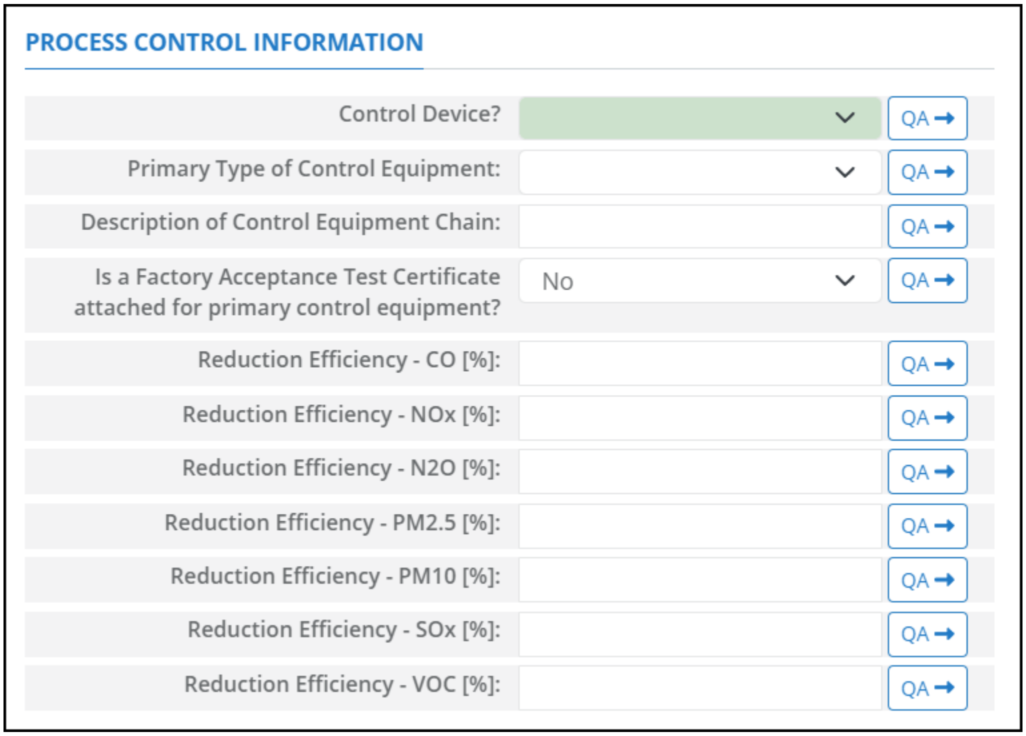


Figure A - 6. BOI-M02R Control Request tab

1. Control Device?: Is a control device or end of pipe treatment included in the process? This is a Yes/No question
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – N_2O [%]: This describes the average reduction of emitted N_2O using the control technology. If the total reduction of N_2O using a vapor recovery unit is 65%, enter “65” in the field
8. Reduction Efficiency –$PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.
10. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.

11. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.4 BOI-M03R (Boilers, Heaters, and Burners – Natural Gas, Process Gas, or Waste Gas)

A.4.1 BOI-M03R Calculation Method

For boiler, heater, and burner units powered by natural gas, process gas, or waste gas, the calculator BOI-M03R Version 4 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times 0.001 \times U \qquad (A-4)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMscf]
U = Total fuel usage [Mscf/month]

Table A - 3 shows the EFs for units powered by natural gas, process gas, or waste gas.

Table A - 3. EFs for boilers, heaters, and burners powered by gas*[*]

Pollutant	EF [lb/MMscf]
Volatile organic compound (VOC) †	5.5
Lead (Pb)	5E-04
Sulfur dioxide (SO_2) †	0.6
Nitrogen oxides (NO_x) †	190
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	1.9
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	1.9
Ammonia (NH_3)	3.2
Carbon monoxide (CO) †	84
Nitrous oxide (N_2O) †	2.2
Methane (CH_4)	2.3
Carbon dioxide (CO_2)	120,000
Arsenic	2E-04
Benzene	2.1E-03
Beryllium	1.2E-05
Cadmium	1.1E-03
Chromium III	1.34E-03
Chromium VI	5.60E-05
Formaldehyde	0.075
Hexane	1.8
Mercury	2.6E-04
Toluene	3.40E-03

[1] References: USEPA (1995a), Sections 1.3 and 1.4; USEPA (2015)

† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.4.2 BOI-M03R Data and Control Requests

The calculator BOI-M03R Version 4 in OCS AQS calculates the monthly emissions from a gas-fueled unit powered by natural gas, process gas, or waste gas using the following **Data Request** fields show in Figure A - 7:

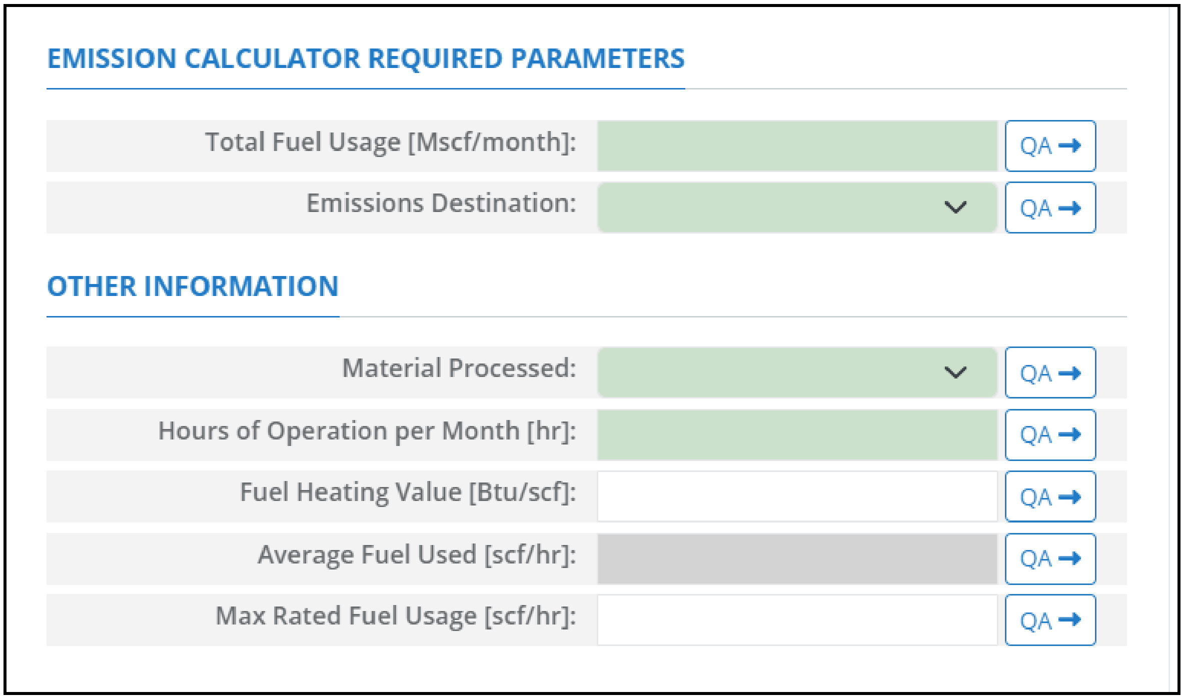


Figure A - 7. BOI-M03R Data Request tab

1. Total Fuel Usage [Mscf/month]: Total monthly rate of the gas fuel used during the survey period.
2. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
3. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas / Exhaust Gas.
4. Hours of Operation per Month [hr]: The total monthly hours of operation of the gas-fueled unit during the survey period.
5. Fuel Heating Value [Btu/scf]: The amount of heat released during the combustion of a specified amount of the gas fuel.
6. Average Fuel Used [scf/hr]: The average hourly rate of gas fuel used during the survey period. This field is auto-calculated.
7. Max Rated Fuel Usage [scf/hr]: The maximum hourly usage rate of the gas fuel.

The calculator BOI-M03R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a gas-fueled unit powered by natural gas, process gas, or waste gas using the following **Control Request** fields in Figure A - 8:

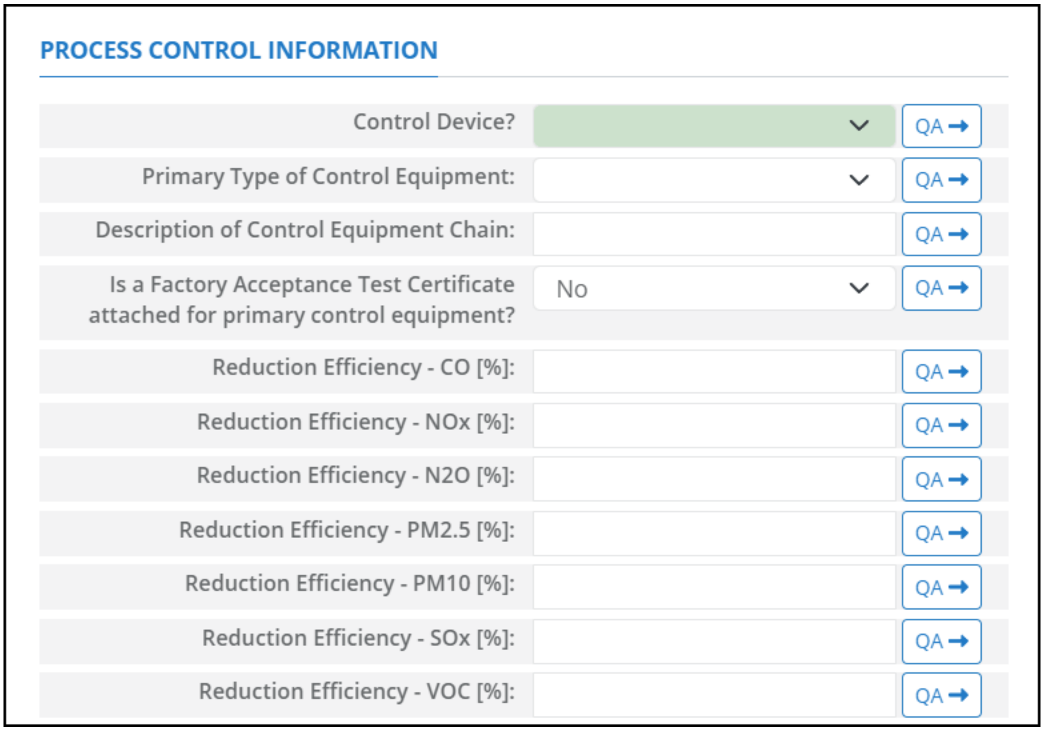


Figure A - 8. BOI-M03R Control Request tab

1. Control Device?: Is a control device or end of pipe treatment included in the process? This is a Yes/No question
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter "65" in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter "65" in the field.
7. Reduction Efficiency – N_2O [%]: This describes the average reduction of emitted N_2O using the control technology. If the total reduction of N_2O using a vapor recovery unit is 65%, enter "65" in the field
8. Reduction Efficiency –$PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter "65" in the field.
9. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter "65" in the field.

10. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.
11. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.5 DIE-M01R (Gasoline Engines)

A.5.1 DIE-M01R Calculation Method

For gasoline engines, the calculator DIE-M01R Version 4 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times 10^{-6} \times U \times 6.17 \frac{\text{lb}}{\text{gal}} \times H \qquad (A-5)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
U = Total fuel usage [gallons/month]
H = Fuel heating value [Btu/lb]

Table A - 4 shows the EFs for gasoline engines.

Table A - 4. EFs for gasoline engines*

Pollutant	EF [lb/MMBtu]
Volatile organic compound (VOC) †	3.03
Sulfur dioxide (SO_2) †	0.084
Nitrogen oxides (NO_x) †	1.63
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI) †	0.1
Particulate matter less than 10 microns – Primary (PM_{10} -PRI) †	0.1
Carbon monoxide (CO) †	0.99
Carbon dioxide (CO_2)	154

[1] References: USEPA (1995a), Sections 3.3 and 3.4; USEPA (2015)

† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.5.2 DIE-M01R Data and Control Requests

The calculator DIE-M01R Version 4 in OCS AQS calculates the monthly emissions from gasoline engines using the following **Data Request** fields shown in Figure A - 9:

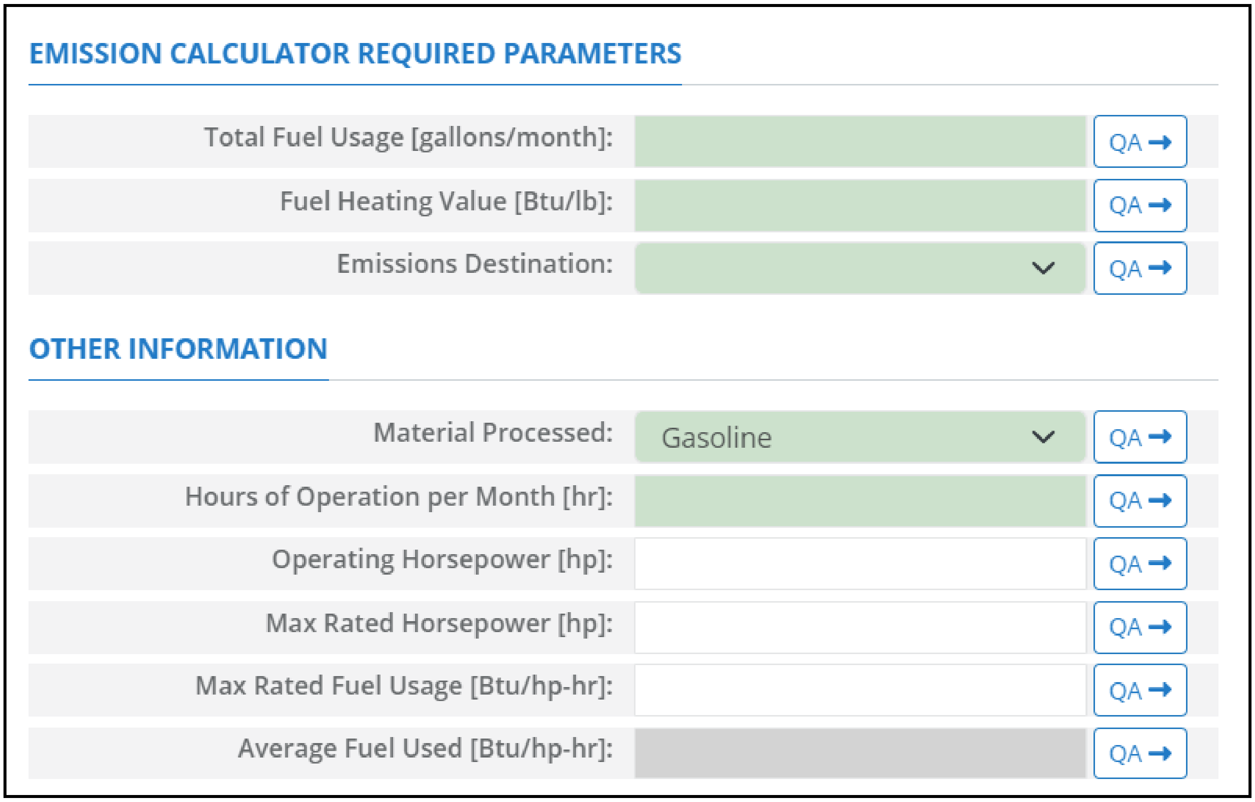


Figure A - 9. DIE-M01R Data Request tab

1. Total Fuel Usage [gallons/month]: Total monthly rate of the gasoline fuel used during the survey period.
2. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of the gasoline fuel.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Gasoline.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the unit during the survey period.
6. Operating Horsepower [hp]: The operating horsepower of the gasoline engine.
7. Max Rated Horsepower [hp]: The manufacturer’s maximum rated horsepower of the gasoline engine.
8. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the gasoline fuel.
9. Average Fuel Used [Btu/hp-hr]: The average hourly rate of gasoline fuel used during the survey period. This field is auto-calculated.

The calculator DIE-M01R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a gasoline engine using the following **Control Request** fields in Figure A - 10:

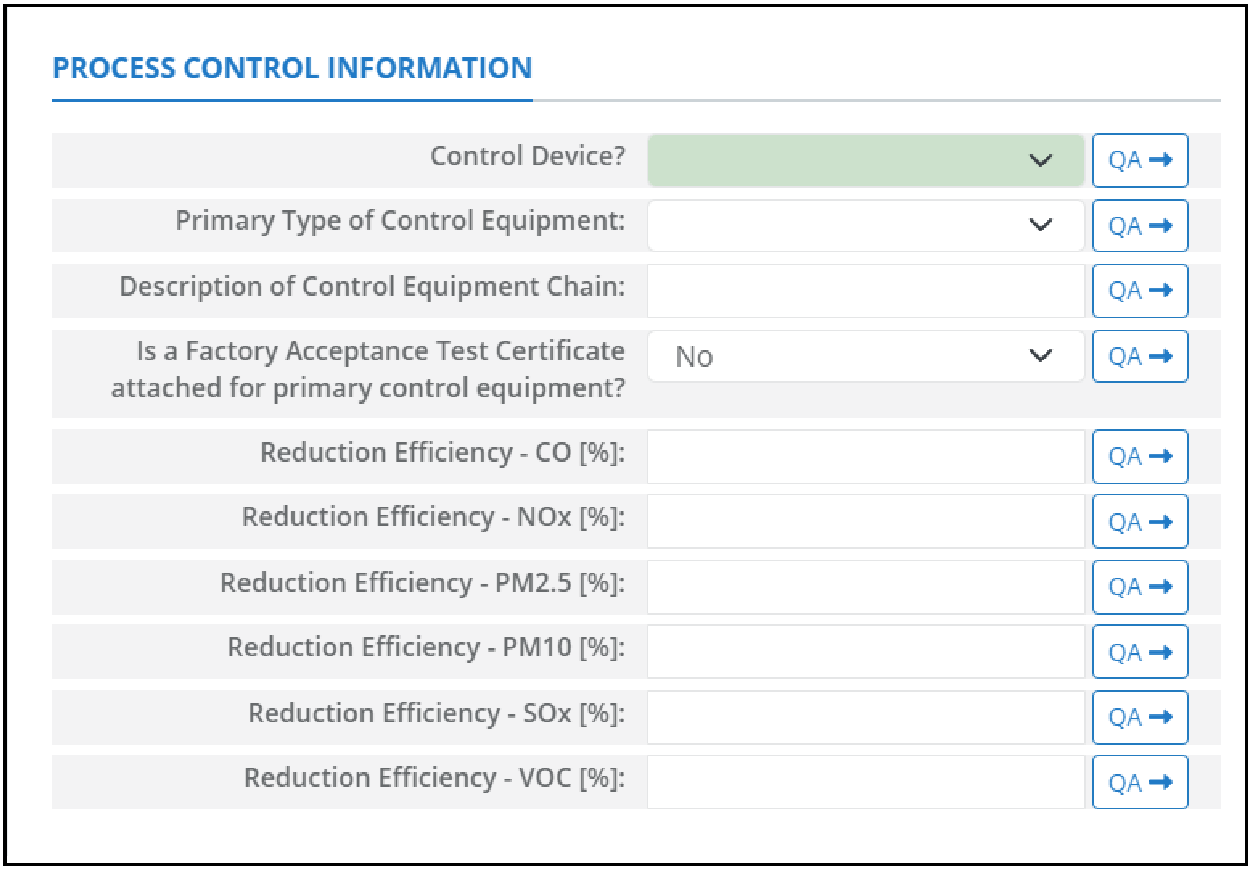


Figure A - 10. DIE-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NOx [%]: This describes the average reduction of emitted NOx using the control technology. If the total reduction of NOx using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.

8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.
10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.6 DIE-M02R (Diesel Engines, Max HP < 600)

A.6.1 DIE-M02R Calculation Method

For diesel engines with max HP < 600, the calculator DIE-M02R Version 5 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times 10^{-6} \times U \times 7.1 \frac{\text{lb}}{\text{gal}} \times H \qquad (A-6)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
U = Total fuel usage [gallons/month]
H = Fuel heating value [Btu/lb]

Table A - 5 shows the EFs for diesel engines with max HP < 600.

Table A - 5. EFs for diesel engines with max HP < 600*

Pollutant	EF [lb/MMBtu]
Volatile organic compound (VOC) †	0.36
Sulfur dioxide (SO_2) †	0.29
Nitrogen oxides (NO_x)†	4.41
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI) †	0.31
Particulate matter less than 10 microns – Primary (PM_{10} -PRI) †	0.31
Carbon monoxide (CO) †	0.95
Carbon Ddoxide (CO_2)	164
Acetaldehyde	7.67E-04
Benzene	9.33E-04
Formaldehyde	1.18E-03
Polycyclic aromatic hydrocarbon (PAH)	1.68E-04
Toluene	4.09E-04
Xylenes	2.85E-04

[1] References: USEPA (1995a), Sections 3.3 and 3.4; USEPA (2015)
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.6.2 DIE-M02R Data and Control Requests

The calculator DIE-M02R Version 5 in OCS AQS calculates the monthly emissions from a diesel engine where Max HP < 600 using the following **Data Request** fields in Figure A - 11:

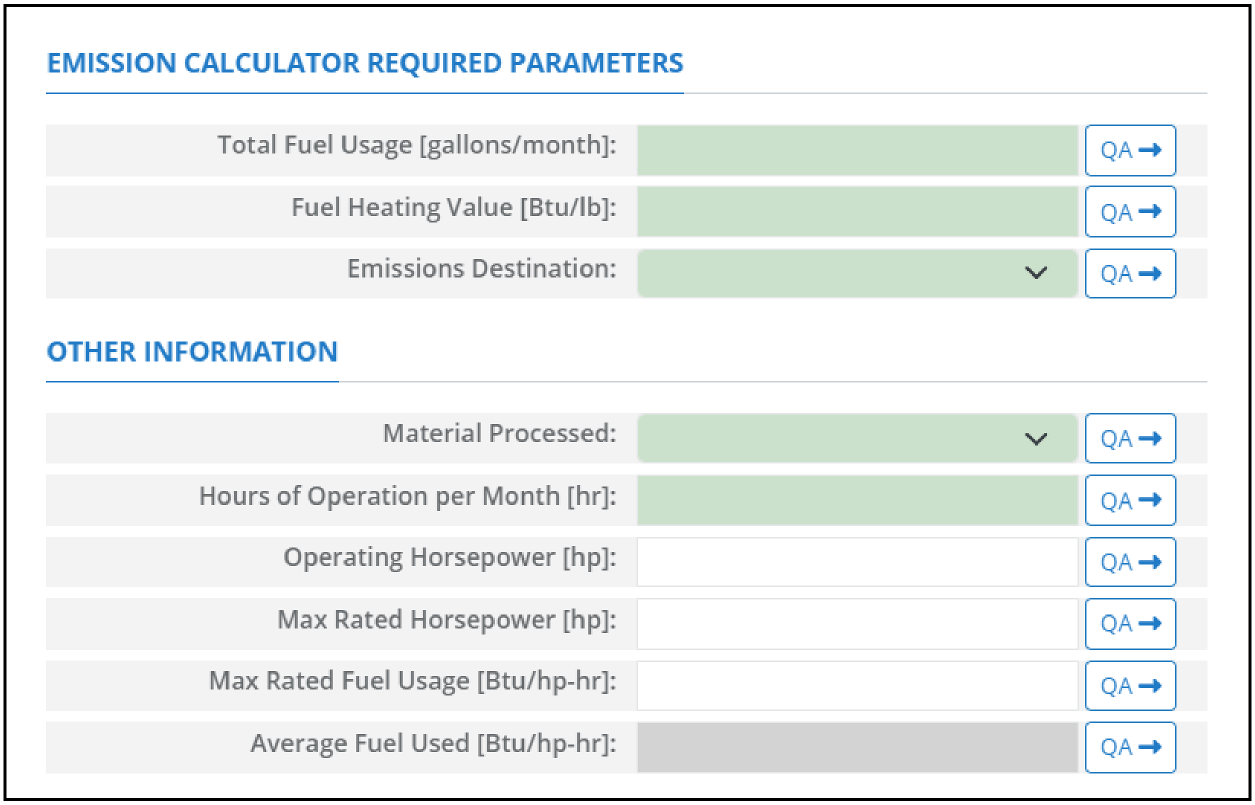


Figure A - 11. DIE-M02R Data Request tab

1. Total Fuel Usage [gallons/month]: Total monthly rate of the diesel fuel used during the survey period.
2. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of the diesel fuel.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the unit during the survey period.
6. Operating Horsepower [hp]: The operating horsepower of the diesel engine.
7. Max Rated Horsepower [hp]: The manufacturer's maximum rated horsepower of the diesel engine.
8. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the diesel fuel.
9. Average Fuel Used [Btu/hp-hr]: The average hourly rate of diesel fuel used during the survey period. This field is auto-calculated.

The calculator DIE-M02R Version 5 in OCS AQS calculates the monthly emissions with pollution control from a diesel engine where Max HP < 600 using the following **Control Request** fields in Figure A - 12:

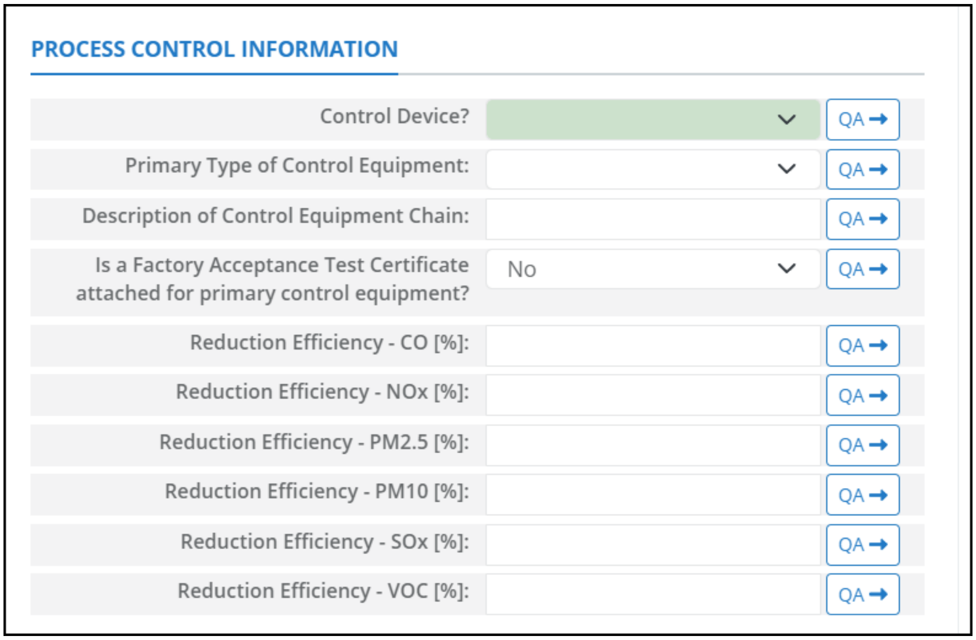


Figure A - 12. DIE-M02R Control Request tab.

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NOx [%]: This describes the average reduction of emitted NOx using the control technology. If the total reduction of NOx using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.

10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*: ** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.7 DIE-M03R (Diesel Engines, Max HP >= 600)

A.7.1 DIE-M03R Calculation Method

For diesel engines with max HP ≥ 600, the calculator DIE-M03R Version 5 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times 10^{-6} \times U \times 7.1 \frac{\text{lb}}{\text{gal}} \times H \qquad (A-7)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
U = Total fuel usage [gallons/month]
H = Fuel heating value [Btu/lb]
S = Fuel sulfur content [wt %] – This variable is not shown in the formula above but is a required field in OCS AQS and is used to obtain the SO_2 EF – see Table A - 6 for SO_2.

Table A - 6 shows the EFs for diesel engines with max HP ≥ 600.

Table A - 6. EFs for diesel engines with max HP ≥ 600*

Pollutant	EF [lb/MMBtu]
Volatile organic compound (VOC) †	0.0819
Sulfur Dioxide (SO_2) †	$1.01 \times S$
Nitrogen Oxides (NO_x)†	3.2
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI) †	0.0556
Particulate matter less than 10 microns – Primary (PM_{10} -PRI) †	0.0573
Carbon Monoxide (CO) †	0.85
Methane (CH_4)	8.1E-03
Carbon Dioxide (CO_2)	165
Acetaldehyde	2.52E-05
Benzene	7.76E-04
Formaldehyde	7.89E-05
Polycyclic aromatic hydrocarbon (PAH)	2.12E-04
Toluene	2.81E-04
Xylenes	1.93E-04

[1] References: USEPA (1995a), Sections 3.3 and 3.4; USEPA (2015)

† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.7.2 DIE-M03R Data and Control Requests

The calculator DIE-M03R Version 5 in OCS AQS calculates the monthly emissions from a diesel engine where Max HP >= 600 using the following **Data Request** fields in Figure A - 13:

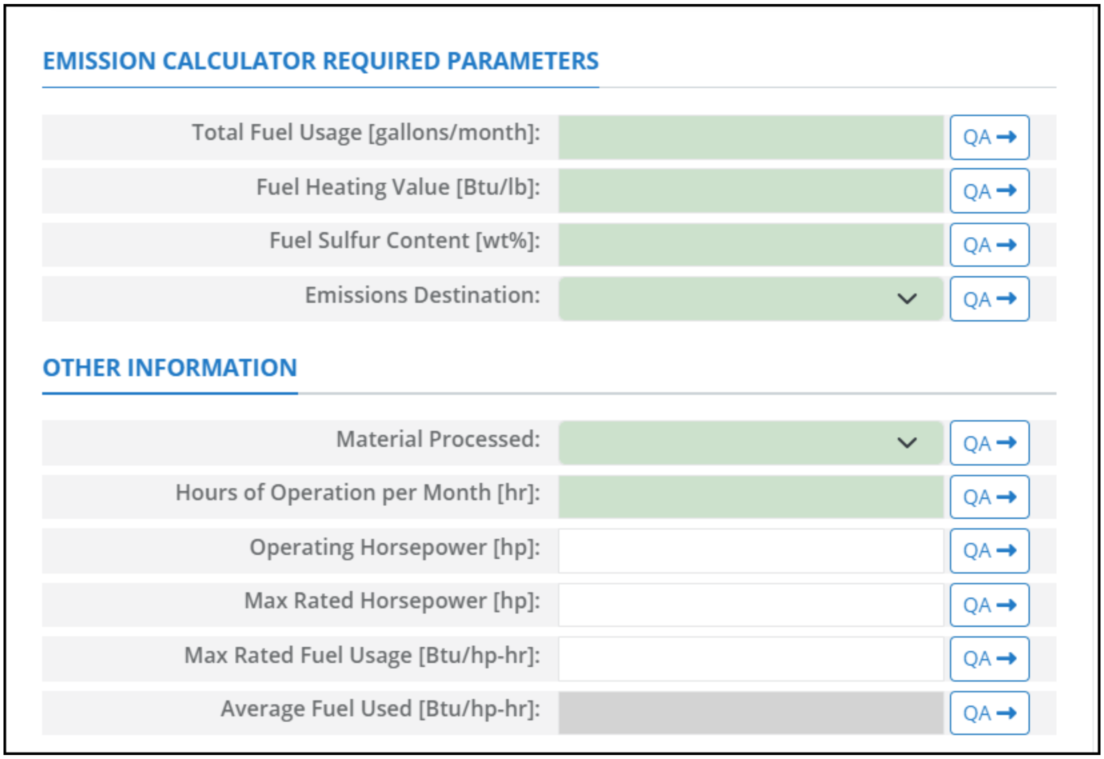


Figure A - 13. DIE-M03R Data Request tab

1. Total Fuel Usage [gallons/month]: Total monthly rate of the diesel fuel used during the survey period.
2. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of the diesel fuel.
3. Fuel Sulfur Content [wt%]: The weight percentage concentration of the sulfur content in the used diesel fuel. For example, if the fuel is 1.0% sulfur, then user enters 1 and not 0.01.
4. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
5. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil.
6. Hours of Operation per Month [hr]: The total monthly hours of operation of the unit during the survey period.
7. Operating Horsepower [hp]: The operating horsepower of the diesel engine.
8. Max Rated Horsepower [hp]: The manufacturer’s maximum rated horsepower of the diesel engine.
9. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the diesel fuel.
10. Average Fuel Used [Btu/hp-hr]: The average hourly rate of diesel fuel used during the survey period. This field is auto-calculated.

The calculator DIE-M03R Version 5 in OCS AQS calculates the monthly emissions with pollution control from a diesel engine where Max HP >= 600 using the following **Control Request** fields in Figure A - 14:

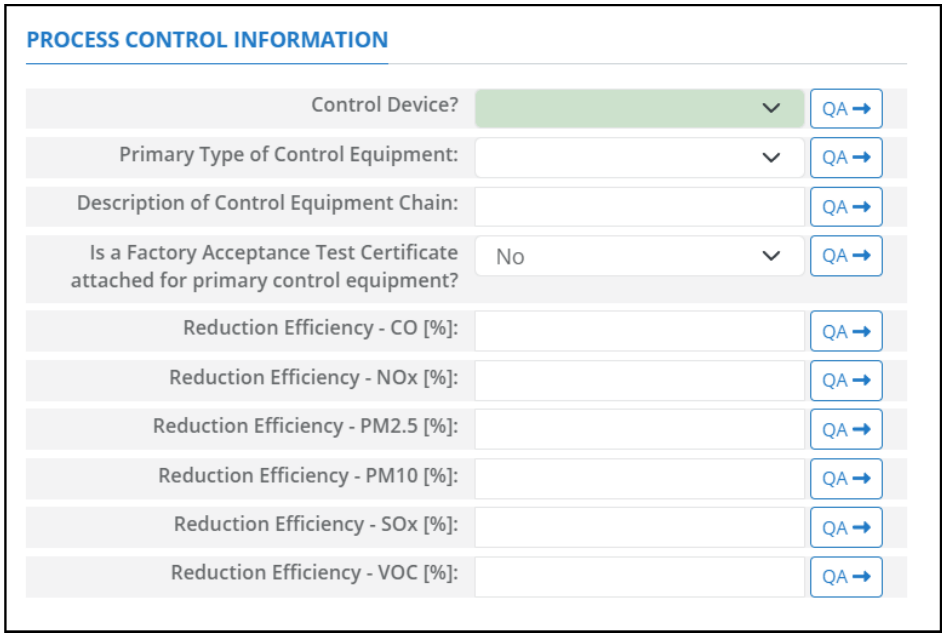


Figure A - 14. DIE-M03R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NOx [%]: This describes the average reduction of emitted NOx using the control technology. If the total reduction of NOx using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.

10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.8 DRI-M01R (Drilling Equipment – Gasoline Fuel)

A.8.1 DRI-M01R Calculation Method

For gasoline-powered drilling equipment, the calculator DRI-M01R Version 4 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times 10^{-6} \times U \times 6.17\,\frac{\text{lb}}{\text{gal}} \times 20{,}300\,\frac{\text{Btu}}{\text{lb}} \qquad (A-8)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
U = Total fuel usage [gallons/month]

Table A - 7 shows the EFs for units powered by gasoline.

Table A - 7. EFs for drilling equipment powered by gasoline*

Pollutant	EF [lb/MMBtu]
Volatile organic compound (VOC) †	3.03
Sulfur dioxide (SO_2) †	0.084
Nitrogen oxides (NO_x) †	1.63
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI) †	0.1
Particulate matter less than 10 microns – Primary (PM_{10} -PRI) †	0.1
Carbon monoxide (CO) †	0.99
Carbon dioxide (CO_2)	154

[1] References: USEPA (1995a), Sections 3.2, 3.3, and 3.4; USEPA (2015)

† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.8.2 DRI-M01R Data and Control Requests

The calculator DRI-M01R Version 4 in OCS AQS calculates the monthly emissions from a drilling equipment powered by gasoline fuel using the following **Data Request** fields in Figure A - 15:

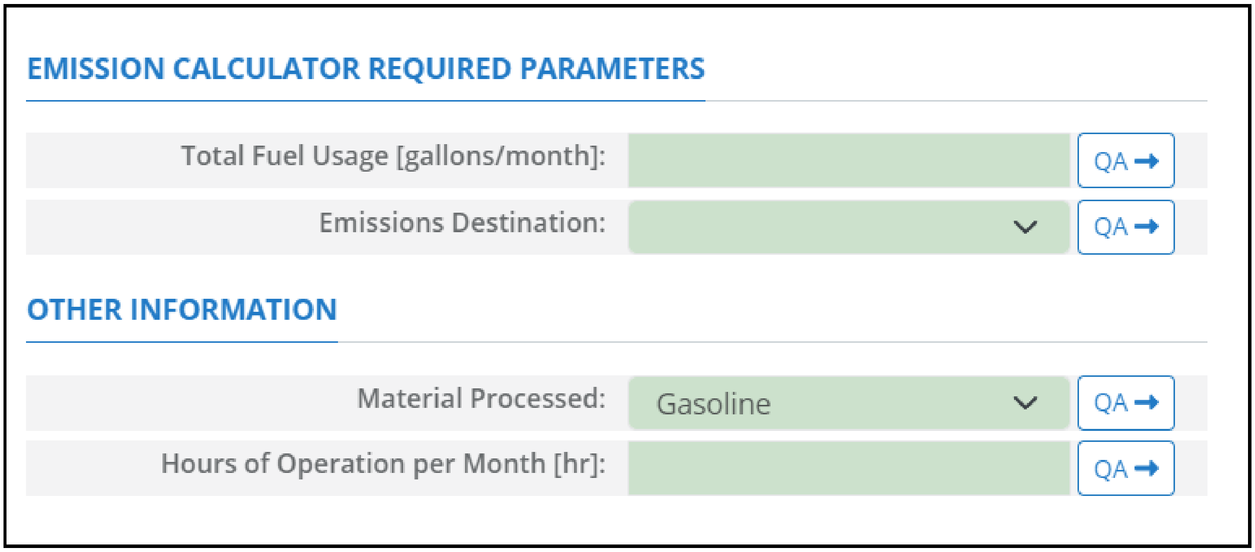


Figure A - 15. DRI-M01R Data Request tab

1. Total Fuel Usage [gallons/month]: Total monthly rate of the gasoline fuel used during the survey period.
2. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
3. Material processed: A drop-down list field to specify the processed material: Gasoline.
4. Hours of Operation per Month [hr]: The total monthly hours of operation of the unit during the survey period.

The calculator DRI-M01R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a drilling equipment powered by gasoline fuel using the following **Control Request** fields in Figure A - 16:

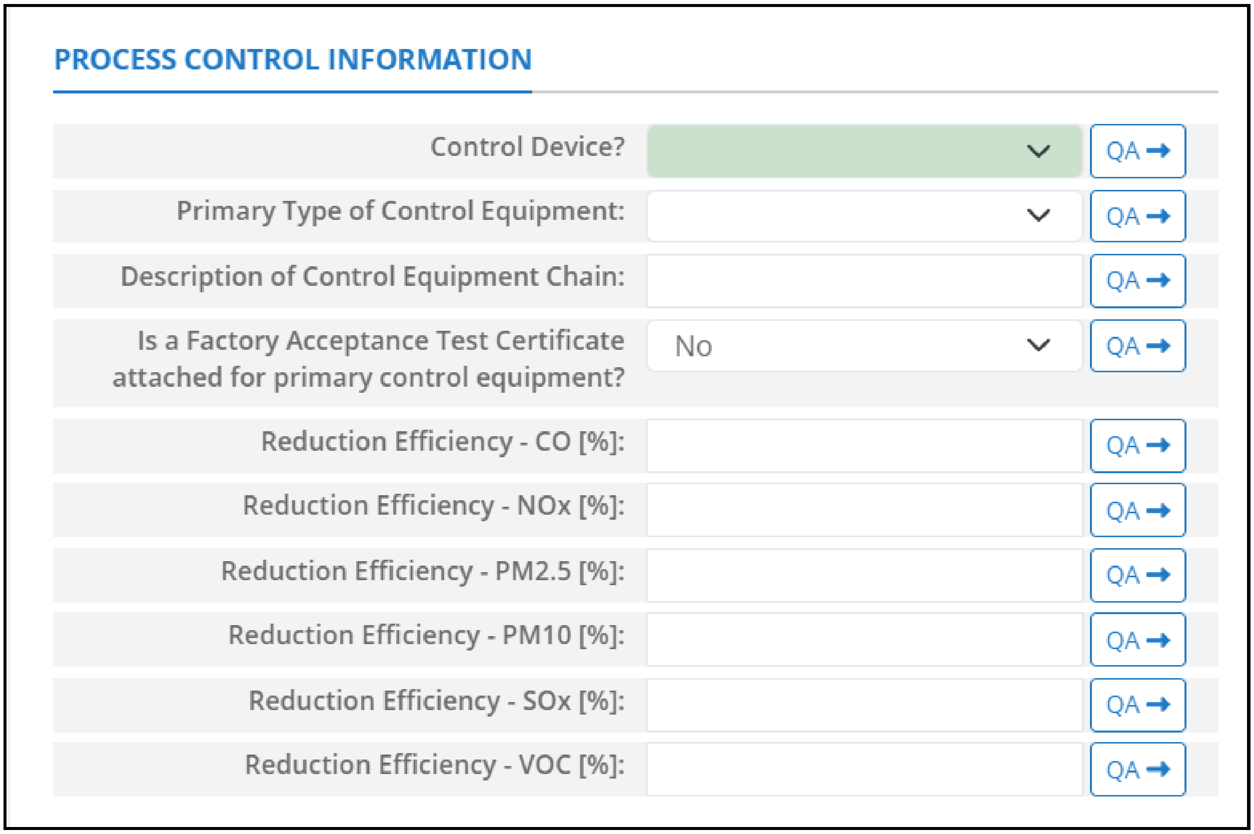


Figure A - 16. DRI-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NOx using the control technology. If the total reduction of NOx using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.

8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter "65" in the field.
9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter "65" in the field.
10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter "65" in the field.

    IMPORTANT**:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.9 DRI-M02R (Drilling Equipment – Diesel Fuel)

A.9.1 DRI-M02R Calculation Method

For diesel-powered drilling equipment, the calculator DRI-M02R Version 5 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times 10^{-6} \times U \times 7.1\,\frac{\text{lb}}{\text{gal}} \times 19{,}300\,\frac{\text{Btu}}{\text{lb}} \qquad (A-9)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
U = Total fuel usage [gallons/month]
S = Fuel sulfur content [wt %] – This variable is not shown in the formula above but is a required field in OCS AQS and is used to obtain the SO_2 EF – see Table A - 8 for SO_2.

Table A - 8 shows the EFs for units powered by diesel.

Table A - 8. EFs for drilling equipment powered by diesel*

Pollutant	EF [lb/MMBtu]
Volatile organic compound (VOC) †	0.0819
Sulfur Dioxide (SO_2) †	1.01 × *S*
Nitrogen Oxides (NO_x) †	3.2
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI) †	0.0556
Particulate matter less than 10 microns – Primary (PM_{10} -PRI) †	0.0573
Carbon Monoxide (CO) †	8.1E-03
Methane (CH_4)	0.85
Carbon Dioxide (CO_2)	165
Acetaldehyde	2.52E-05
Benzene	7.76E-04
Formaldehyde	7.89E-05
Polycyclic aromatic hydrocarbon (PAH)	2.12E-04
Toluene	2.81E-04
Xylenes	1.93E-04

[1] References: USEPA (1995a), Sections 3.2, 3.3, and 3.4; USEPA (2015)
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.9.2 DRI-M02R Data and Control Requests

The calculator DRI-M02R Version 5 in OCS AQS calculates the monthly emissions from a drilling equipment powered by diesel fuel using the following **Data Request** fields in Figure A - 17:

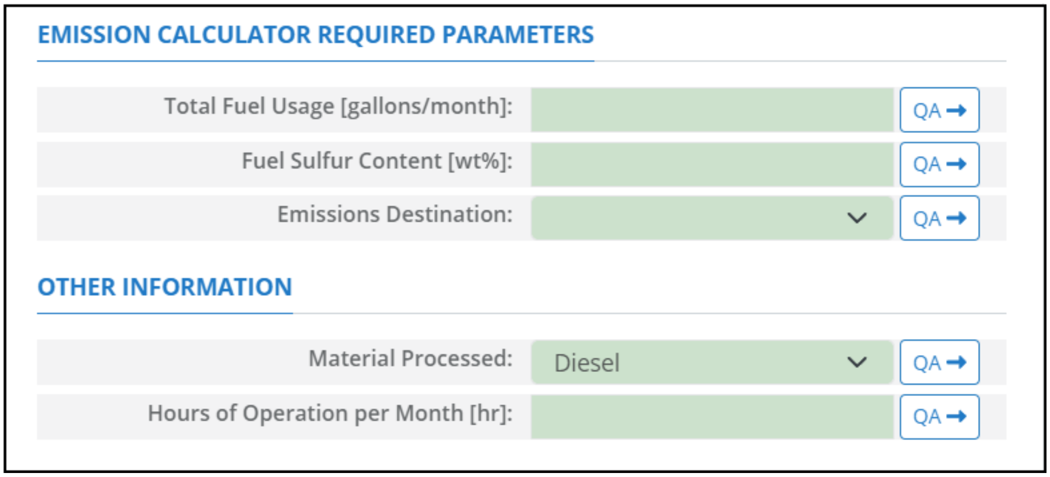


Figure A - 17. DRI-M02R Data Request tab

1. Total Fuel Usage [gallons/month]: Total monthly rate of the diesel fuel used during the survey period.
2. Fuel Sulfur Content [wt%]: The weight percentage concentration of the sulfur content in the used diesel fuel. For example, if the fuel is 1.0% sulfur, then user enters 1 and not 0.01.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the unit during the survey period.

The calculator DRI-M02R Version 5 in OCS AQS calculates the monthly emissions with pollution control from a drilling equipment powered by diesel fuel using the following **Control Request** fields in Figure A - 18:

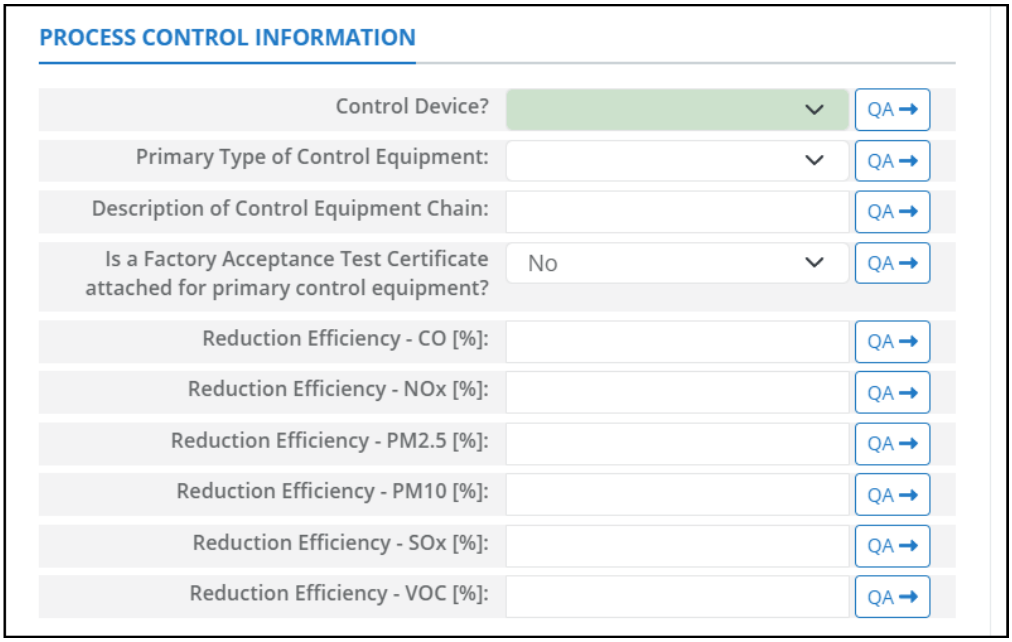


Figure A - 18. DRI-M02R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NOx using the control technology. If the total reduction of NOx using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.

10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.10 DRI-M03R (Drilling Equipment – Natural Gas Fuel)

A.10.1 DRI-M03R Calculation Method

For drilling equipment powered by natural gas, the calculator DRI-M03R Version 4 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times U \times 0.001 \qquad (A-10)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMscf]
U = Total fuel usage [Mscf/month]

Table A - 9 shows the EFs for units powered by natural gas.

Table A - 9. EFs for drilling equipment powered by natural gas*

Pollutant	EF [lb/MMscf]
Volatile organic compound (VOC) †	75.3
Sulfur Dioxide (SO_2) †	0.6
Nitrogen Oxides (NO_x) †	2,467.5
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI) †	4.9
Particulate matter less than 10 microns – Primary (PM_{10} -PRI) †	4.9
Carbon Monoxide (CO) †	2,127.3
Methane (CH_4)	755
Carbon Dioxide (CO_2)	112,200
Acetaldehyde	5.86
Benzene	1.06
Formaldehyde	38.54
Ethylbenzene	0.03
Polycyclic aromatic hydrocarbon (PAH)	0.09
Toluene	0.51
Xylenes	0.2

[1] References: USEPA (1995a), Sections 3.2, 3.3, and 3.4; USEPA (2015)
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.10.2 DRI-M03R Data and Control Requests

The calculator DRI-M03R Version 4 in OCS AQS calculates the monthly emissions from a drilling equipment powered by natural gas fuel using the following **Data Request** fields in Figure A - 19:

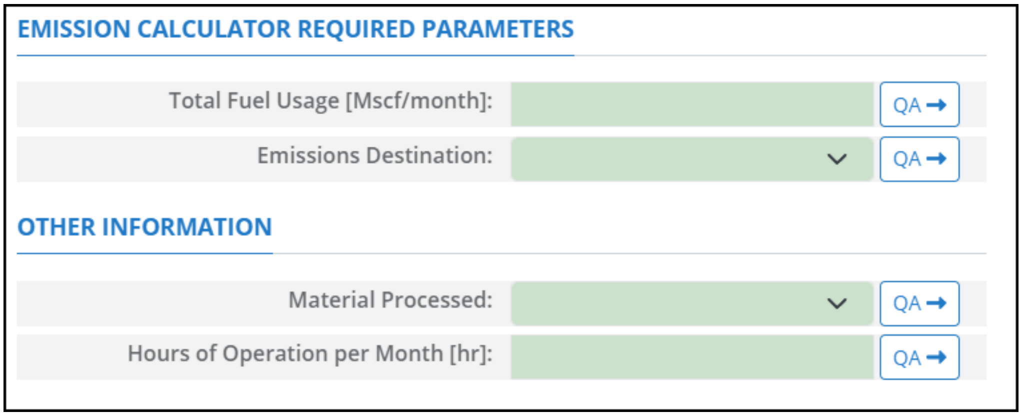


Figure A - 19. DRI-M03R Data Request tab

1. Total Fuel Usage [Mscf/month]: Total monthly rate of the natural gas fuel used during the survey period.
2. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to the system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
3. Material Processed: A drop-down list field to specify the processed material: Natural Gas/ Process Gas.
4. Hours of Operation per Month [hr]: The total monthly hours of operation of the unit during the survey period.

The calculator DRI-M03R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a drilling equipment powered by natural gas fuel using the following **Control Request** fields in Figure A - 20:

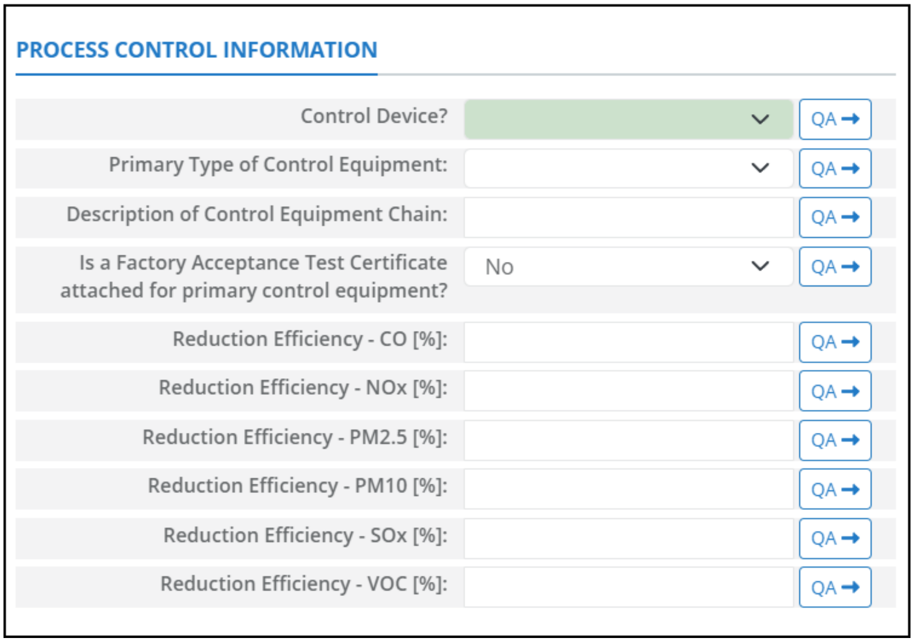


Figure A - 20. DRI-M03R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NOx using the control technology. If the total reduction of NOx using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.

10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.11 FLA-M01 (Combustion Flare)

A.11.1 FLA-M01 Calculation Method

For combustion flares (flaring processes), the FLA-M01 Version 4 calculator in OCS AQS calculates the monthly emissions of pollutants listed in Table A - 10 as follows:

$$E = V \times H \times EF \times 0.001 \qquad (\text{A} - 11)$$

where:

E = Emissions [lb/month]
V = Total volume of gas flared (not including pilot) [Mscf/month]
H = Flare gas heating value [Btu/scf]
EF = Emission factor [lb/MMBtu], which can depend on **smoke conditions**, provided as operator input (see below)

Table A - 10 shows the EFs for combustion flares.

Table A - 10. EFs for combustion flares[*]

Pollutant	EF [lb/MMBtu]
Nitrogen Oxides (NO_x)	0.068
Particulate matter less than 2.5 and 10 microns – Filterable ($PM_{2.5}$ – Fil and PM_{10} – Fil) **no smoke**	0.0
Particulate matter less than 2.5 and 10 microns – Filterable ($PM_{2.5}$ – Fil and PM_{10} – Fil) **light smoke**	2E-03
Particulate matter less than 2.5 and 10 microns – Filterable ($PM_{2.5}$ – Fil and PM_{10} – Fil) **medium smoke**	0.01
Particulate matter less than 2.5 and 10 microns – Filterable ($PM_{2.5}$ – Fil and PM_{10} – Fil) **heavy**	0.02
Carbon monoxide (CO)	0.31
Nitrous oxide (N_2O)	2E-03
Carbon dioxide (CO_2)	117.65
Acetaldehyde	0.05519
Benzene	1.59E-03
Ethylbenzene	9E-05
Formaldehyde	0.08302
Hexane	7.48E-03
Toluene	1.42E-03
2,2,4 Trimethylpentane	2.11E-03
Xylenes	4E-04

[1] References: USEPA (1995a), Sections 13.5 and 1.4; USEPA (2015)

Flaring process emissions for SO_2, VOC, and CH_4 are calculated using different formulation, as described below. Among other differences, each requires the use of its molecular weight in lb/lb-mol, as shown below.

For SO_2, which has a molecular weight of $64\ \text{lb/lb-mol}$, emissions are calculated as follows:

$$E_{SO_2} = \frac{Eff}{100} \times \frac{10^{-6}}{\text{ppm}} \times \frac{64\ \text{lb/lb-mol}}{379.4\,\frac{\text{scf}}{\text{lb-mol}}} \times 1{,}000\ \times \text{V} \times C_{H_2S} \qquad (\text{A} - 12)$$

where:

E_{SO_2} = SO_2 emissions [lb/month]
Eff = Combustion efficiency of the flare [%]
V = Total volume of gas flared (not including pilot) [Mscf/month]
C_{H_2S} = Concentration of Hydrogen sufide (H_2S) in the flare gas [ppm]

For VOC, emissions are calculated as follows:

$$E_{VOC} = V \times \left(1 - \frac{Eff}{100}\right) \times \frac{m_{VOC}\ \text{lb/lb-mol}}{379.4\,\frac{\text{scf}}{\text{lb-mol}}} \times 1{,}000 \qquad (A - 13)$$

where:

E_{VOC} = VOC emissions [lb/month]
Eff = Combustion efficiency of the flare [%]
V = Total volume of gas flared (not including pilot) [Mscf/month]
m_{VOC} = The mole weight of VOC - this is automatically calculated in OCS AQS from the sales gas data

For CH_4, which has a molecular weight of 16.04 lb/lb-mol, emissions are calculated as follows:

$$E_{CH_4} = V \times \left(1 - \frac{Eff}{100}\right) \times \frac{16.04\ \text{lb/lb-mol}}{379.4\,\frac{\text{scf}}{\text{lb-mol}}} \times 1{,}000 \qquad (A - 14)$$

where:

E_{CH_4} = CH_4 emissions [lb/month]
Eff = Combustion efficiency of the flare [%]
V = Total volume of gas flared (not including pilot) [Mscf/month]

A.11.2 FLA-M01 Data and Control Requests

The calculator FLA-M01 Version 4 in OCS AQS calculates the monthly emissions from a combustion flare using the following **Data Request** fields in Figure A - 21:

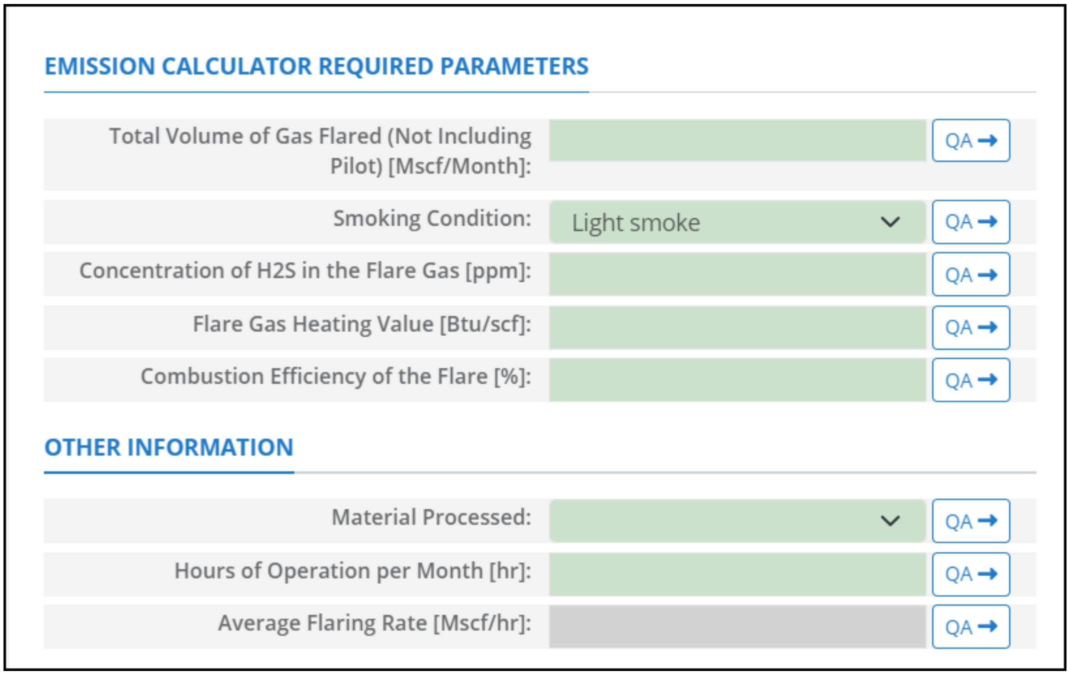


Figure A - 21. FLA-M01 Data Request tab

1. Total Volume of Gas Flared (Not Including Pilot) [Mscf/Month]: The total volume of flare gas during the survey period, <u>without the pilot flared gas.</u>
2. Smoking Condition: A drop-down list field to specify the condition of the flare emitted smoke: No Smoke / Light Smoke / Medium Smoke / Heavy Smoke. Smoking condition determines the PM10 and PM2.5 emission factors used in the calculations (Wilson et al. 2019). Default selection is Light Smoke
3. Concentration of H_2S in the Flare Gas [ppm]: The ppm concentration of hydrogen sulfide present in the flare gas.
4. Flare Gas Heating Value [Btu/scf]: The amount of heat released during the combustion of a specified amount of the flare gas.
5. Combustion Efficiency of the Flare [%]: The percentage efficiency of complete combustion, or the percentage of hydrocarbon conversion to carbon dioxide (CO_2).
6. Material Processed: A drop-down list field to specify the processed material: Gas/ Natural Gas / Process Gas / Exhaust gas.
7. Hours of Operation per Month [hr]: The total monthly hours of operation of the unit during the survey period.
8. Hours of Operation per Month [hr]: The total monthly hours of operation of the unit during the survey period.
9. Average flaring rate [Mscf/hr]. The flaring hourly volumetric rate. This field is auto-calculated.

A.12 FLA-M02 (Combustion Flares – Pilot)

A.12.1 FLA-M02 Calculation Method

The calculator FLA-M02 Version 4 in OCS AQS calculates the flare pilot process monthly emissions as follows:

$$E = P \times D \times EF \times 0.001 \qquad (A-15)$$

where:

E = Emissions [lb/month]
P = Pilot feed rate [Mscf/day]
D = Number of days in month [Day]
EF = Emission factor [lb/MMscf]

Table A - 11 shows the EFs for flare pilot.

Table A - 11. EFs for flare pilot*

Pollutant	EF [lb/MMscf]
Volatile organic compound (VOC)	5.5
Lead (Pb)	5E-04
Nitrogen oxides (NO_x)	100
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil)	1.9
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil)	1.9
Ammonia (NH_3)	3.2
Sulfur dioxide (SO_2)	0.6
Carbon monoxide (CO)	84
Nitrous oxide (N_2O)	2.2
Methane (CH_4)	2.3
Carbon dioxide (CO_2)	120,000
Arsenic	2E-04
Benzene	2.1E-03
Beryllium	1.2E-05
Cadmium	1.1E-03
Chromium III	1.344E-03
Chromium VI	5.6E-05
Formaldehyde	0.075
Hexane	1.8
Mercury	2.6E-04
Toluene	3.4E-03

[1] References: USEPA (1995a), Sections 13.5 and 1.4; USEPA (2015)

A.12.2 FLA-M02 Data and Control Requests

The calculator FLA-M02 Version 4 in OCS AQS calculates the monthly emissions from a flare pilot process using the following **Data Request** fields in Figure A - 22:

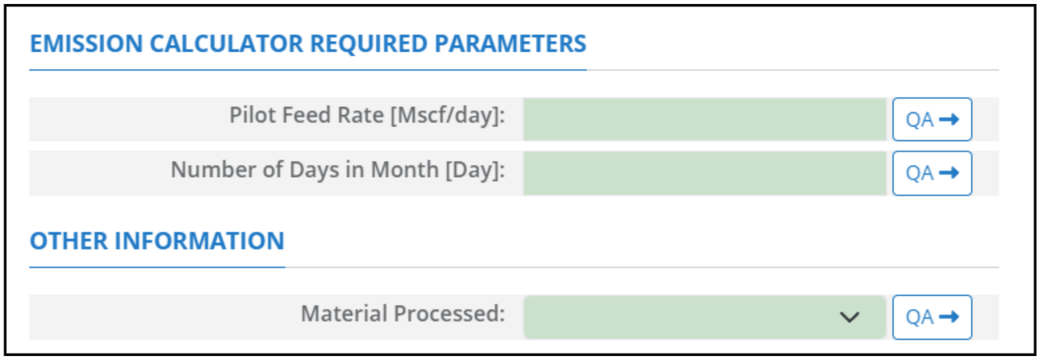


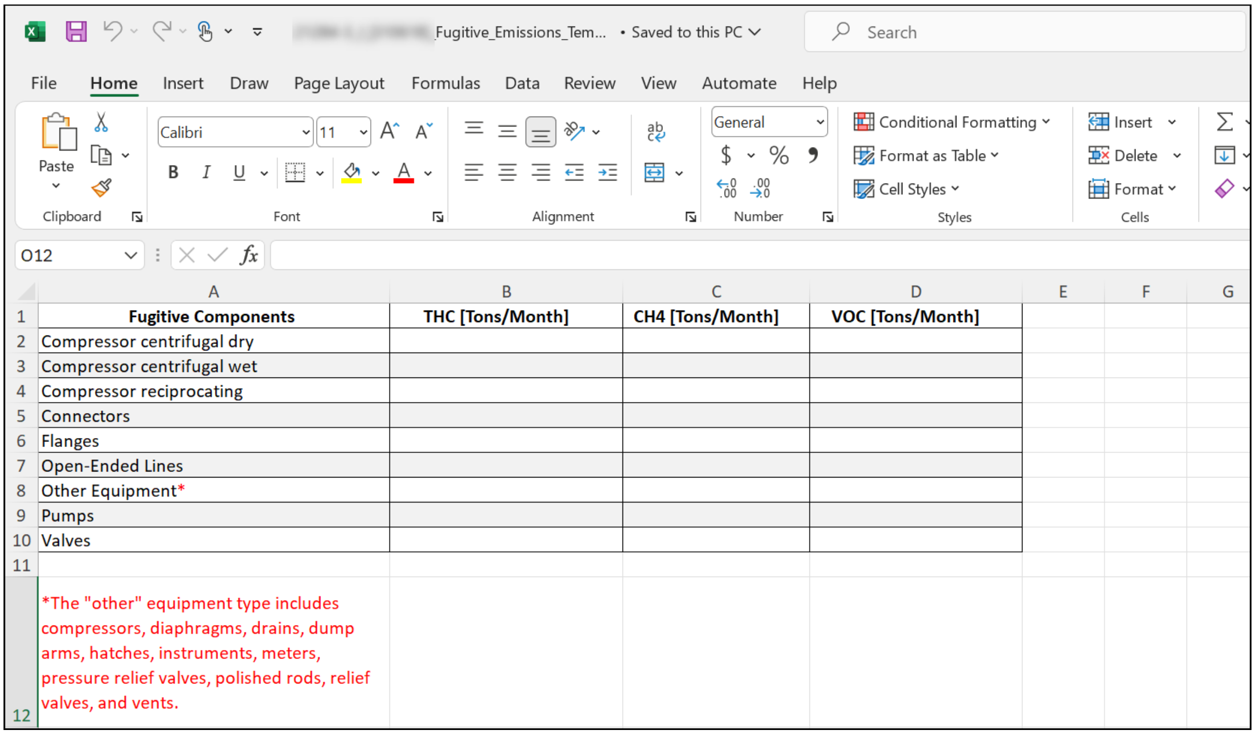
Figure A - 22. FLA-M02 Data Request tab

1. Pilot Feed Rate [Mscf/day]: Daily volumetric flowrate of gas fed to the pilot.
2. Number of Days in Month [Day]: The number of days in the month of the survey period.
3. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas / Process Gas / Exhaust gas.

A.13 FUG-I01 (Fugitive Sources)

A.13.1 FUG-I01 Calculation Method

OCS AQS offers the FUG-I01 calculator to enable the import of externally calculated monthly fugitive component emissions. This emissions data must be imported into OCS AQS using the **Apply Leak Detection Approach** wizard found in the Activity Emissions Manager (AEM) tool (Section 3.2.4). You are required to export a predefined Excel® template, enter the fugitive component emissions, and then import it back into OCS AQS. Figure A - 23 below shows the pre-defined template for one month. See Section 3.2.4.2 for more details on how to import/export this template.



Fugitive Components	THC [Tons/Month]	CH4 [Tons/Month]	VOC [Tons/Month]
Compressor centrifugal dry			
Compressor centrifugal wet			
Compressor reciprocating			
Connectors			
Flanges			
Open-Ended Lines			
Other Equipment*			
Pumps			
Valves			

*The "other" equipment type includes compressors, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents.

Figure A - 23. Fugitive emissions template file

***IMPORTANT*:** When utilizing this calculator, you are still required to provide the component counts for the purposes of data quality assurance and control. However, these component counts will not impact the emissions data you import.

A.13.2 FUG-I01 Data and Control Requests

The calculator FUG-I01 Version 1 in OCS AQS utilizes the following **Data Request** fields in Figure A - 24:

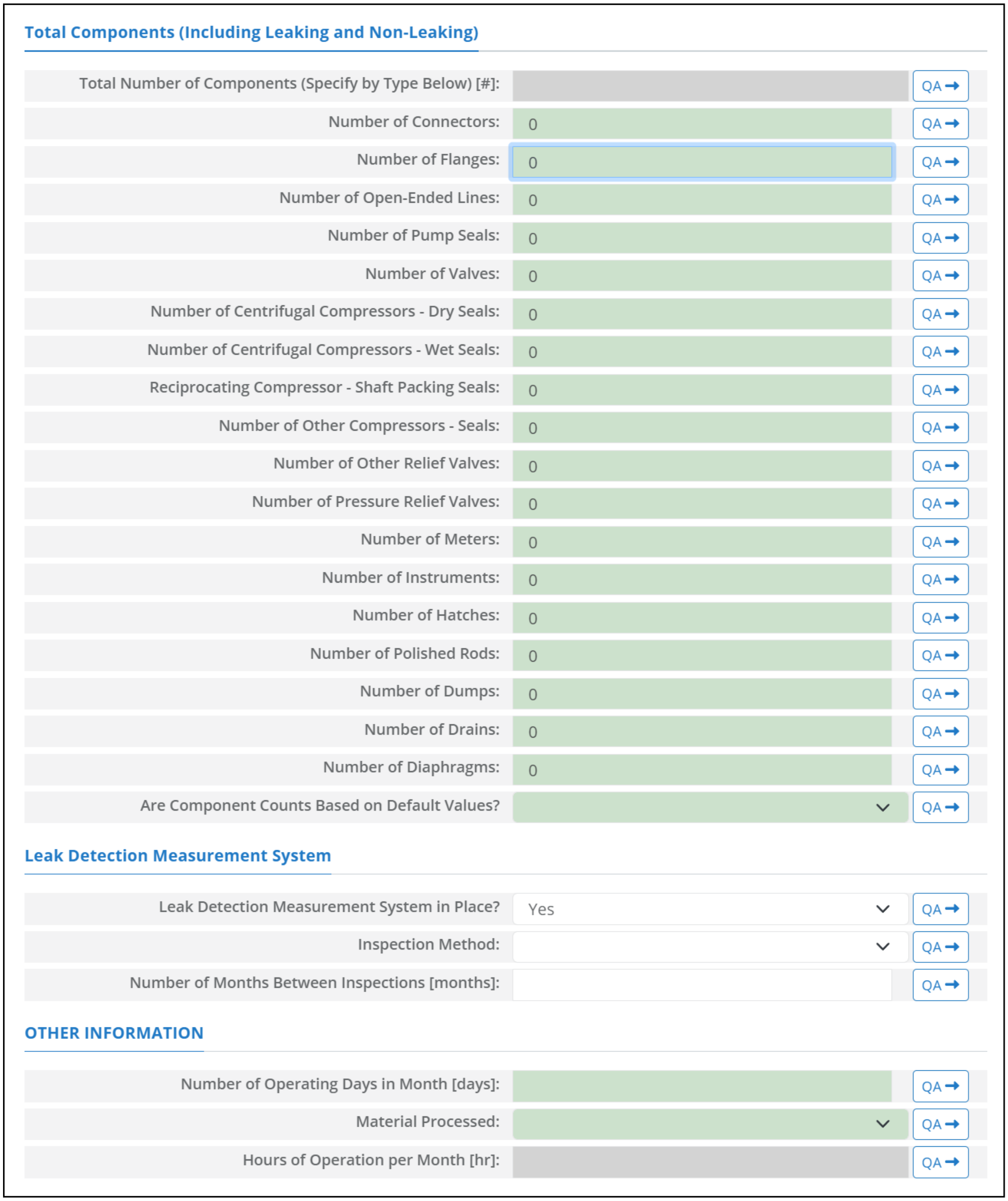


Figure A - 24. FUG-I01 Data Request tab

1. Total Number of Components (Specify by Type Below)[#]: The summation of the number of components. This field is auto-calculated based on the number of components provided in the subsequent fields.
2. Number of Connectors: Total number of connectors in the structure.

3. Number of Flanges: Total number of flanges in this structure.
4. Number of Open-Ended Lines: Total number of open-ended lines in the structure.
5. Number of Pump Seals: Total number of pump seals in this structure.
6. Number of Valves: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals: Total number of other compressors in the structure.
11. Number of Other Relief Valves: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves: Total number of pressure relief valves in the structure.
13. Number of Meters: Total number of meters in the structure.
14. Number of Instruments: Total number of instruments in the structure.
15. Number of Hatches: Total number of hatches in the structure.
16. Number of Polished Rods: Total number of polished rods in the structure.
17. Number of Dumps: Total number of dumps in the structure.
18. Number of Drains: Total number of drains in the structure.
19. Number of Diaphragms: Total number of diaphragms in the structure.
20. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
21. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses leaking fugitive components or not. Default selection is Yes.
22. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
23. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program
24. Number of Operating Days in Month [Days]: The total number of days that the fugitive source operated during the survey period.
25. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
26. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

> ***IMPORTANT*:** When utilizing this calculator, the component counts you provide are important for the purposes of data quality assurance and control. However, these component counts will not impact the emissions data you import.

A.14 FUG-M01 (Fugitive Sources – Gas – Average Emission Factor Approach)

Fugitive sources have different calculators depending on the stream type. Each calculator requires component counts of different equipment. Additional information provided by the Offshore Operators Committee may also be helpful as a starting point in compiling a component count (Table A - 12).

Table A - 12: Summary of equipment inventory data (number of components) by skid type

Skid Type	Valves	Pump Seals	Threaded Connections	Flanges	Open Ended Lines	Compressor Seals	Diaphragms	Drains	Dump Arms	Hatches	Instruments	Meters	Pressure Relief Valves	Polished Rods	Other Relief Valves
Separator Skid	34	0	13	73	0	0	0	2	0	0	15	1	1	0	0
Heater Treater Skid	98	0	70	114	0	0	0	3	0	0	25	0	3	0	0
LACT Charge Pump Skid	21	3	6	47	0	0	0	1	0	0	9	0	0	0	0
LACT Skid	62	1	75	69	0	0	0	1	0	0	34	4	6	0	0
Pipeline Pumps Skid	39	3	12	78	0	0	0	2	0	0	70	0	3	0	0
Pig Launcher/Receiver Skid	13	0	14	16	0	0	0	0	0	0	9	0	1	0	0
Compressor Skid	119	0	113	138	0	4	0	1	0	0	69	0	9	4	0
Filter/Separator Skid	30	0	25	37	0	0	0	1	0	0	9	0	1	0	0
Gas Dehydration Skid	23	0	14	40	0	0	0	1	0	0	12	0	1	0	0
Glycol Regeneration Skid	134	0	110	194	0	0	0	4	0	0	45	1	7	6	1
Gas Meter	10	0	11	26	0	0	0	1	0	0	21	2	0	0	0
Fuel Gas Skid	62	0	47	85	0	0	0	1	0	0	32	1	4	0	0
Floatation Cell Skid	41	1	34	70	0	0	1	1	0	15	8	0	2	0	2
Scrubber	13	0	13	18	0	0	0	1	0	0	9	0	1	0	0
Amine Unit	226	8	166	391	0	0	1	5	0	0	121	2	12	0	1
Line Heater	30	0	46	18	0	0	0	1	0	0	10	0	0	0	1
Production Manifold	108	0	31	148	0	0	0	1	0	0	43	0	0	7	0
Wellhead	15	0	6	19	0	0	0	0	0	0	11	0	0	0	0
Import or Export Pipeline	3	0	0	9	0	0	0	0	0	0	0	0	0	0	0

Because there is a large variation in emissions for compressor seals, you are asked to specify the compressor and seal type:

- Centrifugal: wet seal
- Centrifugal: dry seal
- Reciprocating: shaft packing
- Other (specify in comments)
  ***IMPORTANT*:** If you are using the values from the table above, you must select the **Default** option. If you are using actual counts, select the **Actual** option.

  ***IMPORTANT*:** The values in Table A - 12 above are provided for reference purposes only and are not coded into OCS AQS. Regardless of whether you select **Default** or **Actual** option, you must specify all values manually.

The total number of components will automatically be calculated for you in the top field under **Emission Calculator Required Parameters**.

A.14.1 FUG-M01 Calculation Method

For the **Gas** stream, the calculator FUG-M01Version 2 in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions as follows:

$$E_{THC} = \left(\sum_{\text{comp}} (EF \times N)_{\text{comp}} \right) \times D \qquad (A-16)$$

where:

E_{THC} = THC emissions for the **Gas** stream [lb/month]
EF = Emission factor of the component for the **Gas** stream [lb/component-day]
N **=** Total number of components (to specify by type)
D = Number of operating days in month [days]

Table A - 13 shows the EFs for THC, by component type, for the **Gas** stream.

Table A - 13. EFs for total hydrocarbons by component for the gas stream[*]

Component	EF – Gas Stream [lb/component-day]
Connector	0.011
Flange	0.021
Line	0.11
Other[†]	0.47
Pump Seals	0.13
Valve	0.24

[*] Reference: Section 4.2.06 (Fugitive Sources) from Wilson et al. (2019).
[†] Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Gas** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A-17)$$

where:

E = Emissions for VOC or CH_4 [lb/month]
E_{THC} = THC emissions [lb/month], as described above

WF = Weight fraction of CH_4 or VOC for **Gas** stream

Table A - 14 shows the weight fractions of CH_4 and VOC for the **Gas** process stream.

Table A - 14. Weight fractions of CH_4 and VOC for the gas process stream*

Pollutant	Weight Fractions - Gas Stream
Methane (CH_4)	0.8816
Volatile organic compounds (VOC)	0.0396

* Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.14.2 FUG-M01 Data Request

The calculator FUG-M01 Version 2 in OCS AQS calculates the monthly emissions from the **Gas** fugitive sources using the following **Data Request** fields in Figure A - 25:

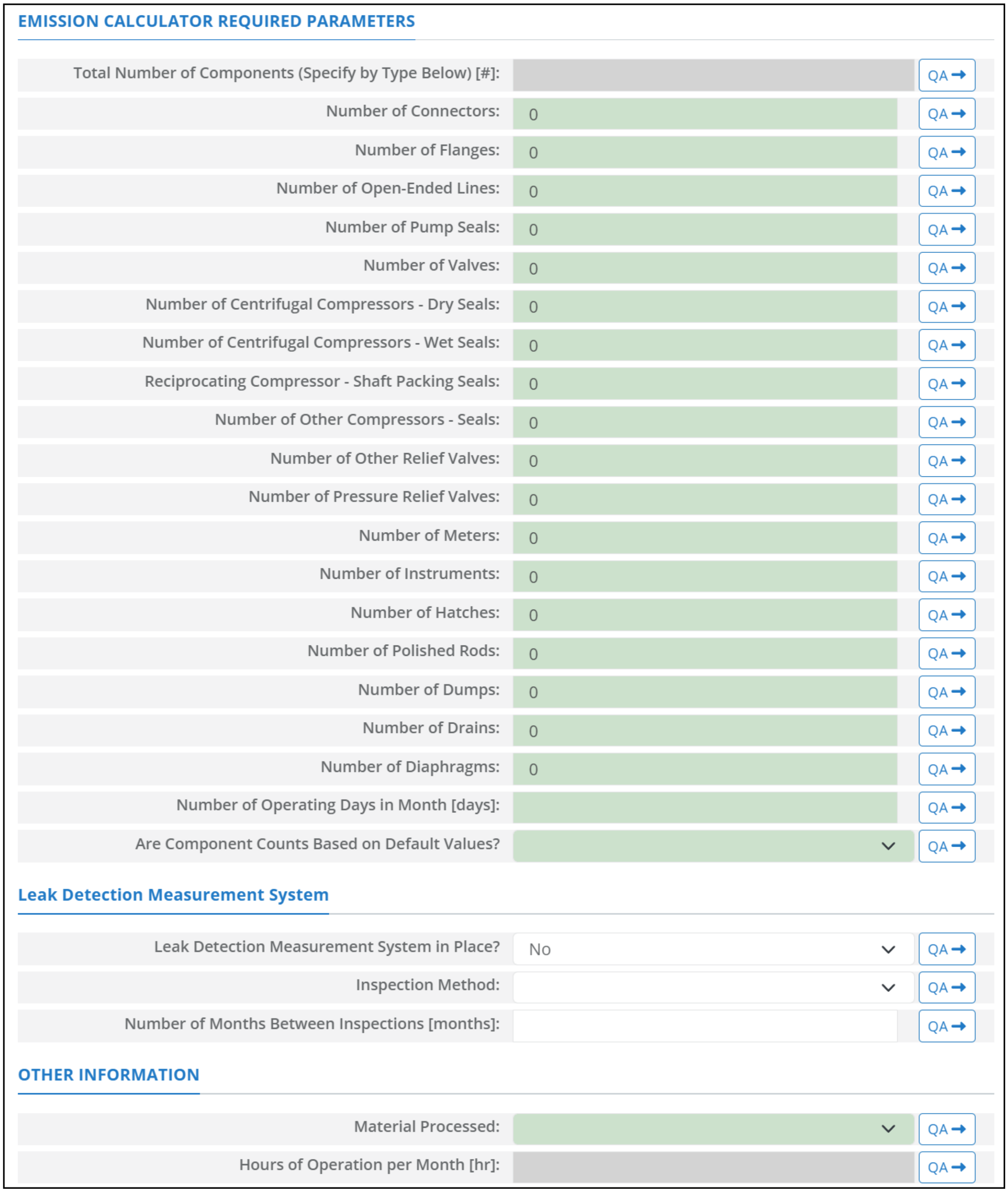


Figure A - 25. FUG-M01 Data Request tab

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of components. This field is auto-calculated based on the number of components provided in the subsequent fields.
2. Number of Connectors: Total number of connectors in the structure.
3. Number of Flanges: Total number of flanges in this structure.
4. Number of Open-Ended Lines: Total number of open-ended lines in the structure.
5. Number of Pump Seals: Total number of pump seals in this structure.
6. Number of Valves: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals: Total number of other compressors in the structure.
11. Number of Other Relief Valves: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves: Total number of pressure relief valves in the structure.
13. Number of Meters: Total number of meters in the structure.
14. Number of Instruments: Total number of instruments in the structure.
15. Number of Hatches: Total number of hatches in the structure.
16. Number of Polished Rods: Total number of polished rods in the structure.
17. Number of Dumps: Total number of dumps in the structure.
18. Number of Drains: Total number of drains in the structure.
19. Number of Diaphragms: Total number of diaphragms in the structure.
20. Number of Operating Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
21. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
22. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is No.
23. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
27. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
24. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
25. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

A.15 FUG-M02 (Fugitive Sources – Natural Gas Liquid – Average Emission Factor Approach)

Fugitive sources have different calculators depending on the stream type. Each calculator requires component counts of different equipment. Additional information provided by the Offshore Operators Committee may also be helpful as a starting point in compiling a component count (See Table A - 12 above).

A.15.1 FUG-M02 Calculation Method

For the **Natural Gas Liquid** stream, the calculator FUG-M02 Version 2 in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions as follows:

$$E_{THC} = \left(\sum_{\text{comp}} (EF \times N)_{\text{comp}} \right) \times D \qquad (A - 18)$$

where:

E_{THC} = THC emissions for the **Natural Gas Liquid** stream [lb/month]
EF = Emission factor of the component for the **Natural Gas Liquid** stream [lb/component-day]
N **=** Total number of components (to specify by type)
D = Number of days in month [day]

Table A **-** 15 shows the EFs for THC, by component type, for the **Natural Gas Liquid** stream.

Table A - 15. EFs for total hydrocarbons by component for the natural gas liquid stream[*]

Component	EF - Natural Gas Liquid Stream [lb/component-day]
Connector	0.011
Flange	5.8E-03
Line	0.074
Other[†]	0.4
Pump Seals	0.69
Valve	0.13

[*] Reference: Section 4.2.06 (Fugitive Sources) from Wilson et al. (2019).
[†] Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Natural Gas Liquid** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A - 19)$$

where:

E = Emissions for VOC or CH_4 [lb/month]
E_{THC} = THC emissions [lb/month], as described above
WF = Weight fraction of CH_4 or VOC for the **Natural Gas Liquid** Stream

Table A **-** 16 shows the weight fractions of CH_4 and VOC for the **Natural Gas Liquid** process stream.

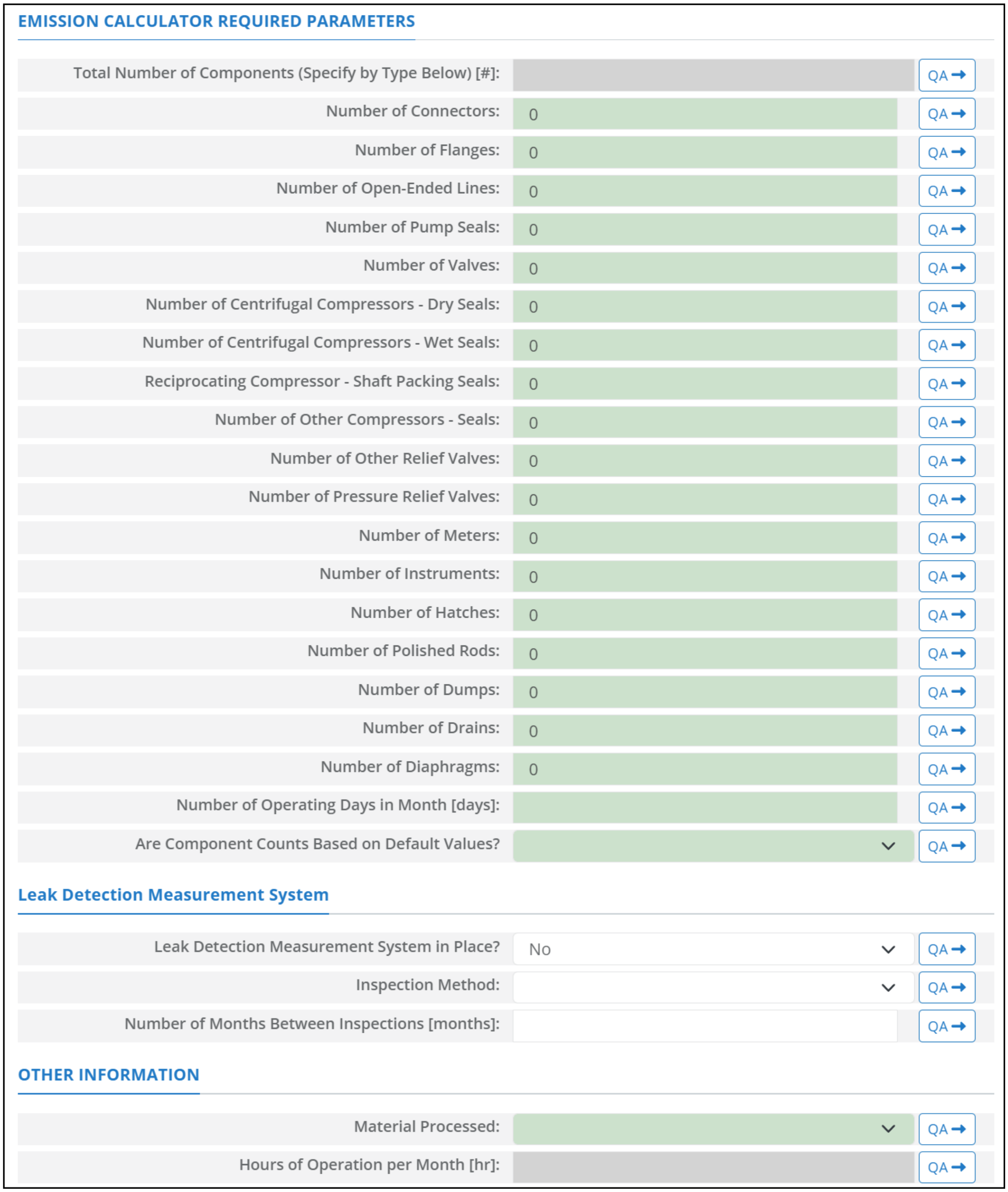
Table A - 16. Weight fractions of CH_4 and VOC for the natural gas liquid process stream*

Pollutant	Weight Fractions – Natural Gas Liquid Stream
Methane (CH_4)	0.612
Volatile organic compounds (VOC)	0.296

*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.15.2 FUG-M02 Data and Control Requests

The calculator FUG-M02 Version 2 in OCS AQS calculates the monthly emissions from the **Natural Gas Liquid** fugitive sources using the following **Data Request** fields in Figure A - 26:



EMISSION CALCULATOR REQUIRED PARAMETERS

Total Number of Components (Specify by Type Below) [#]:		QA
Number of Connectors:	0	QA
Number of Flanges:	0	QA
Number of Open-Ended Lines:	0	QA
Number of Pump Seals:	0	QA
Number of Valves:	0	QA
Number of Centrifugal Compressors - Dry Seals:	0	QA
Number of Centrifugal Compressors - Wet Seals:	0	QA
Reciprocating Compressor - Shaft Packing Seals:	0	QA
Number of Other Compressors - Seals:	0	QA
Number of Other Relief Valves:	0	QA
Number of Pressure Relief Valves:	0	QA
Number of Meters:	0	QA
Number of Instruments:	0	QA
Number of Hatches:	0	QA
Number of Polished Rods:	0	QA
Number of Dumps:	0	QA
Number of Drains:	0	QA
Number of Diaphragms:	0	QA
Number of Operating Days in Month [days]:		QA
Are Component Counts Based on Default Values?		QA

Leak Detection Measurement System

Leak Detection Measurement System in Place?	No	QA
Inspection Method:		QA
Number of Months Between Inspections [months]:		QA

OTHER INFORMATION

Material Processed:		QA
Hours of Operation per Month [hr]:		QA

Figure A - 26. FUG-M02 Data Request tab

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of components. This field is auto-calculated based on the number of components provided in the subsequent fields.
2. Number of Connectors: Total number of connectors in the structure.
3. Number of Flanges: Total number of flanges in this structure.
4. Number of Open-Ended Lines: Total number of open-ended lines in the structure.
5. Number of Pump Seals: Total number of pump seals in this structure.
6. Number of Valves: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals: Total number of other compressors in the structure.
11. Number of Other Relief Valves: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves: Total number of pressure relief valves in the structure.
13. Number of Meters: Total number of meters in the structure.
14. Number of Instruments: Total number of instruments in the structure.
15. Number of Hatches: Total number of hatches in the structure.
16. Number of Polished Rods: Total number of polished rods in the structure.
17. Number of Dumps: Total number of dumps in the structure.
18. Number of Drains: Total number of drains in the structure.
19. Number of Diaphragms: Total number of diaphragms in the structure.
20. Number of Operating Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
21. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
22. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is No.
23. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
28. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
24. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
25. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

A.16 FUG-M03 (Fugitive Sources – Heavy Oil – Average Emission Factor Approach)

Fugitive sources have different calculators depending on the stream type. Each calculator requires component counts of different equipment. Additional information provided by the Offshore Operators Committee may also be helpful as a starting point in compiling a component count (Table A - 12).

A.16.1 FUG-M03 Calculation Method

For the **Heavy Oil (<20 API Gravity)** stream, the calculator FUG-M03 Version 2 in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions as follows:

$$E_{THC} = \left(\sum_{\text{comp}} (EF \times N)_{\text{comp}} \right) \times D \qquad (A-20)$$

where:

E_{THC} = THC emissions for the **Heavy Oil** stream [lb/month]
EF = Emission factor of the component for the **Heavy Oil** stream [lb/component-day]
N = Total number of components (to specify by type)
D = Number of days in month [day]

Table A - 17 shows the EFs for THC, by component type, for the **Heavy Oil** stream.

Table A - 17. EFs for total hydrocarbons by component for the heavy oil stream*

Component	EF – Heavy Oil (<20 API Gravity) Stream [lb/component-day]
Connector	4E-04
Flange	2.1E-05
Line	0.074
Other†	1.7E-03
Pump Seals	0.69
Valve	4.4E-04

* Reference: Section 4.2.06 (Fugitive Sources) from Wilson et al. (2019).
† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Heavy Oil** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A-21)$$

where:

E = Emissions for VOC or CH_4 [lb/month]
E_{THC} = THC emissions [lb/month], as described above
WF = Weight fraction of CH_4 or VOC for the **Heavy Oil** stream

Table A - 18 shows the weight fractions of CH_4 and VOC for the **Heavy Oil** process stream.

Table A - 18. Weight fractions of CH_4 and VOC for the heavy oil process stream*

Pollutant	Weight Fractions – Heavy Oil Stream
Methane (CH_4)	0.942
Volatile organic compounds (VOC)	0.030

*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.16.2 FUG-M03 Data and Control Requests

The calculator FUG-M03 Version 2 in OCS AQS calculates the monthly emissions from the **Heavy Oil** fugitive sources using the following **Data Request** fields in Figure A - 27:

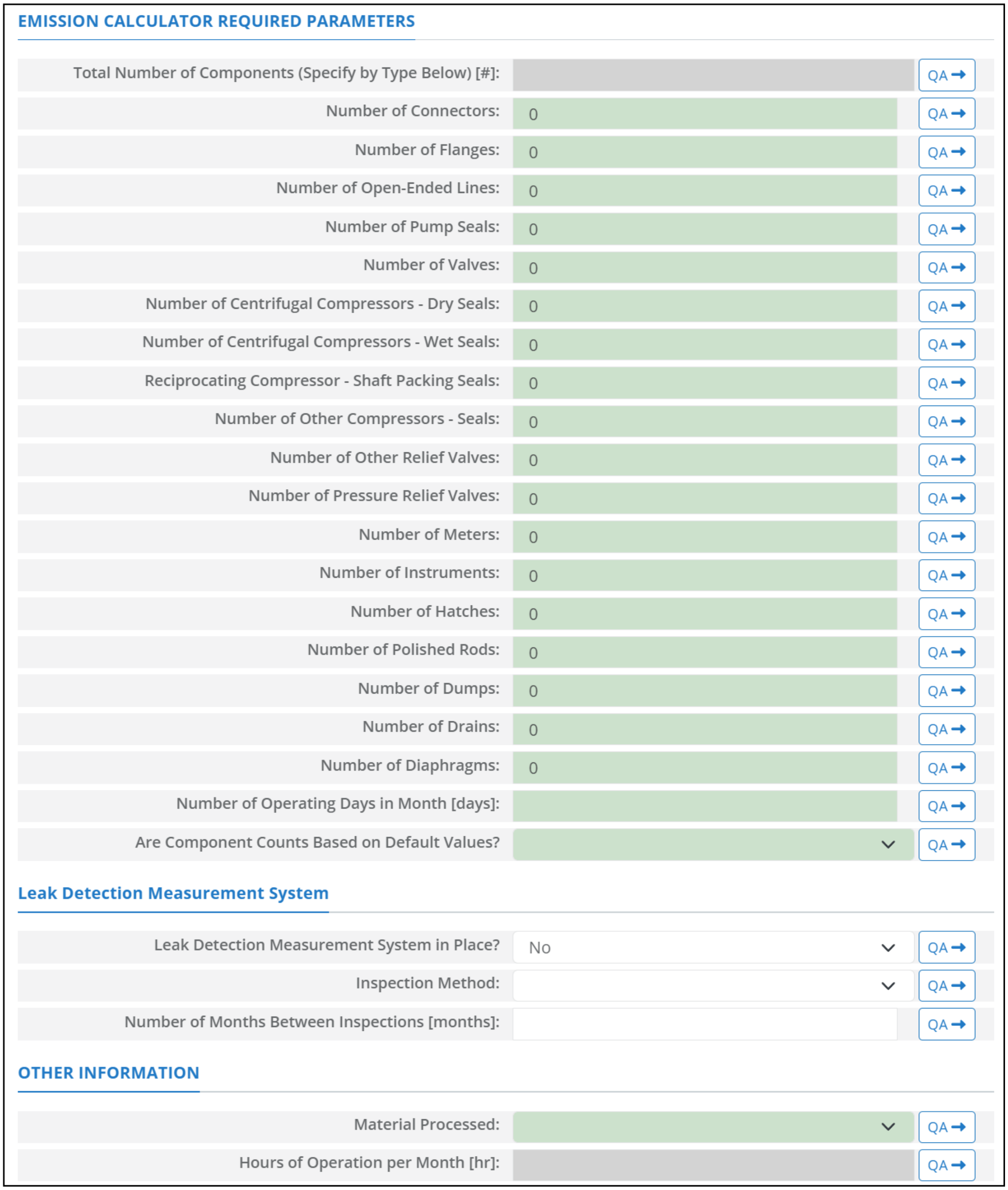


Figure A - 27. FUG-M03 Data Request tab

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of components. This field is auto-calculated based on the number of components provided in the subsequent fields.

2. Number of Connectors: Total number of connectors in the structure.
3. Number of Flanges: Total number of flanges in this structure.
4. Number of Open-Ended Lines: Total number of open-ended lines in the structure.
5. Number of Pump Seals: Total number of pump seals in this structure.
6. Number of Valves: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals: Total number of other compressors in the structure.
11. Number of Other Relief Valves: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves: Total number of pressure relief valves in the structure.
13. Number of Meters: Total number of meters in the structure.
14. Number of Instruments: Total number of instruments in the structure.
15. Number of Hatches: Total number of hatches in the structure.
16. Number of Polished Rods: Total number of polished rods in the structure.
17. Number of Dumps: Total number of dumps in the structure.
18. Number of Drains: Total number of drains in the structure.
19. Number of Diaphragms: Total number of diaphragms in the structure.
20. Number of Operating Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
21. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
22. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is No.
23. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
24. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
25. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
26. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

A.17 FUG-M04 (Fugitive Sources –Light Oil – Average Emission Factor Approach)

Fugitive sources have different calculators depending on the stream type. Each calculator requires component counts of different equipment. Additional information provided by the Offshore Operators Committee may also be helpful as a starting point in compiling a component count (See Table A - 12 above).

A.17.1 FUG-M04 Calculation Method

For the **Light Oil (≥20 API Gravity)** stream, the calculator FUG-M04 Version 2 in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions as follows:

$$E_{THC} = \left(\sum_{\text{comp}} (EF \times N)_{\text{comp}} \right) \times D \qquad (A-22)$$

where:

E_{THC} = THC emissions for the **Light Oil** stream [lb/month]
EF = Emission factor of the component for the **Light Oil** stream [lb/component-day]
N **=** Total number of components (to specify by type)
D = Number of days in month [day]

Table A - 19 shows the EFs for THC, by component type, for the **Light Oil** stream.

Table A - 19. EFs for total hydrocarbons by component for the light oil stream*

Component	EF – Light Oil (≥20 API Gravity) Stream [lb/component-day]
Connector	0.011
Flange	5.8E-03
Line	0.074
Other†	0.4
Pump Seals	0.69
Valve	0.13

* Reference: Section 4.2.06 (Fugitive Sources) from Wilson et al. (2019)
† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Light Oil** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A-23)$$

where:

E = Emissions for VOC or CH_4 [lb/month]
E_{THC} = THC emissions [lb/month], as described above
WF = Weight fraction of CH_4 or VOC for the **Light Oil** stream

Table A - 20 shows the weight fractions of CH_4 and VOC for the **Light Oil** process stream.

Table A - 20. Weight fractions of CH_4 and VOC for the light oil process stream*

Pollutant	Weight Fractions – Light Oil Stream
Methane (CH_4)	0.612
Volatile organic compounds (VOC)	0.296

* Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.17.2 FUG-M04 Data and Control Requests

The calculator FUG-M04 Version 2 in OCS AQS calculates the monthly emissions from the **Light Oil** fugitive sources using the following **Data Request** fields in Figure A - 28:

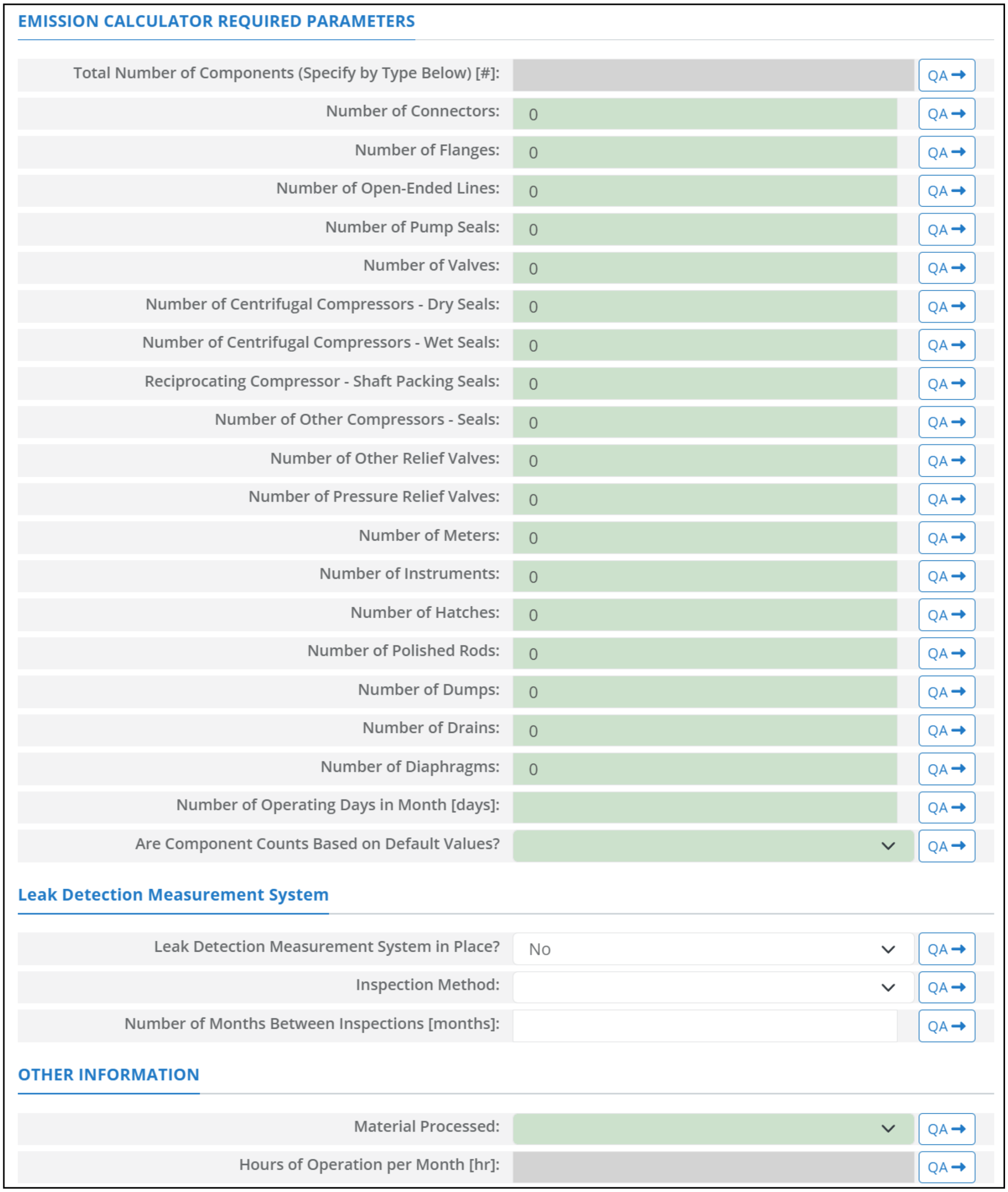


Figure A - 28. FUG-M04 Data Request tab

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of components. This field is auto-calculated based on the number of components provided in the subsequent fields.

2. Number of Connectors: Total number of connectors in the structure.
3. Number of Flanges: Total number of flanges in this structure.
4. Number of Open-Ended Lines: Total number of open-ended lines in the structure.
5. Number of Pump Seals: Total number of pump seals in this structure.
6. Number of Valves: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals: Total number of other compressors in the structure.
11. Number of Other Relief Valves: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves: Total number of pressure relief valves in the structure.
13. Number of Meters: Total number of meters in the structure.
14. Number of Instruments: Total number of instruments in the structure.
15. Number of Hatches: Total number of hatches in the structure.
16. Number of Polished Rods: Total number of polished rods in the structure.
17. Number of Dumps: Total number of dumps in the structure.
18. Number of Drains: Total number of drains in the structure.
19. Number of Diaphragms: Total number of diaphragms in the structure.
20. Number of Operating Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
21. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
22. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is No.
23. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
24. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
25. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
26. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

A.18 FUG-M05 (Fugitive Sources – Water, Oil – Average Emission Factor Approach)

Fugitive sources have different calculators depending on the stream type. Each calculator requires component counts of different equipment. Additional information provided by the Offshore Operators Committee may also be helpful as a starting point in compiling a component count (See Table A - 12 above).

A.18.1 FUG-M05 Calculation Method

For the **Water, Oil** stream, the calculator FUG-M05 Version 2 in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions as follows:

$$E_{THC} = \left(\sum_{\text{comp}} (EF \times N)_{\text{comp}} \right) \times D \qquad (A-24)$$

where:

E_{THC} = THC emissions for the **Water, Oil** stream [lb/month]
EF = Emission factor of the component for the **Water, Oil** stream [lb/component-day]
N = Total number of components (to specify by type)
D = Number of days in month [day]

Table A - 21 shows the EFs for THC, by component type, for the **Water, Oil** stream.

Table A - 21. EFs for total hydrocarbons by component for the water, oil stream*

Component	EF – Water, Oil Stream [lb/component-day]
Connector	5.8E-03
Flange	1.5E-04
Line	0.013
Other†	0.74
Pump Seals	1.3E-03
Valve	5.2E-03

* Reference: Section 4.2.06 (Fugitive Sources) from Wilson et al. (2019)
† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Water, Oil** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A-25)$$

where:

E = Emissions for VOC or CH_4 [lb/month]
E_{THC} = THC emissions [lb/month], as described above
WF = Weight fraction of CH_4 or VOC for the **Water, Oil** stream

Table A - 22 shows the weight fractions of CH_4 and VOC for the **Water, Oil** process stream.

Table A - 22. Weight fractions of CH_4 and VOC for the water, oil process stream*

Pollutant	Weight Fractions – Water, Oil Stream
Methane (CH_4)	0.612
Volatile organic compounds (VOC)	0.296

*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.18.2 FUG-M05 Data and Control Requests

The calculator FUG-M05 Version 2 in OCS AQS calculates the monthly emissions from the **Water, Oil** fugitive sources using the following **Data Request** fields in Figure A - 29:

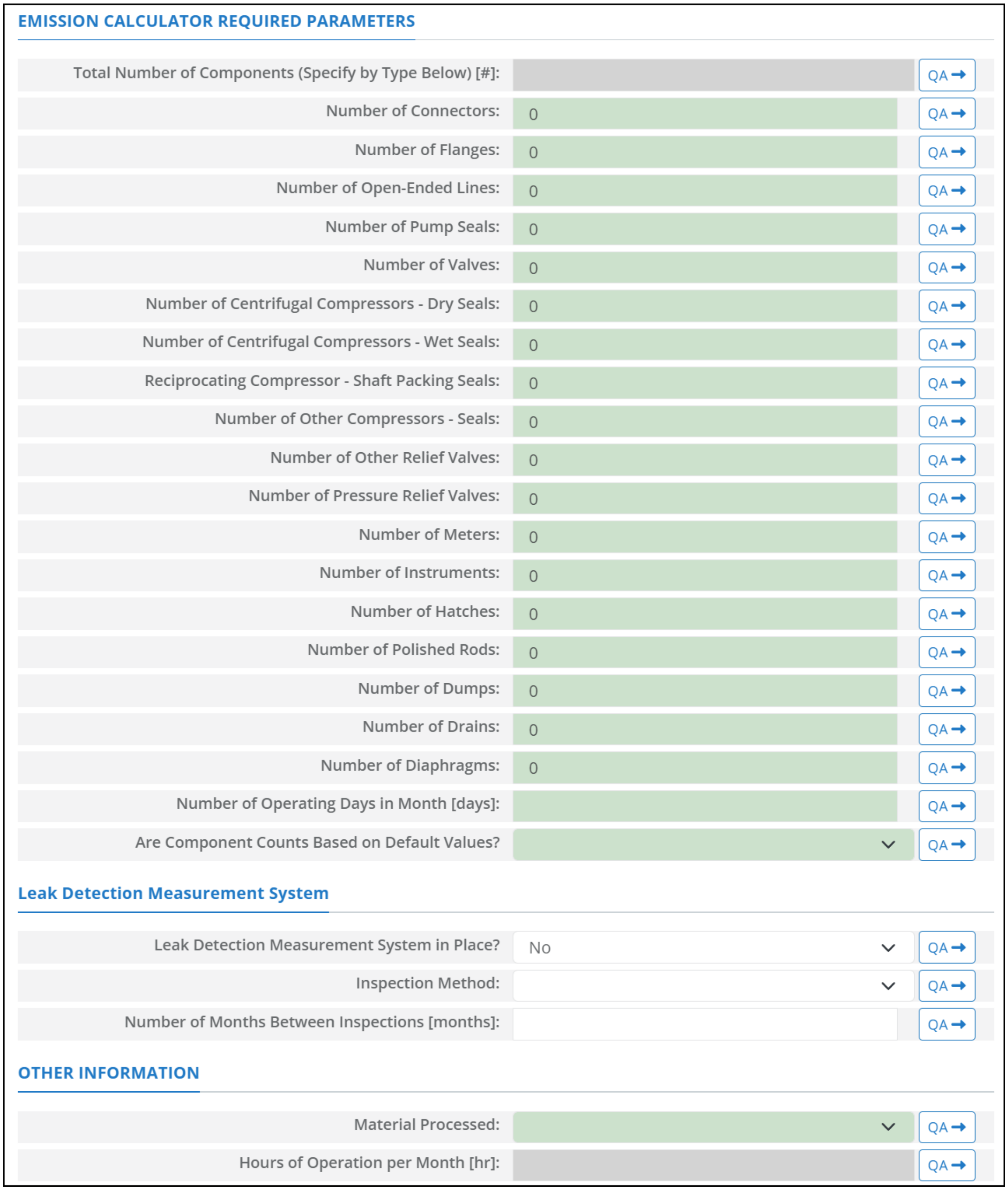


Figure A - 29. FUG-M05 Data Request tab

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of components. This field is auto-calculated based on the number of components provided in the subsequent fields.
2. Number of Connectors: Total number of connectors in the structure.
3. Number of Flanges: Total number of flanges in this structure.
4. Number of Open-Ended Lines: Total number of open-ended lines in the structure.
5. Number of Pump Seals: Total number of pump seals in this structure.
6. Number of Valves: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals: Total number of other compressors in the structure.
11. Number of Other Relief Valves: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves: Total number of pressure relief valves in the structure.
13. Number of Meters: Total number of meters in the structure.
14. Number of Instruments: Total number of instruments in the structure.
15. Number of Hatches: Total number of hatches in the structure.
16. Number of Polished Rods: Total number of polished rods in the structure.
17. Number of Dumps: Total number of dumps in the structure.
18. Number of Drains: Total number of drains in the structure.
19. Number of Diaphragms: Total number of diaphragms in the structure.
20. Number of Operating Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
21. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
22. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is No.
23. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
24. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
25. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
26. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

A.19 FUG-M06 (Fugitive Sources – Water, Oil, Gas – Average Emission Factor Approach)

Fugitive sources have different calculators depending on the stream type. Each calculator requires component counts of different equipment. Additional information provided by the Offshore Operators Committee may also be helpful as a starting point in compiling a component count (See Table A - 12 above).

A.19.1 FUG-M06 Calculation Method

For the **Water, Oil, Gas** stream, the calculator FUG-M06 Version 2 in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions as follows:

$$E_{THC} = \left(\sum_{\text{comp}} (EF \times N)_{\text{comp}} \right) \times D \qquad (A-26)$$

where:

E_{THC} = THC emissions for the **Water, Oil, Gas** stream [lb/month]
EF = Emission factor of the component for the **Water, Oil, Gas** stream [lb/component-day]
N **=** Total number of components (to specify by type)
D = Number of days in month [day]

Table A - 23 shows the EFs for THC, by component type, for the **Water, Oil, Gas** stream.

Table A - 23. EFs for total hydrocarbons by component for the water, oil, gas stream*

Component	EF – Water, Oil, Gas Stream [lb/component-day]
Connector	0.011
Flange	0.021
Line	0.11
Other†	0.74
Pump Seals	0.13
Valve	0.24

* Reference: Section 4.2.06 (Fugitive Sources) from Wilson et al. (2019)
† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Water, Oil, Gas** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A-27)$$

where:

E = Emissions for VOC or CH_4 (lb/month)
E_{THC} = THC emissions (lb/month), as described above
WF = Weight fraction of CH_4 or VOC for the **Water, Oil, Gas** stream

Table A - 24 shows the weight fractions of CH_4 and VOC for the **Water, Oil, Gas** process stream.

Table A - 24. Weight fractions of CH_4 and VOC for the water, oil, gas process stream*

Pollutant	Weight Fractions – Water, Oil, Gas Stream
Methane (CH_4)	0.612
Volatile organic compounds (VOC)	0.296

*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.19.2 FUG-M06 Data and Control Requests

The calculator FUG-M06 Version 2 in OCS AQS calculates the monthly emissions from the **Water, Oil, Gas** fugitive sources using the following **Data Request** fields in Figure A - 30:

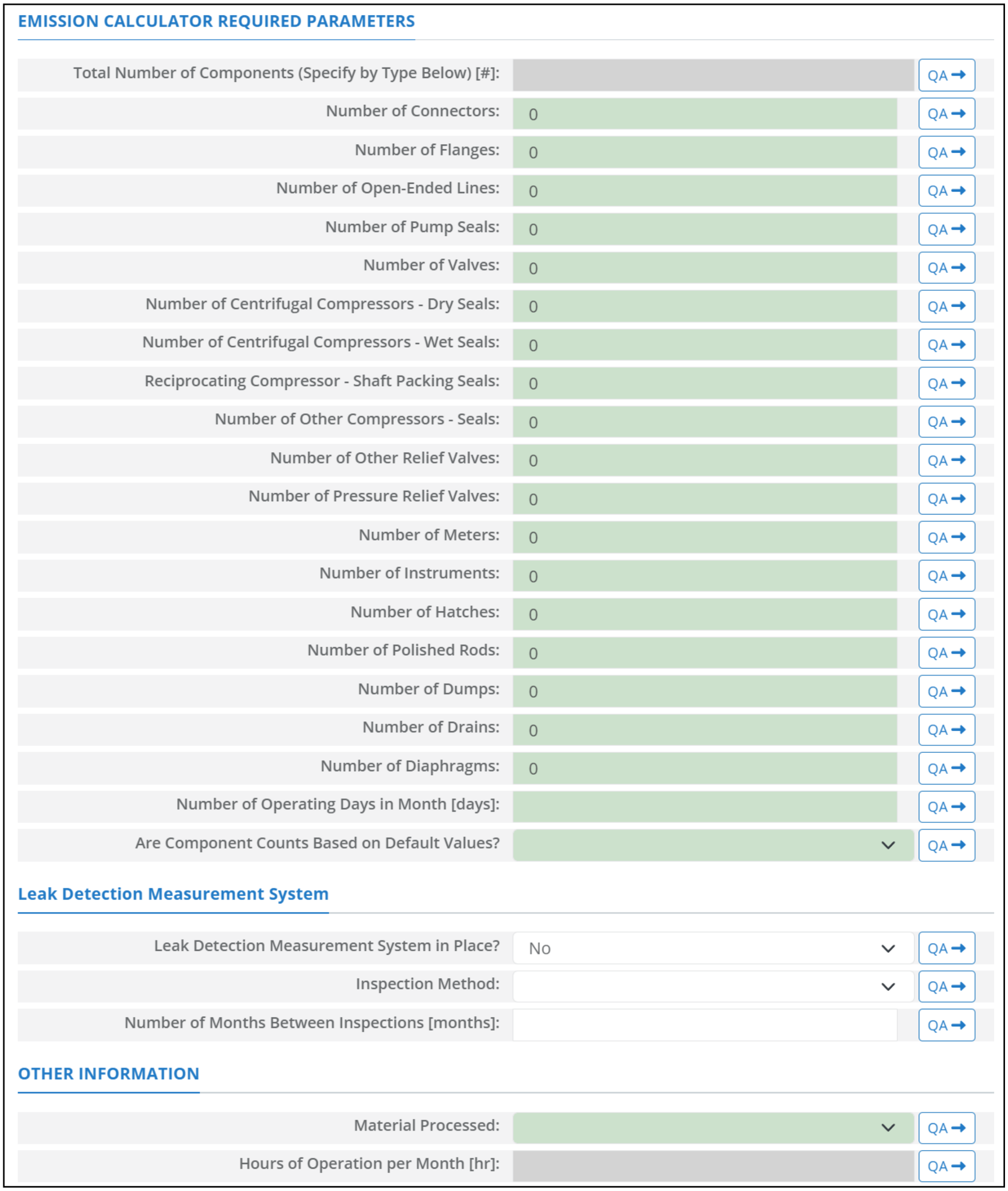


Figure A - 30. FUG-M06 Data Request tab

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of components. This field is auto-calculated based on the number of components provided in the subsequent fields.

2. Number of Connectors: Total number of connectors in the structure.
3. Number of Flanges: Total number of flanges in this structure.
4. Number of Open-Ended Lines: Total number of open-ended lines in the structure.
5. Number of Pump Seals: Total number of pump seals in this structure.
6. Number of Valves: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals: Total number of other compressors in the structure.
11. Number of Other Relief Valves: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves: Total number of pressure relief valves in the structure.
13. Number of Meters: Total number of meters in the structure.
14. Number of Instruments: Total number of instruments in the structure.
15. Number of Hatches: Total number of hatches in the structure.
16. Number of Polished Rods: Total number of polished rods in the structure.
17. Number of Dumps: Total number of dumps in the structure.
18. Number of Drains: Total number of drains in the structure.
19. Number of Diaphragms: Total number of diaphragms in the structure.
20. Number of Operating Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
21. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
22. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is No.
23. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
24. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
25. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
26. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

A.20 FUG-S01 (Fugitive Sources – Gas – Screening Ranges Approach)

OCS AQS offers the FUG-S01 calculator to enable you to calculate emissions for the **Gas** stream component types and counts known to be leaking using the screening ranges method. This method can be selected from the **Apply Leak Detection Approach** wizard found in the Activity Emissions Manager (AEM) tool (Section 3.2.4). For this method, you are required to report the total count of components and the count of leaking components. Components having a measured concentration exceeding a threshold of 10,000 parts per million by volume (ppmV) should labeled as "leakers", while those below or equal to this threshold are designated as "non-leakers" for the purposes of this screening approach. See Section 3.2.4.1 for more information.

A.20.1 FUG-S01 Calculation Method

For the **Gas** stream, the FUG-S01 Version 1 calculator in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions using the screening ranges approach as follows:

$$E_{THC} = \left(\sum_{\text{comp}} \left(EF_{non-leaking} \times N_{non-leaking} \right)_{\text{comp}} + \left(EF_{leaking} \times N_{leaking} \right)_{\text{comp}} \right) \times D \quad (A-28)$$

where:

E_{THC} = THC emissions for the **Gas** stream [kg/month]
$EF_{non-leaking}$ = Emission factor of the non-leaking component for the **Gas** stream [kg /component-day]
$N_{non-leaking}$ = Total number of non-leaking components (to specify by type) determined by subtracting the number of leaking components from the total number of components
$EF_{leaking}$ = Emission factor of the leaking component for the **Gas** stream [kg/component-day]
$N_{leaking}$ = Total number of leaking components (to specify by type)
D = Number of days in month [day]

Table A - 25 shows the leaking and non-leaking EFs for THC, by component type, for the **Gas** stream.

Table A - 25. EFs for total hydrocarbons by component for the gas stream*

Component	$EF_{non-leaking}$ – Gas Stream [kg/component-day]	$EF_{leaking}$ – Gas Stream [kg/component-day]
Valves	6E-04	2.352
Pump seals	8.4E-03	1.776
Other†	2.88E-03	2.136
Connectors	2.4E-04	0.624
Flanges	1.368E-04	1.968
Open-ended lines	3.6E-04	1.32

* Reference: USEPA (1995b), Table 2-8; values from Table 2-8 are multiplied by 24 to convert the unit from [kg/component-hr] to [kg/component-day].
† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Gas** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \quad (A-29)$$

where:

E = Emissions for VOC or CH_4 [kg/month]
E_{THC} = THC emissions [kg/month], as described above

WF = Weight fraction of CH_4 or VOC for **Gas** stream

Table A - 26 shows the weight fractions of CH_4 and VOC for the **Gas** process stream.

Table A - 26. Weight fractions of CH_4 and VOC for the gas process stream*

Pollutant	Weight Fractions - Gas Stream
Methane (CH_4)	0.8816
Volatile Organic Compounds (VOC)	0.0396

*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.20.2 FUG-S01 Data and Control Requests

The calculator FUG-S01 Version 1 in OCS AQS calculates the monthly emissions from the **Gas** fugitive sources using the following Data Request fields in Figure A - 31:

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of the total components. This field is auto-calculated based on the number of total components provided in the subsequent fields.
2. Number of Connectors - Total: Total number of connectors in the structure.
3. Number of Flanges - Total : Total number of flanges in this structure.
4. Number of Open-Ended Lines - Total : Total number of open-ended lines in the structure.
5. Number of Pump Seals - Total: Total number of pump seals in this structure.
6. Number of Valves - Total: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals - Total: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals – Total: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals - Total: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals - Total: Total number of other compressors in the structure.
11. Number of Other Relief Valves - Total: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves - Total: Total number of pressure relief valves in the structure.
13. Number of Meters - Total: Total number of meters in the structure.
14. Number of Instruments - Total: Total number of instruments in the structure.
15. Number of Hatches - Total: Total number of hatches in the structure.
16. Number of Polished Rods - Total: Total number of polished rods in the structure.
17. Number of Dumps - Total: Total number of dumps in the structure.
18. Number of Drains - Total: Total number of drains in the structure.
19. Number of Diaphragms - Total: Total number of diaphragms in the structure.
20. Total Number of Leaking Components (Specify by Type Below) [#]: The summation of the number of the leaking components. This field is auto-calculated based on the number of the leaking components provided in the subsequent fields.
21. Number of Connectors - Leaking: The number of the leaking connectors in the structure.
22. Number of Flanges - Leaking: The number of leaking flanges in this structure.
23. Number of Open-Ended Lines - Leaking: The number of leaking open-ended lines in the structure.
24. Number of Pump Seals - Leaking: The number of leaking pump seals in this structure.
25. Number of Valves - Leaking: The number of leaking valves in this structure.
26. Number of Centrifugal Compressors – Dry Seals - Leaking: The number of leaking dry seals centrifugal compressors the structure.

27. Number of Centrifugal Compressors – Wet Seals - Leaking: The number of leaking wet seals centrifugal compressors the structure.
28. Reciprocating Compressor – Shaft Packing Seals - Leaking: The number of leaking shaft packing seals reciprocating compressors.
29. Number of Other Compressors – Seals - Leaking: The number of other leaking compressors in the structure.
30. Number of Other Relief Valves - Leaking: The number of other leaking relief valves in the structure.
31. Number of Pressure Relief Valves - Leaking: The number of leaking pressure relief valves in the structure.
32. Number of Meters - Leaking: The number of leaking meters in the structure.
33. Number of Instruments - Leaking: The number of leaking instruments in the structure.
34. Number of Hatches - Leaking: The number of leaking hatches in the structure.
35. Number of Polished Rods - Leaking: The number of leaking polished rods in the structure.
36. Number of Dumps - Leaking: The number of leaking dumps in the structure.
37. Number of Drains - Leaking: The number of leaking drains in the structure.
38. Number of Diaphragms - Leaking: The number of leaking diaphragms in the structure.
39. Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
40. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is Yes.
41. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
42. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
43. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
44. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
45. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

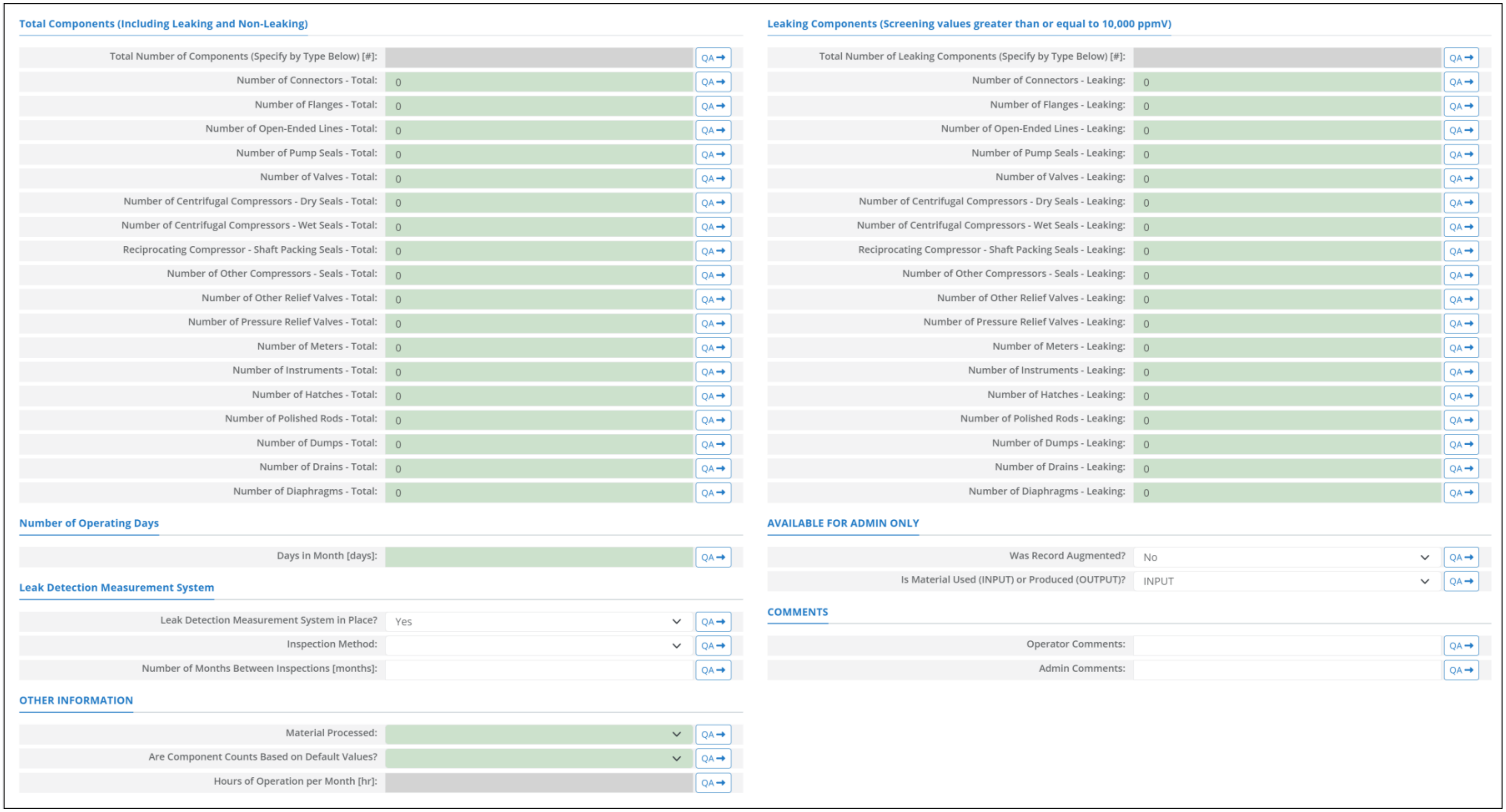


Figure A - 31. FUG-S01 Data Request tab

A.21 FUG-S02 (Fugitive Sources – Natural Gas Liquid – Screening Ranges Approach)

OCS AQS offers the FUG-S01 calculator to enable you to calculate emissions for the **Natural Gas Liquid** stream component types and counts known to be leaking using the screening ranges method. This method can be selected from the **Apply Leak Detection Approach** wizard found in the Activity Emissions Manager (AEM) tool (Section 3.2.4). For this method, you are required to report the total count of components and the count of leaking components of them. Components having a measured concentration exceeding a threshold of 10,000 parts per million by volume (ppmV) should labeled as "leakers", while those below or equal to this threshold are designated as "non-leakers" for the purposes of this screening approach. See Section 3.2.4.1 for more information.

A.21.1 FUG-S02 Calculation Method

For the **Natural Gas Liquid** stream, the FUG-S02 Version 1 calculator in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions using the screening ranges approach as follows:

$$E_{THC} = \left(\sum_{\text{comp}} \left(EF_{non-leaking} \times N_{non-leaking} \right)_{\text{comp}} + \left(EF_{leaking} \times N_{leaking} \right)_{\text{comp}} \right) \times D \quad (A-30)$$

where:

E_{THC} = THC emissions for the **Natural Gas Liquid** stream [lb/month]
$EF_{non-leaking}$ = Emission factor of the non-leaking component for the **Natural Gas Liquid** stream [lb/component-day]
$N_{non-leaking}$ = Total number of non-leaking components (to specify by type) determined by subtracting the number of leaking components from the total number of components
$EF_{leaking}$ = Emission factor of the leaking component for the **Natural Gas Liquid** stream [lb/component-day]
$N_{leaking}$ = Total number of leaking components (to specify by type)
D = Number of days in month [day]

Table A - 27 shows the leaking and non-leaking EFs for THC, by component type, for the **Natural Gas Liquid** stream.

Table A - 27. EFs for total hydrocarbons by component for the natural gas liquid stream*

Component	$EF_{non-leaking}$ – Natural Gas Liquid Stream [lb/component-day]	$EF_{leaking}$ – Natural Gas Liquid Stream [lb/component-day]
Valves	8.50E-04	3.381
Pump seals	1.03E-02	3.905
Other†	3.76E-03	3.846
Connectors	5.11E-04	1.497
Flanges	1.33E-03	4.490
Open-ended lines	9.40E-04	1.600

* Reference: API (2021), Table 7-7 "API Oil and Gas Offshore Screening Emission Factors"
† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

***IMPORTANT*:** Table 2-8 of USEPA (1995b) does not provide leaking and non-leaking emission factors for the Natural Gas Liquid Stream. Consequently, a BOEM-approved assumption was made to use general values (independent of stream type) from the API reference found below Table A - 27.

Fugitive CH_4 and VOC emissions for the **Gas** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A-31)$$

where:

E = Emissions for VOC or CH_4 [lb/month]
E_{THC} = THC emissions [lb/month], as described above
WF = Weight fraction of CH_4 or VOC for **Natural Gas Liquid Stream**

Table A - 28 shows the weight fractions of CH_4 and VOC for the **Natural Gas Liquid** process stream.

Table A - 28. Weight fractions of CH_4 and VOC for the natural gas liquid process stream*

Pollutant	Weight Fractions – Natural Gas Liquid Stream
Methane (CH_4)	0.612
Volatile organic compounds (VOC)	0.296

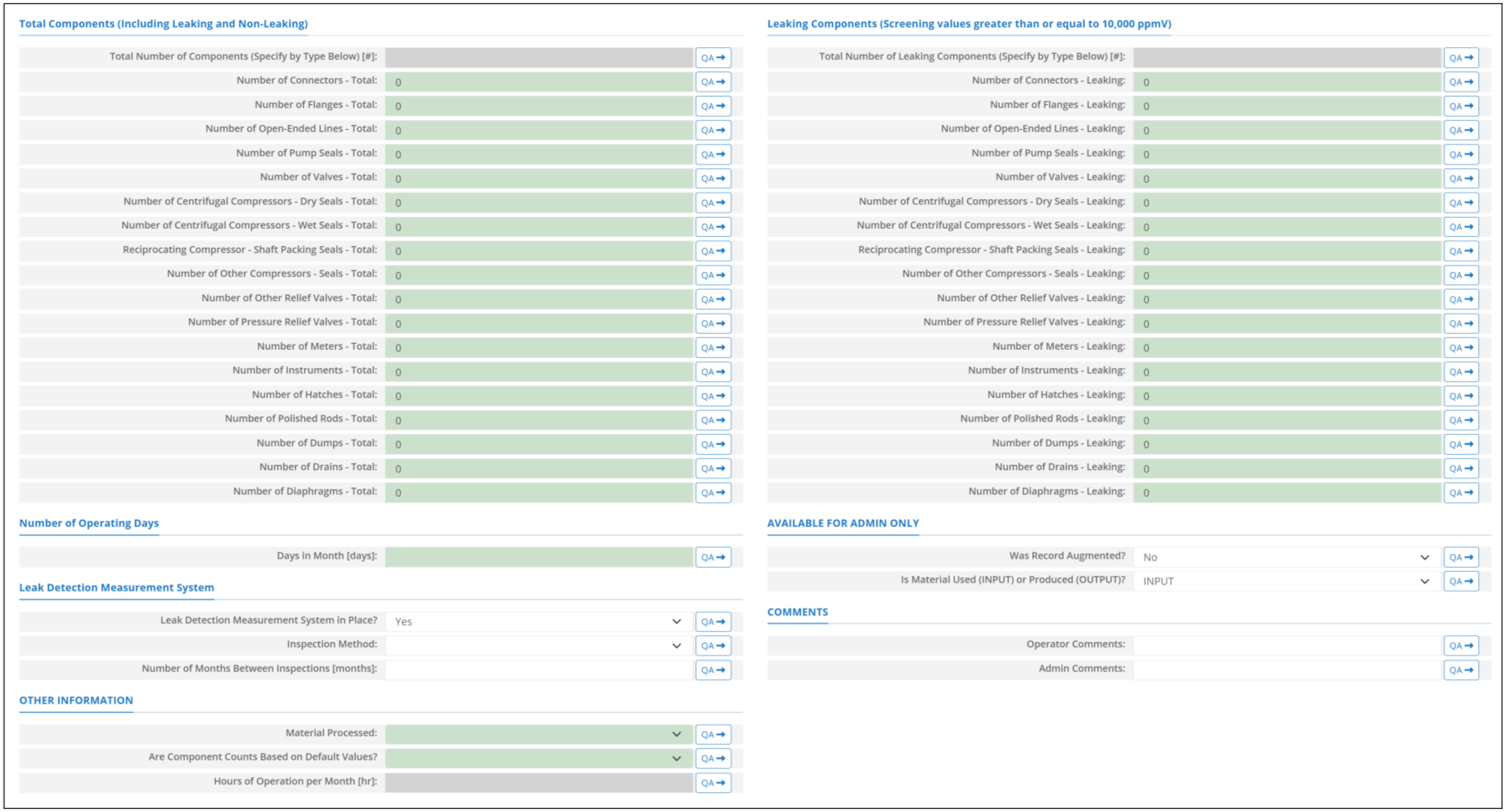
*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.21.2 FUG-S02 Data and Control Requests

The calculator FUG-S02 Version 1 in OCS AQS calculates the monthly emissions from the **Natural Gas Liquid** fugitive sources using the following **Data Request** fields in Figure A - 32:

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of the total components. This field is auto-calculated based on the number of total components provided in the subsequent fields.
2. Number of Connectors - Total: Total number of connectors in the structure.
3. Number of Flanges - Total : Total number of flanges in this structure.
4. Number of Open-Ended Lines - Total : Total number of open-ended lines in the structure.
5. Number of Pump Seals - Total: Total number of pump seals in this structure.
6. Number of Valves - Total: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals - Total: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals – Total: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals - Total: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals - Total: Total number of other compressors in the structure.
11. Number of Other Relief Valves - Total: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves - Total: Total number of pressure relief valves in the structure.
13. Number of Meters - Total: Total number of meters in the structure.
14. Number of Instruments - Total: Total number of instruments in the structure.
15. Number of Hatches - Total: Total number of hatches in the structure.
16. Number of Polished Rods - Total: Total number of polished rods in the structure.
17. Number of Dumps - Total: Total number of dumps in the structure.
18. Number of Drains - Total: Total number of drains in the structure.
19. Number of Diaphragms - Total: Total number of diaphragms in the structure.

20. Total Number of Leaking Components (Specify by Type Below) [#]: The summation of the number of the leaking components. This field is auto-calculated based on the number of leaking components provided in the subsequent fields.
21. Number of Connectors - Leaking: The number of the leaking connectors in the structure.
22. Number of Flanges - Leaking: The number of leaking flanges in this structure.
23. Number of Open-Ended Lines - Leaking: The number of leaking open-ended lines in the structure.
24. Number of Pump Seals - Leaking: The number of leaking pump seals in this structure.
25. Number of Valves - Leaking: The number of leaking valves in this structure.
26. Number of Centrifugal Compressors – Dry Seals - Leaking: The number of leaking dry seals centrifugal compressors the structure.
27. Number of Centrifugal Compressors – Wet Seals - Leaking: The number of leaking wet seals centrifugal compressors the structure.
28. Reciprocating Compressor – Shaft Packing Seals - Leaking: The number of leaking shaft packing seals reciprocating compressors.
29. Number of Other Compressors – Seals - Leaking: The number of other leaking compressors in the structure.
30. Number of Other Relief Valves - Leaking: The number of other leaking relief valves in the structure.
31. Number of Pressure Relief Valves - Leaking: The number of leaking pressure relief valves in the structure.
32. Number of Meters - Leaking: The number of leaking meters in the structure.
33. Number of Instruments - Leaking: The number of leaking instruments in the structure.
34. Number of Hatches - Leaking: The number of leaking hatches in the structure.
35. Number of Polished Rods - Leaking: The number of leaking polished rods in the structure.
36. Number of Dumps - Leaking: The number of leaking dumps in the structure.
37. Number of Drains - Leaking: The number of leaking drains in the structure.
38. Number of Diaphragms - Leaking: The number of leaking diaphragms in the structure.
39. Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
40. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is Yes.
41. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
42. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
43. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
44. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
45. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.



Total Components (Including Leaking and Non-Leaking)

Total Number of Components (Specify by Type Below) [#]:	
Number of Connectors - Total:	0
Number of Flanges - Total:	0
Number of Open-Ended Lines - Total:	0
Number of Pump Seals - Total:	0
Number of Valves - Total:	0
Number of Centrifugal Compressors - Dry Seals - Total:	0
Number of Centrifugal Compressors - Wet Seals - Total:	0
Reciprocating Compressor - Shaft Packing Seals - Total:	0
Number of Other Compressors - Seals - Total:	0
Number of Other Relief Valves - Total:	0
Number of Pressure Relief Valves - Total:	0
Number of Meters - Total:	0
Number of Instruments - Total:	0
Number of Hatches - Total:	0
Number of Polished Rods - Total:	0
Number of Dumps - Total:	0
Number of Drains - Total:	0
Number of Diaphragms - Total:	0

Number of Operating Days

Days in Month [days]:	

Leak Detection Measurement System

Leak Detection Measurement System in Place?	Yes
Inspection Method:	
Number of Months Between Inspections [months]:	

OTHER INFORMATION

Material Processed:	
Are Component Counts Based on Default Values?	
Hours of Operation per Month [hr]:	

Leaking Components (Screening values greater than or equal to 10,000 ppmV)

Total Number of Leaking Components (Specify by Type Below) [#]:	
Number of Connectors - Leaking:	0
Number of Flanges - Leaking:	0
Number of Open-Ended Lines - Leaking:	0
Number of Pump Seals - Leaking:	0
Number of Valves - Leaking:	0
Number of Centrifugal Compressors - Dry Seals - Leaking:	0
Number of Centrifugal Compressors - Wet Seals - Leaking:	0
Reciprocating Compressor - Shaft Packing Seals - Leaking:	0
Number of Other Compressors - Seals - Leaking:	0
Number of Other Relief Valves - Leaking:	0
Number of Pressure Relief Valves - Leaking:	0
Number of Meters - Leaking:	0
Number of Instruments - Leaking:	0
Number of Hatches - Leaking:	0
Number of Polished Rods - Leaking:	0
Number of Dumps - Leaking:	0
Number of Drains - Leaking:	0
Number of Diaphragms - Leaking:	0

AVAILABLE FOR ADMIN ONLY

Was Record Augmented?	No
Is Material Used (INPUT) or Produced (OUTPUT)?	INPUT

COMMENTS

Operator Comments:	
Admin Comments:	

Figure A - 32. FUG-S02 Data Request tab

A.22 FUG-S03 (Fugitive Sources – Heavy Oil – Screening Ranges Approach)

OCS AQS offers the FUG-S01 calculator to enable you to calculate emissions for the **Heavy Oil** stream component types and counts known to be leaking using the screening ranges method. This method can be selected from the **Apply Leak Detection Approach** wizard found in the Activity Emissions Manager (AEM) tool (Section 3.2.4). For this method, you are required to report the total count of components and the count of leaking components of them. Components having a measured concentration exceeding a threshold of 10,000 parts per million by volume (ppmV) should labeled as "leakers", while those below or equal to this threshold are designated as "non-leakers" for the purposes of this screening approach. See Section 3.2.4.1 for more information.

A.22.1 FUG-S03 Calculation Method

For the **Heavy Oil** stream, the FUG-S03 Version 1 calculator in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions using the screening ranges approach as follows s:

$$E_{THC} = \left(\sum_{\text{comp}} \left(EF_{non-leaking} \times N_{non-leaking} \right)_{\text{comp}} + \left(EF_{leaking} \times N_{leaking} \right)_{\text{comp}} \right) \times D \quad (A-32)$$

where:

E_{THC} = THC emissions for the **Heavy Oil** stream [kg/month]
$EF_{non-leaking}$ = Emission factor of the non-leaking component for the **Heavy Oil** stream [kg/component-day]
$N_{non-leaking}$ = Total number of non-leaking components (to specify by type) determined by subtracting the number of leaking components from the total number of components
$EF_{leaking}$ = Emission factor of the leaking component for the **Heavy Oil** stream [kg/component-day]
$N_{leaking}$ = Total number of leaking components (to specify by type)
D = Number of days in month [day]

Table A - 29 shows the leaking and non-leaking EFs for THC, by component type, for the **Heavy Oil** stream.

Table A - 29. EFs for total hydrocarbons by component for the heavy oil stream[*]

Component	$EF_{non-leaking}$ – Heavy Oil Stream [kg/component-day]	$EF_{leaking}$ –Heavy Oil Stream [kg/component-day]
Valves	2.016E-04	2.016E-04[a]
Pump seals	0.312	0.312[b]
Other[†]	7.68E-04	7.68E-04[c]
Connectors	1.8E-04	1.8E-04[d]
Flanges	9.36E-06	9.36E-06[e]
Open-ended lines	1.728E-04	0.72

[*] Reference: USEPA (1995b), Table 2-8; values from Table 2-8 are multiplied by 24 to convert the unit from [kg/component-hr] to [kg/component-day].
[†] Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.
[a,b,c,d,e] Table 2-8 of USEPA (1995b) does not provide leaking emission factors for the Heavy Oil stream (listed as N/A). Consequently, a BOEM-approved assumption was made to use the Heavy Oil non-leaking EF values from Table 2-8 from USEPA (1995b).

Fugitive CH_4 and VOC emissions for the **Heavy Oil** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A-33)$$

where:

E = Emissions for VOC or CH_4 [kg/month]
E_{THC} = THC emissions [kg/month], as described above
WF = Weight fraction of CH_4 or VOC for **Heavy Oil Stream**

Table A - 30 shows the weight fractions of CH_4 and VOC for the **Heavy Oil** process stream.

Table A - 30. Weight fractions of CH_4 and VOC for the Heavy Oil process stream*

Pollutant	Weight Fractions – Heavy Oil Stream
Methane (CH_4)	0.942
Volatile Organic Compounds (VOC)	0.030

*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.22.2 FUG-S03 Data and Control Requests

The calculator FUG-S03 Version 1 in OCS AQS calculates the monthly emissions from the **Heavy Oil** fugitive sources using the following **Data Request** fields in Figure A - 33:

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of the total components. This field is auto calculated based on the number of total components provided in the subsequent fields.
2. Number of Connectors - Total: Total number of connectors in the structure.
3. Number of Flanges - Total: Total number of flanges in this structure.
4. Number of Open-Ended Lines - Total: Total number of open-ended lines in the structure.
5. Number of Pump Seals - Total: Total number of pump seals in this structure.
6. Number of Valves - Total: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals - Total: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals – Total: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals - Total: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals - Total: Total number of other compressors in the structure.
11. Number of Other Relief Valves - Total: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves - Total: Total number of pressure relief valves in the structure.
13. Number of Meters - Total: Total number of meters in the structure.
14. Number of Instruments - Total: Total number of instruments in the structure.
15. Number of Hatches - Total: Total number of hatches in the structure.
16. Number of Polished Rods - Total: Total number of polished rods in the structure.
17. Number of Dumps - Total: Total number of dumps in the structure.
18. Number of Drains - Total: Total number of drains in the structure.
19. Number of Diaphragms - Total: Total number of diaphragms in the structure.
20. Total Number of Leaking Components (Specify by Type Below) [#]: The summation of the number of the leaking components. This field is auto-calculated based on the number of the leaking components provided in the subsequent fields.
21. Number of Connectors - Leaking: The number of the leaking connectors in the structure.

22. Number of Flanges - Leaking: The number of leaking flanges in this structure.
23. Number of Open-Ended Lines - Leaking: The number of leaking open-ended lines in the structure.
24. Number of Pump Seals - Leaking: The number of leaking pump seals in this structure.
25. Number of Valves - Leaking: The number of leaking valves in this structure.
26. Number of Centrifugal Compressors – Dry Seals - Leaking: The number of leaking dry seals centrifugal compressors the structure.
27. Number of Centrifugal Compressors – Wet Seals - Leaking: The number of leaking wet seals centrifugal compressors the structure.
28. Reciprocating Compressor – Shaft Packing Seals - Leaking: The number of leaking shaft packing seals reciprocating compressors.
29. Number of Other Compressors – Seals - Leaking: The number of other leaking compressors in the structure.
30. Number of Other Relief Valves - Leaking: The number of other leaking relief valves in the structure.
31. Number of Pressure Relief Valves - Leaking: The number of leaking pressure relief valves in the structure.
32. Number of Meters - Leaking: The number of leaking meters in the structure.
33. Number of Instruments - Leaking: The number of leaking instruments in the structure.
34. Number of Hatches - Leaking: The number of leaking hatches in the structure.
35. Number of Polished Rods - Leaking: The number of leaking polished rods in the structure.
36. Number of Dumps - Leaking: The number of leaking dumps in the structure.
37. Number of Drains - Leaking: The number of leaking drains in the structure.
38. Number of Diaphragms - Leaking: The number of leaking diaphragms in the structure.
39. Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
40. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is Yes.
41. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
42. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
43. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
44. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
45. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

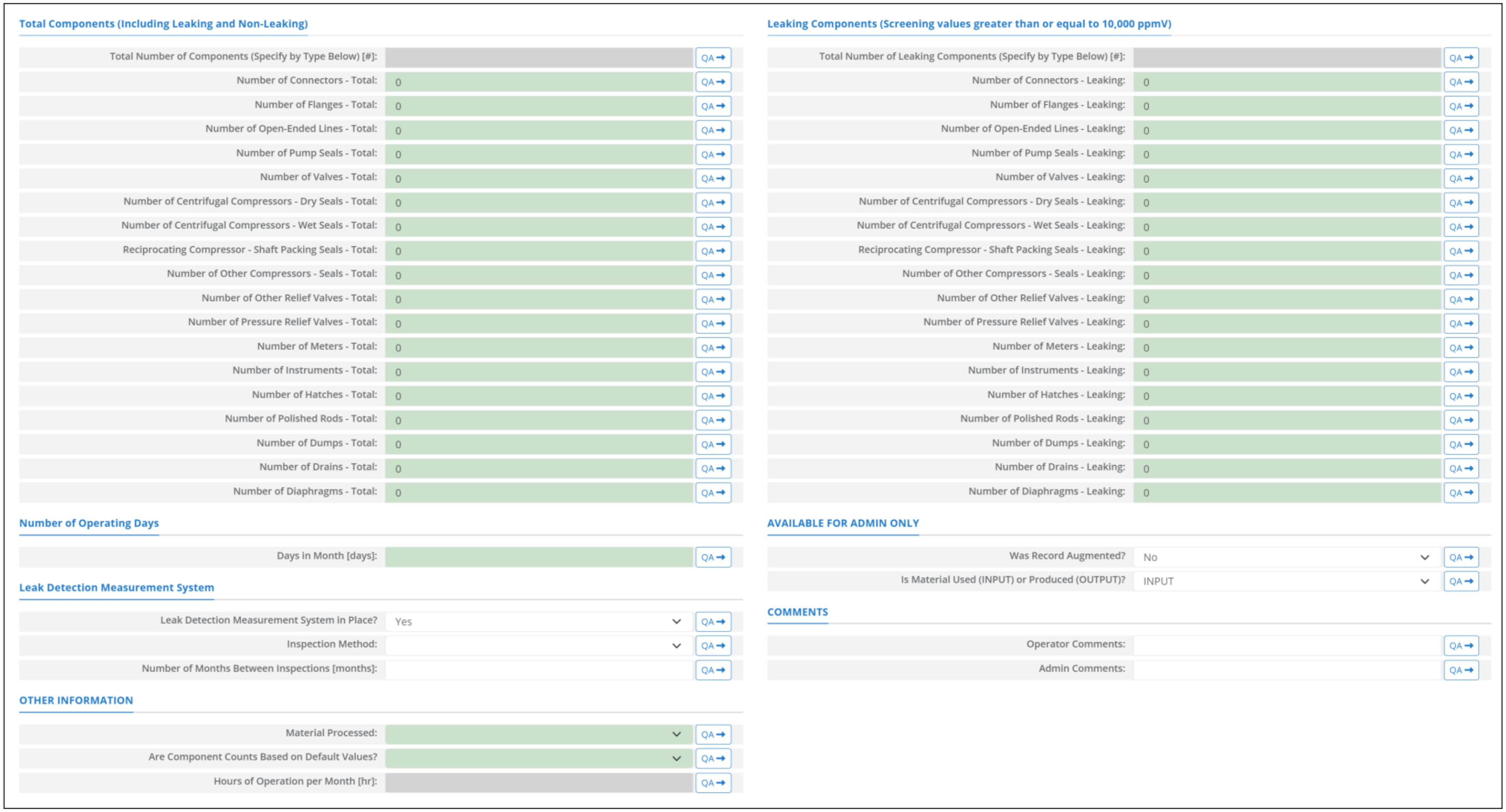


Figure A - 33. FUG-S03 Data Request tab

A.23 FUG-S04 (Fugitive Sources – Light Oil – Screening Ranges Approach)

OCS AQS offers the FUG-S01 calculator to enable you to calculate emissions for the **Natural Gas Liquid** stream component types and counts known to be leaking using the screening ranges method. This method can be selected from the **Apply Leak Detection Approach** wizard found in the Activity Emissions Manager (AEM) tool (Section 3.2.4). For this method, you are required to report the total count of components and the count of leaking components of them. Components having a measured concentration exceeding a threshold of 10,000 parts per million by volume (ppmV) should labeled as "leakers", while those below or equal to this threshold are designated as "non-leakers" for the purposes of this screening approach. See Section 3.2.4.1 for more information.

A.23.1 FUG-S04 Calculation Method

For the **Light Oil Stream**, the FUG-S04 Version 1 calculator in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions using the screening ranges approach as follows:

$$E_{THC} = \left(\sum_{\text{comp}} \left(EF_{non-leaking} \times N_{non-leaking} \right)_{\text{comp}} + \left(EF_{leaking} \times N_{leaking} \right)_{\text{comp}} \right) \times D \quad (A-34)$$

where:

E_{THC} = THC emissions for the **Light Oil** stream [kg/month]
$EF_{non-leaking}$ = Emission factor of the non-leaking component for the **Light Oil** stream [kg/component-day]
$N_{non-leaking}$ = Total number of non-leaking components (to specify by type) determined by subtracting the number of leaking components from the total number of components
$EF_{leaking}$ = Emission factor of the leaking component for the **Light Oil** stream [kg/component-day]
$N_{leaking}$ = Total number of leaking components (to specify by type)
D = Number of days in month [day]

Table A - 31 shows the leaking and non-leaking EFs for THC, by component type, for the **Light Oil** stream.

Table A - 31. EFs for total hydrocarbons by component for the light oil stream*

Component	$EF_{non-leaking}$ – Light Oil Stream [kg/component-day]	$EF_{leaking}$ –Light Oil Stream [kg/component-day]
Valves	4.56E-04	2.088
Pump seals	0.01224	2.4
Other†	2.64E-03	1.992
Connectors	2.328E-04	0.624
Flanges	5.76E-05	1.752
Open-ended lines	3.36E-04	1.056

* Reference: USEPA (1995b), Table 2-8; values from Table 2-8 are multiplied by 24 to convert the unit from [kg/component-hr] to [kg/component-day].
† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Light Oil** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A - 35)$$

where:

E = Emissions for VOC or CH_4 [kg/month]
E_{THC} = THC emissions [kg/month], as described above
WF = Weight fraction of CH_4 or VOC for **Light Oil** stream

Table A - 32 shows the weight fractions of CH_4 and VOC for the **Light Oil** process stream.

Table A - 32. Weight fractions of CH_4 and VOC for the Light Oil process stream*

Pollutant	Weight Fractions – Light Oil Stream
Methane (CH_4)	0.612
Volatile Organic Compounds (VOC)	0.296

*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.23.2 FUG-S04 Data and Control Requests

The calculator FUG-S04 Version 1 in OCS AQS calculates the monthly emissions from the **Light Oil** fugitive sources using the following **Data Request** fields in Figure A - 34:

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of the total components. This field is auto-calculated based on the number of total components provided in the subsequent fields.
2. Number of Connectors - Total: Total number of connectors in the structure.
3. Number of Flanges - Total: Total number of flanges in this structure.
4. Number of Open-Ended Lines - Total: Total number of open-ended lines in the structure.
5. Number of Pump Seals - Total: Total number of pump seals in this structure.
6. Number of Valves - Total: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals - Total: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals – Total: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals - Total: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals - Total: Total number of other compressors in the structure.
11. Number of Other Relief Valves - Total: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves - Total: Total number of pressure relief valves in the structure.
13. Number of Meters - Total: Total number of meters in the structure.
14. Number of Instruments - Total: Total number of instruments in the structure.
15. Number of Hatches - Total: Total number of hatches in the structure.
16. Number of Polished Rods - Total: Total number of polished rods in the structure.
17. Number of Dumps - Total: Total number of dumps in the structure.
18. Number of Drains - Total: Total number of drains in the structure.
19. Number of Diaphragms - Total: Total number of diaphragms in the structure.
20. Total Number of Leaking Components (Specify by Type Below) [#]: The summation of the number of the leaking components. This field is auto-calculated based on the number of leaking components provided in the subsequent fields.
21. Number of Connectors - Leaking: The number of the leaking connectors in the structure.
22. Number of Flanges - Leaking: The number of leaking flanges in this structure.

23. Number of Open-Ended Lines - Leaking: The number of leaking open-ended lines in the structure.
24. Number of Pump Seals - Leaking: The number of leaking pump seals in this structure.
25. Number of Valves - Leaking: The number of leaking valves in this structure.
26. Number of Centrifugal Compressors – Dry Seals - Leaking: The number of leaking dry seals centrifugal compressors the structure.
27. Number of Centrifugal Compressors – Wet Seals - Leaking: The number of leaking wet seals centrifugal compressors the structure.
28. Reciprocating Compressor – Shaft Packing Seals - Leaking: The number of leaking shaft packing seals reciprocating compressors.
29. Number of Other Compressors – Seals - Leaking: The number of other leaking compressors in the structure.
30. Number of Other Relief Valves - Leaking: The number of other leaking relief valves in the structure.
31. Number of Pressure Relief Valves - Leaking: The number of leaking pressure relief valves in the structure.
32. Number of Meters - Leaking: The number of leaking meters in the structure.
33. Number of Instruments - Leaking: The number of leaking instruments in the structure.
34. Number of Hatches - Leaking: The number of leaking hatches in the structure.
35. Number of Polished Rods - Leaking: The number of leaking polished rods in the structure.
36. Number of Dumps - Leaking: The number of leaking dumps in the structure.
37. Number of Drains - Leaking: The number of leaking drains in the structure.
38. Number of Diaphragms - Leaking: The number of leaking diaphragms in the structure.
39. Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
40. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is Yes.
41. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
42. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
43. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
44. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
45. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

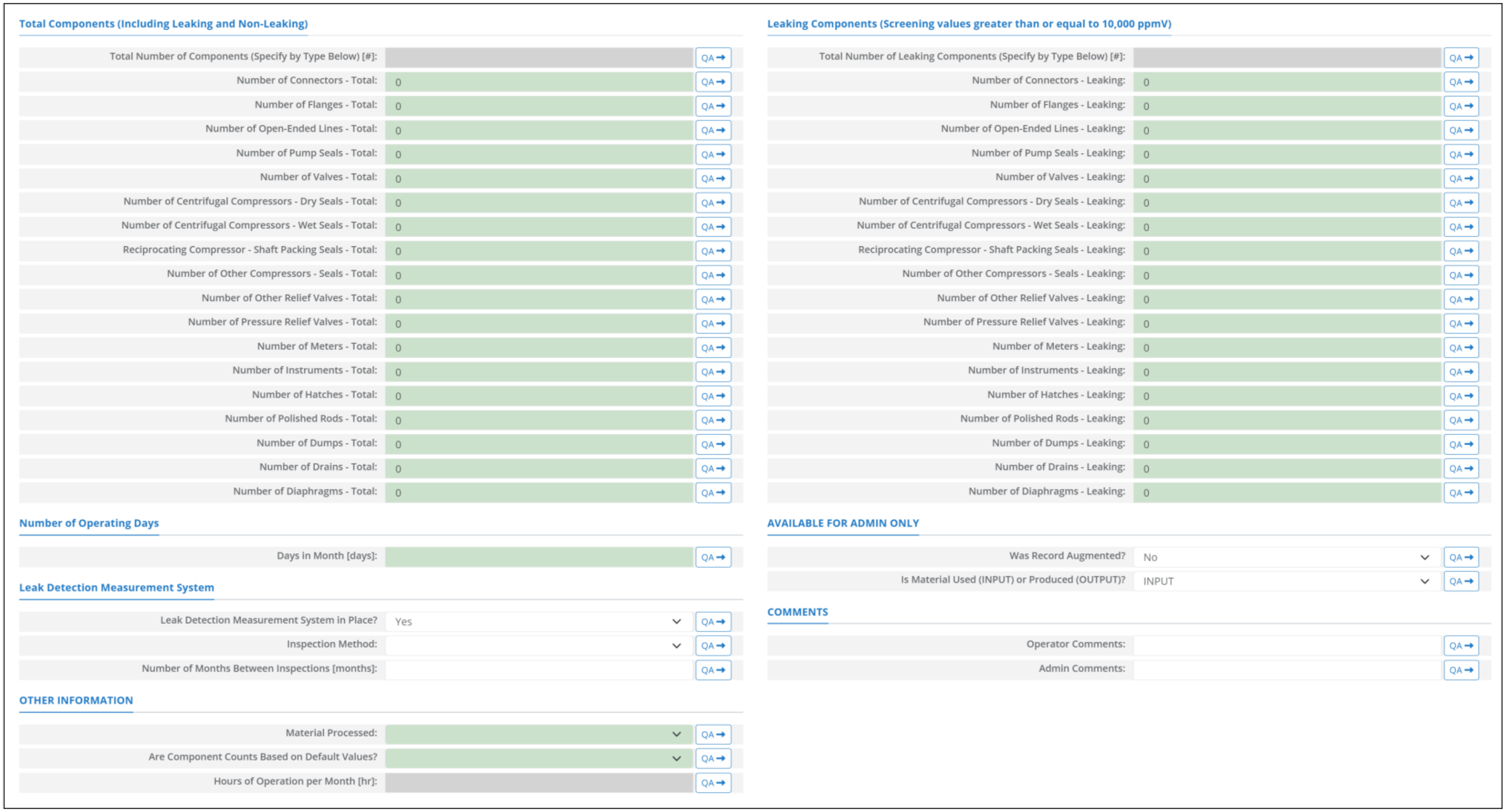


Figure A - 34. FUG-S04 Data Request tab

A.24 FUG-S05 (Fugitive Sources – Water, Oil – Screening Ranges Approach)

OCS AQS offers the FUG-S01 calculator to enable you to calculate emissions for the **Natural Gas Liquid** stream component types and counts known to be leaking using the screening ranges method. This method can be selected from the **Apply Leak Detection Approach** wizard found in the Activity Emissions Manager (AEM) tool (Section 3.2.4). For this method, you are required to report the total count of components and the count of leaking components of them. Components having a measured concentration exceeding a threshold of 10,000 parts per million by volume (ppmV) should labeled as "leakers", while those below or equal to this threshold are designated as "non-leakers" for the purposes of this screening approach. See Section 3.2.4.1 for more information.

A.24.1 FUG-S05 Calculation Method

For the **Water, Oil** stream, the FUG-S05 Version 1 calculator in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions using the screening ranges approach as follows:

$$E_{THC} = \left(\sum_{\text{comp}} \left(EF_{non-leaking} \times N_{non-leaking}\right)_{\text{comp}} + \left(EF_{leaking} \times N_{leaking}\right)_{\text{comp}} \right) \times D \quad (A-36)$$

where:

E_{THC} = THC emissions for the **Water, Oil** stream [kg/month]
$EF_{non-leaking}$ = Emission factor of the non-leaking component for the **Water, Oil** stream [kg/component-day]
$N_{non-leaking}$ = Total number of non-leaking components (to specify by type) determined by subtracting the number of leaking components from the total number of components
$EF_{leaking}$ = Emission factor of the leaking component for the **Water, Oil** stream [kg/component-day]
$N_{leaking}$ = Total number of leaking components (to specify by type)
D = Number of days in month [day]

Table A - 33 shows the leaking and non-leaking EFs for THC, by component type, for the **Water, Oil** stream.

Table A - 33. EFs for total hydrocarbons by component for the water / oil stream*

Component	$EF_{non-leaking}$ – Water, Oil Stream [kg/component-day]	$EF_{leaking}$ –Water, Oil Stream [kg/component-day]
Valves	2.328E-04	1.536
Pump seals	5.76E-04	5.76E-04[a]
Other†	1.416E-03	1.656
Connectors	2.4E-04	0.672
Flanges	6.96E-05	6.96E-05[b]
Open-ended lines	8.4E-05	0.72

* Reference: USEPA (1995b), Table 2-8; values from Table 2-8 are multiplied by 24 to convert the unit from [kg/component-hr] to [kg/component-day].
† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

[a,b] Table 2-8 from USEPA (1995b) does not provide leaking emission factors for the Heavy Oil stream (listed as N/A). Consequently, a BOEM-approved assumption was made to use the Heavy Oil non-leaking EF values from Table 2-8 from USEPA (1995b).

Fugitive CH_4 and VOC emissions for the **Water, Oil** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \qquad (A-37)$$

where:

E = Emissions for VOC or CH_4 [kg/month]
E_{THC} = THC emissions [kg/month], as described above
WF = Weight fraction of CH_4 or VOC for **Water, Oil** stream

Table A - 34 shows the weight fractions of CH_4 and VOC for the **Water, Oil** process stream.

Table A - 34. Weight fractions of CH_4 and VOC for the water, oil process stream*

Pollutant	Weight Fractions – Water, Oil Stream
Methane (CH_4)	0.612
Volatile Organic Compounds (VOC)	0.296

*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.24.2 FUG-S05 Data and Control Requests

The calculator FUG-S05 Version 1 in OCS AQS calculates the monthly emissions from the **Water, Oil** fugitive sources using the following **Data Request** fields in Figure A - 35:

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of the total components. This field is auto-calculated based on the number of total components provided in the subsequent fields.
2. Number of Connectors - Total: Total number of connectors in the structure.
3. Number of Flanges - Total: Total number of flanges in this structure.
4. Number of Open-Ended Lines - Total: Total number of open-ended lines in the structure.
5. Number of Pump Seals - Total: Total number of pump seals in this structure.
6. Number of Valves - Total: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals - Total: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals – Total: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals - Total: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals - Total: Total number of other compressors in the structure.
11. Number of Other Relief Valves - Total: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves - Total: Total number of pressure relief valves in the structure.
13. Number of Meters - Total: Total number of meters in the structure.
14. Number of Instruments - Total: Total number of instruments in the structure.
15. Number of Hatches - Total: Total number of hatches in the structure.
16. Number of Polished Rods - Total: Total number of polished rods in the structure.
17. Number of Dumps - Total: Total number of dumps in the structure.
18. Number of Drains - Total: Total number of drains in the structure.
19. Number of Diaphragms - Total: Total number of diaphragms in the structure.

20. Total Number of Leaking Components (Specify by Type Below) [#]: The summation of the number of the leaking components. This field is auto-calculated based on the number of leaking components provided in the subsequent fields.
21. Number of Connectors - Leaking: The number of the leaking connectors in the structure.
22. Number of Flanges - Leaking: The number of leaking flanges in this structure.
23. Number of Open-Ended Lines - Leaking: The number of leaking open-ended lines in the structure.
24. Number of Pump Seals - Leaking: The number of leaking pump seals in this structure.
25. Number of Valves - Leaking: The number of leaking valves in this structure.
26. Number of Centrifugal Compressors – Dry Seals - Leaking: The number of leaking dry seals centrifugal compressors the structure.
27. Number of Centrifugal Compressors – Wet Seals - Leaking: The number of leaking wet seals centrifugal compressors the structure.
28. Reciprocating Compressor – Shaft Packing Seals - Leaking: The number of leaking shaft packing seals reciprocating compressors.
29. Number of Other Compressors – Seals - Leaking: The number of other leaking compressors in the structure.
30. Number of Other Relief Valves - Leaking: The number of other leaking relief valves in the structure.
31. Number of Pressure Relief Valves - Leaking: The number of leaking pressure relief valves in the structure.
32. Number of Meters - Leaking: The number of leaking meters in the structure.
33. Number of Instruments - Leaking: The number of leaking instruments in the structure.
34. Number of Hatches - Leaking: The number of leaking hatches in the structure.
35. Number of Polished Rods - Leaking: The number of leaking polished rods in the structure.
36. Number of Dumps - Leaking: The number of leaking dumps in the structure.
37. Number of Drains - Leaking: The number of leaking drains in the structure.
38. Number of Diaphragms - Leaking: The number of leaking diaphragms in the structure.
39. Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
40. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is Yes.
41. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
42. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
43. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
44. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
45. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.

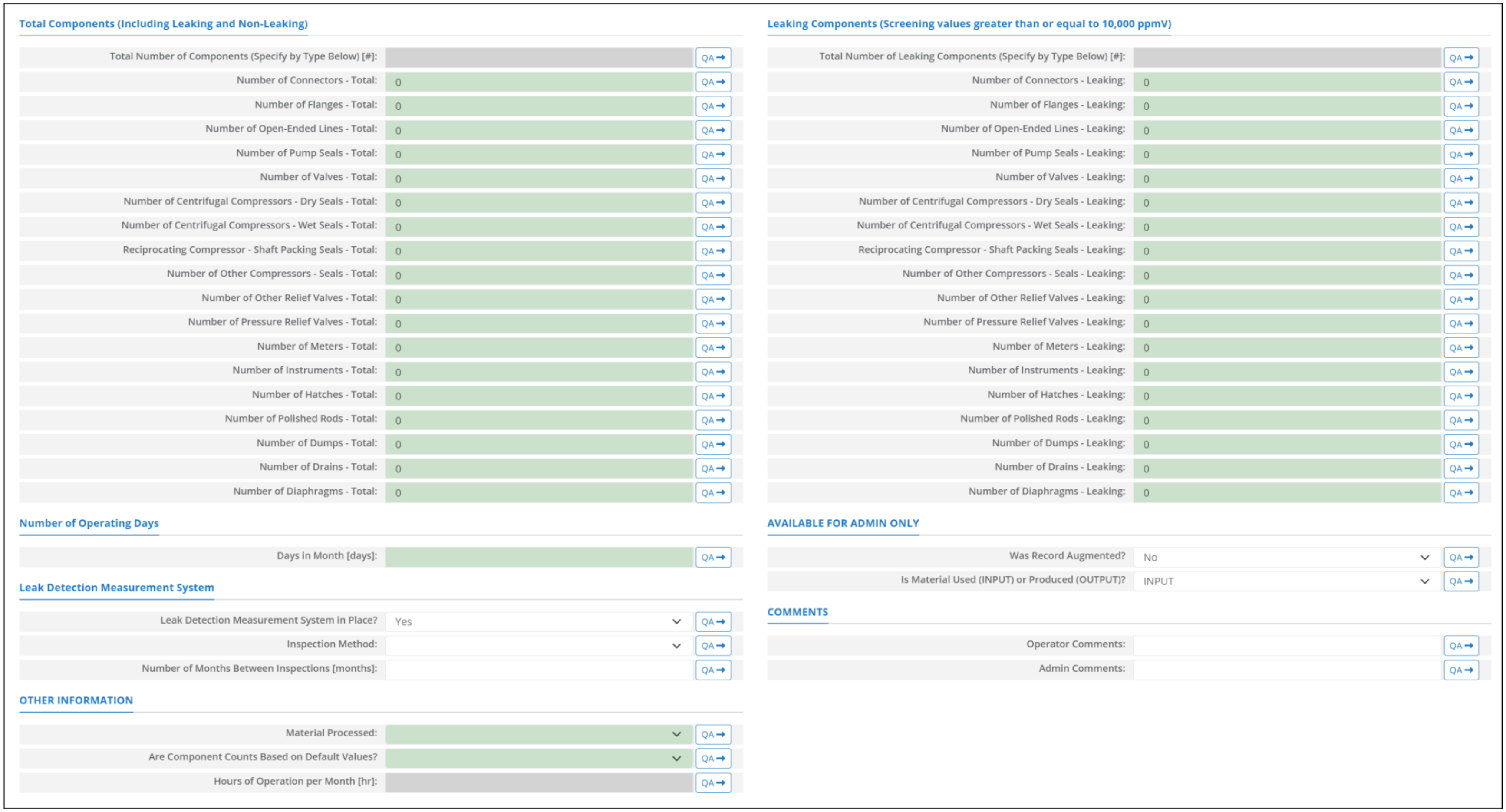


Figure A - 35. FUG-S05 Data Request tab

A.25 FUG-S06 (Fugitive Sources – Oil, Water, Gas– Screening Ranges Approach)

OCS AQS offers the FUG-S01 calculator to enable you to calculate emissions for the **Oil, Water, Gas** stream component types and counts known to be leaking using the screening ranges method. This method can be selected from the **Apply Leak Detection Approach** wizard found in the Activity Emissions Manager (AEM) tool (Section 3.2.4). For this method, you are required to report the total count of components and the count of leaking components of them. Components having a measured concentration exceeding a threshold of 10,000 parts per million by volume (ppmV) should labeled as "leakers", while those below or equal to this threshold are designated as "non-leakers" for the purposes of this screening approach. See Section 3.2.4.1 for more information.

A.25.1 FUG-S06 Calculation Method

For the **Water, Oil, Gas** stream, the FUG-S06 Version 1 calculator in OCS AQS calculates the monthly fugitive total hydrocarbons (THC) emissions using the screening ranges approach as follows:

$$E_{THC} = \left(\sum_{\text{comp}} \left(EF_{non-leaking} \times N_{non-leaking} \right)_{\text{comp}} + \left(EF_{leaking} \times N_{leaking} \right)_{\text{comp}} \right) \times D \quad (A-38)$$

where:

E_{THC} = THC emissions for the **Water, Oil, Gas** stream [kg/month]
$EF_{non-leaking}$ = Emission factor of the non-leaking component for the **Water, Oil, Gas** stream [kg/component-day]
$N_{non-leaking}$ = Total number of non-leaking components (to specify by type) determined by subtracting the number of leaking components from the total number of components
$EF_{leaking}$ = Emission factor of the leaking component for the **Water, Oil, Gas** stream [kg/component-day]
$N_{leaking}$ = Total number of leaking components (to specify by type)
D = Number of days in month [day]

Table A - 35 shows the leaking and non-leaking EFs for THC, by component type, for the **Water, Oil, Gas** stream.

Table A - 35. EFs for total hydrocarbons by component for the water / oil stream[*, $]

Component	$EF_{non-leaking}$ – Water, Oil, Gas Stream [kg/component-day]	$EF_{leaking}$ – Water, Oil, Gas Stream [kg/component-day]
Valves	6.0E-04	2.352
Pump seals	8.4E-03	1.776
Other[†]	2.88E-03	2.136
Connectors	2.4E-04	0.624
Flanges	1.368E-04	1.968
Open-ended lines	3.6E-04	1.32

[*] Table 2-8 from USEPA (1995b) does not list emission factors (EFs) for the Oil, Water, Gas stream. A BOEM-approved assumption was made to use the gas stream EF values from Table 2-8. This assumption aligns with the footnotes in Table W-1E from https://ecfr.io/Title-40/sp40.23.98.w, which recommend using the EFs for gas service when dealing with multi-phase flow that includes gas. Therefore, the gas stream EFs were applied to the Oil, Water, Gas stream.

$The Table 2-8 from USEPA (1995b) did not mention the Oil, Water, Gas stream. However, according to the footnotes provided in Table W-1E from the https://ecfr.io/Title-40/sp40.23.98.w, when encountering multi-phase flow that includes gas, it is recommended to utilize the EFs designated for gas service. Therefore, we will apply the emission factor for the gas stream for the Oil, Water, Gas stream.

† Other Includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents.

Fugitive CH_4 and VOC emissions for the **Water, Oil, Gas** stream are calculated from the THC emissions as follows:

$$E = E_{THC} \times WF \quad (A-39)$$

where:

E = Emissions for VOC or CH_4 [kg/month]
E_{THC} = THC emissions [kg/month], as described above
WF = Weight fraction of CH_4 or VOC for **Water, Oil, Gas** stream

Table A - 36 shows the weight fractions of CH_4 and VOC for the **Water, Oil, Gas** process stream.

Table A - 36. Weight fractions of CH_4 and VOC for the water, oil, gas process stream*

Pollutant	Weight Fractions – Water, Oil, Gas Stream
Methane (CH_4)	0.612
Volatile organic compounds (VOC)	0.296

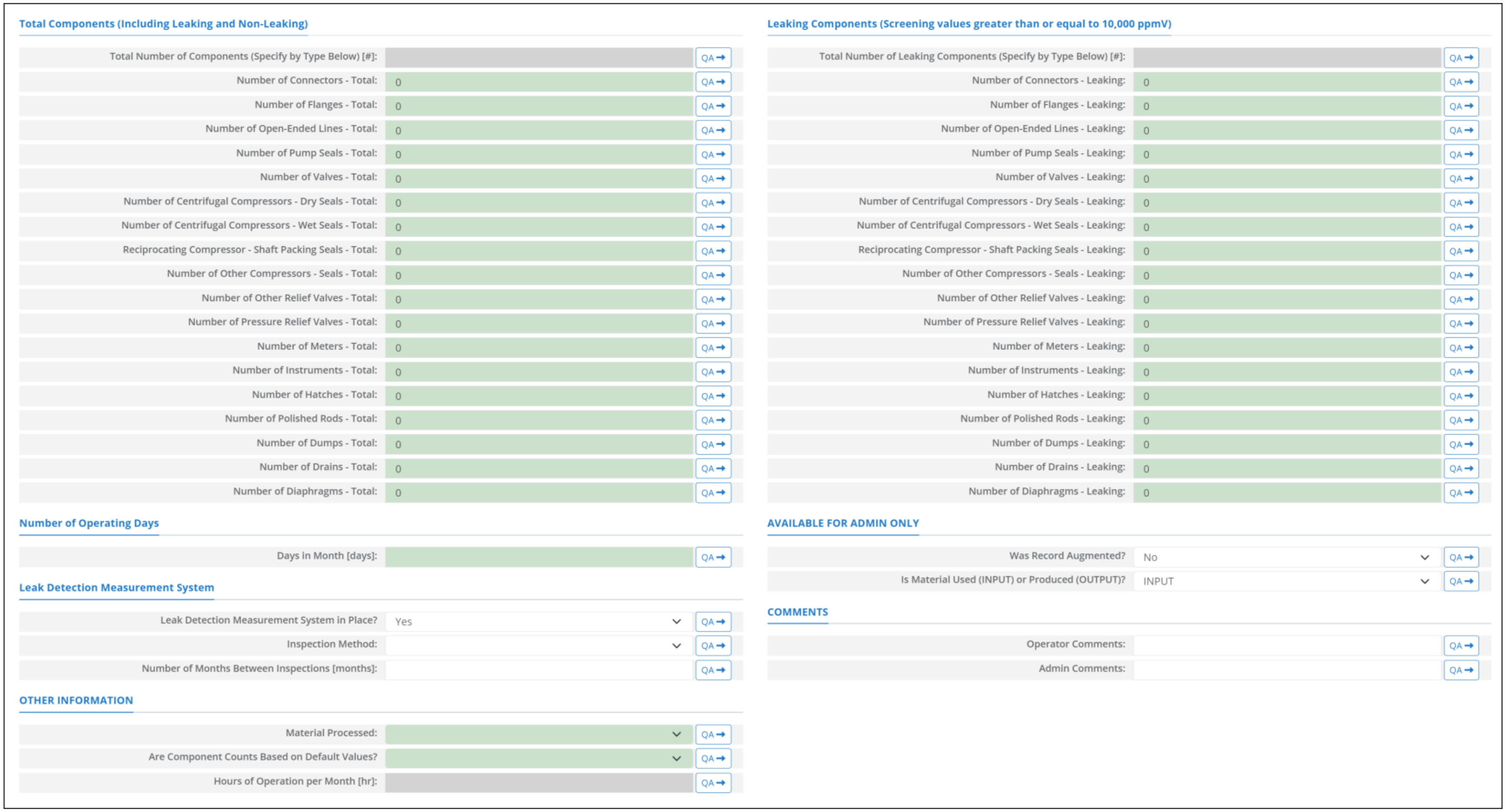
*Reference: Table 4-15 (Default Speciation Weight Fractions for THC Emissions by Stream Type) from Wilson et al. (2019)

A.25.2 FUG-S06 Data and Control Requests

The calculator FUG-S06 Version 1 in OCS AQS calculates the monthly emissions from the **Water, Oil, Gas** fugitive sources using the following **Data Request** fields in Figure A - 36:

1. Total Number of Components (Specify by Type Below) [#]: The summation of the number of the total components. This field is auto-calculated based on the number of total components provided in the subsequent fields.
2. Number of Connectors - Total: Total number of connectors in the structure.
3. Number of Flanges - Total: Total number of flanges in this structure.
4. Number of Open-Ended Lines - Total: Total number of open-ended lines in the structure.
5. Number of Pump Seals - Total: Total number of pump seals in this structure.
6. Number of Valves - Total: Total number of valves in this structure.
7. Number of Centrifugal Compressors – Dry Seals - Total: Total number of dry seals centrifugal compressors the structure.
8. Number of Centrifugal Compressors – Wet Seals – Total: Total number of wet seals centrifugal compressors the structure.
9. Reciprocating Compressor – Shaft Packing Seals - Total: Total number of shaft packing seals reciprocating compressors.
10. Number of Other Compressors – Seals - Total: Total number of other compressors in the structure.
11. Number of Other Relief Valves - Total: Total number of other relief valves in the structure.
12. Number of Pressure Relief Valves - Total: Total number of pressure relief valves in the structure.
13. Number of Meters - Total: Total number of meters in the structure.
14. Number of Instruments - Total: Total number of instruments in the structure.
15. Number of Hatches - Total: Total number of hatches in the structure.
16. Number of Polished Rods - Total: Total number of polished rods in the structure.
17. Number of Dumps - Total: Total number of dumps in the structure.

18. Number of Drains - Total: Total number of drains in the structure.
19. Number of Diaphragms - Total: Total number of diaphragms in the structure.
20. Total Number of Leaking Components (Specify by Type Below) [#]: The summation of the number of the leaking components. This field is auto-calculated based on the number of leaking components provided in the subsequent fields.
21. Number of Connectors - Leaking: The number of the leaking connectors in the structure.
22. Number of Flanges - Leaking: The number of leaking flanges in this structure.
23. Number of Open-Ended Lines - Leaking: The number of leaking open-ended lines in the structure.
24. Number of Pump Seals - Leaking: The number of leaking pump seals in this structure.
25. Number of Valves - Leaking: The number of leaking valves in this structure.
26. Number of Centrifugal Compressors – Dry Seals - Leaking: The number of leaking dry seals centrifugal compressors the structure.
27. Number of Centrifugal Compressors – Wet Seals - Leaking: The number of leaking wet seals centrifugal compressors the structure.
28. Reciprocating Compressor – Shaft Packing Seals - Leaking: The number of leaking shaft packing seals reciprocating compressors.
29. Number of Other Compressors – Seals - Leaking: The number of other leaking compressors in the structure.
30. Number of Other Relief Valves - Leaking: The number of other leaking relief valves in the structure.
31. Number of Pressure Relief Valves - Leaking: The number of leaking pressure relief valves in the structure.
32. Number of Meters - Leaking: The number of leaking meters in the structure.
33. Number of Instruments - Leaking: The number of leaking instruments in the structure.
34. Number of Hatches - Leaking: The number of leaking hatches in the structure.
35. Number of Polished Rods - Leaking: The number of leaking polished rods in the structure.
36. Number of Dumps - Leaking: The number of leaking dumps in the structure.
37. Number of Drains - Leaking: The number of leaking drains in the structure.
38. Number of Diaphragms - Leaking: The number of leaking diaphragms in the structure.
39. Days in Month [days]: The total number of days that the fugitive source operated during the survey period.
40. Leak Detection Measurement System in Place?: A Yes/No drop-down list field to indicate whether the facility routinely assesses and repairs leaking fugitive components or not. Default selection is Yes.
41. Inspection Method: A drop-down list field to specify the employed inspection method: Optical Instrumentation / Visual Inspection / Vapor Analyzer.
42. Number of Months Between Inspections [months]: The inspection frequency of the leak detection program.
43. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas Liquid / Heavy Oil / Light Oil / Water, Oil / Oil, Water, Gas.
44. Are Component Counts Based on Default Values?: A drop-down list field [Actual / Default] to specify whether the facility-specific component count is provided (Actual), or default values provided by BOEM are used (Default). Default components are given as:
    Connectors: 9,194
    Valves: 1,713
    Open-Ends: 285
    Others: 228
45. Hours of Operation per Month [hr]: The total monthly hours of operation of the fugitive sources during this survey period. This field is auto-calculated.



Total Components (Including Leaking and Non-Leaking)

Total Number of Components (Specify by Type Below) [#]:	
Number of Connectors - Total:	0
Number of Flanges - Total:	0
Number of Open-Ended Lines - Total:	0
Number of Pump Seals - Total:	0
Number of Valves - Total:	0
Number of Centrifugal Compressors - Dry Seals - Total:	0
Number of Centrifugal Compressors - Wet Seals - Total:	0
Reciprocating Compressor - Shaft Packing Seals - Total:	0
Number of Other Compressors - Seals - Total:	0
Number of Other Relief Valves - Total:	0
Number of Pressure Relief Valves - Total:	0
Number of Meters - Total:	0
Number of Instruments - Total:	0
Number of Hatches - Total:	0
Number of Polished Rods - Total:	0
Number of Dumps - Total:	0
Number of Drains - Total:	0
Number of Diaphragms - Total:	0

Number of Operating Days

Days in Month [days]:	

Leak Detection Measurement System

Leak Detection Measurement System in Place?	Yes
Inspection Method:	
Number of Months Between Inspections [months]:	

OTHER INFORMATION

Material Processed:	
Are Component Counts Based on Default Values?	
Hours of Operation per Month [hr]:	

Leaking Components (Screening values greater than or equal to 10,000 ppmV)

Total Number of Leaking Components (Specify by Type Below) [#]:	
Number of Connectors - Leaking:	0
Number of Flanges - Leaking:	0
Number of Open-Ended Lines - Leaking:	0
Number of Pump Seals - Leaking:	0
Number of Valves - Leaking:	0
Number of Centrifugal Compressors - Dry Seals - Leaking:	0
Number of Centrifugal Compressors - Wet Seals - Leaking:	0
Reciprocating Compressor - Shaft Packing Seals - Leaking:	0
Number of Other Compressors - Seals - Leaking:	0
Number of Other Relief Valves - Leaking:	0
Number of Pressure Relief Valves - Leaking:	0
Number of Meters - Leaking:	0
Number of Instruments - Leaking:	0
Number of Hatches - Leaking:	0
Number of Polished Rods - Leaking:	0
Number of Dumps - Leaking:	0
Number of Drains - Leaking:	0
Number of Diaphragms - Leaking:	0

AVAILABLE FOR ADMIN ONLY

Was Record Augmented?	No
Is Material Used (INPUT) or Produced (OUTPUT)?	INPUT

COMMENTS

Operator Comments:	
Admin Comments:	

Figure A - 36. FUG-S06 Data Request tab

A.26 GLY-000 (Glycol Dehydrator Unit)

A.26.1 GLY-000 Calculation Method

OCS AQS provides a calculator for glycol dehydrators (GLY-000). Hourly emissions from glycol dehydrators are calculated outside of OCS AQS using the GRI-GLYCalc™ Software Version 4.0. The emissions data must be imported to OCS AQS using the **Glycol Emission Rates Import** tool available within OCS AQS. You are required to provide the hourly emissions data (lb/hr) as well as the hours of operation per month (hr/month)**.** The calculator GLY-000 Version 0 in OCS AQS will then calculate the monthly emissions as follows:

$$E = E_{hr} \times t \qquad (A - 40)$$

where:

E = Emissions [lb/month]
E_{hr} = Hourly emissions of glycol dehydrators [lb/hr]
t = Hours of operation per month [hr/month]

A.26.2 GLY-000 Data and Control Requests

The hourly emission rates from the glycol dehydrator unit are calculated externally using GRI-GLYCalc Version 4.0. These emission rates are then imported into OCS AQS using the Glycol Emission Rates Import tool located in the AEM section of the Emissions module. The calculator GLY-000 Version 0 in OCS AQS calculates the monthly emissions from the glycol dehydrator unit using the imported emission rates and the following **Data Request** fields in Figure A - 37:

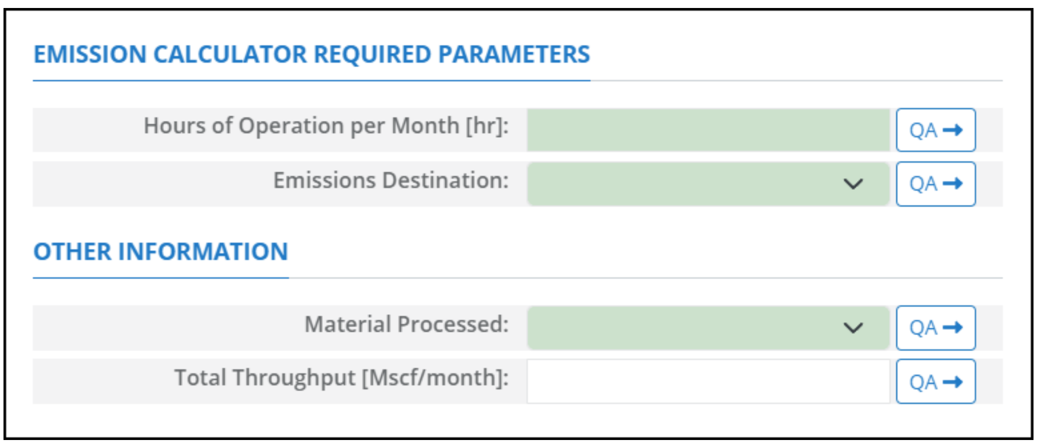


Figure A - 37. GLY-000 Data Request tab

1. Hours of Operation per Month [hr]: The total monthly hours of operation of the glycol dehydrator unit during this survey period.
2. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
3. Material Processed: A drop-down list field to specify the processed material: Natural Gas.
4. Total Throughput [Mscf/month]: The total volume of gas processed in this glycol dehydrator unit during the specific monthly survey period, volume adjusted to standard temperature and pressure (60 degrees Fahrenheit, 1 atmosphere).

The calculator GLY-000 Version 0 in OCS AQS requires information about control devices accompanying the glycol dehydrator units using the following **Control Request** fields in Figure A - 38:

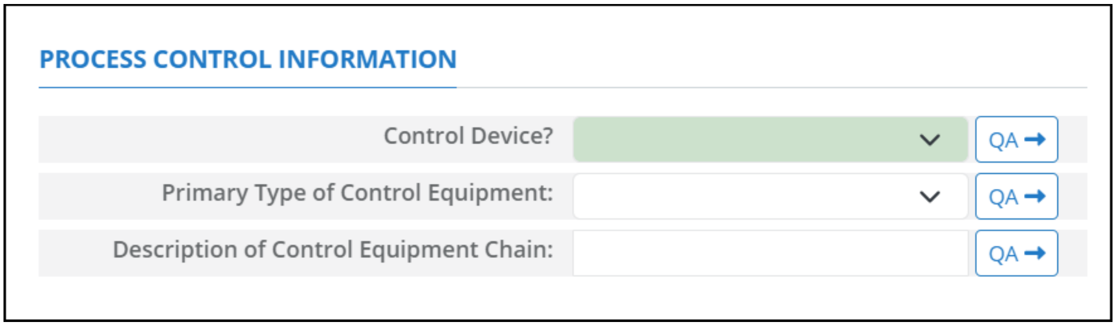


Figure A - 38. GLY-000 Control Request tab

1. Control Device?: Is a control device or end of pipe treatment included in the process? This is a Yes/No question
2. Primary Type of Control Equipment: A drop-down menu to secvify the type of control equipment: Falre/ Vapor Recovery Unit/ Condenser/ Other
3. Description of Control Equipment: a Text filed to provide details about the control equipment (if used)

A.27 LOA-M01R (Loading Operations)

A.27.1 LOA-M01R Calculation Method

The LOA-M01R Version 3 calculator in OCS AQS calculates the monthly total hydrocarbons (THC) emissions released from loading operations as follows:

$$E_{THC} = \left(0.46 + 1.84 \times (0.44 \times P - 0.42) \times \frac{m}{(T_B + 460)} \times 1.02\right) \times Q \times \frac{42\text{ gal}}{\text{barrel}} \times 10^{-3} \quad (A-41)$$

where:

E_{THC} = THC emissions [lb/month]
P = True vapor pressure of the loaded liquid [psia] – see below
m = Average molecular weight of vapors [lb/lb-mol]
T_B = Liquid bulk temperature in Fahrenheit [°F] – OCS AQS converts this to Rankine
Q = Total barrels transferred [bbl/month]

The true vapor pressure of the loaded liquid, P, is calculated as follows:

$$P = e^{[A-(B/T_{LA})]} \quad (A-42)$$

In the above equation, A and B represent empirical constants based on the Reid vapor pressure P_R, and T_{LA} is the daily average liquid surface temperature in Rankine, obtained by the following formulation:

$$A = 12.82 - 0.9672 \times \ln(P_R) \quad (A-43)$$

$$B = 7{,}261 - 1{,}216 \times \ln(P_R) \quad (A-44)$$

$$T_{LA} = 0.44 \times (T_{AA} + 460) + [0.56 \times (T_B + 460)] + \left(0.0079 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2\cdot\text{day}}\right) \quad (A-45)$$

where:

T_{LA} = Daily average liquid surface temperature [°R]
P_R = Reid vapor pressure [psia]
T_{AA} = Daily average ambient temperature [°F] – OCS AQS converts this to Rankine
a = Tank paint solar absorptance, determined in OCS AQS based on user input for the storage tank paint color and the paint condition – see below

Table A - 37 shows the solar absorptance values used in OCS AQS based on the user-specified paint color and paint condition.

Table A - 37. Tank paint solar absorptance by paint color and condition*

Paint Color	Paint Condition = Good	Paint Condition = Poor
Aluminum or Specular	0.39	0.49
Aluminum or Diffuse	0.60	0.68
Gray or Light	0.54	0.63
Gray or Medium	0.68	0.74
Red or Primer	0.89	0.91
White	0.17	0.34

* Reference: Table 4-17 (Tank Paint Solar Absorptance) from Wilson et al. (2019)

VOC emissions are calculated as a percent of THC emissions as follows:

$$E_{VOC} = \frac{WP_{VOC}}{100} \times E_{THC} \quad (A-46)$$

where:

WP_{VOC} = VOC tank vapor weight percent [%]

NOTE: The equations $A - 41$ to $A - 46$ are all from Section 4.2.8 (Loading Operations) from Wilson et al. (2019).

NOTE: You are allowed to provide reduction efficiencies for emissions from loading operations by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.27.2 LOA-M01R Data and Control Requests

The calculator LOA-M01R Version 3 in OCS AQS calculates the monthly emissions from the loading operations using the following **Data Request** fields in Figure A - 39:

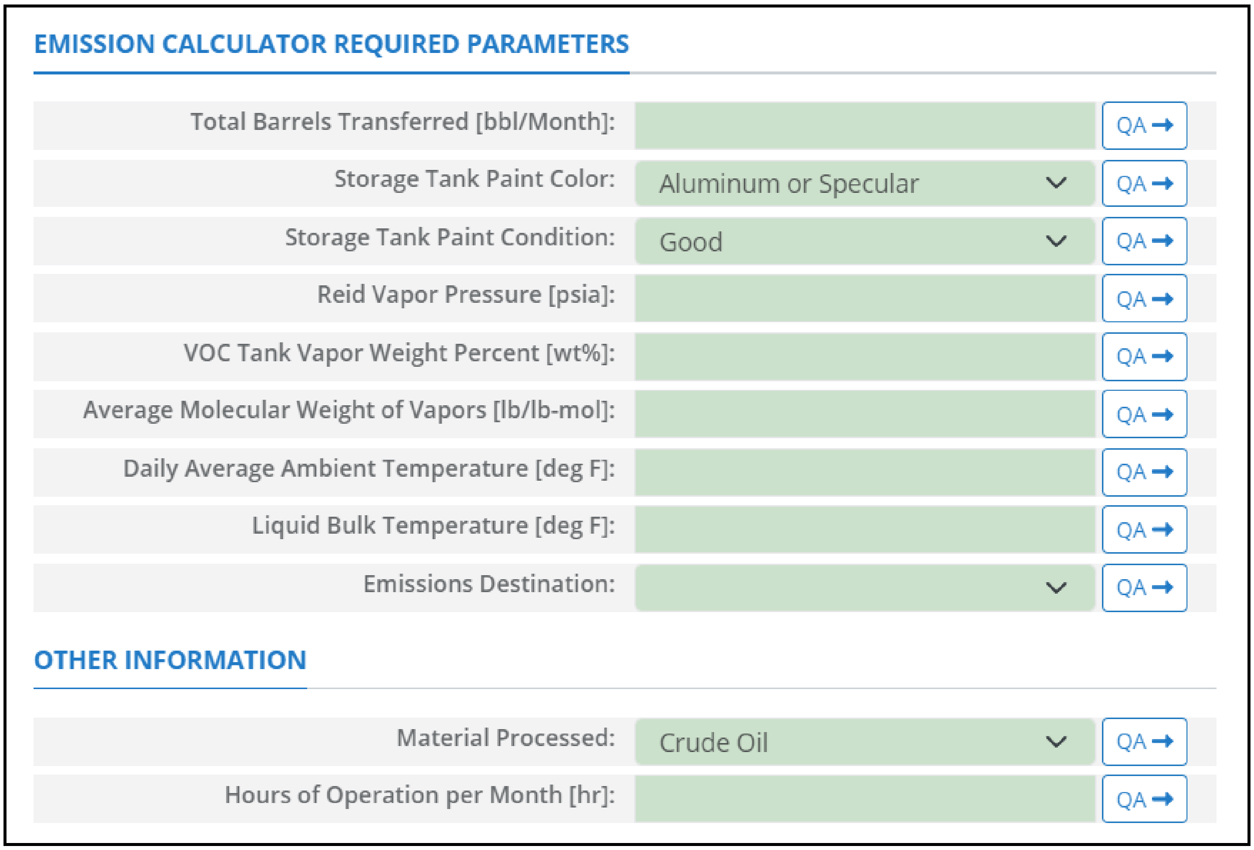


Figure A - 39. LOA-M01R Data Request tab

1. Total Barrels Transferred per Month [bbl/Month]: The number of barrels of liquid hydrocarbons transferred / loaded per month.
2. Storage Tank Paint Color: A drop-down list field to specify the exterior paint color of the dispensing storage tank: Aluminum or Specular / Aluminum or Diffuse / Grey or Light / Grey or Medium / Red or Primer / White.
3. Storage Tank Paint Condition: A drop-down list field to specify the exterior paint condition of the dispensing storage tank: Good / Poor / Average.

4. Reid Vapor Pressure [psia]: The Reid vapor pressure of the liquid in the dispensing storage tank.
5. VOC Tank Vapor Weight Percent [wt%]: The weight percentage concentration of the vapor VOC in the dispensing storage tank.
6. Average Molecular Weight of Vapors [lb/lb-mol]: The average molecular weight of the vapor VOC present in the dispensing storage tank.
7. Daily Average Ambient Temperature [deg F]: The daily average ambient temperature.
8. Liquid Bulk Temperature [deg F]: The bulk temperature of the liquid in the dispensing storage tank.
9. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
10. Material Processed: A drop-down list field to specify the processed material: Crude Oil.
11. Hours of Operation per Month [hr]: The total monthly hours of loading operations during this survey period.

The calculator LOA-M01R Version 3 in OCS AQS calculates the monthly emissions with pollution control from the loading operations using the following **Control Request** fields in Figure A - 40:

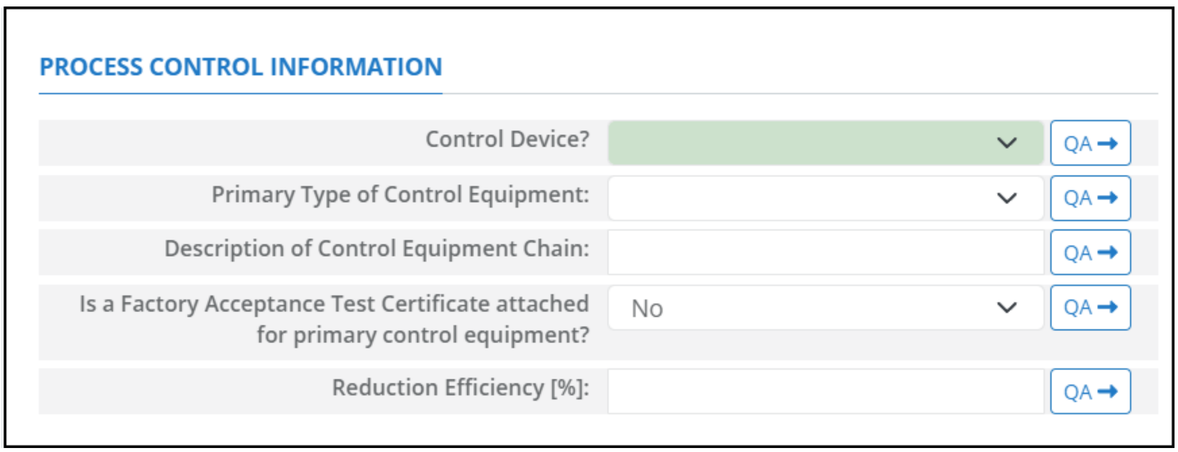


Figure A - 40. LOA-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain in the comments field.
3. Description of Control Equipment Chain: If more than one type of control technology is used, user can describe the sequence of processing in this field.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency [%]: This term describes the reduction of all emitted constituents of the emission stream using the control technology. For example, if a Vapor Unit Recovery is employed with a 90% reduction efficiency, the user enters “90” in the “Reduction Efficiency [%]” field. After the calculation is executed, all the emitted constituents will be reduced uniformly by 90%.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.28 LOS-M01R (Losses from Flashing)

A.28.1 LOS-M01R Calculation Method

The LOS-M01R Version 4 calculator in OCS AQS calculates the monthly emissions of VOC, CO_2, and CH_4 released from flashing processes as follows:

$$E_f = (GOR_U - GOR_V) \times Q \times W_g \qquad (A-47)$$

where:

E_f = Emissions from flashing [lb/month]
GOR_U = Gas-to-oil ratio for upstream vessel [scf/bbl]
GOR_V = Gas-to-oil ratio for vessel [scf/bbl]
Q = Throughput volume [bbl/month]
W_g = Gas density [lb/scf] – see below for the values used in OCS AQS

Table A - 38 shows the gas density values used for VOC, CO_2, and CH_4.

Table A - 38. Gas density values for losses from flashing*

Pollutant	Gas density [lb/scf]
Volatile organic compounds (VOC)	1.8E-03
Carbon dioxide (CO_2)	9.28E-04
Methane (CH_4)	0.04

* Reference: Section 4.2.9 (Losses from Flashing) in Wilson et al. (2019)

The gas-to-oil ratio (*GOR*) in the equation above is calculated using the Vasquez-Beggs correlation, as follows:

$$GOR = A \times (P_V + P_A)^B \times G_{fg} \times e^{\frac{C \times G_{oil}}{T_V + 460}} \qquad (A-48)$$

where:

GOR = Gas-to-oil ratio [scf/bbl]
P_V = Vessel operating pressure (upstream/downstream) [psia]
P_A = Atmospheric pressure [psia]
A, *B*, and *C* are empirical constants – see below for the values used in OCS AQS
G_{fg} = Specific gravity of flash gas – see below for the values used in OCS AQS
T_V = Vessel operating temperature (upstream/downstream) [°F]
G_{oil} = API gravity
OCS AQS uses the following values in Table A - 39 and *Reference: Section 4.2.9 (Losses from Flashing) in Wilson et al. (2019)

Table A - 40 for A, B, C, and based on API gravity provided by the operator:

Table A - 39. Parameters in Vasquez-Beggs correlation for API gravity > 30*

Parameter	Value
A	0.0178
B	1.187
C	23.931
G_{fg}	0.93

*Reference: Section 4.2.9 (Losses from Flashing) in Wilson et al. (2019)

Table A - 40. Parameters in Vasquez-Beggs correlation for API gravity ≤ 30*

Parameter	Value
A	0.0362
B	1.0937
C	25.724
G_{fg}	1.08

*Reference: Section 4.2.9 (Losses from Flashing) in Wilson et al. (2019)

> ***NOTE:*** You are allowed to provide reduction efficiencies for emissions from flashing by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.28.2 LOS-M01R Data and Control Requests

The calculator LOS-M01R Version 4 in OCS AQS calculates the monthly emitted losses from flashing using the following **Data Request** fields in Figure A - 41:

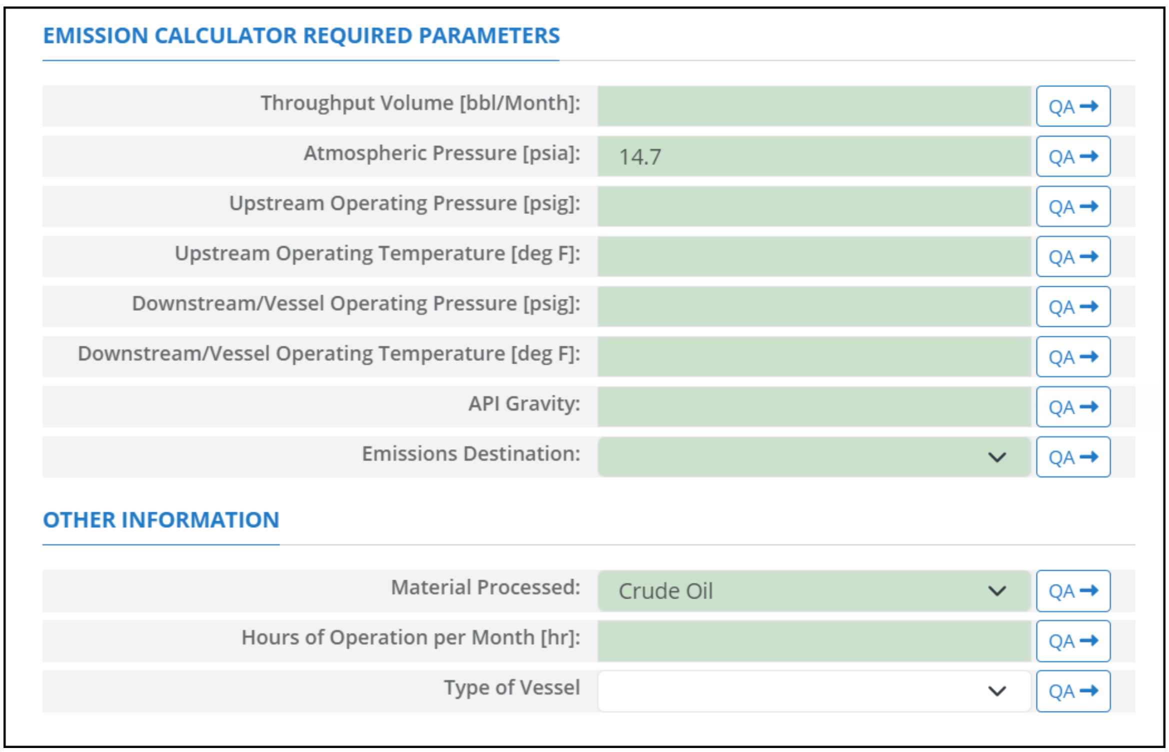


Figure A - 41. LOS-M01R Data Request tab

1. Throughput Volume per Month [bbl/Month]: The total volume of the material processed in the vessel during the specific monthly survey period.
2. Atmospheric Pressure [psia]: The atmospheric pressure. Default value is 14.7 pisa.
3. Upstream Operating Pressure [psig]: Operating pressure of the upstream vessel.
4. Upstream Operating Temperature [deg F]: Operating temperature of the upstream vessel.
5. Downstream / Vessel Operating Pressure [psig]: Operating pressure of the downstream / vessel where the flashing takes place.
6. Downstream /Vessel Operating Temperature [deg F]: Operating temperature of the downstream / vessel where the flashing takes place.
7. API Gravity: The API gravity of the oil/condensate in the vessel where the flashing takes place.
8. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally

selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.

9. Material Processed: A drop-down list field to specify the processed material: Crude Oil / Condensate.
10. Hours of Operation per Month [hr]: The total monthly hours of flashing operations during this survey period.
11. Type of Vessel: A drop-down list field to specify the type of vessel: Heater Treater / Separator / Storage Tank / Surge Tank / Other.

The calculator LOS-M01R Version 4 in OCS AQS the monthly losses emitted from flashing with pollution control using the following **Control Request** fields in Figure A - 42:

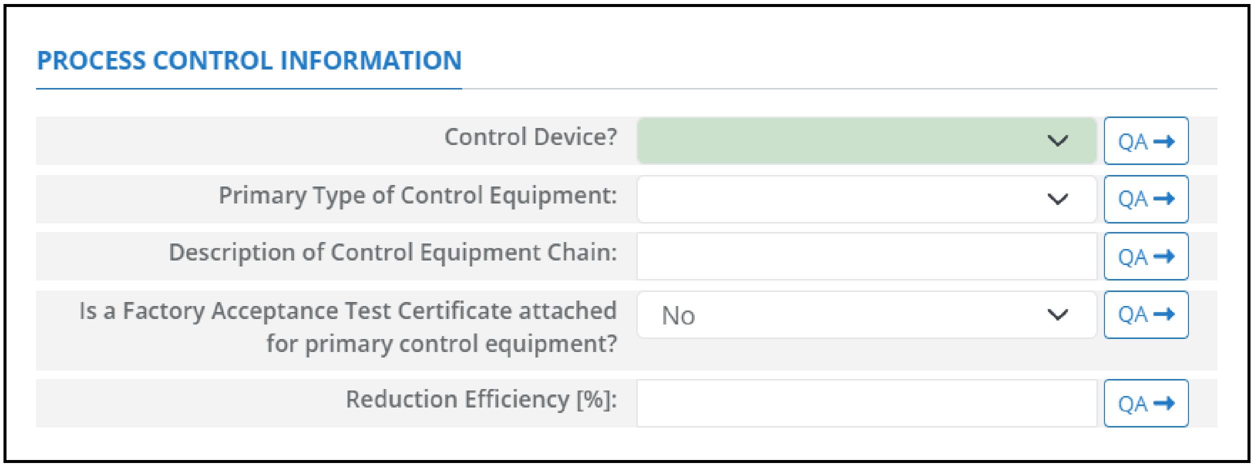


Figure A - 42. LOS-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain in the comments field.
3. Description of Control Equipment Chain: If more than one type of control technology is used, user can describe the sequence of processing in this field.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency [%]: This term describes the reduction of all emitted constituents of the emission stream using the control technology. For example, if a Vapor Unit Recovery is employed with a 90% reduction efficiency, the user enters “90” in the “Reduction Efficiency [%]” field. After the calculation is executed, all the emitted constituents will be reduced uniformly by 90%.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.29 MUD-M01 (Mud Degassing)

A.29.1 MUD-M01 Calculation Method

The MUD-M01R Version 2 calculator in OCS AQS calculates the monthly emissions released from mud degassing processes as follows:

$$E = \frac{WP}{100} \times EF \times D_{drill} \qquad (A-49)$$

where:

E = Emissions [lb/ month]
WP = Mud degassing speciation weight fraction [%]
EF = Emission factor [lb/day], which depends on the type of mud indicated by the operator
D_{drill} = Days per month of drilling with mud [Days]

Table A - 41 below shows the speciation fraction default values used in OCS AQS.

Table A - 41. Mud degassing speciation fractions*

Component	WP - Percent Composition by Weight [%]
Methane (CH_4)	64.705
Ethane (C_2H_6)	7.834
Propane (C_3H_8)	12.977
Butane (C_4H_{10})	8.973
Pentane (C_5H_{12})	4.873
Carbon dioxide (CO_2)	0.6

* Reference: Table 4-19 (Mud Degassing Speciation Fractions) in Wilson et al. (2019)

Table A - 42 below shows the EFs for mud degassing based on the type of mud.

Table A - 42. EFs for mud degassing*

Type of Mud	EF [lb THC/day]
Water-based Mud	881.84
Oil-based Mud	198.41
Synthetic Mud	198.41

*Reference: Section 4.2.10 (Mud Degassing) in Wilson et al. (2019)

A.29.2 MUD-M01 Data and Control Requests

The calculator MUD-M01 Version 2 in OCS AQS calculates the monthly emissions from the mud degassing operation using the following **Data Request** fields in Figure A - 43:

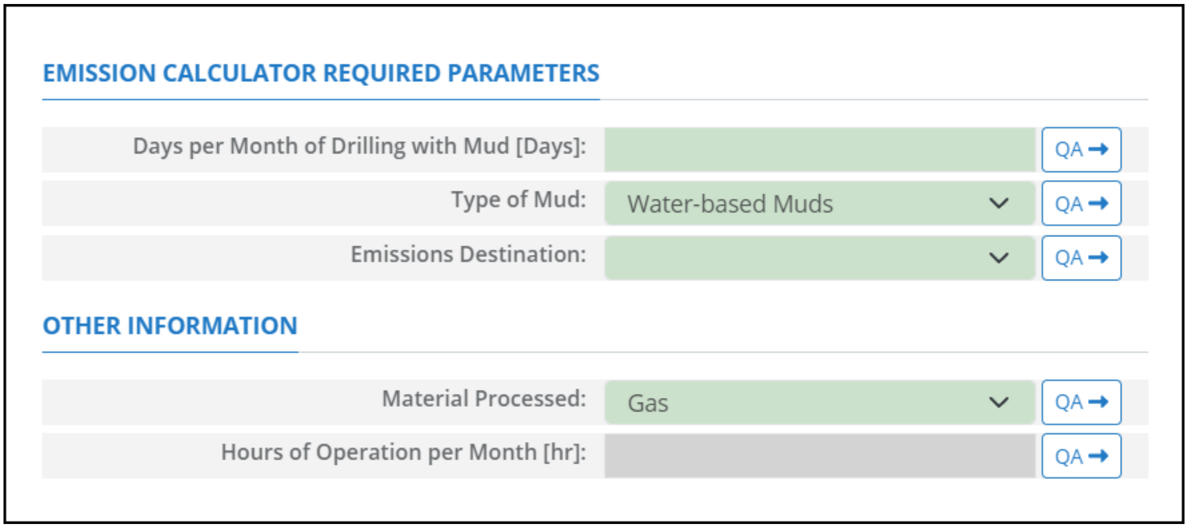


Figure A - 43. MUD-M01 Data Request tab

1. Days per Month of Drilling with Mud [Days]: The total number of 24-hour days of drilling with mud during the specific monthly survey period.
2. Type of Mud: A drop-down list field to specify the type of drilling mud: Water-based Mud / Oil-based Mud / Synthetic.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: The type of fuel burned in the equipment: Gas / Natural Gas.
5. Hours of Operation per Month [hr]: The total monthly hours of mud degassing operations during this survey period. This field is auto-calculated.

A.30 NGE-M01R (Natural Gas Engine – Engine Stroke Cycle = 2-Cycle and Engine Burn = Lean)

A.30.1 NGE-M01R Calculation Method

For natural gas engine having Stroke Cycle = 2-Cycle and Engine Burn = Lean, the calculator NGE-M01R Version 4 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times H \times U \times 0.001 \qquad (A-50)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
H = Fuel heating value [Btu/scf]
U = Total Fuel usage [Mscf/month]

Table A - 43 shows EFs for 2-Stroke, Lean Burn engines.

Table A - 43. EFs for natural gas engines: 2-stroke, lean burn (NGE-M01R)*

Pollutants	EF [lb/MMBtu]
Volatile organic compound (VOC) †	0.12
Sulfur dioxide (SO_2) †	5.88E-04
Nitrogen Oxides (NO_x)†	1.94
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	0.0384
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	0.0384
Carbon monoxide (CO) †	0.353
Methane (CH_4)	1.45
Carbon dioxide (CO_2)	110
Acetaldehyde	7.76E-03
Benzene	1.94E-03
Ethylbenzene	1.08E-04
Formaldehyde	0.0552
Hexane	4.45E-04
Polycyclic aromatic hydrocarbon (PAH)	1.34E-04
Toluene	9.63E-04
2,2,4-trimethylpentane	8.46E-04
Xylenes	2.68E-04

* Reference: USEPA (1995a), Section 3.2
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.30.2 NGE-M01R Data and Control Requests

The calculator NGE-M01R Version 4 in OCS AQS calculates the monthly emissions from a natural gas engine with two engine cycle stroke and lean engine burn using the following **Data Request** fields in Figure A - 44:

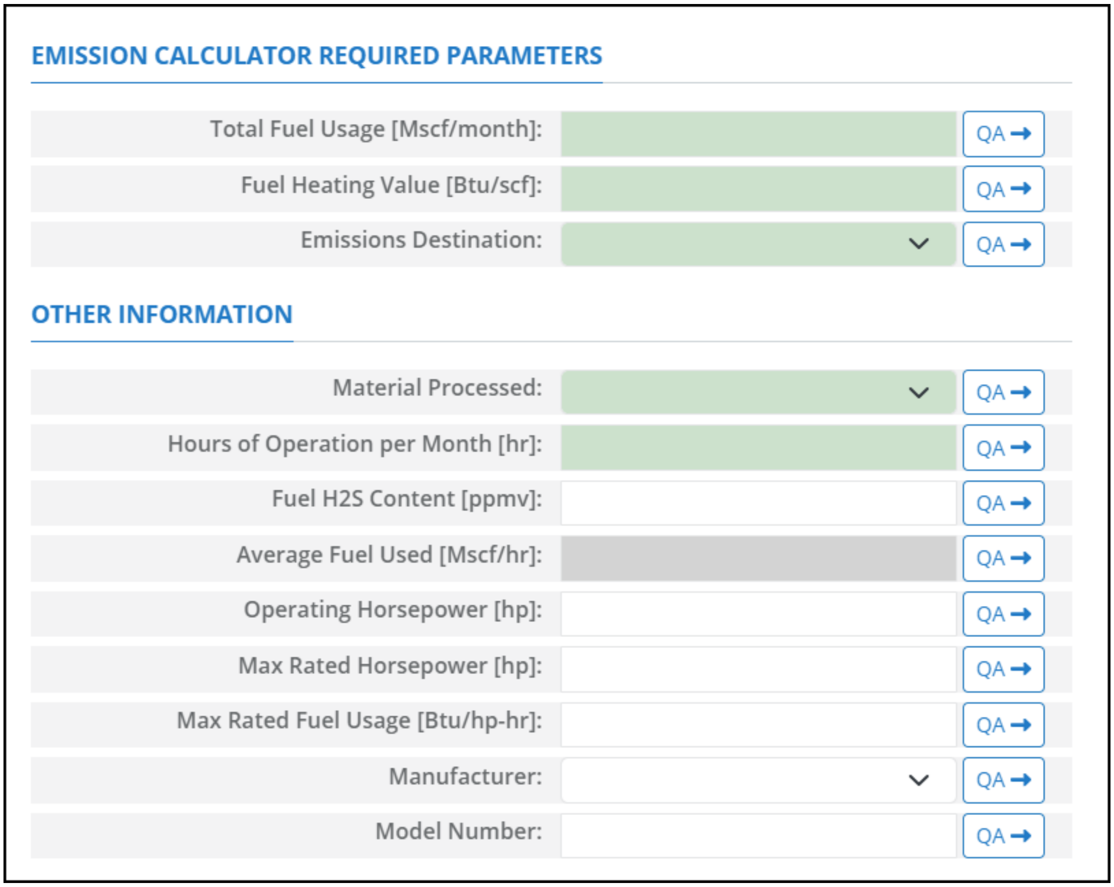


Figure A - 44. NGE-M01R Data Request tab

1. Total Fuel Usage [Mscf/month]: Total monthly rate of the gas fuel used during the survey period.
2. Fuel Heating Value [Btu/scf]: The amount of heat released during the combustion of a specified amount of natural gas fuel.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the engine during the survey period.
6. Fuel H_2S Content [ppmv]: The ppmv concentration of hydrogen sulfide present in natural gas fuel.
7. Average Fuel Used [Mscf/hr]: The average hourly rate of natural gas fuel used during the survey period. This field is auto-calculated.
8. Operating Horsepower [hp]: The operating horsepower of the natural gas engine.
9. Max Rated Horsepower [hp]: The manufacturer’s maximum rated horsepower the natural gas engine.
10. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the gas fuel.

11. Manufacturer: A drop-down list field to specify the engines' manufacturer name.
12. Model Number: The model number of the engine.

The calculator NGE-M01R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a natural gas engine with two engine cycle stroke and lean engine burn using the following **Control Request** fields in Figure A - 45:

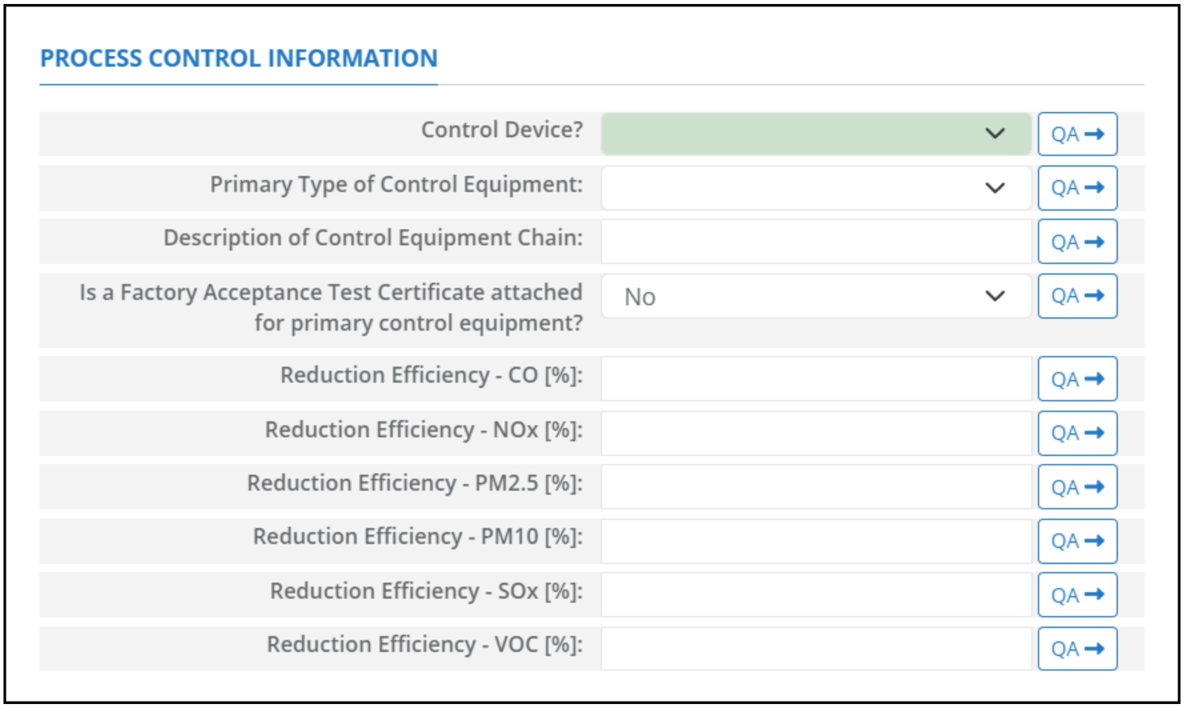


Figure A - 45. NGE-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.

10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.31 NGE-M02R (Natural Gas Engine – Engine Stroke Cycle = 4-Cycle and Engine Burn = Lean)

A.31.1 NGE-M02R Calculation Method

For natural gas engine having Stroke Cycle = 4-Cycle and Engine Burn = Lean, the calculator NGE-M01R Version 5 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times H \times U \times 0.001 \qquad (A-51)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
H = Fuel heating value [Btu/scf]
U = Total Fuel usage [Mscf/month]

Table A - 44 shows EFs for 4-Stroke, Lean Burn engines.

Table A - 44. EFs for natural gas engines: 4-stroke, lean burn (NGE-M02R)*

Pollutants	EF [lb/MMBtu]
Volatile organic compound (VOC) †	0.118
Sulfur Dioxide (SO_2)†	5.88E-04
Nitrogen Oxides (NO_x)†	0.847
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	7.71E-5
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	7.71E-5
Carbon Monoxide (CO) †	0.557
Methane (CH_4)	1.25
Carbon Dioxide (CO_2)	110
Acetaldehyde	8.36E-03
Benzene	4.40E-04
Ethylbenzene	3.97E-05
Formaldehyde	0.0528
Hexane	1.11E-03
Polycyclic aromatic hydrocarbon (PAH)	2.69E-05
Toluene	4.08E-04
2,2,4-Trimethylpentane	2.50E-04
Xylenes	1.84E-04

* Reference: USEPA (1995a), Section 3.2
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.31.2 NGE-M02R Data and Control Requests

The calculator NGE-M02R Version 5 in OCS AQS calculates the monthly emissions from a natural gas engine with four engine cycle stroke and lean engine burn using the following **Data Request** fields in Figure A - 46:

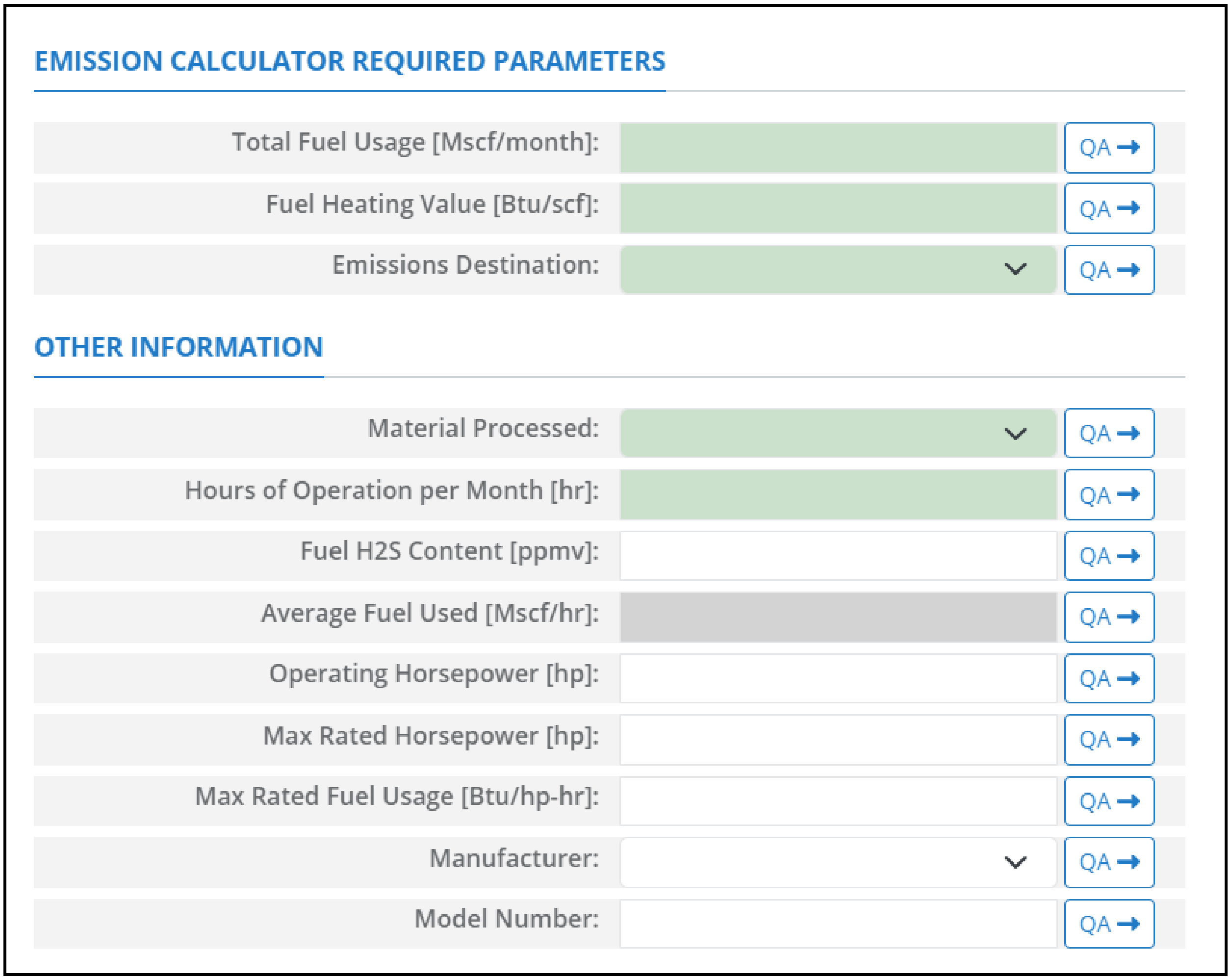


Figure A - 46. NGE-M02R Data Request tab

1. Total Fuel Usage [Mscf/month]: Total monthly rate of the gas fuel used during the survey period.
2. Fuel Heating Value [Btu/scf]: The amount of heat released during the combustion of a specified amount of the natural gas fuel.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the engine during the survey period
6. Fuel H_2S Content [ppmv]: The ppmv concentration of hydrogen sulfide present in natural gas fuel.
7. Average Fuel Used [Mscf/hr]: The average hourly rate of natural gas fuel used during the survey period. This field is auto-calculated.
8. Operating Horsepower [hp]: The operating horsepower of the natural gas engine.

9. Max Rated Horsepower [hp]: The manufacturer's maximum rated horsepower of the natural gas engine.
10. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the gas fuel.
11. Manufacturer: A drop-down list field to specify the engines' manufacturer name.
12. Model Number: The model number of the engine.

The calculator NGE-M02R Version 5 in OCS AQS calculates the monthly emissions with pollution control from a natural gas engine with four engine cycle stroke and lean engine burn using the following **Control Request** fields in Figure A - 47:

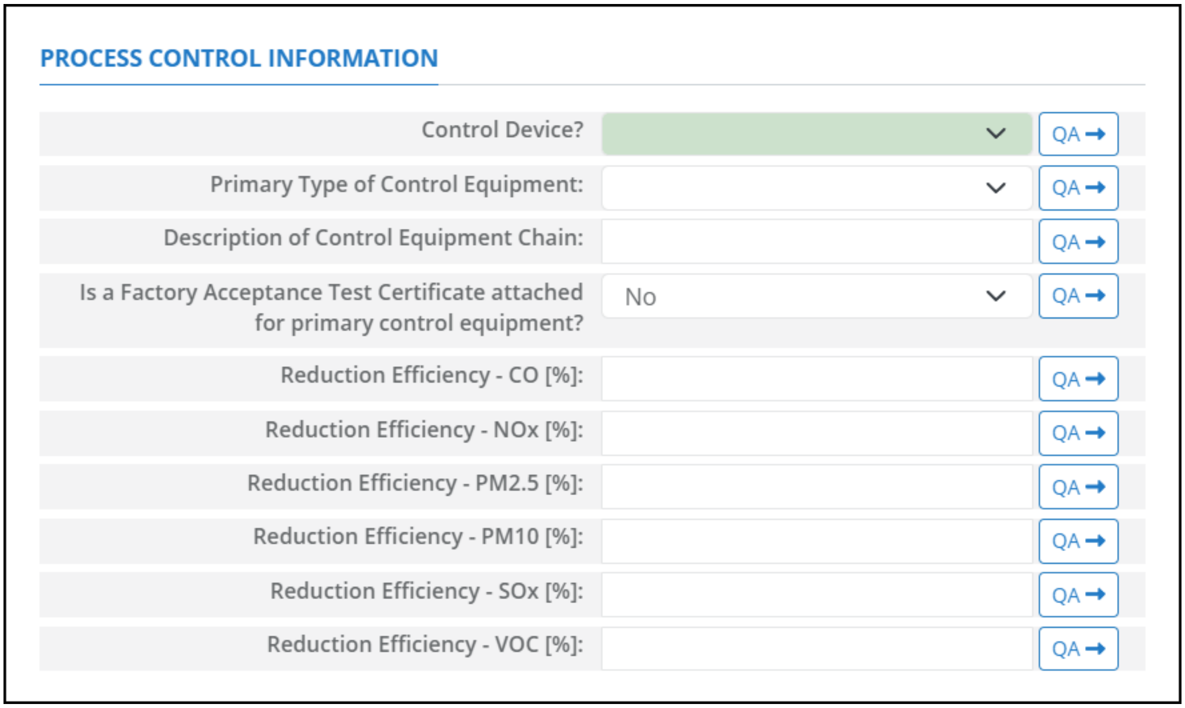


Figure A - 47. NGE-M02R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter "65" in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter "65" in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter "65" in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter "65" in the field.

9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.
10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.32 NGE-M03R (Natural Gas Engine – Engine Stroke Cycle = 4-Cycle and Engine Burn = Rich)

A.32.1 NGE-M03R Calculation Method

For natural gas engine having Stroke Cycle = 4-Cycle and Engine Burn = Rich, the calculator NGE-M03R Version 4 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times H \times U \times 0.001 \qquad (A - 52)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
H = Fuel heating value [Btu/scf]
U = Total Fuel usage [Mscf/month]

Table A - 45 shows EFs for 4-Stroke, Rich Burn engines.

Table A - 45. EFs for natural gas engines: 4-stroke, rich burn (NGE-M03R)*

Pollutants	EF [lb/MMBtu]
Volatile organic compound (VOC) †	0.0296
Sulfur Dioxide (SO_2) †	5.88E-04
Nitrogen Oxides (NO_x) †	2.27
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	9.50E-3
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	9.50E-3
Carbon Monoxide (CO) †	3.51
Methane (CH_4)	0.23
Carbon Dioxide (CO_2)	110
Acetaldehyde	2.79E-03
Benzene	1.58E-03
Ethylbenzene	2.48E-05
Formaldehyde	0.0205
Polycyclic aromatic hydrocarbon (PAH)	1.41E-04
Toluene	5.58E-04
Xylenes	1.95E-04

* Reference: USEPA (1995a), Section 3.2
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.32.2 NGE-M03R Data and Control Requests

The calculator NGE-M03R Version 4 in OCS AQS calculates the monthly emissions from a natural gas engine with four engine cycle stroke and rich engine burn using the following **Data Request** fields in Figure A - 48:

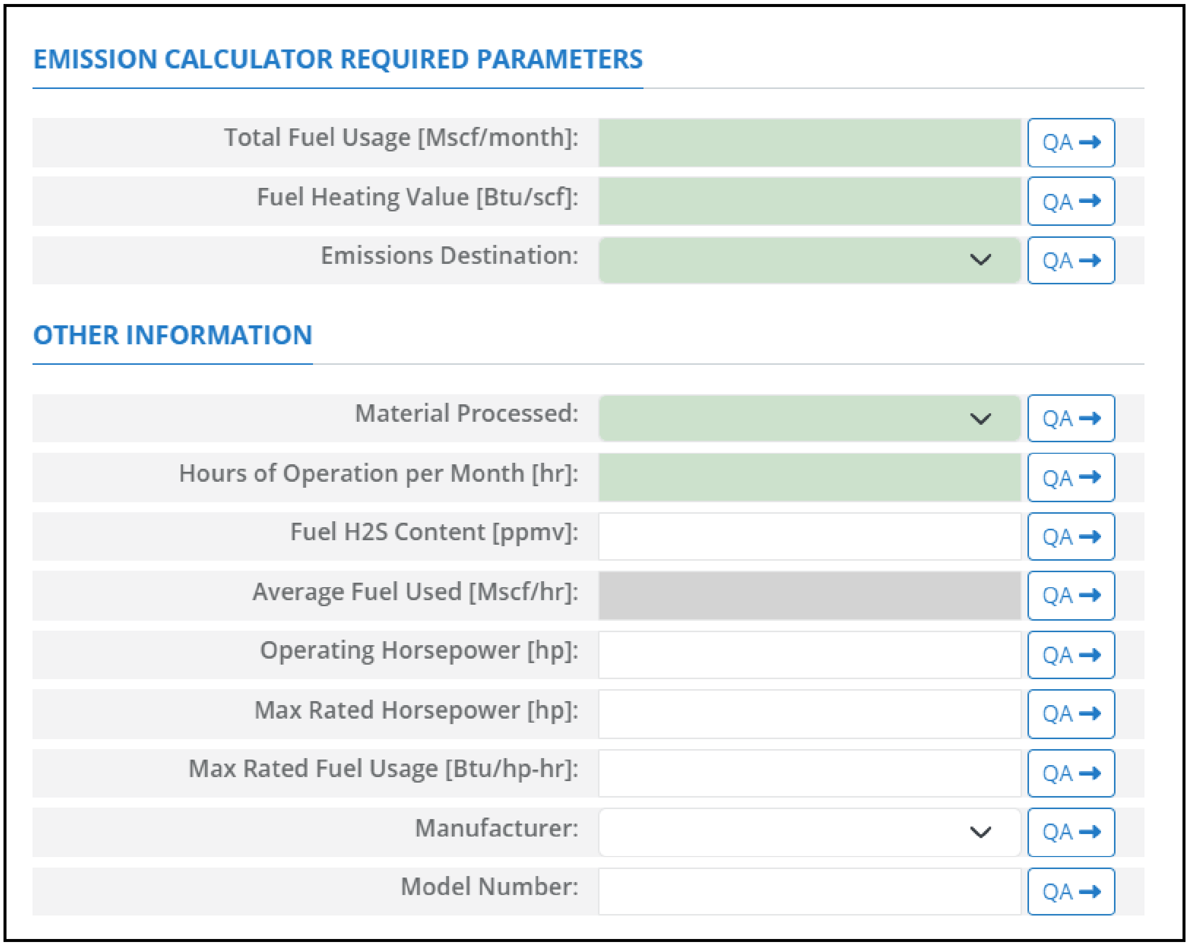


Figure A - 48. NGE-M03R Data Request tab

1. Total Fuel Usage [Mscf/month]: Total monthly rate of the gas fuel used during the survey period.
2. Fuel Heating Value [Btu/scf]: The amount of heat released during the combustion of a specified amount of the natural gas fuel.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the engine during the survey period.
6. Fuel H_2S Content [ppmv]: The ppmv concentration of hydrogen sulfide present in natural gas fuel.
7. Average Fuel Used [Mscf/hr]: The average hourly rate of natural gas fuel used during the survey period. This field is auto-calculated.
8. Operating Horsepower [hp]: The operating horsepower of the engine.
9. Max rated horsepower [hp]: The manufacturer’s maximum rated horsepower of the engine.

10. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the gas fuel.
11. Manufacturer: A drop-down list field to specify the engines' manufacturer name.
12. Model Number: The model number of the engine.

The calculator NGE-M03R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a natural gas engine with four engine cycle stroke and rich engine burn using the following **Control Request** fields in Figure A - 49:

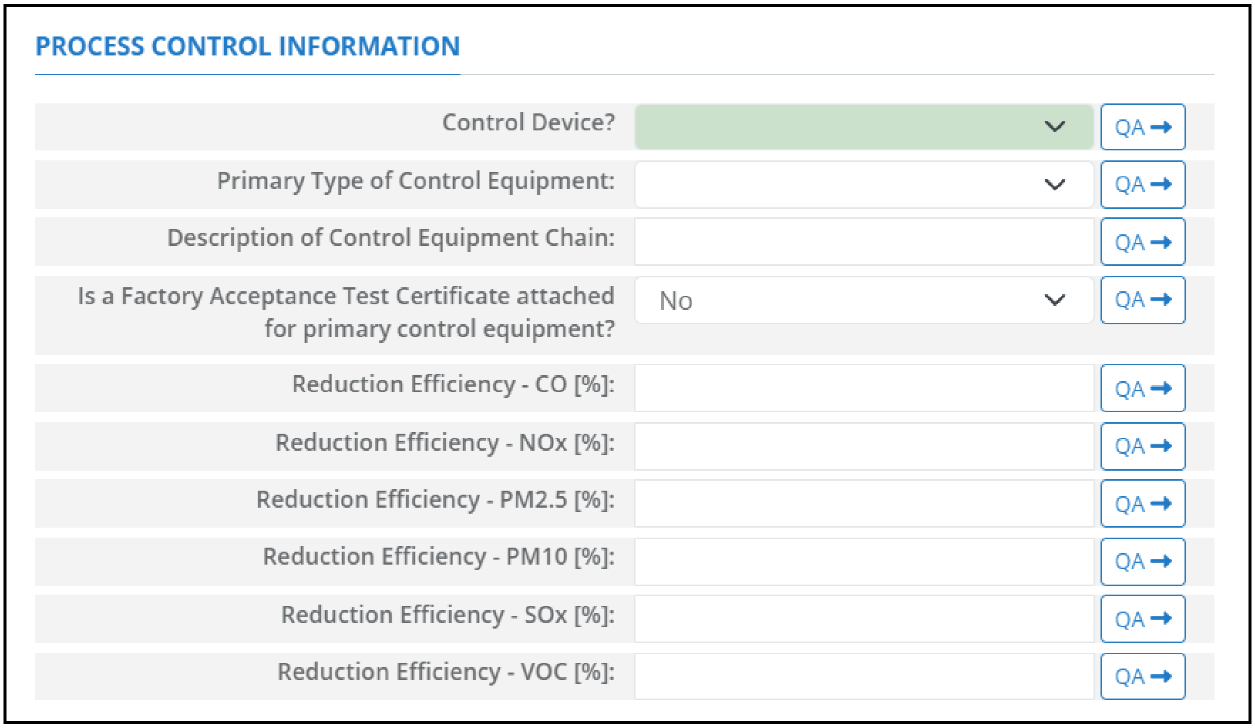


Figure A - 49. NGE-M03R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.

9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.
10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.33 NGE-M04R (Natural Gas Engine – Engine Burn =clean)

A.33.1 NGE-M04R Calculation Method

For natural gas engines having Engine Burn = Rich, the calculator NGE-M04R Version 4 in OCS AQS calculates the monthly emissions as follows:

$$E = EF \times H \times U \times 0.001 \qquad (A-53)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
H = Fuel heating value [Btu/scf]
U = Total Fuel usage [Mscf/month]

Table A - 46 shows EFs for Rich Burn engines.

Table A - 46. EFs for natural gas engines: clean burn (NGE-M04R)*

Pollutants	EF [lb/MMBtu]
Volatile organic compound (VOC) †	0.12
Sulfur Dioxide (SO_2) †	5.88E-04
Nitrogen Oxides (NO_x) †	0.59
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	7.71E-5
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	7.71E-5
Carbon Monoxide (CO) †	0.88
Methane (CH_4)	1.25
Carbon Dioxide (CO_2)	110
Acetaldehyde	3.52E-03
Benzene	6.00E-04
Ethylbenzene	4.19E-05
Formaldehyde	0.0495
Hexane	6.48E-04
Toluene	5.05E-04
2,2,4-Trimethylpentane	1.05E-04
Xylenes	1.71E-04

* Reference: Section 4.2.11 (Natural Gas Engines) in Wilson et al. (2019)
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.33.2 NGE-M04R Data and Control Requests

The calculator NGE-M04R Version 4 in OCS AQS calculates the monthly emissions from a natural gas engine with clean engine burn using the following **Data Request** fields in Figure A - 50:

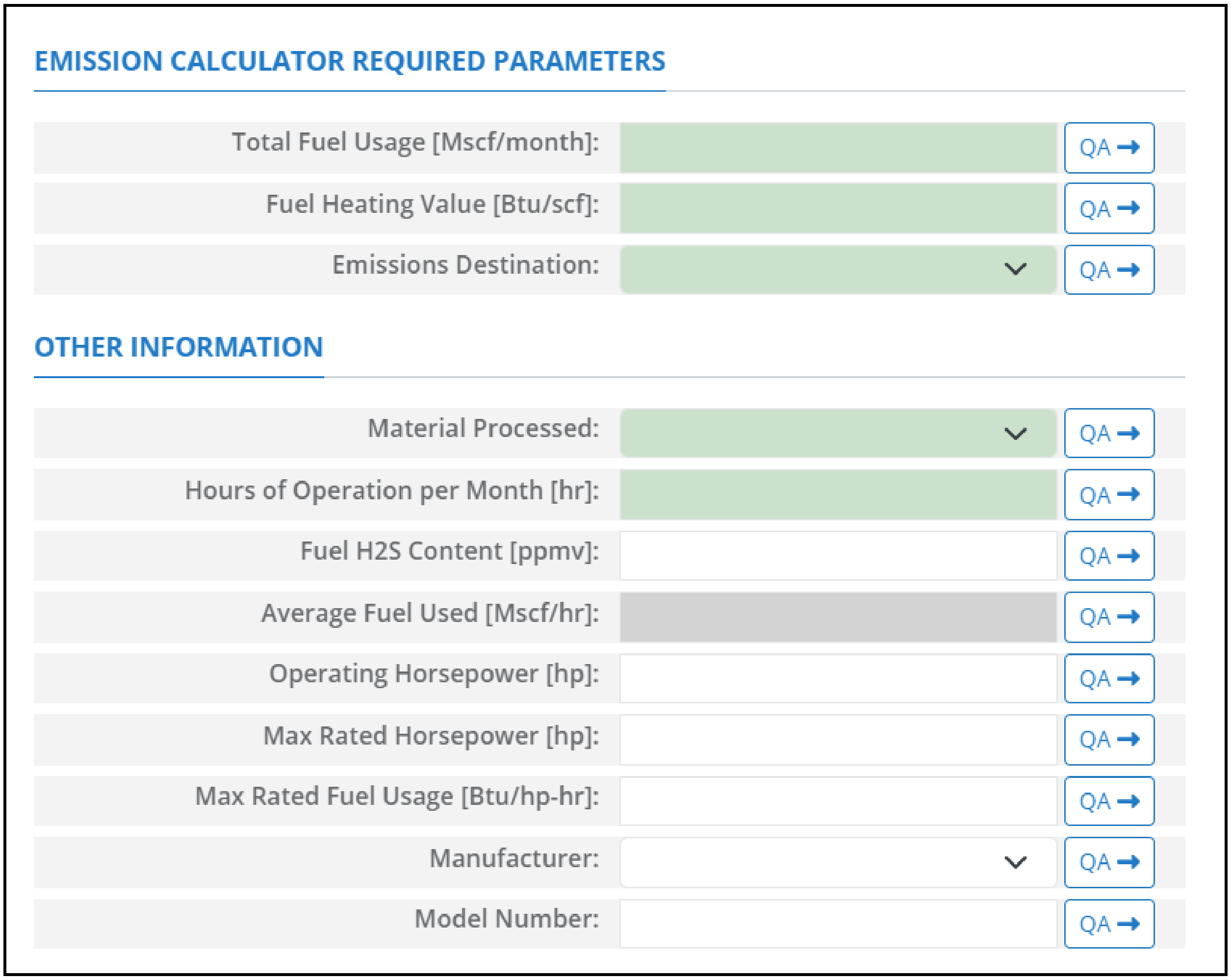


Figure A - 50. NGE-M04R Data Request tab

1. Total Fuel Usage [Mscf/month]: Total monthly rate of the gas fuel used during the survey period.
2. Fuel Heating Value [Btu/scf]: The amount of heat released during the combustion of a specified amount of the natural gas fuel.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the engine during the survey period.
6. Fuel H_2S Content [ppmv]: The ppmv concentration of hydrogen sulfide present in natural gas fuel.
7. Average Fuel Used [Mscf/hr]: The average hourly rate of natural gas fuel used during the survey period. This field is auto-calculated.
8. Operating Horsepower [hp]: The operating horsepower of the engine.

9. Max Rated Horsepower [hp]: The manufacturer's maximum rated horsepower of the engine.
10. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the gas fuel.
11. Manufacturer: A drop-down list field to specify the engines' manufacturer name.
12. Model Number: The model number of the engine.

The calculator NGE-M04R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a natural gas engine with clean engine burn using the following **Control Request** fields in Figure A - 51:

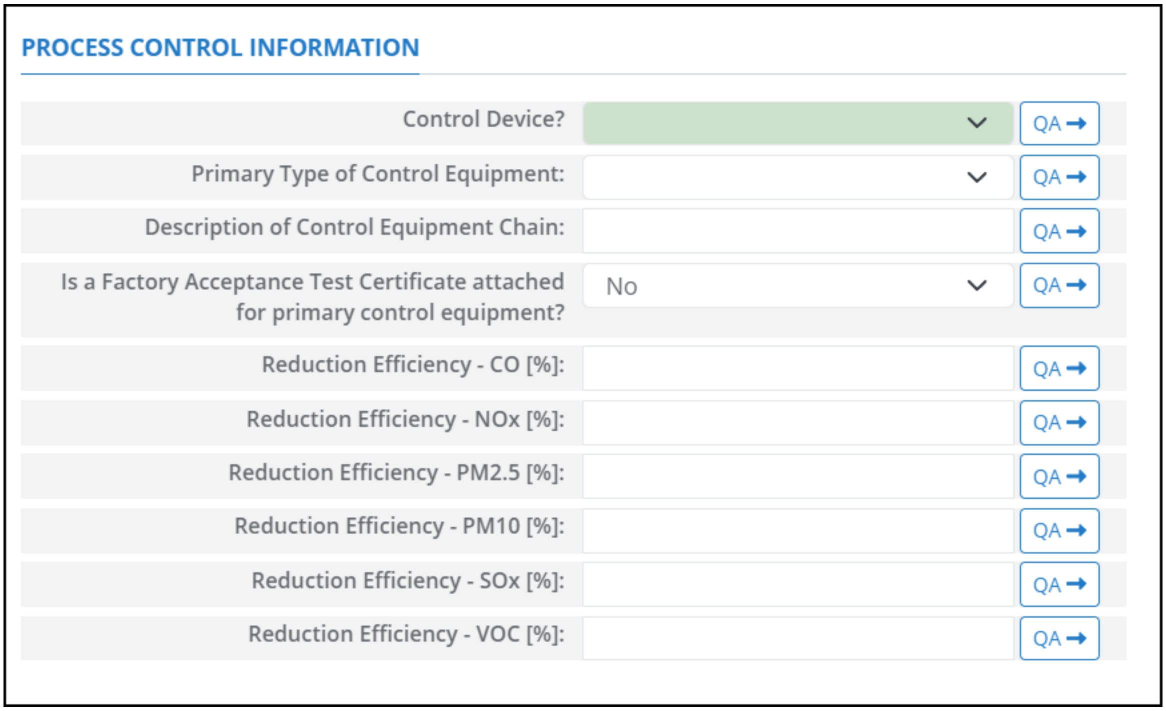


Figure A - 51. NGE-M04R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other to describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter "65" in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter "65" in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter "65" in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter "65" in the field.

9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.
10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.34 NGT-M01R (Dual-Fuel Turbines – Nat. Gas – Known Sulfur)

A.34.1 NGT-M01R Calculation Method

The calculator NGT-M01R Version 4 in OCS AQS calculates the monthly emissions from natural gas dual-fuel turbines with known fuel sulfur content as follows:

$$E = EF \times H \times U \times 0.001 \qquad (A - 54)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
H = Fuel heating value [Btu/scf]
U = Total Fuel usage [Mscf/month]
S = Fuel sulfur content [wt %] – This factor is not shown in the formula above but is a required field in OCS AQS and is used to obtain the EF for SO_2.

Table A - 47 shows the EFs for natural gas dual-fuel turbine engines when the sulfur content is known.

Table A - 47. EFs for natural gas dual-fuel turbines with known fuel gas sulfur content*

Pollutants	EF (lb/MMBtu)
Volatile organic compound (VOC) †	2.10E-03
Sulfur Dioxide (SO_2) †	0.94 × *S*
Nitrogen Oxides (NO_x) †	0.32
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	1.9E-03
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	1.9E-03
Carbon Monoxide (CO) †	0.082
Nitrous Oxide (N_2O) †	3E-03
Methane (CH_4)	8.6E-03
Carbon Dioxide (CO_2)	110
Acetaldehyde	4E-05
Benzene	1.2E-05
Cadmium	6.93E-06
Chromium III	1.28E-05
Chromium VI	5.32E-07
Ethylbenzene	3.2E-05
Formaldehyde	7.1E-04
Mercury	6.63E-06
Polycyclic aromatic hydrocarbon (PAH)	2.2E-06
Toluene	1.3E-04
Xylenes	6.4E-05

* References: USEPA (1995a), Section 3.1; USEPA (2015)
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.34.2 NGT-M01R Data and Control Requests

The calculator NGT-M01R Version 4 in OCS AQS calculates the monthly emissions from a dual-fuel turbine powered by natural gas with known sulfur content using the following **Data Request** fields in Figure A - 52:

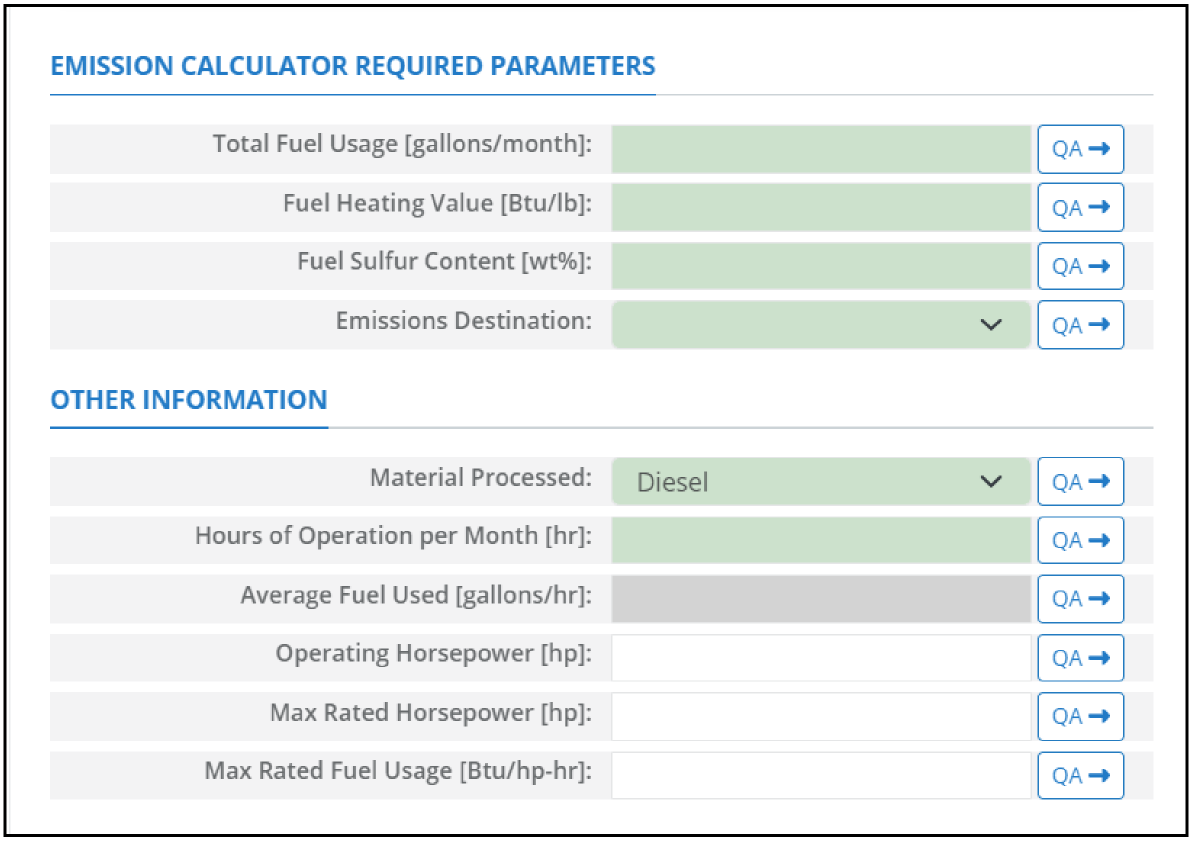


Figure A - 52. NGT-M01R Data Request tab

1. Total Fuel Usage [gallons/month]: Total monthly rate of the natural gas fuel used during the survey period.
2. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of the natural gas fuel.
3. Fuel Sulfur Content [wt%]: The weight percentage of the sulfur content in the used natural gas fuel. For example, if the fuel is 1.0% sulfur, then user enters 1 and not 0.01.
4. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
5. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.
6. Hours of Operation per Month [hr]: The total monthly hours of operation of the turbine during the survey period.
7. Average Fuel Used [gallons/hr]: The average hourly rate of natural gas fuel used during the survey period. This field is auto-calculated.
8. Operating Horsepower [hp]: The operating horsepower of the turbine.
9. Max Rated Horsepower [hp]: The manufacturer's maximum rated horsepower of the turbine.
10. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the gas fuel.

The calculator NGT-M01R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a dual-fuel turbine powered by natural gas with known sulfur content using the following **Control Request** fields in Figure A - 53:

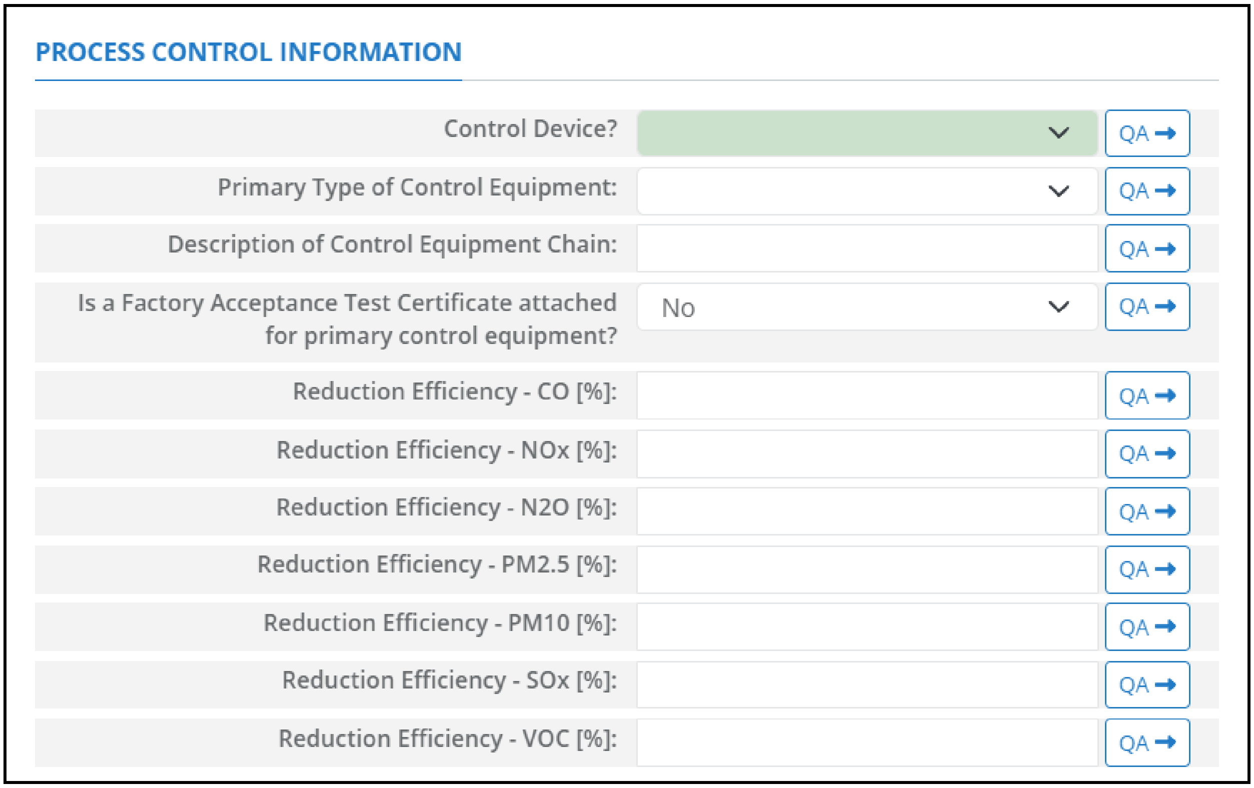


Figure A - 53. NGT-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain and describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – N_2O [%]: This describes the average reduction of emitted N_2O using the control technology. If the total reduction of N_2O using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.

10. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.
11. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.35 NGT-M02R (Dual-Fuel Turbines – Nat. Gas – Unknown Sulfur)

A.35.1 NGT-M02R Calculation Method

When the fuel sulfur content is not known, the calculator NGT-M02R Version 4 in OCS AQS calculates the monthly emissions from natural gas dual-fuel turbines are calculated as follows:

$$E = EF \times H \times U \times 0.001 \qquad (A-55)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
H = Fuel heating value [Btu/scf]
U = Total Fuel usage [Mscf/month]

EFs are identical to when the sulfur content is known, except for the SO_2 EF. For completeness, Table A - 48 shows the EFs for natural gas dual-fuel turbines with unknown sulfur content.

Table A - 48. EFs for natural gas dual-fuel turbines with unknown fuel gas sulfur content*

Pollutants	EF [lb/MMBtu]
Volatile organic compound (VOC) †	2.10E-03
Sulfur Dioxide (SO_2) †	3.47E-03
Nitrogen Oxides (NO_x) †	0.32
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	1.9E-03
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	1.9E-03
Carbon Monoxide (CO) †	0.082
Nitrous Oxide (N_2O) †	3.0E-03
Methane (CH_4)	8.6E-03
Carbon Dioxide (CO_2)	110
Acetaldehyde	4.0E-05
Benzene	1.2E-05
Cadmium	6.93E-06
Chromium III	1.28E-05
Chromium VI	5.32E-07
Ethylbenzene	3.2E-05
Formaldehyde	7.1E-04
Mercury	6.63E-06
Polycyclic aromatic hydrocarbon (PAH)	2.2E-06
Toluene	1.3E-04
Xylenes	6.4E-05

* References: USEPA (1995a), Section 3.1; USEPA (2015)
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.35.2 NGT-M02R Data and Control Requests

The calculator NGT-M02R Version 4 in OCS AQS calculates the monthly emissions from a dual-fuel turbine powered by natural gas with unknown sulfur content using the following **Data Request** fields in Figure A - 54:

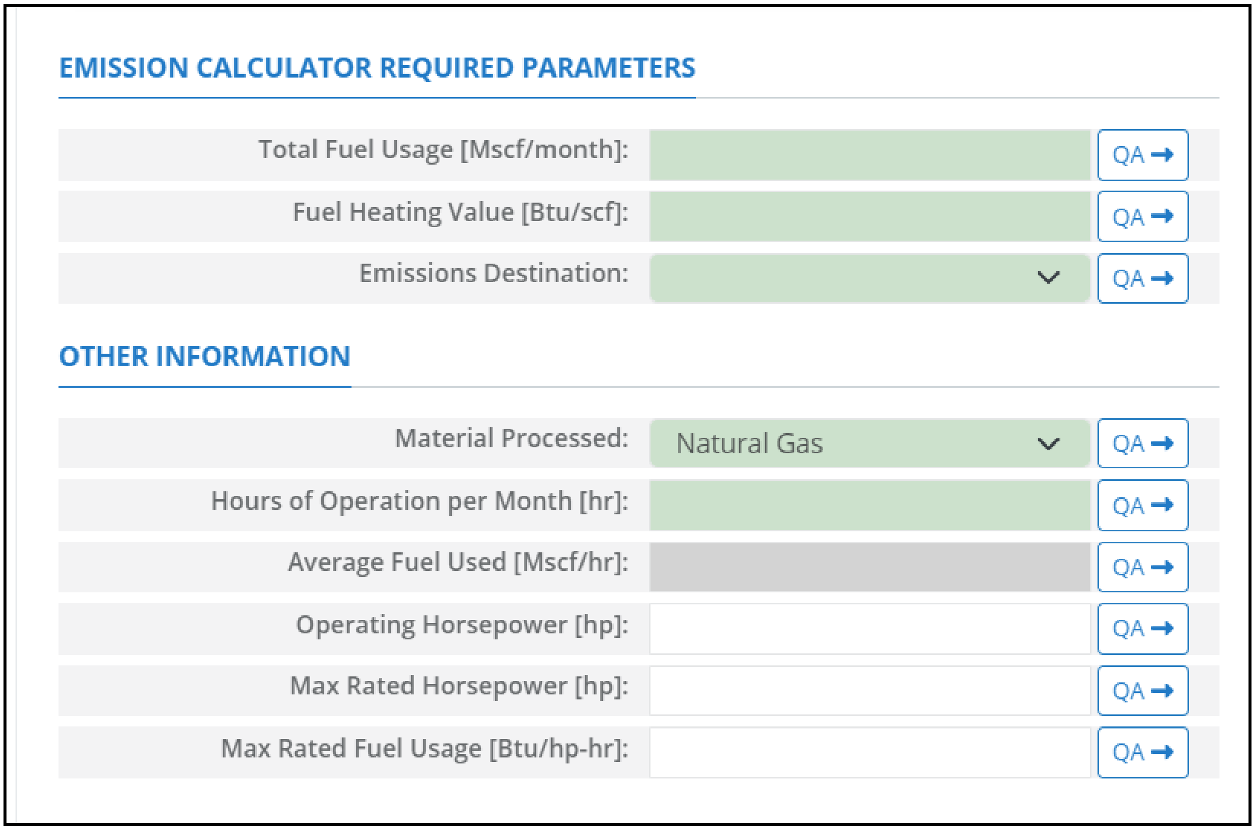


Figure A - 54. NGT-M02R Data Request tab

1. Total Fuel Usage [Mscf/month]: Total monthly rate of the gas fuel used during the survey period.
2. Fuel Heating Value [Btu/scf]: The amount of heat released during the combustion of a specified amount of the natural gas fuel.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.
5. Hours of Operation per Month [hr]: The total monthly hours of operation of the turbine during the survey period.
6. Average Fuel Used [Mscf/hr]: The average hourly rate of natural gas fuel used during the survey period. This field is auto-calculated.
7. Operating Horsepower [hp]: The operating horsepower of the turbine.
8. Max Rated Horsepower [hp]: The manufacturer’s maximum rated horsepower of the turbine.
9. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the gas fuel.

The calculator NGT-M02R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a dual-fuel turbine powered by natural gas with unknown sulfur content using the following **Control Request** fields in Figure A - 55:

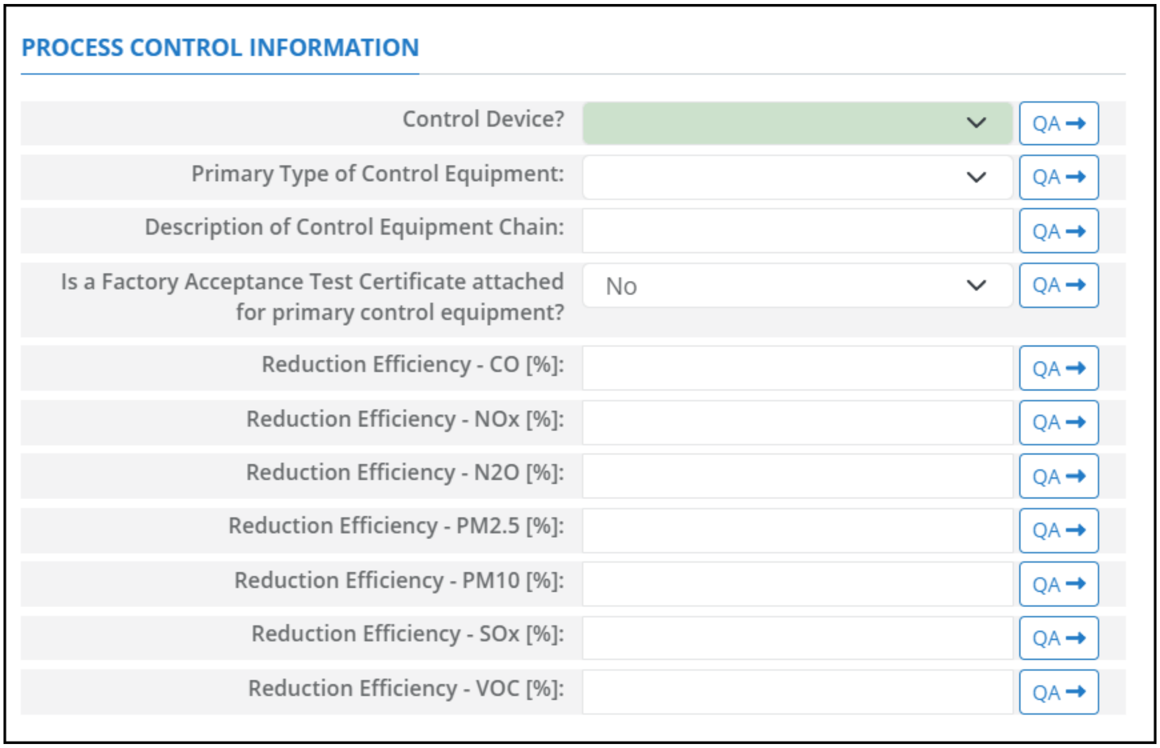


Figure A - 55. NGT-M02R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain and describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – N_2O [%]: This describes the average reduction of emitted N_2O using the control technology. If the total reduction of N_2O using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.

10. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.
11. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.36 NGT-M03R (Dual-Fuel Turbines – Diesel)

A.36.1 NGT-M03R Calculation Method

The calculator NGT-M01R Version 4 in OCS AQS calculates the monthly emissions from diesel dual-fuel turbines as follows:

$$E = EF \times 10^{-6} \times U \times 7.1 \frac{\text{lb}}{\text{gal}} \times 19{,}300 \frac{\text{Btu}}{\text{lb}} \qquad (A - 56)$$

where:

E = Emissions [lb/month]
EF = Emission factor [lb/MMBtu]
U = Total fuel usage [gal/month]
S = Fuel sulfur content [wt %] – This factor is not shown in the formula above but is a required field in OCS AQS and is used to obtain certain EFs.

Table A - 49 shows the EFs for diesel dual-fuel turbine engines.

Table A - 49. EFs for dual-fuel turbines using diesel fuel*

Pollutants	EF [lb/MMBtu]
Volatile organic compound (VOC) †	4.1E-04
Lead (Pb)	1.4E-05
Sulfur Dioxide (SO_2) †	1.01 × S
Nitrogen Oxides (NO_x) †	0.88
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil) †	4.3E-03
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil) †	4.3E-03
Carbon Monoxide (CO) †	3.3E-03
Carbon Dioxide (CO_2)	157
Arsenic	1.1E-05
Benzene	5.5E-05
Beryllium	3.1E-07
Cadmium	4.8E-06
Chromium III	9.02E-06
Chromium VI	1.98E-06
Formaldehyde	2.8E-04
Mercury	1.2E-06
Polycyclic aromatic hydrocarbon (PAH)	4.0E-05

* References: USEPA (1995a), Section 3.1; USEPA (2015)
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.36.2 NGT-M03R Data and Control Requests

The calculator NGT-M03R Version 4 in OCS AQS calculates the monthly emissions from a dual turbine powered by diesel using the following **Data Request** fields in Figure A - 56:

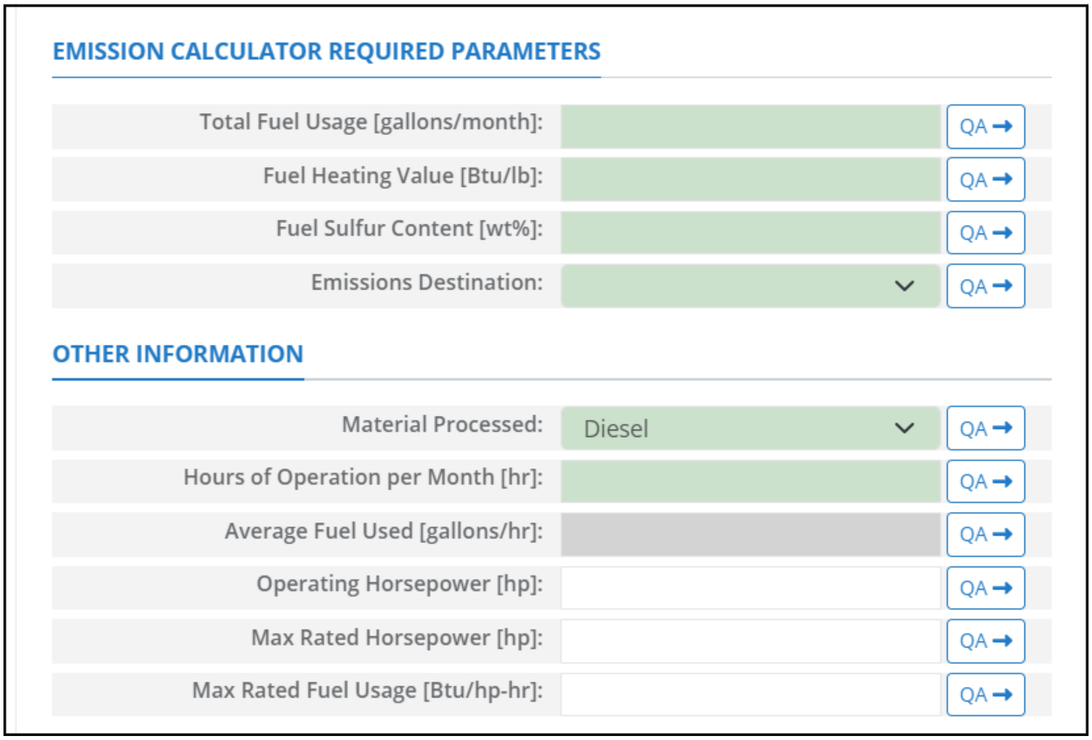
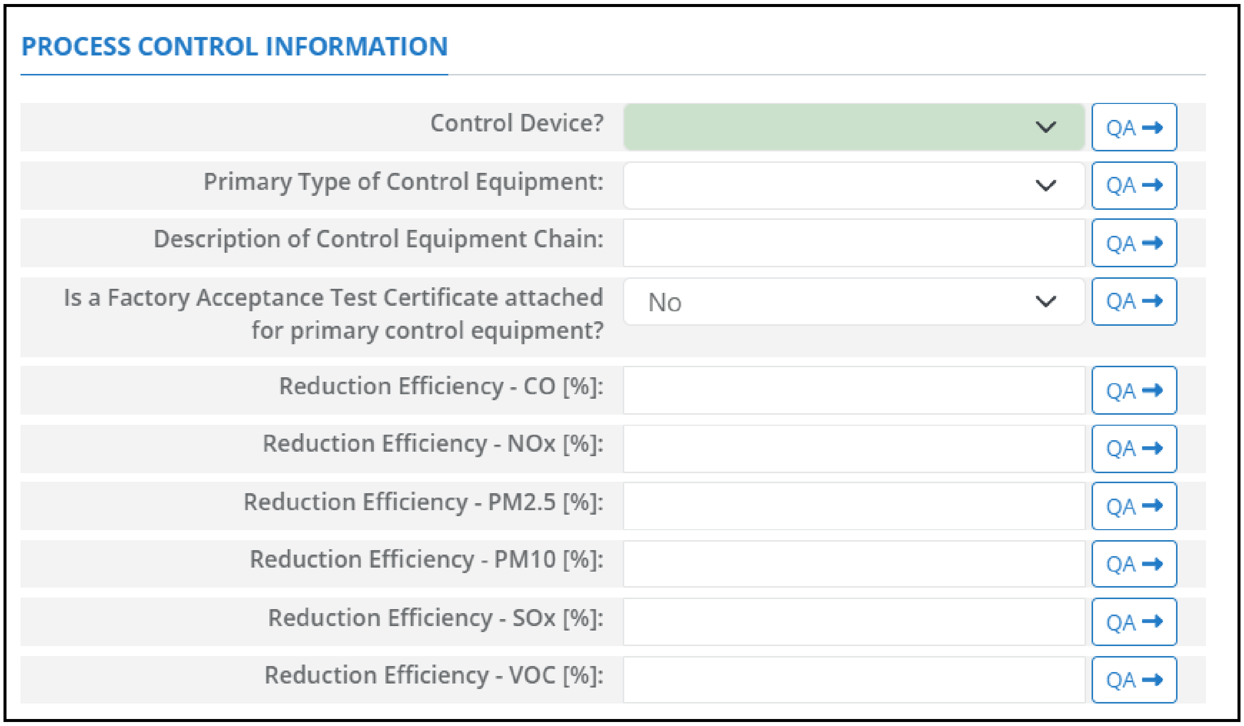


Figure A - 56. NGT-M03R Data Request tab

1. Total Fuel Usage [gallons/month]: Total monthly rate of the natural gas fuel used during the survey period.
2. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of the diesel fuel.
3. Fuel Sulfur Content [wt%]: The weight percentage of the sulfur content in the used natural gas fuel. For example, if the fuel is 1.0% sulfur, then user enters 1 and not 0.01.
4. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
5. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil.
6. Hours of Operation per Month [hr]: The total monthly hours of operation of the turbine during the survey period.
7. Average Fuel Used [gallons/hr]: The average hourly rate of diesel fuel used during the survey period. This field is auto-calculated.
8. Operating Horsepower [hp]: The operating horsepower of the turbine.
9. Max Rated Horsepower [hp]: The manufacturer's maximum rated horsepower of the turbine.
10. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the diesel fuel.

The calculator NGT-M03R Version 4 in OCS AQS calculates the monthly emissions with pollution control from a dual turbine powered by diesel using the following **Control Request** fields in Figure A - 57:


PROCESS CONTROL INFORMATION

Control Device?		QA ➡
Primary Type of Control Equipment:		QA ➡
Description of Control Equipment Chain:		QA ➡
Is a Factory Acceptance Test Certificate attached for primary control equipment?	No	QA ➡
Reduction Efficiency - CO [%]:		QA ➡
Reduction Efficiency - NOx [%]:		QA ➡
Reduction Efficiency - PM2.5 [%]:		QA ➡
Reduction Efficiency - PM10 [%]:		QA ➡
Reduction Efficiency - SOx [%]:		QA ➡
Reduction Efficiency - VOC [%]:		QA ➡

Figure A - 57. NGT-M03R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain and describe the type in the comments field.
3. Description of Control Equipment Chain: This field allows you to describe the control equipment chain if more than one type of technology is used.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency – CO [%]: This describes the average reduction of emitted CO using the control technology. If the total reduction of CO using a vapor recovery unit is 65%, enter “65” in the field.
6. Reduction Efficiency – NO_x [%]: This describes the average reduction of emitted NO_x using the control technology. If the total reduction of NO_x using a vapor recovery unit is 65%, enter “65” in the field.
7. Reduction Efficiency – $PM_{2.5}$ [%]: This describes the average reduction of emitted $PM_{2.5}$ using the control technology. If the total reduction of $PM_{2.5}$ using a vapor recovery unit is 65%, enter “65” in the field.
8. Reduction Efficiency – PM_{10} [%]: This describes the average reduction of emitted PM_{10} using the control technology. If the total reduction of PM_{10} using a vapor recovery unit is 65%, enter “65” in the field.
9. Reduction Efficiency – SO_x [%]: This describes the average reduction of emitted SO_x using the control technology. If the total reduction of SO_x using a vapor recovery unit is 65%, enter “65” in the field.

10. Reduction Efficiency – VOC [%]: This describes the average reduction of emitted VOC using the control technology. If the total reduction of VOC using a vapor recovery unit is 65%, enter “65” in the field.

    ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.37 PNE-M01R (Pneumatic Pumps)

A.37.1 PNE-M01R Calculation Method

The calculator PNE-M01R Version 3 in OCS AQS calculates the monthly CO_2, CH_4, and VOC emissions from pneumatic pumps as follows:

$$E = t \times r_{fu} \times MW \times \frac{MP}{100} \times \frac{1 \text{ lb·mol}}{379.4 \text{ scf}} \qquad (A-57)$$

where:

E = Emissions [lb/month]
t = Hours of operation per month [hr/month]
r_{fu} = Fuel usage rate [scf/hour]
MW = Mole weight of gas [lb/lb·mol]
MP = Mole percentage of gas [%] – This factor is automatically calculated in OCS AQS from the sales gas data.

Table A - 50 shows the mole weight of the pollutants used in OCS AQS for pneumatic pump emissions.

Table A - 50. Mole weight of the pollutants for pneumatic pumps

Pollutants	Mole Weight [lb/lb·mol]
Methane (CH_4)	16.043
Carbon Dioxide (CO_2)	44.097
Volatile organic compound (VOC)	Automatically calculated from sales gas

Hazardous air pollutant (HAP) emissions are calculated based on the VOC emissions obtained from the equation above and applying the speciation profile data:

$$E_{HAP} = E_{VOC} \times \left(\frac{WP_{HAP}}{WP_{VOC}}\right) \qquad (A-58)$$

where:

E_{VOC} = VOC emissions [lb/month]
WP_{HAP} = HAP average weight [%]
WP_{VOC} = VOC average weight [%]

Table A - 51 shows the HAP speciation profile with average weight in %.

Table A - 51. Speciation profile used to calculate HAP emissions based on VOC emissions*

Pollutants	Average weight (%)
Benzene†	0.01855
Ethylbenzene†	1.15E-03
Hexane†	0.35195
Toluene†	2.80E-03
2,2,4-Trimethylpentane†	7.0E-04
Xylenes†	4.80E-03
Volatile organic compound (VOC) †	17.21

* Reference: Table 4-2 (Volatile HAP Speciation Profile) in Wilson et al. (2019)

† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.37.2 PNE-M01R Data and Control Requests

The calculator PNE-M01R Version 3 in OCS AQS calculates the monthly emissions from a pneumatic pump using the following **Data Request** fields in Figure A - 58:

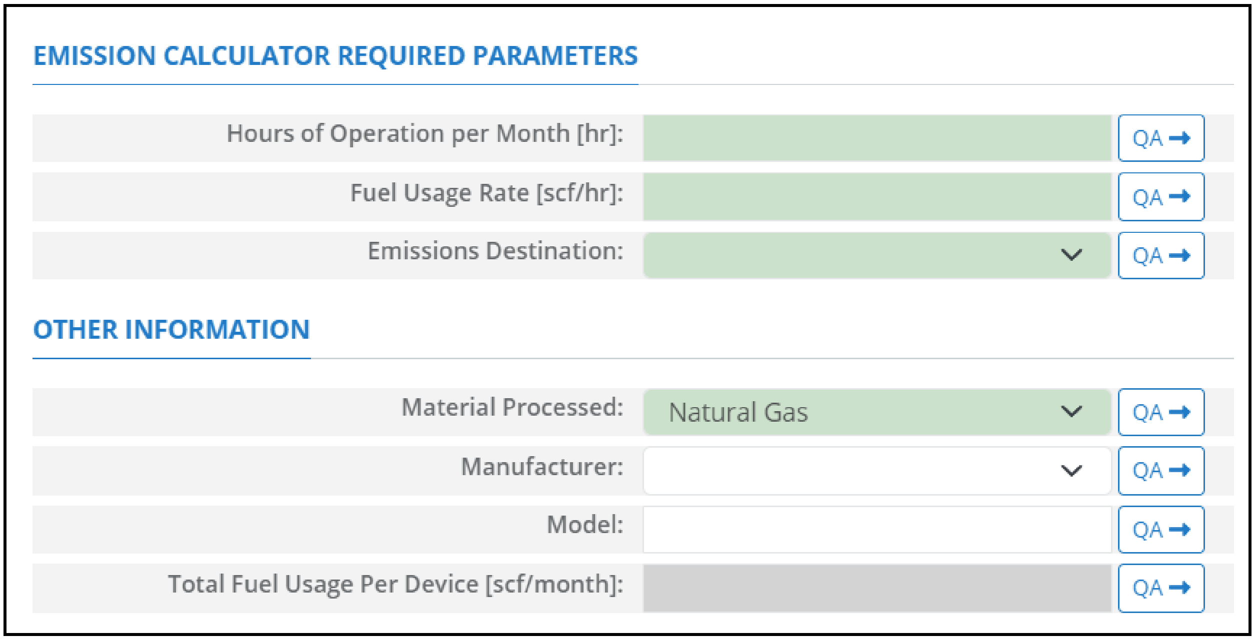


Figure A - 58. PNE-M01R Data Request tab

1. Hours of Operation per Month [hr]: The total monthly hours of operation of the pneumatic pump during the survey period.
2. Fuel Usage Rate [scf/hr]: Average hourly rate of the fuel used during the survey period.
3. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
4. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.
5. Manufacturer: A drop-down list field to specify the pump's manufacturer name.
6. Model: The model of the pump.
7. Total Fuel Usage Per Device [scf/month]: Total gaseous fuel used per device during this survey period. This field is auto-calculated.

The calculator PNE-M01R Version 3 in OCS AQS calculates the monthly emissions with pollution control from a pneumatic pump using the following **Control Request** fields in Figure A - 59:

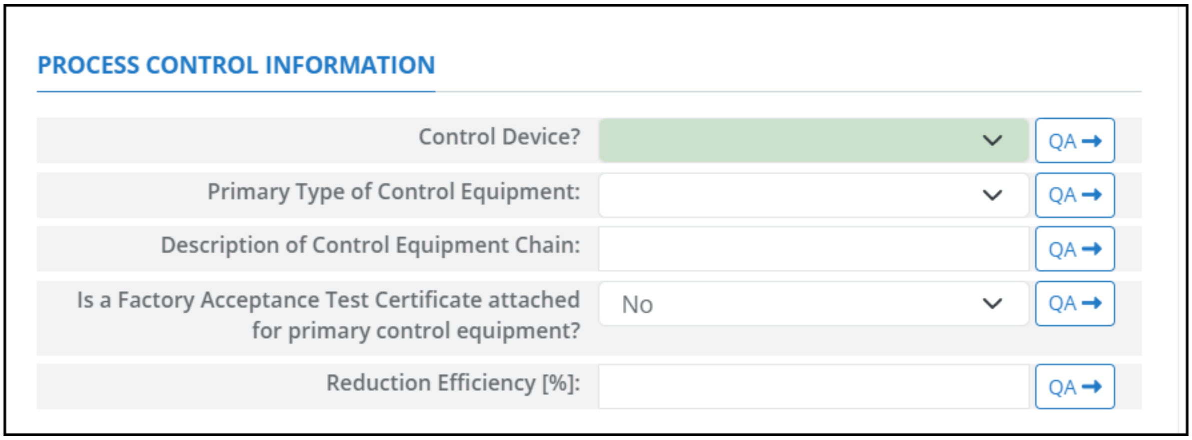


Figure A - 59. PNE-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain in the comments field.
3. Description of Control Equipment Chain: If more than one type of control technology is used, user can describe the sequence of processing in this field.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency [%]: This term describes the reduction of all emitted constituents of the emission stream using the control technology. For example, if a Vapor Unit Recovery is employed with a 90% reduction efficiency, the user enters “90” in the “Reduction Efficiency [%]” field. After the calculation is executed, all the emitted constituents will be reduced uniformly by 90%.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.38 PRE-M01R (Pneumatic Controllers)

A.38.1 PRE-M01R Calculation Method

The calculator PRE-M01R Version 3 in OCS AQS calculates the monthly CO_2, CH_4, and VOC emissions from pneumatic controllers as follows:

$$E = N \times t \times r_{fu} \times MW \times \frac{MP}{100} \times \frac{1\ \text{lb}\cdot\text{mol}}{379.4\ \text{scf}} \qquad (A-59)$$

where:

E = Emissions [lb/month]
N = Number of units
t = Hours of operation per month [hr/month]
r_{fu} = Fuel usage rate [scf/hour]
MW = Mole weight of gas [lb/lb·mol]
MP = Mole percentage of gas [%] – This factor is automatically calculated in OCS AQS from the sales gas data.

Table A - 52 shows the mole weight of the pollutants used in OCS AQS for pneumatic pump emissions.

Table A - 52. Mole weight of the pollutants for pneumatic controller

Pollutants	Mole Weight [lb/lb·mol]
Methane (CH_4)	16.043
Carbon Dioxide (CO_2)	44.097
Volatile organic compound (VOC)	Automatically calculated from sales gas

HAP emissions are calculated based on the VOC emissions obtained from the equation above and applying the speciation profile data:

$$E_{HAP} = E_{VOC} \times \left(\frac{WP_{HAP}}{WP_{VOC}}\right) \qquad (A-60)$$

where:

E_{VOC} = VOC emissions [lb/month]
WP_{HAP} = HAP average weight [%]
WP_{VOC} = VOC average weight [%]

Table A - 53 shows the HAP speciation profile with average weight in %.

Table A - 53. Speciation profile used to calculate HAP emissions based on VOC emissions*

Pollutants	Average weight [%]
Benzene†	0.01855
Ethylbenzene†	1.15E-03
Hexane†	0.35195
Toluene†	2.80E-03
2,2,4-Trimethylpentane†	7.0E-04
Xylenes†	4.80E-03
Volatile organic compound (VOC) †	17.21

* Reference: Table 4-2 (Volatile HAP Speciation Profile) in Wilson et al. (2019)
† You are allowed to provide reduction efficiencies for these pollutants by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.38.2 PRE-M01R Data and Control Requests

The calculator PRE-M01R Version 3 in OCS AQS calculates the monthly emissions from a pneumatic controller using the following **Data Request** fields in Figure A - 60:

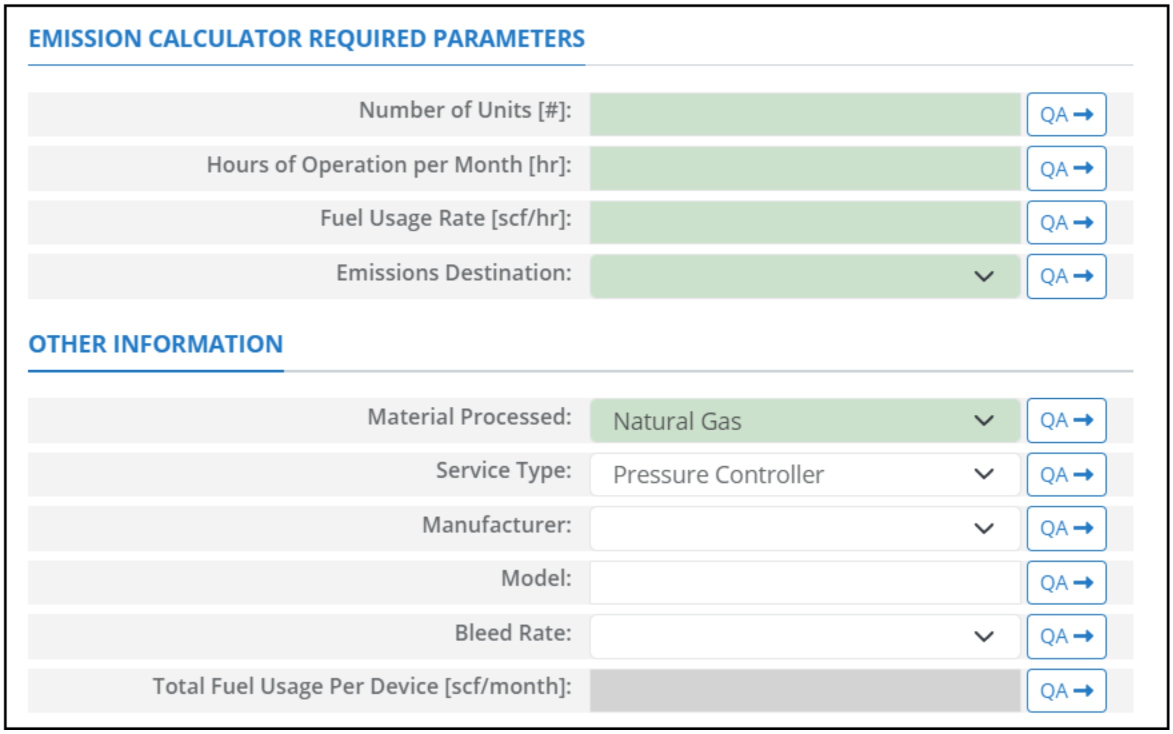


Figure A - 60. PRE-M01R Data Request tab

1. Number of Units [#]: Number of pneumatic controllers in the structure.
2. Hours of Operation per Month [hr]: The total monthly hours of operation of the controller during the survey period.
3. Fuel Usage Rate [scf/hr]: Average hourly rate of the fuel used during the survey period.
4. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
5. Material Processed: A drop-down list field to specify the processed material: Natural Gas / Process Gas.
6. Service Type: A drop-down list field to specify the service type of the controller: Pressure Controller / Level Controller / Flow Controller / Other.
7. Manufacturer: A drop-down list field to specify the controllers' manufacturer name.
8. Model: The model of the controller.
9. Bleed Rate: A drop-down list field to specify the bleed rate type of the controller: High-bleed (>6scfh) / Intermittent / Low-bleed (<6scfh) / Zero-bleed.
10. Total Fuel Usage Per Device [scf/month]: Total gaseous fuel per device used during this survey period. This field is auto-calculated.

The calculator PRE-M01R Version 3 in OCS AQS calculates the monthly emissions with pollution control from a pneumatic controller using the following **Control Request** fields in Figure A - 61:

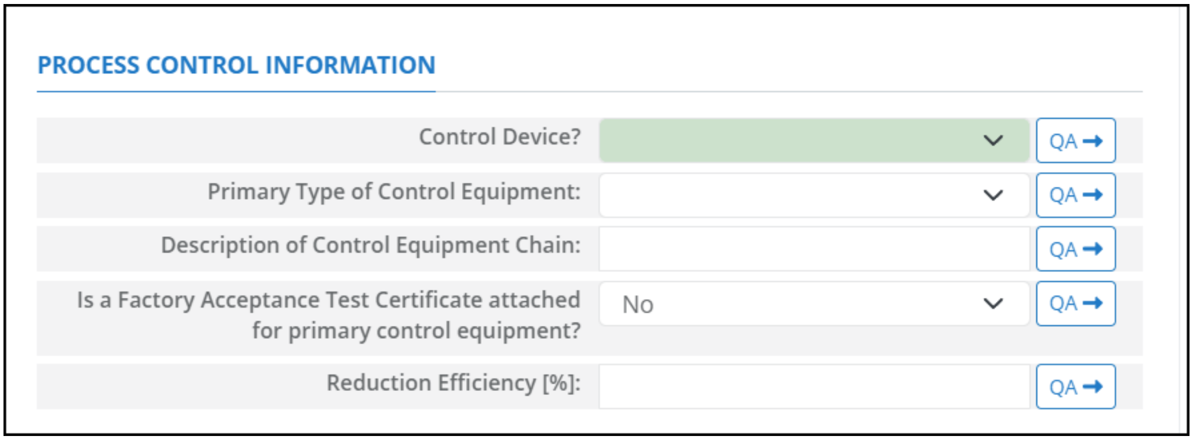


Figure A - 61. PRE-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain in the comments field.
3. Description of Control Equipment Chain: If more than one type of control technology is used, user can describe the sequence of processing in this field.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency [%]: This term describes the reduction of all emitted constituents of the emission stream using the control technology. For example, if a Vapor Unit Recovery is employed with a 90% reduction efficiency, the user enters “90” in the “Reduction Efficiency [%]” field. After the calculation is executed, all the emitted constituents will be reduced uniformly by 90%.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.39 STO-M01R (Storage Tank – Horizontal, Rectangular Tank)

A.39.1 STO-M01R Calculation Method

The calculator STO-M01R Version 3 in OCS AQS calculates the Total Hydrocarbons (THC) emissions from horizontal, rectangular storage tanks as follows:

$$E_{THC} = E_{LS} + E_{LW} \qquad (A-61)$$

where:

E_{THC} = Total THC emissions [lb/month]
E_{LS} = THC emissions from standing losses [lb/month]
E_{LW} = THC emissions from working losses [lb/month]

THC emissions from standing losses are calculated as follows:

$$E_{LS} = D \times V_V \times W_V \times K_E \times K_S \qquad (A-62)$$

where:

E_{LS}= THC emissions from standing losses [lb/month]
D = Number of days in month [day/month]
V_V = Vapor space volume [ft^3]
W_V = Vapor density [lb/ft^3]
K_E = Vapor space expansion factor
K_S = Vented vapor saturation factor

The vapor space volume V_V is based on the geometry of the storage tanks, as follows:

$$V_V = L \times W \times H_{VO} \qquad (A-63)$$

where:

L = Tank shell length [ft]
W = Tank shell width [ft]
H_{VO}= Vapor space outage [ft]

In the above expression, the vapor space outage H_{VO} is given by the following:

$$H_{VO} = (H - H_L) \qquad (A-64)$$

where:

H = Tank shell height [ft]
H_L= Tank average liquid height [ft]

Returning to the expression for emissions from standing losses, the vapor density W_V is calculated as follows:

$$W_V = \frac{M_V \times P_{VA}}{10.731 \frac{\text{psia}\cdot\text{ft}^3}{\text{lb-mole}\cdot{}^\circ\text{R}} \times T_V} \qquad (A-65)$$

where:

M_V= Vapor molecular weight [lb/lb-mol]
P_{VA} = True vapor pressure [psia]
T_V = Average vapor temperature [°R]

The true vapor pressure P_{VA} is calculated as follows:

$$P_{VA} = e^{\left(A - \frac{B}{T_{LA}}\right)} \qquad (A-66)$$

In the above equation, *A* and *B* represent empirical constants based on the Reid vapor pressure P_R, as follows:

$$A = 12.82 - 0.9672 \times \ln(P_R) \qquad (A-67)$$

$$B = 7{,}261 - 1{,}216 \times \ln(P_R) \qquad (A-68)$$

where:

P_R = Reid vapor pressure [psia]

T_{LA} is the daily average liquid surface temperature in Rankine, obtained by the following:

$$T_{LA} = 0.4 \times T_{AA} + [0.6 \times (T_B + 460)] + \left(0.005 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2 \cdot \text{day}}\right) \qquad (A-69)$$

where:

T_{AA} = Daily average ambient temperature [°R] – see below
T_B = Liquid bulk temperature in Fahrenheit [°F] – OCS AQS converts this to Rankine
a = Tank paint solar absorptance, determined in OCS AQS based on user input for the storage tank paint color and the paint condition.

Table A - 54 shows the solar absorptance values used in OCS AQS based on the user-specified paint color and paint condition.

Table A - 54. Tank paint solar absorptance by paint color and condition*

Paint Color	Paint Condition = Good	Paint Condition = Average	Paint Condition = Poor
Aluminum or Specular	0.39	0.44	0.49
Aluminum or Diffuse	0.60	0.64	0.68
Gray or Light	0.54	0.58	0.63
Gray or Medium	0.68	0.71	0.74
Red or Primer	0.89	0.90	0.91
White	0.17	0.25	0.34

* References: Table 7.1-6. Paint Solar Absorptance from AP 42, Fifth Edition, Volume I Chapter 7: Liquid Storage Tanks (https://www3.epa.gov/ttn/chief/ap42/ch07/final/ch07s01.pdf)

The daily average ambient temperature T_{AA} in the above expression is obtained as follows:

$$T_{AA} = 0.5 \times (T_{AMAX} + T_{AMIN}) + 460 \qquad (A-70)$$

where:

T_{AMAX} = Average daily maximum ambient temperature in Fahrenheit [°F]
T_{AMIN} = Average daily minimum ambient temperature in Fahrenheit [°F]

Note that OCS AQS converts the temperature to Rankine in obtaining T_{AA}.

The vapor space expansion factor K_E is calculated as follows:

$$K_E = 0.0018 \times \left[0.7 \times \left((T_{AMAX} + 460) - (T_{AMIN} + 460)\right) + 0.02 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2 \cdot \text{day}}\right] \qquad (A-71)$$

Finally, the last variable in the equation for standing losses is the vented vapor saturation factor K_S and this is calculated as follows:

$$K_S = \frac{1}{1 + 0.053 \times P_{VA} \times H_{VO}} \qquad (A-72)$$

where the true vapor pressure P_{VA} and vapor space outage H_{VO} terms are as defined previously.

This completes the formulation for standing losses.

Working losses E_{LW} are calculated as follows:

$$E_{LW} = 5.614 \frac{\mathrm{ft}^3}{\mathrm{bbl}} \times Q \times W_V \times K_N \times K_P \times K_B \qquad (A-73)$$

where:

Q = Monthly net throughput [bbl/month]
W_V = Vapor density [lb/ft^3], as obtained above

K_N , K_P , and K_B represent, respectively, the working loss turnover, working loss product, and vent setting correction factors which are provided in OCS AQS. K_P and K_B are set to constant values equal to 0.75 and 1, respectively. K_N is calculated as follows:

$$K_N = \begin{cases} 1, N \le 36 \\ \frac{180 + N}{6N}, N > 36 \end{cases} \qquad (A-74)$$

where:

N = Number of turnovers

The number of turnovers N is in turn given by the following:

$$N = 5.614 \frac{\mathrm{ft}^3}{\mathrm{bbl}} \times Q \times V_{LX} \qquad (A-75)$$

where:

V_{LX} = Tank volume [ft^3]

As was the case with the vapor volume V_V , the tank volume V_{LX} depends on the tank geometry, as follows:

$$V_{LX} = L \times W \times H \qquad (A-76)$$

Emissions of VOC, CH_4, and ethane (C_2H_6) were calculated as follows, respectively, based on the specification profiles:

$$E_{VOC} = 0.467 \times E_{THC} \qquad (A-77)$$

$$E_{CH_4} = 0.463 \times E_{THC} \qquad (A-78)$$

$$E_{C_2H_6} = 0.07 \times E_{THC} \qquad (A-79)$$

NOTE: The equations $A - 61$ to $A - 79$ are all from AP 42, Fifth Edition, Volume I Chapter 7: Liquid Storage Tanks https://www3.epa.gov/ttn/chief/ap42/ch07/final/ch07s01.pdf

NOTE: You are allowed to provide reduction efficiencies for emissions from loading operations by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.39.2 STO-M01R Data and Control Requests

The calculator STO-M01R Version 3 in OCS AQS calculates the monthly emissions from an uninsulated horizontal rectangular storage tank using the following **Data Request** fields in Figure A - 62:

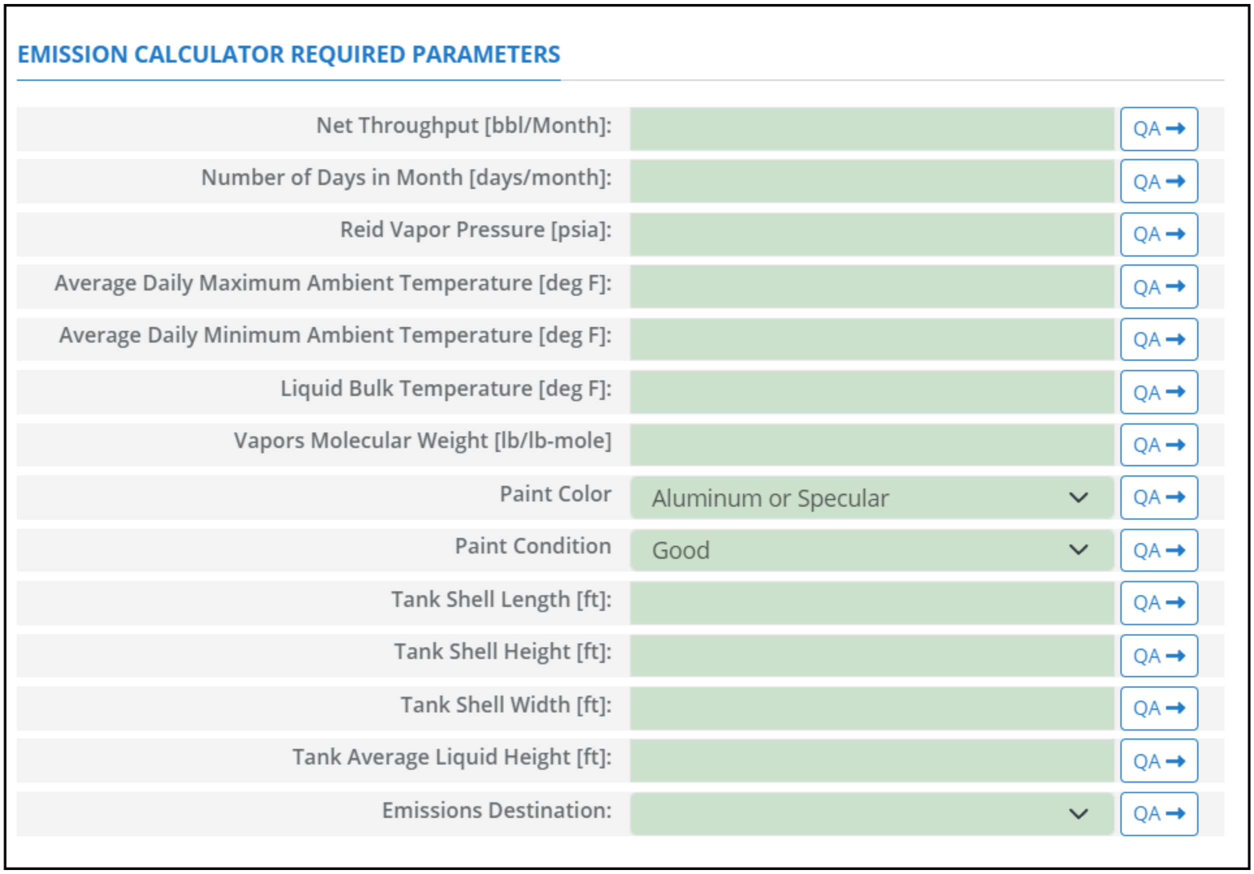


Figure A - 62. STO-M01R Data Request tab

1. Net Throughput [bbl/Month]: The total monthly throughput volumetric flow rate fed to the storage tank during the survey period.
2. Number of Days in Month [days/month]: Number of days in the month of the survey period.
3. Reid Vapor Pressure [psia]: The Reid vapor pressure of the liquid mixture in the storage tank.
4. Average Daily Maximum Ambient Temperature [deg F]: The average daily maximum ambient temperature.
5. Average Daily Minimum Ambient Temperature [deg F]: The average daily minimum ambient temperature.
6. Liquid Bulk Temperature [deg F]: The bulk temperature of the liquid mixture in the storage tank.
7. Vapors Molecular Weight [lb/lb-mole]: The average molecular weight of the vapor phase VOCs mixture in the storage tank.
8. Paint Color: A drop-down list field to specify the exterior paint color of the storage tank: Aluminum or Specular / Aluminum or Diffuse / Grey or Light / Grey or Medium / Red or Primer / White.

9. Paint Condition: A drop-down list field to specify the exterior paint condition of the storage tank: Good / Poor / Average.
10. Tank Shell Length [ft]: The longest horizontal dimension of a horizontal rectangular storage tank.
11. Tank Shell Height [ft]: The vertical height of the rectangular tank.
12. Tank Shell Width [ft]: The horizontal width of a rectangular tank.
13. Tank Average Liquid Height [ft]: The average height of stored liquid during the survey period, measured from the bottom of the storage space to the top of the liquid.
14. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
15. Material Processed: A drop-down list field to specify the processed material: Distillate Oil / Crude Oil / Condensate / Other.

The calculator STO-M01R Version 3 in OCS AQS calculates the monthly emissions with pollution control from an uninsulated horizontal rectangular storage tank using the following **Control Request** fields in Figure A - 63:

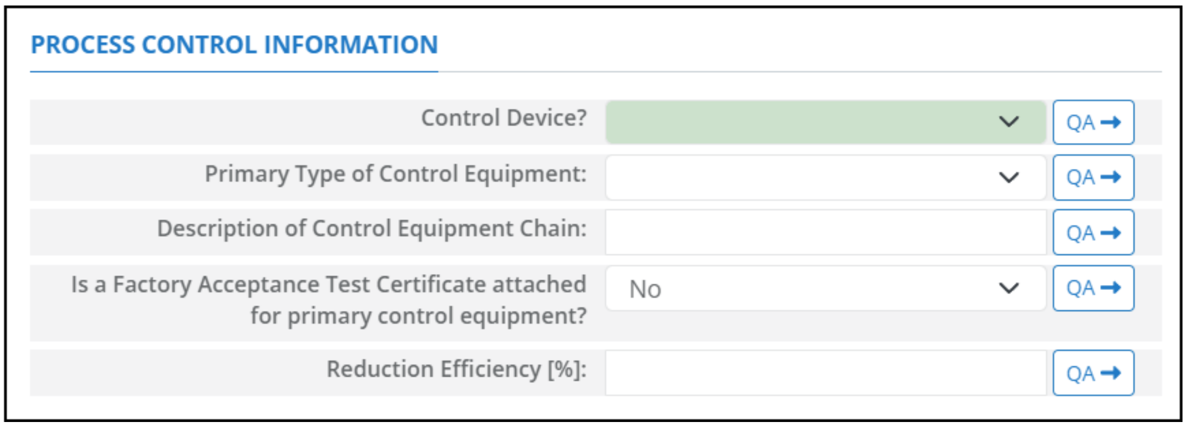


Figure A - 63. STO-M01R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain in the comments field.
3. Description of Control Equipment Chain: If more than one type of control technology is used, user can describe the sequence of processing in this field.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency [%]: This term describes the reduction of all emitted constituents of the emission stream using the control technology. For example, if a Vapor Unit Recovery is employed with a 90% reduction efficiency, the user enters "90" in the "Reduction Efficiency [%]" field. After the calculation is executed, all the emitted constituents will be reduced uniformly by 90%.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.40 STO-M02R (Storage Tank – Vertical, Rectangular Tank)

A.40.1 STO-M02R Calculation Method

The calculator STO-M01R Version 3 in OCS AQS calculates the Total Hydrocarbons (THC) emissions from vertical, rectangular storage tanks as follows:

$$E_{THC} = E_{LS} + E_{LW} \qquad (A-80)$$

where:

E_{THC} = Total THC emissions [lb/month]
E_{LS} = THC emissions from standing losses [lb/month]
E_{LW} = THC emissions from working losses [lb/month]

THC emissions from standing losses are calculated as follows:

$$E_{LS} = D \times V_V \times W_V \times K_E \times K_S \qquad (A-81)$$

where:

E_{LS}= THC emissions from standing losses [lb/month]
D = Number of days in month [day/month]
V_V = Vapor space volume [ft^3]
W_V = Vapor density [lb/ft^3]
K_E = Vapor space expansion factor
K_S = Vented vapor saturation factor

The vapor space volume V_V is based on the geometry of the storage tanks, as follows:

$$V_V = W_1 \times W_2 \times H_{VO} \qquad (A-82)$$

where:

W_1 = Horizontal width of rectangular tank [ft]
W_2 = Second horizontal width of rectangular tank [ft]

The vapor space outage H_{VO} is given by the same expression as in the case of the horizontal, rectangular tanks:

$$H_{VO} = (H - H_L) \qquad (A-83)$$

H = Tank shell height [ft]
H_L= Tank average liquid height [ft]

Returning to the expression for emissions from standing losses, the vapor density W_V is calculated as follows:

$$W_V = \frac{M_V \times P_{VA}}{10.731 \frac{\text{psia}\cdot\text{ft}^3}{\text{lb-mole}\cdot{}^\circ\text{R}} \times T_V} \qquad (A-84)$$

where:

M_V= Vapor molecular weight [lb/lb-mol]
P_{VA} = True vapor pressure [psia]
T_V = Average vapor temperature [°R]

The true vapor pressure P_{VA} is calculated as follows:

$$P_{VA} = e^{\left(A - \frac{B}{T_{LA}}\right)} \qquad (A-85)$$

In the above equation, A and B represent empirical constants based on the Reid vapor pressure P_R, as follows:

$$A = 12.82 - 0.9672 \times \ln(P_R) \tag{A-86}$$

$$B = 7{,}261 - 1{,}216 \times \ln(P_R) \tag{A-87}$$

where:

P_R = Reid vapor pressure [psia]

T_{LA} is the daily average liquid surface temperature in Rankine, obtained by the following:

$$T_{LA} = 0.4 \times T_{AA} + [0.6 \times (T_B + 460)] + \left(0.005 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2\text{·day}}\right) \tag{A-88}$$

where:

T_{AA} = Daily average ambient temperature [°R] – see below
T_B = Liquid bulk temperature in Fahrenheit [°F] – OCS AQS converts this to Rankine
a = Tank paint solar absorptance, determined in OCS AQS based on user input for the storage tank paint color and the paint condition.

Table A - 54 above shows the solar absorptance values used in OCS AQS based on the user-specified paint color and paint condition.

The daily average ambient temperature T_{AA} in the above expression is obtained as follows:

$$T_{AA} = 0.5 \times (T_{AMAX} + T_{AMIN}) + 460 \tag{A-89}$$

where:

T_{AMAX} = Average daily maximum ambient temperature in Fahrenheit [°F]
T_{AMIN} = Average daily minimum ambient temperature in Fahrenheit [°F]

Note that OCS AQS converts the temperature to Rankine in obtaining T_{AA}.

The vapor space expansion factor K_E is calculated as follows:

$$K_E = 0.0018 \times \left[0.7 \times \left((T_{AMAX} + 460) - (T_{AMIN} + 460)\right) + 0.02 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2\text{·day}}\right] \tag{A-90}$$

Finally, the last variable in the equation for standing losses is the vented vapor saturation factor K_S and this is calculated as follows:

$$K_S = \frac{1}{1 + 0.053 \times P_{VA} \times H_{VO}} \tag{A-91}$$

where the true vapor pressure P_{VA} and vapor space outage H_{VO} terms are as defined previously. This completes the formulation for standing losses.

Working losses E_{LW} are calculated as follows:

$$E_{LW} = 5.614 \frac{\text{ft}^3}{\text{bbl}} \times Q \times W_V \times K_N \times K_P \times K_B \tag{A-92}$$

where:

Q = Monthly net throughput [bbl/month]
W_V = Vapor density [lb/ft^3], as obtained above

K_N , K_P , and K_B represent, respectively, the working loss turnover, working loss product, and vent setting correction factors which are provided in OCS AQS. K_P and K_B are set to constant values equal to 0.75 and 1, respectively. K_N is calculated as follows:

$$K_N = \begin{cases} 1, N \leq 36 \\ \frac{180 + N}{6N}, N > 36 \end{cases} \quad (A - 93)$$

where:

N = Number of turnovers

The number of turnovers N is in turn given by the following:

$$N = 5.614 \frac{\text{ft}^3}{\text{bbl}} \times Q \times V_{LX} \quad (A - 94)$$

where:

V_{LX} = Tank volume [ft^3]

As was the case with the vapor volume V_V , the tank volume V_{LX} depends on the tank geometry, as follows:

$$V_{LX} = W_1 \times W_2 \times (H - 2) \quad (A - 95)$$

Emissions of VOC, CH_4, and C_2H_6 were calculated as follows, respectively, based on the specification profiles:

$$E_{VOC} = 0.467 \times E_{THC} \quad (A - 96)$$

$$E_{CH_4} = 0.463 \times E_{THC} \quad (A - 97)$$

$$E_{C_2H_6} = 0.07 \times E_{THC} \quad (A - 98)$$

NOTE: The equations $A - 80$ to $A - 98$ are all from AP 42, Fifth Edition, Volume I Chapter 7: Liquid Storage Tanks https://www3.epa.gov/ttn/chief/ap42/ch07/final/ch07s01.pdf

NOTE: You are allowed to provide reduction efficiencies for emissions from loading operations by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.40.2 STO-M02R Data and Control Requests

The calculator STO-M02R Version 3 in OCS AQS calculates the monthly emissions from uninsulated vertical rectangular storage tank using the following **Data Request** fields in Figure A - 64:

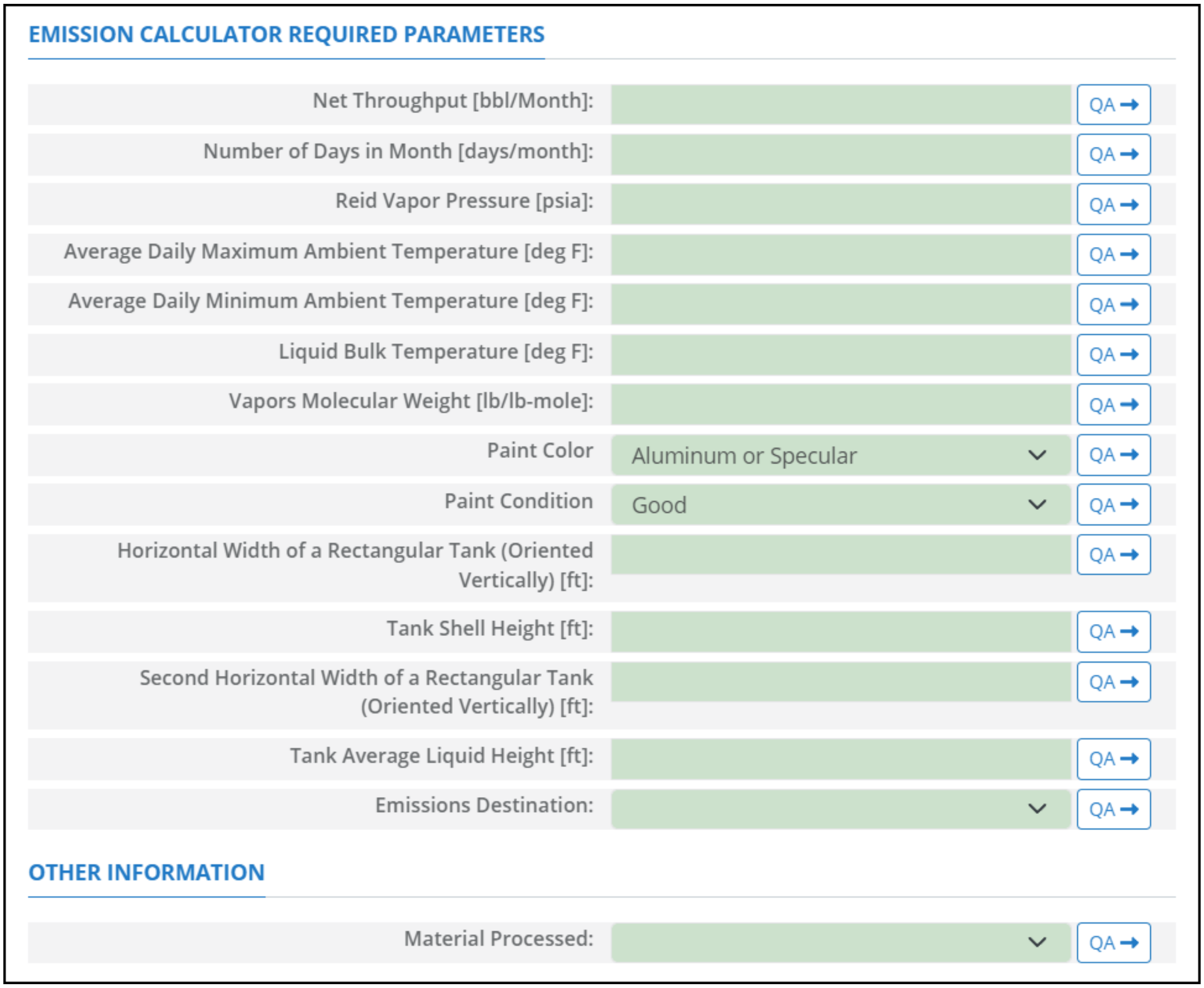


Figure A - 64. STO-M02R Data Request tab

1. Net Throughput [bbl/Month]: The total monthly throughput volumetric flow rate in the storage tank during the survey period.
2. Number of Days in Month [days/month]: Number of days in the month of the survey period.
3. Reid Vapor Pressure [psia]: The Reid vapor pressure of the liquid mixture in the storage tank.
4. Average Daily Maximum Ambient Temperature [deg F]: The average daily maximum ambient temperature.
5. Average Daily Minimum Ambient Temperature [deg F]: The average daily minimum ambient temperature.
6. Liquid Bulk Temperature [deg F]: The bulk temperature of the liquid mixture in the storage tank.
7. Vapors Molecular Weight [lb/lb-mole]: The average molecular weight of the vapor phase of the VOCs mixture in the storage tank.
8. Paint Color: A drop-down list field to specify the exterior paint color of the storage tank: Aluminum or Specular / Aluminum or Diffuse / Grey or Light / Grey or Medium / Red or Primer / White.
9. Paint Condition: A drop-down list field to specify the exterior paint condition of the storage tank: Good / Poor / Average.

10. Horizontal Width of a Rectangular Tank (Oriented Vertically) [ft]: The first horizontal width of a rectangular tank.
11. Tank Shell Height [ft]: The vertical height of the rectangular tank.
12. Second Horizontal Width of a Rectangular Tank (Oriented Vertically) [ft]: The second horizontal width of a rectangular tank.
13. Tank Average Liquid Height [ft]: The average height of stored liquid during the survey period, measured from the bottom of the storage space to the top of the liquid.
14. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
15. Material Processed: A drop-down list field to specify the processed material: Distillate Oil (Diesel) / Crude Oil / Condensate / Other.

The calculator STO-M02R Version 3 in OCS AQS calculates the monthly emissions <u>with pollution control</u> from an uninsulated vertical rectangular storage tank using the following **Control Request** fields in Figure A - 65:

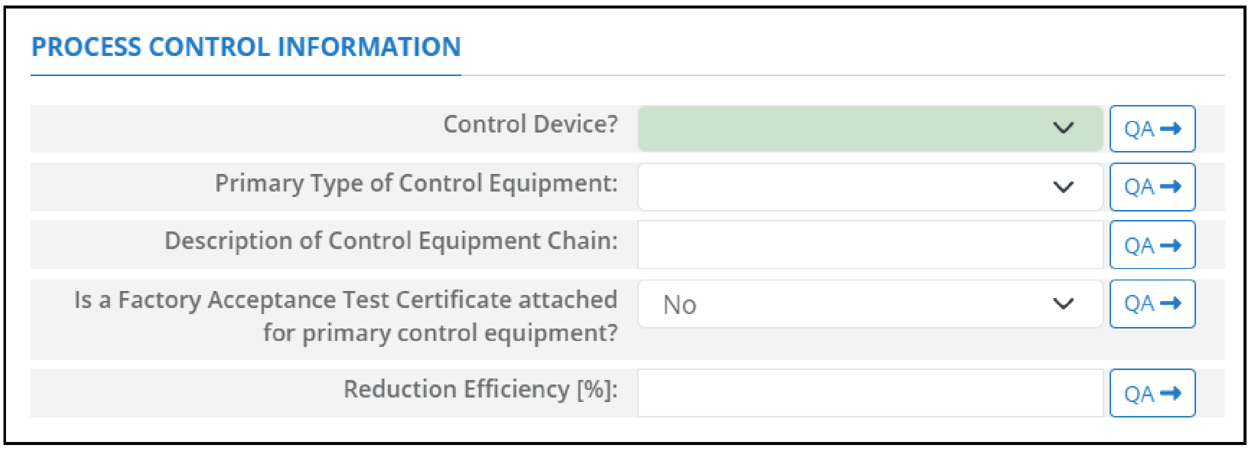


Figure A - 65. STO-M02R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain in the comments field.
3. Description of Control Equipment Chain: If more than one type of control technology is used, user can describe the sequence of processing in this field.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency [%]: This term describes the reduction of all emitted constituents of the emission stream using the control technology. For example, if a Vapor Unit Recovery is employed with a 90% reduction efficiency, the user enters “90” in the “Reduction Efficiency [%]” field. After the calculation is executed, all the emitted constituents will be reduced uniformly by 90%.

> ***IMPORTANT*:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.41 STO-M03R (Storage Tank – Horizontal, Cylindrical Tank)

A.41.1 STO-M03R Calculation Method

The calculator STO-M03R Version 3 in OCS AQS calculates the Total Hydrocarbons (THC) emissions from horizontal, cylindrical storage tanks as follows:

$$E_{THC} = E_{LS} + E_{LW} \qquad (A-99)$$

where:

E_{THC} = Total THC emissions [lb/month]
E_{LS} = THC emissions from standing losses [lb/month]
E_{LW} = THC emissions from working losses [lb/month]

THC emissions from standing losses are calculated as follows:

$$E_{LS} = D \times V_V \times W_V \times K_E \times K_S \qquad (A-100)$$

where:

E_{LS}= THC emissions from standing losses [lb/month]
D = Number of days in month [day/month]
V_V = Vapor space volume [ft^3]
W_V = Vapor density [lb/ft^3]
K_E = Vapor space expansion factor
K_S = Vented vapor saturation factor

The vapor space volume V_V is based on the geometry of the storage tanks, as follows:

$$V_V = L \times d \times H_{VO} \qquad (A-101)$$

where:

L = Tank shell length [ft]
d = Tank shell diameter [ft]

The vapor space outage H_{VO} in this case is calculated as follows:

$$H_{VO} = 0.5 \times \frac{\pi}{4} \times d \qquad (A-102)$$

Returning to the expression for emissions from standing losses, the vapor density W_V is calculated as follows:

$$W_V = \frac{M_V \times P_{VA}}{10.731 \frac{\text{psia}\cdot\text{ft}^3}{\text{lb-mole}\cdot{}^\circ\text{R}} \times T_V} \qquad (A-103)$$

where:

M_V= Vapor molecular weight [lb/lb-mol]
P_{VA} = True vapor pressure [psia]
T_V = Average vapor temperature [°R]

The true vapor pressure P_{VA} is calculated as follows:

$$P_{VA} = e^{\left(A - \frac{B}{T_{LA}}\right)} \qquad (A-104)$$

In the above equation, A and B represent empirical constants based on the Reid vapor pressure P_R, as follows:

$$A = 12.82 - 0.9672 \times \ln(P_R) \qquad (A-105)$$

$$B = 7{,}261 - 1{,}216 \times \ln(P_R) \qquad (A-106)$$

where:

P_R = Reid vapor pressure [psia]

T_{LA} is the daily average liquid surface temperature in Rankine, obtained by the following:

$$T_{LA} = 0.4 \times T_{AA} + [0.6 \times (T_B + 460)] + \left(0.005 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2 \cdot \text{day}}\right) \qquad (A-107)$$

where:

T_{AA} = Daily average ambient temperature [°R] – see below
T_B = Liquid bulk temperature in Fahrenheit [°F] – OCS AQS converts this to Rankine
a = Tank paint solar absorptance, determined in OCS AQS based on user input for the storage tank paint color and the paint condition.

Table A - 54 above shows the solar absorptance values used in OCS AQS based on the user-specified paint color and paint condition.

The daily average ambient temperature T_{AA} in the above expression is obtained as follows:

$$T_{AA} = 0.5 \times (T_{AMAX} + T_{AMIN}) + 460 \qquad (A-108)$$

where:

T_{AMAX} = Average daily maximum ambient temperature in Fahrenheit [°F]
T_{AMIN} = Average daily minimum ambient temperature in Fahrenheit [°F]

Note that OCS AQS converts the temperature to Rankine in obtaining T_{AA}.

The vapor space expansion factor K_E is calculated as follows:

$$K_E = 0.0018 \times \left[0.7 \times \left((T_{AMAX} + 460) - (T_{AMIN} + 460)\right) + 0.02 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2 \cdot \text{day}}\right] \qquad (A-109)$$

Finally, the last variable in the equation for standing losses is the vented vapor saturation factor K_S and this is calculated as follows:

$$K_S = \frac{1}{1 + 0.053 \times P_{VA} \times H_{VO}} \qquad (A-110)$$

where the true vapor pressure P_{VA} and vapor space outage H_{VO} terms are as defined previously. This completes the formulation for standing losses.

Working losses E_{LW} are calculated as follows:

$$E_{LW} = 5.614 \frac{\text{ft}^3}{\text{bbl}} \times Q \times W_V \times K_N \times K_P \times K_B \qquad (A-111)$$

where:

Q = Monthly net throughput [bbl/month]
W_V = Vapor density [lb/ft^3], as obtained above

K_N , K_P , and K_B represent, respectively, the working loss turnover, working loss product, and vent setting correction factors which are provided in OCS AQS. K_P and K_B are set to constant values equal to 0.75 and 1, respectively. K_N is calculated as follows:

$$K_N = \begin{cases} 1, N \leq 36 \\ \dfrac{180 + N}{6N}, N > 36 \end{cases} \qquad (A - 112)$$

where:

N = Number of turnovers

The number of turnovers N is in turn given by the following:

$$N = 5.614 \frac{\mathrm{ft}^3}{\mathrm{bbl}} \times Q \times V_{LX} \qquad (A - 113)$$

where:

V_{LX} = Tank volume [ft^3]

As was the case with the vapor volume V_V , the tank volume V_{LX} depends on the tank geometry, as follows:

$$V_{LX} = \frac{\pi}{4} \times d^2 \times L \qquad (A - 114)$$

Emissions of VOC, CH_4, and C_2H_6 were calculated as follows, respectively, based on the specification profiles:

$$E_{VOC} = 0.467 \times E_{THC} \qquad (A - 115)$$

$$E_{CH_4} = 0.463 \times E_{THC} \qquad (A - 116)$$

$$E_{C_2H_6} = 0.07 \times E_{THC} \qquad (A - 117)$$

NOTE: The equations $A - 99$ to $A - 117$ are all from AP 42, Fifth Edition, Volume I Chapter 7: Liquid Storage Tanks https://www3.epa.gov/ttn/chief/ap42/ch07/final/ch07s01.pdf

NOTE: You are allowed to provide reduction efficiencies for emissions from loading operations by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.41.2 STO-M03R Data and Control Requests

The calculator STO-M03R Version 3 in OCS AQS calculates the monthly emissions from an uninsulated horizontal cylindrical storage tank using the following **Data Request** fields in Figure A - 66:

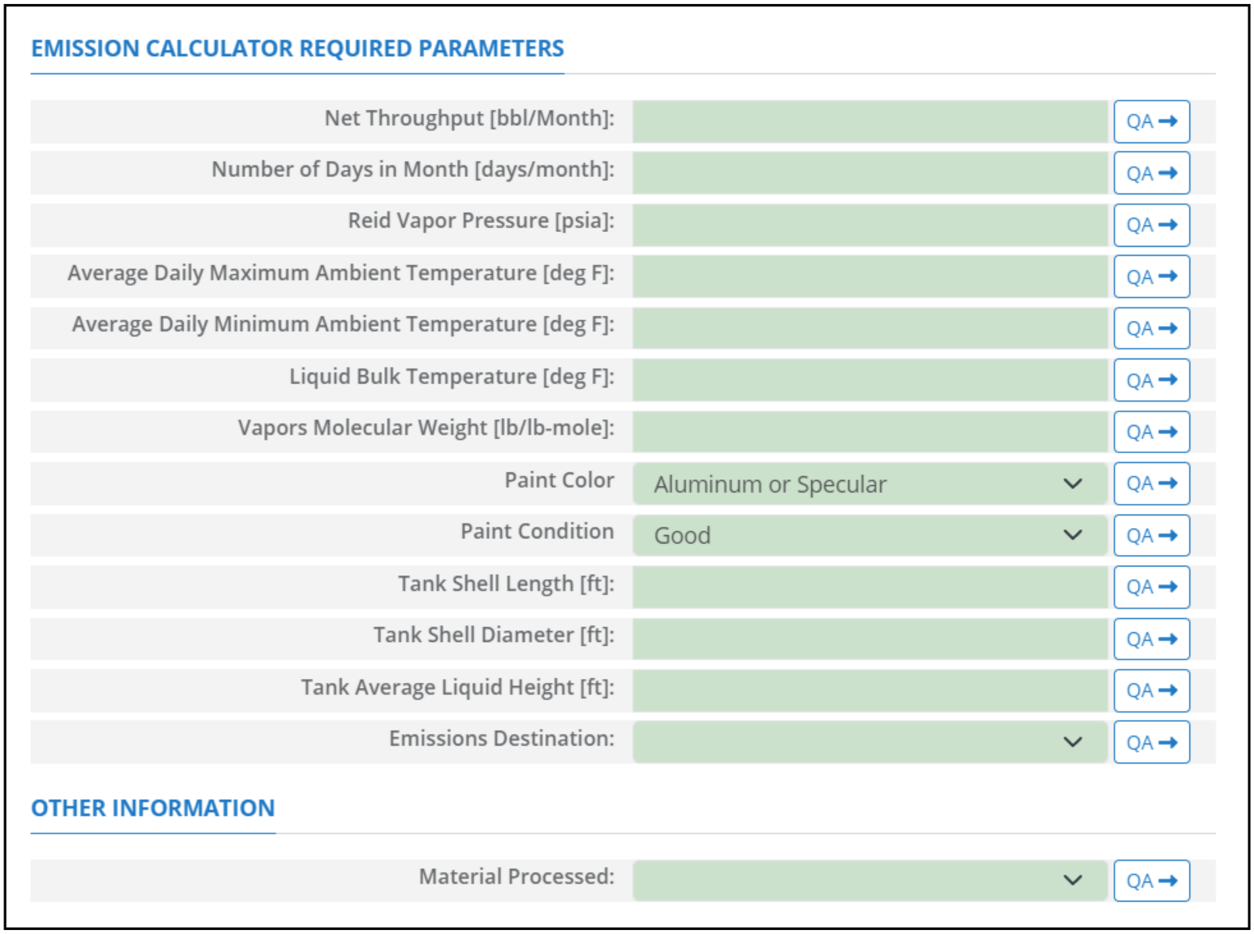


Figure A - 66. STO-M03R Data Request tab

1. Net Throughput [bbl/Month]: The total monthly throughput volumetric flow rate fed to the storage tank during the survey period.
2. Number of Days in Month [days/month]: Number of days in the month of the survey period.
3. Reid Vapor Pressure [psia]: The Reid vapor pressure of the liquid mixture in the storage tank.
4. Average Daily Maximum Ambient Temperature [deg F]: The average daily maximum ambient temperature.
5. Average Daily Minimum Ambient Temperature [deg F]: The average daily minimum ambient temperature.
6. Liquid Bulk Temperature [deg F]: The bulk temperature of the liquid mixture in the storage tank.
7. Vapors Molecular Weight [lb/lb-mole]: The average molecular weight of the vapor phase of the VOCs mixture in the storage tank.
8. Paint Color: A drop-down list field to specify the exterior paint color of the storage tank: Aluminum or Specular / Aluminum or Diffuse / Grey or Light / Grey or Medium / Red or Primer / White.
9. Paint Condition: A drop-down list field to specify the exterior paint condition of the storage tank: Good / Poor / Average.
10. Tank Shell Length [ft]: The shell horizontal length of the horizontal cylindrical storage tank.
11. Tank Shell Diameter [ft]: The shell diameter of the cylindrical storage tank.

12. Tank Average Liquid Height [ft]: The average height of stored liquid during the survey period, measured from the bottom of the storage space to the top of the liquid.
13. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
16. Material Processed: A drop-down list field to specify the processed material: Distillate Oil (Diesel) /Crude Oil / Condensate / Other.

The calculator STO-M03R Version 3 in OCS AQS calculates the monthly emissions with pollution control from an uninsulated horizonal cylindrical storage tank using the following **Control Request** fields in Figure A - 67:

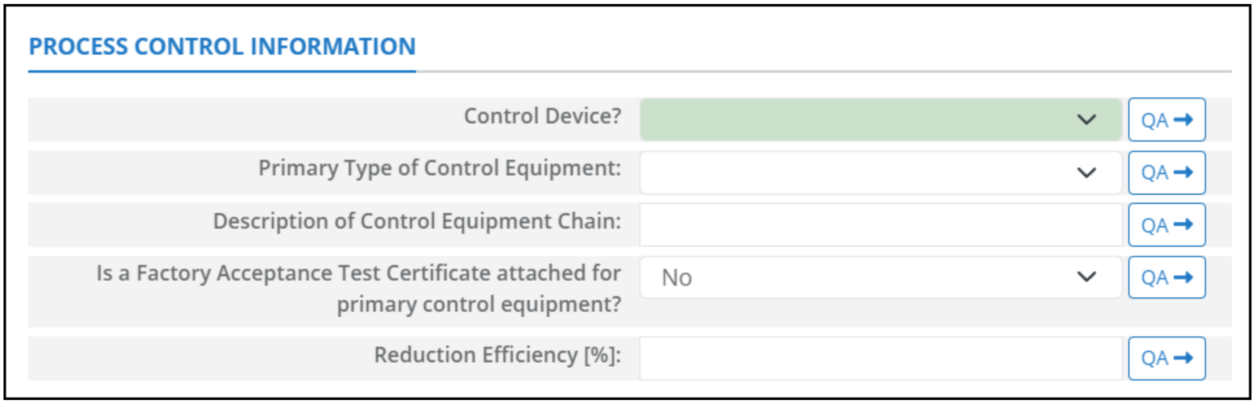


Figure A - 67. STO-M03R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain in the comments field.
3. Description of Control Equipment Chain: If more than one type of control technology is used, user can describe the sequence of processing in this field.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency [%]: This term describes the reduction of all emitted constituents of the emission stream using the control technology. For example, if a Vapor Unit Recovery is employed with a 90% reduction efficiency, the user enters “90” in the “Reduction Efficiency [%]” field. After the calculation is executed, all the emitted constituents will be reduced uniformly by 90%.

> ***IMPORTANT*****:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.42 STO-M04R (Storage Tank – Vertical, Cylindrical Tank)

A.42.1 STO-M04R Calculation Method

The calculator STO-M01R Version 3 in OCS AQS calculates the Total Hydrocarbons (THC) emissions from vertical, cylindrical storage tanks as follows:

$$E_{THC} = E_{LS} + E_{LW} \qquad (A-118)$$

where:

E_{THC} = Total THC emissions [lb/month]
E_{LS} = THC emissions from standing losses [lb/month]
E_{LW} = THC emissions from working losses [lb/month]

THC emissions from standing losses are calculated as follows:

$$E_{LS} = D \times V_V \times W_V \times K_E \times K_S \qquad (A-119)$$

where:

E_{LS}= THC emissions from standing losses [lb/month]
D = Number of days in month [day/month]
V_V = Vapor space volume [ft^3]
W_V = Vapor density [lb/ft^3]
K_E = Vapor space expansion factor
K_S = Vented vapor saturation factor

The vapor space volume V_V is based on the geometry of the storage tanks, as follows:

$$V_V = \frac{\pi}{4} \times d^2 \times H_{VO} \qquad (A-120)$$

where:

d = Tank shell diameter [ft]

The vapor space outage H_{VO} for vertical, cylindrical tanks is calculated as follows:

$$H_{VO} = H - H_L + H_{RO} \qquad (A-121)$$

where:

H = Tank shell height [ft]
H_L= Tank average liquid height [ft]
H_{RO}= Roof outage [ft]

The expression for the roof outage H_{RO} depends on the **roof type** which is provided by the operator during the input process and can be one of the following: **Cone or Peaked / Dome / Flat**.

For the Cone or Peaked roof type:

$$H_{RO} = \frac{1}{3} \times H_R \qquad (A-122)$$

where:

H_R = Tank roof height [ft]

For the Dome roof type:

$$H_{RO} = H_R \times \left[\frac{1}{2} + \frac{1}{6} \times \left(\frac{H_R}{d/2}\right)^2\right] \qquad (A-123)$$

where $\boldsymbol{H_R}$ and $\boldsymbol{d}$ are as previously defined.

For the Flat roof type:

$$H_{RO} = 0$$

Returning to the expression for emissions from standing losses, the vapor density W_V is calculated as follows:

$$W_V = \frac{M_V \times P_{VA}}{10.731 \frac{\text{psia·ft}^3}{\text{lb-mole·°R}} \times T_V} \qquad (A-124)$$

where:

M_V = Vapor molecular weight [lb/lb-mol]
P_{VA} = True vapor pressure [psia]
T_V = Average vapor temperature [°R]

The true vapor pressure P_{VA} is calculated as follows:

$$P_{VA} = e^{\left(A - \frac{B}{T_{LA}}\right)} \qquad (A-125)$$

In the above equation, *A* and *B* represent empirical constants based on the Reid vapor pressure P_R, as follows:

$$A = 12.82 - 0.9672 \times \ln(P_R) \qquad (A-126)$$

$$B = 7{,}261 - 1{,}216 \times \ln(P_R) \qquad (A-127)$$

where:

P_R = Reid vapor pressure [psia]

T_{LA} is the daily average liquid surface temperature in Rankine, obtained by the following:

$$T_{LA} = 0.4 \times T_{AA} + [0.6 \times (T_B + 460)] + \left(0.005 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2\text{·day}}\right) \qquad (A-128)$$

where:

T_{AA} = Daily average ambient temperature [°R] – see below
T_B = Liquid bulk temperature in Fahrenheit [°F] – OCS AQS converts this to Rankine
a = Tank paint solar absorptance, determined in OCS AQS based on user input for the storage tank paint color and the paint condition.

Table A - 54 shows the solar absorptance values used in OCS AQS based on the user-specified paint color and paint condition.

The daily average ambient temperature T_{AA} in the above expression is obtained as follows:

$$T_{AA} = 0.5 \times (T_{AMAX} + T_{AMIN}) + 460 \qquad (A-129)$$

where:

T_{AMAX} = Average daily maximum ambient temperature in Fahrenheit [°F]
T_{AMIN} = Average daily minimum ambient temperature in Fahrenheit [°F]

Note that OCS AQS converts the temperature to Rankine in obtaining T_{AA}.

The vapor space expansion factor K_E is calculated as follows:

$$K_E = 0.0018 \times \left[0.7 \times \left((T_{AMAX} + 460) - (T_{AMIN} + 460)\right) + 0.02 \times a \times 1{,}437 \frac{\text{Btu}}{\text{ft}^2{\cdot}\text{day}}\right] \qquad (A-130)$$

Finally, the last variable in the equation for standing losses is the vented vapor saturation factor K_S and this is calculated as follows:

$$K_S = \frac{1}{1 + 0.053 \times P_{VA} \times H_{VO}} \qquad (A-131)$$

where the true vapor pressure P_{VA} and vapor space outage H_{VO} terms are as defined previously. This completes the formulation for standing losses.

Working losses E_{LW} are calculated as follows:

$$E_{LW} = 5.614 \frac{\text{ft}^3}{\text{bbl}} \times Q \times W_V \times K_N \times K_P \times K_B \qquad (A-132)$$

where:

Q = Monthly net throughput [bbl/month]
W_V = Vapor density [lb/ft^3], as obtained above

K_N, K_P, and K_B represent, respectively, the working loss turnover, working loss product, and vent setting correction factors which are provided in OCS AQS. K_P and K_B are set to constant values equal to 0.75 and 1, respectively. K_N is calculated as follows:

$$K_N = \begin{cases} 1, N \leq 36 \\ \dfrac{180 + N}{6N}, N > 36 \end{cases} \qquad (A-133)$$

where:

N = Number of turnovers

The number of turnovers N is in turn given by the following:

$$N = 5.614 \frac{\text{ft}^3}{\text{bbl}} \times Q \times V_{LX} \qquad (A-134)$$

where:

V_{LX} = Tank volume [ft^3]

As was the case with the vapor volume V_V , the tank volume V_{LX} depends on the tank geometry, as follows:

$$V_{LX} = \frac{\pi}{4} \times d^2 \times L \qquad (A - 135)$$

Emissions of VOC, CH_4, and C_2H_6 were calculated as follows, respectively, based on the specification profiles:

$$E_{VOC} = 0.467 \times E_{THC} \qquad (A - 136)$$

$$E_{CH_4} = 0.463 \times E_{THC} \qquad (A - 137)$$

$$E_{C_2H_6} = 0.07 \times E_{THC} \qquad (A - 138)$$

> ***NOTE:*** The equations $A - 118$ to $A - 138$ are all from AP 42, Fifth Edition, Volume I Chapter 7: Liquid Storage Tanks https://www3.epa.gov/ttn/chief/ap42/ch07/final/ch07s01.pdf
>
> ***NOTE:*** You are allowed to provide reduction efficiencies for emissions from loading operations by entering the required information (e.g., control equipment type, reduction efficiency in %) in OCS AQS.

A.42.2 STO-M04R Data and Control Requests

The calculator STO-M04R Version 3 in OCS AQS calculates the monthly emissions from an uninsulated vertical cylindrical storage tank using the following **Data Request** fields in Figure A - 68:

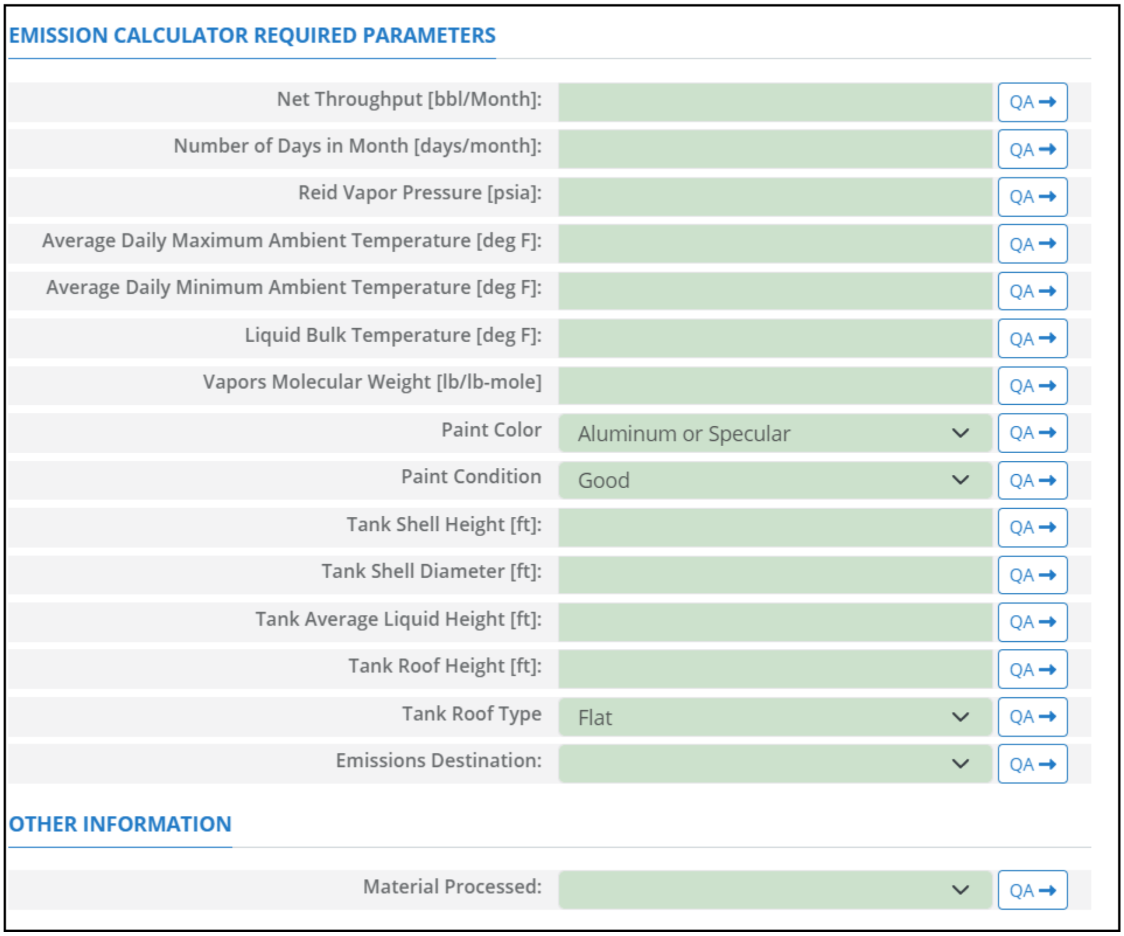


Figure A - 68. STO-M04R Data Request tab

1. Net Throughput [bbl/Month]: The total monthly throughput volumetric flow rate fed to the storage tank during the survey period.
2. Number of Days in Month [days/month]: Number of days in the month of the survey period.
3. Reid Vapor Pressure [psia]: The Reid vapor pressure of the liquid mixture in the storage tank.
4. Average Daily Maximum Ambient Temperature [deg F]: The average daily maximum ambient temperature.
5. Average Daily Minimum Ambient Temperature [deg F]: The average daily minimum ambient temperature.
6. Liquid Bulk Temperature [deg F]: The bulk temperature of the liquid mixture in the storage tank.
7. Vapors Molecular Weight [lb/lb-mole]: The average molecular weight of the vapor phase of the VOCs mixture in the storage tank.
8. Paint Color: A drop-down list field to specify the exterior paint color of the storage tank: Aluminum or Specular / Aluminum or Diffuse / Grey or Light / Grey or Medium / Red or Primer / White.
9. Paint Condition: A drop-down list field to specify the exterior paint condition of the storage tank: Good / Poor / Average.
10. Tank Shell Height [ft]: The shell vertical height of the vertical cylindrical storage tank.
11. Tank Shell Diameter [ft]: The shell diameter of the cylindrical storage tank.
12. Tank Average Liquid Height [ft]: The average height of stored liquid during the survey period, measured from the bottom of the storage space to the top of the liquid.
13. Tank Roof Height [ft]: The height of the tank fixed roof measured from the top of the tank shell to the highest point of the roof.

14. Tank Roof Type: A drop-down list field to specify the tank roof type: Cone or Peaked / Dome / Flat.
15. Emissions Destination: A drop-down list field to specify the emissions destination – whether they are vented locally, flared locally, vented remotely, flared remotely, or routed to system. Vented locally selection will compute the emissions vented from this unit. Whereas, flared locally, vented remotely, flared remotely, and routed to system selections will zero out emissions from this unit.
16. Material Processed: A drop-down list field to specify the processed material: Distillate Oil (Diesel) / Crude Oil / Condensate / Other.

The calculator STO-M04R Version 3 in OCS AQS calculates the monthly emissions with pollution control from an uninsulated vertical cylindrical storage tank using the following **Control Request** fields in Figure A - 69:

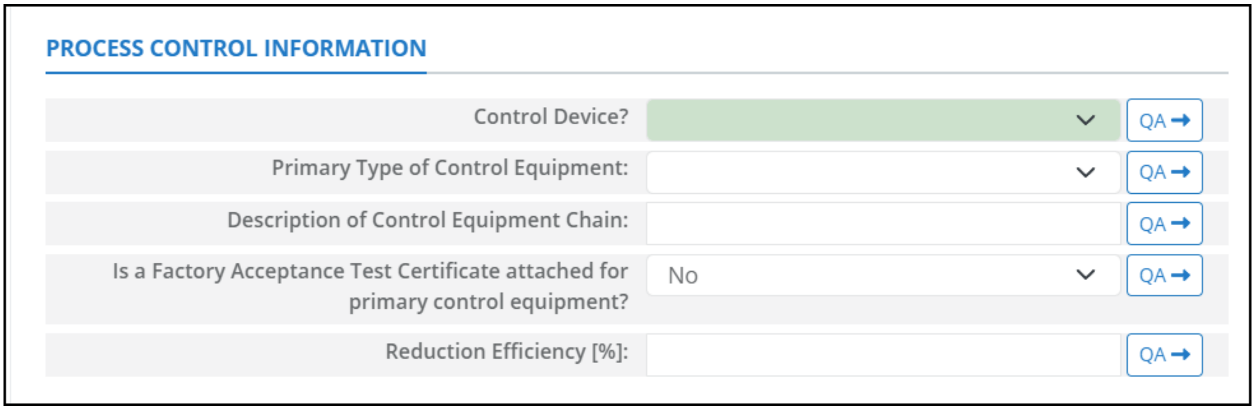


Figure A - 69. STO-M04R Control Request tab

1. Control Device?: Is end of pipe control technology used with this source? A drop-down [Yes/No] list.
2. Primary Type of Control Equipment: A drop-down list field to specify the primary type of the used control equipment. If the type of is not listed, user can select Other and explain in the comments field.
3. Description of Control Equipment Chain: If more than one type of control technology is used, user can describe the sequence of processing in this field.
4. Is a Factory Acceptance Test Certificate attached for primary control equipment?: A drop-down [Yes/No] list to specify if functionality certification paperwork is available for the control equipment.
5. Reduction Efficiency [%]: This term describes the reduction of all emitted constituents of the emission stream using the control technology. For example, if a Vapor Unit Recovery is employed with a 90% reduction efficiency, the user enters “90” in the “Reduction Efficiency [%]” field. After the calculation is executed, all the emitted constituents will be reduced uniformly by 90%.

> ***IMPORTANT*****:** Supporting equipment documentation may be required by BOEM/BSEE to verify specified control efficiency.

A.43 VEN-M01R (Cold Vent)

A.43.1 VEN-M01R Calculation Method

The calculator VEN-M01R Version 5 in OCS AQS calculates the VOC emissions from cold vents as follows:

$$E_{VOC} = C_{VOC} \times 10^{-6} \times \frac{m_{VOC} \times V \times 1{,}000}{379.4 \frac{\text{scf}}{\text{lb·mol}}} \qquad (A-139)$$

where:

E_{VOC} = VOC emissions [lb/month]
C_{VOC} = Concentration of VOC in the vented gas [ppmv]
m_{VOC} = Molecular weight of VOC [lb/lb·mol]
V = Volume of vented gas [Mscf]

CH_4 and CO_2 emissions are calculated using the same formulation as follows. The equations are provided individually below for clarity:

$$E_{CH_4} = WP_{CH_4} \times \frac{m_S}{379.4 \frac{\text{scf}}{\text{lb.mol}}} \times 1000 \times V \qquad (A-140)$$

$$E_{CO_2} = WP_{CO_2} \times \frac{m_S}{379.4 \frac{\text{scf}}{\text{lb.mol}}} \times 1000 \times V \qquad (A-141)$$

where:

E_{CH_4} = CH_4 emissions [lb/month]
E_{CO_2} = CO_2 emissions [lb/month]
m_S = Sales gas mole weight of CH_4 and CO_2 in equations A-137 and A-138, respectively [lb/lb·mol]
WP = Weight percent of CH_4 and CO_2 in equations A-137 and A-138, respectively

Finally, HAP emissions are calculated based on the VOC emissions obtained from the equation above and applying the speciation profile data:

$$E_{HAP} = E_{VOC} \times \left(\frac{WP_{HAP}}{WP_{VOC}}\right) \qquad (A-142)$$

where:

E_{VOC} = VOC emissions [lb/month]
WP_{HAP} = HAP average weight [%]
WP_{VOC} = VOC average weight [%]

Table A - 55 shows the HAP speciation profile with average weight in %.

Table A - 55. Speciation profile used to calculate HAP emissions based on VOC emissions*

Pollutants	Average weight [%]
Benzene	0.01855
Ethylbenzene	1.15E-03
Hexane	0.35195
Toluene	2.80E-03

Pollutants	Average weight [%]
2,2,4-Trimethylpentane	7.0E-04
Xylenes	4.80E-03
Volatile organic compound (VOC)	17.21

* Reference: Table 4-2 (Volatile HAP Speciation Profile) in Wilson et al. (2019)

A.43.2 VEN-M01R Data and Control Requests

The calculator VEN-M01R Version 5 in OCS AQS calculates the monthly emissions from a cold vent using the following **Data Request** fields in Figure A - 70:

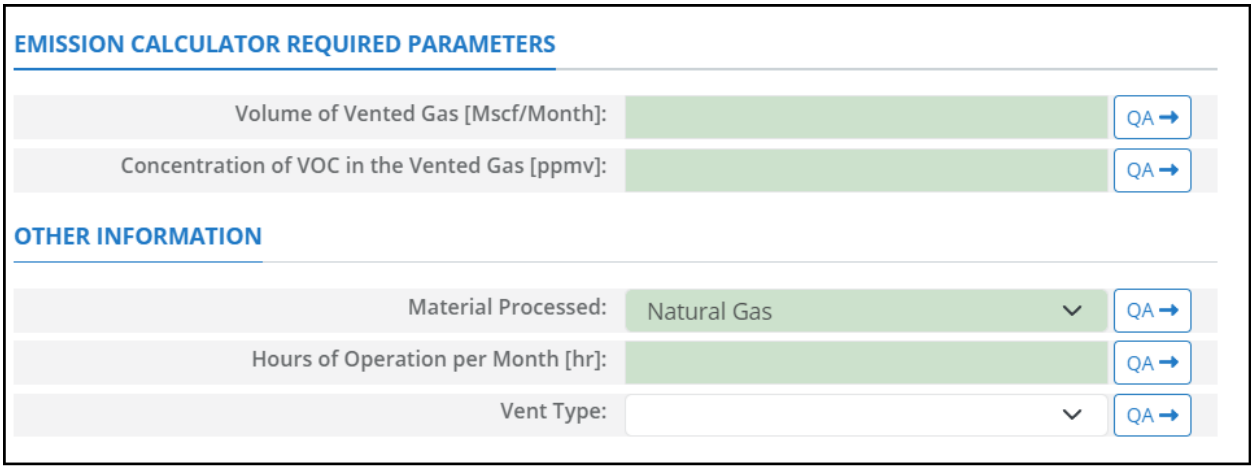


Figure A - 70. VEN-M01R Data Request tab

1. Volume of vented Gas [Mscf/Month]: The total volume of gas vented during the survey period, including periods of upset venting, volume adjusted to standard temperature and pressure). The OCS AQS volume vented should match the Office of Natural Resources Revenue (ONRR)’s volume vented reported in the Oil and Gas Operations Report (OGOR).
2. Concentration of VOC in the Vented Gas [ppmv]: The concentration of VOC in the vented gas.
3. Material Processed: A drop-down list field to specify the processed material: Gas/ Natural Gas / Process Gas / Exhaust gas.
4. Hours of Operation per Month [hr]: The total monthly hours of operation of the cold vent during the survey period.
5. Vent Type: A drop-down list field to specify the type of venting pressure: High Pressure / Low Pressure.

Appendix B – Lease Operation Calculator Descriptions

This section provides a comprehensive overview of the calculation methods, EFs, and data requests used in OCS AQS to estimate emissions from lease operation sources.

B.1 C1C2-DRILL-LO (Self-Propelled C1C2 Vessel – US Flagged)

B.1.1 C1C2-DRILL-LO Calculation Method

For US-flagged lease operations vessels equipped with Category 1 and 2 (C1/C2) propulsion engines, the C1C2-DRILL-LO Version 2 calculator in OCS AQS calculates the emissions as follows:

$$E = Ah \times \mathrm{kW} \times LF \times \mathrm{EF} \times 1.10231 \times 10^{-6} \qquad (B-1)$$

where:

E = Emissions [lb/period]
Ah = Hours of operation per period [hr]
kW = Total vessel power [kW]
LF = Load factor [%]
EF = Emission factor [g/kWh] – dependent on the engine model year; see **Table B - 1** below.
1.10231×10^{-6} = Grams to tons conversion factor

Pollutant	Prior to 2003 (Tier 0)	2004-2006 (Tier 1)	2007 – 2013 (Tier 2)	2014 – 2016 (Tier 3)	2017 (Tier 4)
Nitrogen oxides (NOx)	13.36	10.55	8.33	5.97	1.3
Volatile organic compounds (VOC)	0.14	0.14	0.14	0.07	0.02
Carbon monoxide (CO)	2.48	2.48	2	2	2
Sulfur dioxide (SO_2)	0.006	0.006	0.006	0.006	0.006
Carbon dioxide (CO_2)	648.16	648.16	648.16	648.16	468.16
Particulate matter less than 10 microns – Primary (PM_{10} -PRI)	0.32	0.32	0.32	0.11	0.03
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI)	0.31	0.31	0.32	0.11	0.03
Lead (Pb)	0.00003	0.00003	0.00003	0.00003	0.00003
Nitrous Oxide (N_2O)	0.031	0.031	0.031	0.031	0.031
Methane (CH_4)	0.004	0.004	0.004	0.004	0.004
Ammonia (NH_3)	0.003	0.003	0.003	0.003	0.003

Pollutant	Prior to 2003 (Tier 0)	2004-2006 (Tier 1)	2007 – 2013 (Tier 2)	2014 – 2016 (Tier 3)	2017 (Tier 4)
Nitrogen oxides (NOx)	13.36	10.55	8.33	5.97	1.3
Volatile organic compounds (VOC)	0.14	0.14	0.14	0.07	0.02
Carbon monoxide (CO)	2.48	2.48	2	2	2
Sulfur dioxide (SO_2)	0.006	0.006	0.006	0.006	0.006

Carbon dioxide (CO_2)	648.16	648.16	648.16	648.16	468.16
Particulate matter less than 10 microns – Primary (PM_{10} -PRI)	0.32	0.32	0.32	0.11	0.03
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI)	0.31	0.31	0.32	0.11	0.03
Lead (Pb)	0.00003	0.00003	0.00003	0.00003	0.00003
Nitrous Oxide (N_2O)	0.031	0.031	0.031	0.031	0.031
Methane (CH_4)	0.004	0.004	0.004	0.004	0.004
Ammonia (NH_3)	0.003	0.003	0.003	0.003	0.003

Table B - 1 shows the EFs of the US-flagged C1/C2 vessels by tier and pollutant types.

Table B - 1. EFs [g/kWh] for vessels equipped with category 1 and 2 propulsion engines*

Pollutant	Prior to 2003 (Tier 0)	2004-2006 (Tier 1)	2007 – 2013 (Tier 2)	2014 – 2016 (Tier 3)	2017 (Tier 4)
Nitrogen oxides (NOx)	13.36	10.55	8.33	5.97	1.3
Volatile organic compounds (VOC)	0.14	0.14	0.14	0.07	0.02
Carbon monoxide (CO)	2.48	2.48	2	2	2
Sulfur dioxide (SO_2)	0.006	0.006	0.006	0.006	0.006
Carbon dioxide (CO_2)	648.16	648.16	648.16	648.16	468.16
Particulate matter less than 10 microns – Primary (PM_{10} -PRI)	0.32	0.32	0.32	0.11	0.03
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI)	0.31	0.31	0.32	0.11	0.03
Lead (Pb)	0.00003	0.00003	0.00003	0.00003	0.00003
Nitrous Oxide (N_2O)	0.031	0.031	0.031	0.031	0.031
Methane (CH_4)	0.004	0.004	0.004	0.004	0.004
Ammonia (NH_3)	0.003	0.003	0.003	0.003	0.003

* Reference: Table 5-4 (Tier Emission Factors for Vessels Equipped with Category 1 and 2 Propulsion Engines) in Wilson et al. (2019)

B.1.3 C1C2-DRILL-LO Data Request

The calculator C1C2-DRILL-LO Version 2 in OCS AQS calculates the emissions from a self-propelled C1/C2 engines of a US flagged vessel using the following **Data Request** fields in Figure B - 1:

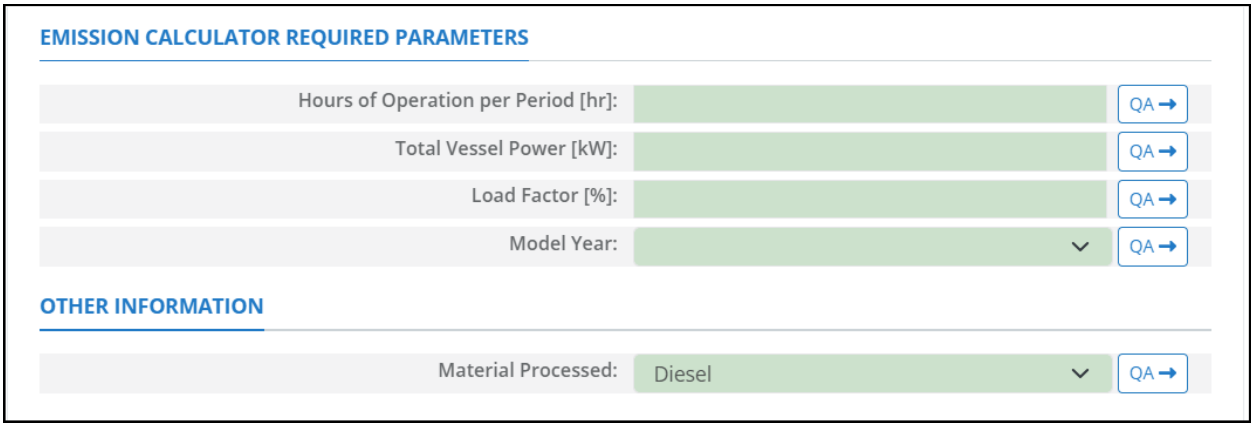


Figure B - 1. C1C2-DRILL-LO Data Request tab

1. Hours of Operation per Period [hr]: The total hours of operation of the self-propelled vessel during the survey period.
2. Total Vessel Power[kW]: The total operating vessel power (totaling individual propulsion engines).
3. Load Factor [%]: The total load factor percentage of the vessel's engine.
4. Model Year: The engine's manufacture year.
5. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil. Default selection is Diesel.

B.2 C1C2-DRILL-LO-F (Self-Propelled C1C2 Vessel – Foreign Flagged)

B.2.1 C1C2-DRILL-LO-F Calculation Method

For foreign-flagged lease operations vessels equipped with Category 1 and 2 (C1/C2) propulsion engines, the C1C2-DRILL-LO-F Version 2 calculator in OCS AQS calculates emissions as follows:

$$E = Ah \times \mathrm{kW} \times LF \times \mathrm{EF} \times 1.10231 \times 10^{-6} \qquad (B-2)$$

where:

E = Emissions [lb/period]
Ah = Hours of operation per period [hr]
kW = Total vessel power [kW]
LF = Load factor [%]
EF = Emission factor [g/kWh] – Only tier 0 EFs will be used for all foreign-flagged vessels because the engine's model year information is not always accessible for foreign vessels
1.10231×10^{-6} = Grams to tons conversion factor

Table B - 2 shows the tier 0 EFs of the foreign-flagged vessel with C1/C2 engine by pollutant types.

Table B - 2. EFs [g/kWh] for foreign vessels equipped with category 1 and 2 propulsion engines (Tier 0 engines)*

Pollutant	Prior to 2003 (Tier 0)
Nitrogen oxides (NOx)	13.36
Volatile organic compounds (VOC)	0.14
Carbon monoxide (CO)	2.48
Sulfur dioxide (SO_2)	0.006
Carbon dioxide (CO_2)	648.16
Particulate matter less than 10 microns –Primary (PM_{10} -PRI)	0.32
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI)	0.31
Lead (Pb)	0.00003
Nitrous Oxide (N_2O)	0.031
Methane (CH_4)	0.004
Ammonia (NH_3)	0.003

* Reference: Tier 0 EFs from Table 5-4 (Tier Emission Factors for Vessels Equipped with Category 1 and 2 Propulsion Engines) in Wilson et al. (2019)

B.2.3 C1C2-DRILL-LO-F Data Request

The calculator C1C2-DRILL-LO-F Version 2 in OCS AQS calculates the emissions from self-propelled C1/C2 engines of foreign-flagged vessels using the following **Data Request** fields in Figure B - 2:

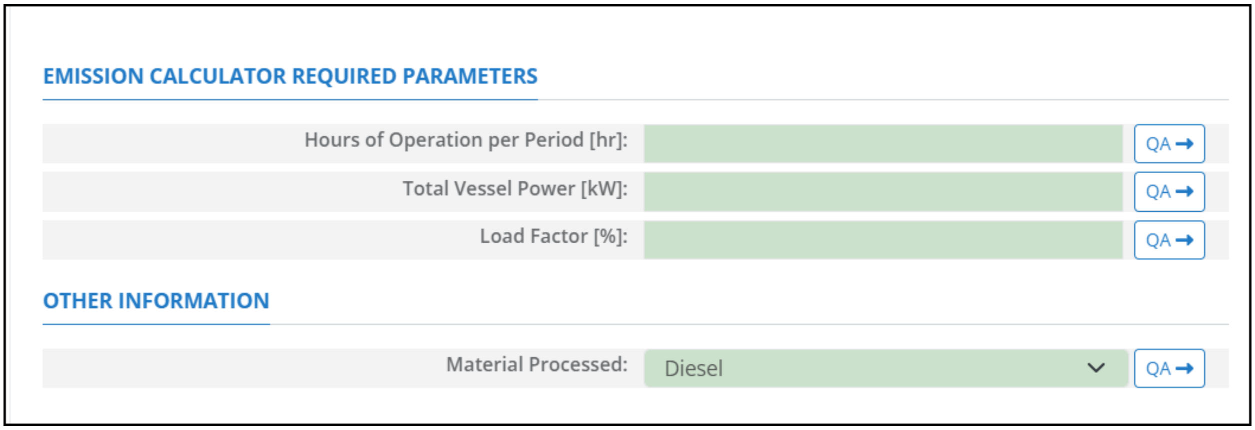


Figure B - 2. C1C2-DRILL-LO-F Data Request tab

1. Hours of Operation per Period [hr]: The total hours of operation of the self-propelled vessel during the survey period.
2. Total Vessel Power[kW]: The total operating vessel power (totaling individual propulsion engines).
3. Load Factor [%]: The total load factor percentage of the vessel's engine.
4. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil. Default selection is Diesel.

B.3 DIE-M02R-LO (Diesel Engines Where Max HP < 600)

B.3.1 DIE-M02R-LO Calculation Method

For lease operations diesel engines with max HP < 600, the calculator DIE-M02R-LO Version 3 in OCS AQS calculates emissions as follows:

$$E = EF \times 10^{-6} \times U \times 7.1\,\frac{\text{lb}}{\text{gal}} \times H \qquad (B-3)$$

where:

E = Emissions [lb/period]
EF = Emission factor [lb/MMBtu]
U = Total fuel usage [gallons/period]
H = Fuel heating value [Btu/lb]

Table B - 3 shows the EFs for diesel engines with max HP < 600.

Table B - 3. EFs for diesel engines with max HP < 600*

Pollutant	EF [lb/MMBtu]
Volatile organic compound (VOC)	0.36
Sulfur dioxide (SO_2)	0.29
Nitrogen oxides (NO_x)	4.41
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI)	0.31
Particulate matter less than 10 microns – Primary (PM_{10} -PRI)	0.31
Carbon monoxide (CO)	0.95
Carbon Ddoxide (CO_2)	164
Acetaldehyde	7.67E-04
Benzene	9.33E-04
Formaldehyde	1.18E-03
Polycyclic aromatic hydrocarbon (PAH)	1.68E-04
Toluene	4.09E-04
Xylenes	2.85E-04

* References: USEPA (1995a), Sections 3.3 and 3.4; USEPA (2015)

B.3.2 DIE-M02R-LO Data Request

The calculator DIE-M02R-LO Version 3 in OCS AQS calculates the emissions from a diesel engine where Max HP < 600 using the following **Data Request** fields in Figure B - 3:

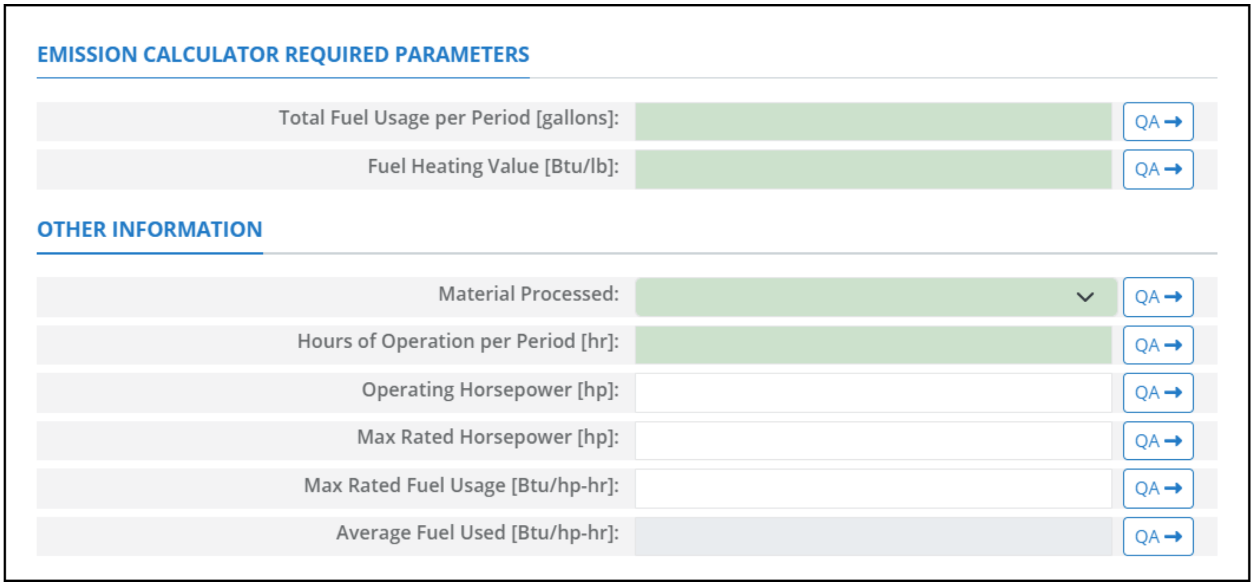


Figure B - 3. DIE-M02R-LO Data Request tab

1. Total Fuel Usage per Period [gallons]: Total rate of the diesel fuel used during the survey period.
2. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of diesel fuel.
3. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil.
4. Hours of Operation per Period [hr]: The total hours of operation of the diesel engine during the survey period.
5. Operating Horsepower [hp]: The operating horsepower of the diesel engine.
6. Max Rated Horsepower [hp]: The manufacturer’s maximum rated horsepower of the diesel engine.
7. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the diesel fuel.
8. Average Fuel Used [Btu/hp-hr]: The average hourly rate of diesel fuel used during the survey period. This field is auto-calculated.

B.4 DIE-M03R-DG (Natural Gas Production Well Drilling – Diesel Engine)

B.4.1 DIE-M03R-DG Calculation Method

For diesel engines accompanying to the natural gas production wells, the DIE-M03R-DG Version 3 calculator in OCS AQS calculates the emissions as follows:

$$E = Ah \times \mathrm{kW} \times LF \times \mathrm{EF} \times 1.10231 \times 10^{-6} \qquad (B-4)$$

where:

E = Emissions [lb/period]
Ah = Hours of operation per period [hr]
kW = Total vessel power [kW]
LF = Load factor [%]
EF = Emission factor [g/kWh] – dependent on the engine's model year; see Table B - 4 below.
1.10231×10^{-6} = Grams to tons conversion factor

Table B - 4 shows the EFs of the diesel engines associated to the natural gas production wells by tier and pollutant types.

Table B - 4. EFs [g/kWh] for diesel engines associated to the natural gas production wells [*]

Pollutant	Prior to 2003 (Tier 0)	2004-2006 (Tier 1)	2007 – 2013 (Tier 2)	2014 – 2016 (Tier 3)	2017 (Tier 4)
Nitrogen oxides (NOx)	13.36	10.55	8.33	5.97	1.3
Volatile organic compounds (VOC)	0.14	0.14	0.14	0.07	0.02
Carbon monoxide (CO)	2.48	2.48	2	2	2
Sulfur dioxide (SO_2)	0.006	0.006	0.006	0.006	0.006
Carbon dioxide (CO_2)	648.16	648.16	648.16	648.16	468.16
Particulate matter less than 10 microns – Primary (PM_{10} -PRI)	0.32	0.32	0.32	0.11	0.03
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI)	0.31	0.31	0.32	0.11	0.03
Lead (Pb)	0.00003	0.00003	0.00003	0.00003	0.00003
Nitrous Oxide (N_2O)	0.031	0.031	0.031	0.031	0.031
Methane (CH_4)	0.004	0.004	0.004	0.004	0.004
Ammonia (NH_3)	0.003	0.003	0.003	0.003	0.003

[*] Reference: Table 5-4 (Tier Emission Factors for Vessels Equipped with Category 1 and 2 Propulsion Engines) in Wilson et al. (2019)

B.4.3 DIE-M03R-DG Data Request

The calculator DIE-M03R-DG Version 3 in OCS AQS calculates the emissions from a diesel engine used for natural gas production well drilling using the following **Data Request** fields in Figure B - 4:

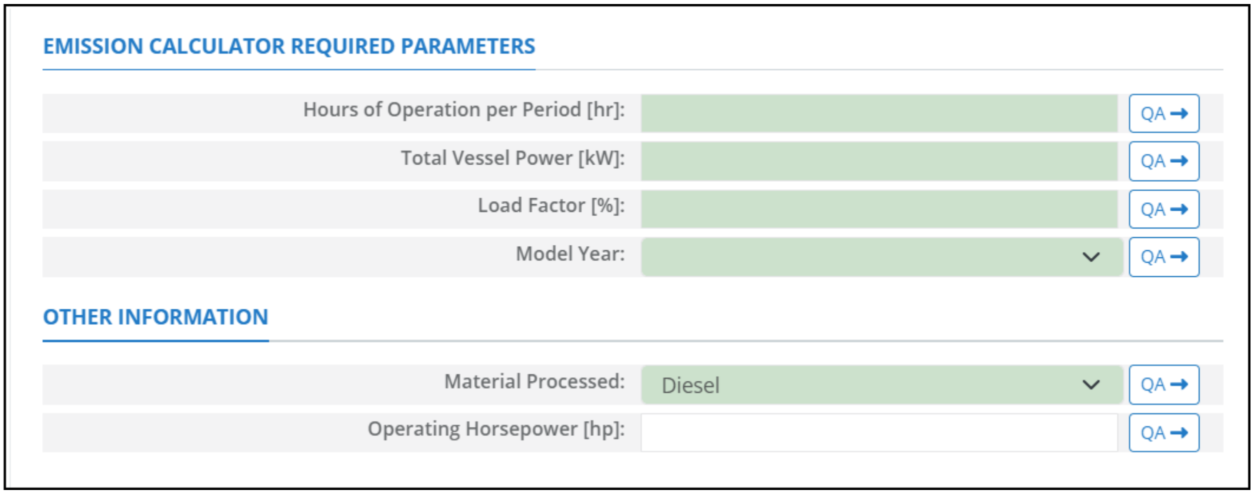


Figure B - 4. DIE-M03R-DG Data Request tab

1. Hours of Operation per Period [hr]: The total hours of operation of the well drilling rig during the survey period.
2. Total Vessel Power[kW]: The total operating vessel power (totaling individual propulsion engines).
3. Load Factor [%]: The total load factor percentage of the drilling rig's engine. Default value is 80 %.
4. Model Year: The engine’s manufacture year.
5. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil. Default selection is Diesel.
6. Operating Horsepower [hp]: The operation horsepower of the drilling rig’s engine.

B.5 DIE-M03R-DO (Crude Oil Production Well Drilling – Diesel Engine)

B.5.1 DIE-M03R-DO Calculation Method

For diesel engines associated to the crude production wells, the DIE-M03R-DO Version 3 calculator in OCS AQS calculates emissions as follows:

$$E = Ah \times \mathrm{kW} \times LF \times \mathrm{EF} \times 1.10231 \times 10^{-6} \qquad (B-5)$$

where:

E = Emissions [lb/period]
Ah = Hours of operation per period [hr]
kW = Total vessel power [kW]
LF = Load factor [%]
EF = Emission factor [g/kWh] – dependent on the engine's model year; see Table B - 5 below.
1.10231×10^{-6} = Grams to tons conversion factor

Table B - 5 shows the EFs of the diesel engines associated to the crude oil production wells by tier and pollutant types.

Table B - 5. EFs [g/kWh] for diesel engines associated to the crude oil production wells *

Pollutant	Prior to 2003 (Tier 0)	2004-2006 (Tier 1)	2007 – 2013 (Tier 2)	2014 – 2016 (Tier 3)	2017 (Tier 4)
Nitrogen oxides (NOx)	13.36	10.55	8.33	5.97	1.3
Volatile organic compounds (VOC)	0.14	0.14	0.14	0.07	0.02
Carbon monoxide (CO)	2.48	2.48	2	2	2
Sulfur dioxide (SO_2)	0.006	0.006	0.006	0.006	0.006
Carbon dioxide (CO_2)	648.16	648.16	648.16	648.16	468.16
Particulate matter less than 10 microns – Primary (PM_{10} -PRI)	0.32	0.32	0.32	0.11	0.03
Particulate matter less than 2.5 microns – Primary ($PM_{2.5}$ -PRI)	0.31	0.31	0.32	0.11	0.03
Lead (Pb)	0.00003	0.00003	0.00003	0.00003	0.00003
Nitrous Oxide (N_2O)	0.031	0.031	0.031	0.031	0.031
Methane (CH_4)	0.004	0.004	0.004	0.004	0.004
Ammonia (NH_3)	0.003	0.003	0.003	0.003	0.003

* Reference: Table 5-4 (Tier Emission Factors for Vessels Equipped with Category 1 and 2 Propulsion Engines) in Wilson et al. (2019)

B.5.3 DIE-M03R-DO Data Request

The calculator DIE-M03R-DO Version 3 in OCS AQS calculates the emissions from a diesel engine used for crude oil production well drilling using the following **Data Request** fields in Figure B - 5:

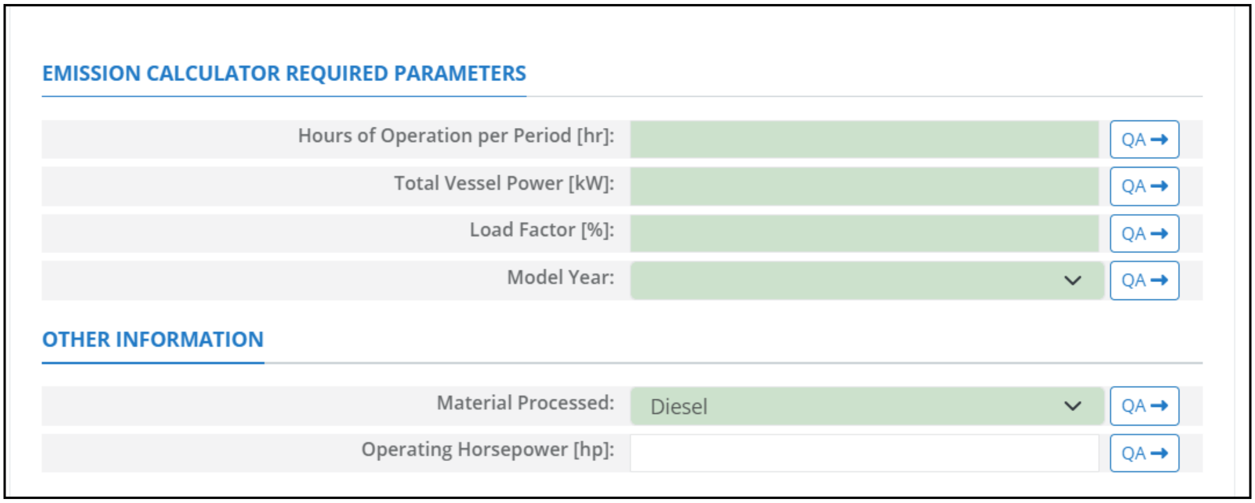


Figure B - 5. DIE-M03R-DO Data Request tab

1. Hours of Operation per Period [hr]: The total hours of operation of the well drilling rig during the survey period.
2. Total Vessel Power[kW]: The total operating vessel power (totaling individual propulsion engines).
3. Load Factor [%]: The total load factor percentage of the drilling rig's engine. Default value is 80 %.
4. Model Year: The engine’s manufacture year.
5. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil. Default selection is Diesel.
6. Operating Horsepower [hp]: The operation horsepower of the drilling rig’s engine

B.6 DIE-M03R-LO (Diesel Engines Where Max HP >= 600)

B.6.1 DIE-M03R-LO Calculation Method

For lease operations diesel engines with max HP ≥ 600, the calculator DIE-M03R-LO Version 3 in OCS AQS calculates emissions as follows:

$$E = EF \times 10^{-6} \times U \times 7.1 \frac{\text{lb}}{\text{gal}} \times H \qquad (B-6)$$

where:

E = Emissions [lb/period]
EF = Emission factor [lb/MMBtu]
U = Total fuel usage [gallons/period]
H = Fuel heating value [Btu/lb]
S = Fuel sulfur content [wt %] – This variable is not shown in the formula above but is a required field in OCS AQS and is used to obtain the SO_2 EF – see Table B - 6 for SO_2.

Table B - 6 shows the EFs for diesel engines with max HP ≥ 600.

Table B - 6. EFs for diesel engines with max HP ≥ 600*

Pollutant	EF [lb/MMBtu]
Volatile organic compound (VOC)	0.0819
Sulfur Dioxide (SO_2)	1.01 × *S*
Nitrogen Oxides (NO_x)†	3.2
Particulate matter less than 2.5 microns –Primary ($PM_{2.5}$ -PRI)	0.0556
Particulate matter less than 10 microns – Primary (PM_{10} -PRI)	0.0573
Carbon Monoxide (CO)	0.85
Methane (CH_4)	8.1E-03
Carbon Dioxide (CO_2)	165
Acetaldehyde	2.52E-05
Benzene	7.76E-04
Formaldehyde	7.89E-05
Polycyclic aromatic hydrocarbon (PAH)	2.12E-04
Toluene	2.81E-04
Xylenes	1.93E-04

* References: USEPA (1995a), Sections 3.3 and 3.4; USEPA (2015)

B.6.3 DIE-M03R-LO Data Request

The calculator DIE-M03R-LO Version 3 in OCS AQS calculates the emissions from a diesel engine where Max HP >= 600 using the following **Data Request** fields in Figure B - 6:

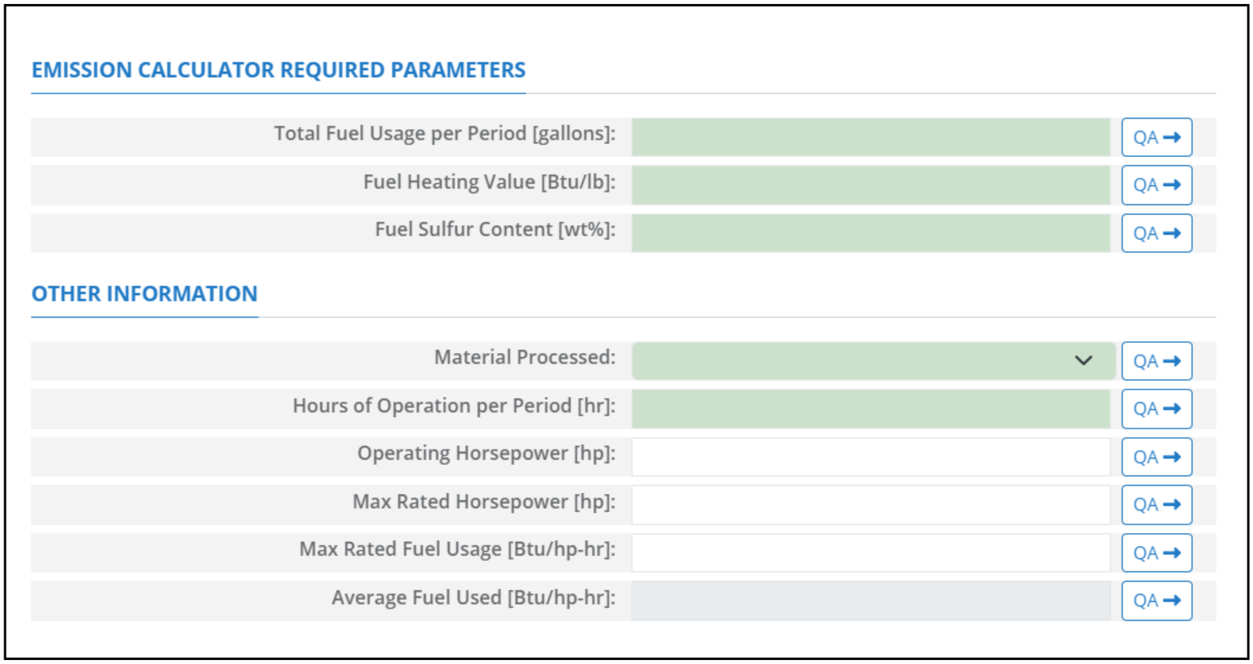


Figure B - 6. DIE-M03R-LO Data Request tab

1. Total Fuel Usage [gallons]: Total rate of the diesel fuel used during the survey period.
2. Fuel Heating Value [Btu/lb]: The amount of heat released during the combustion of a specified amount of diesel fuel.
3. Fuel Sulfur Content [wt%]: The weight percentage concentration of the sulfur content in the used diesel fuel. For example, if the fuel is 1.0% sulfur, then user enters 1 and not 0.01.
4. Material Processed: A drop-down list field to specify the processed material: Diesel / Distillate Oil.
5. Hours of Operation per Period [hr]: The total hours of operation of the diesel engine during the survey period.
6. Operating Horsepower [hp]: The operating horsepower of the diesel engine.
7. Max Rated Horsepower [hp]: The manufacturer’s maximum rated horsepower of the diesel engine.
8. Max Rated Fuel Usage [Btu/hp-hr]: The maximum hourly usage rate of the diesel fuel.
9. Average Fuel Used [Btu/hp-hr]: The average hourly rate of diesel fuel used during the survey period. This field is auto-calculated.

B.7 FLA-M01-LO (Combustion Flare)

B.7.1 FLA-M01-LO Calculation Method

For lease operations combustion flares (flaring processes), the FLA-M01-LO Version 1 calculator in OCS AQS calculates the emissions of the pollutants listed in Table A - 10 as follows:

$$E = V \times H \times EF \times 0.001 \qquad (\mathrm{B}-7)$$

where:

E = Emissions [lb/period]
V = Total volume of gas flared (not including pilot) [Mscf/period]
H = Flare gas heating value [Btu/scf]
EF = Emission factor [lb/MMBtu], which can depend on **smoke conditions**, provided as operator input (see below)

Table A - 10 shows the EFs for combustion flares.

Table B - 7. EFs for combustion flares*

Pollutant	EF [lb/MMBtu]
Nitrogen Oxides (NO_x)	0.068
Particulate matter less than 2.5 and 10 microns – Filterable ($PM_{2.5}$ – Fil and PM_{10} – Fil) **no smoke**	0.0
Particulate matter less than 2.5 and 10 microns – Filterable ($PM_{2.5}$ – Fil and PM_{10} – Fil) **light smoke**	2E-03
Particulate matter less than 2.5 and 10 microns – Filterable ($PM_{2.5}$ – Fil and PM_{10} – Fil) **medium**	0.01
Particulate matter less than 2.5 and 10 microns – Filterable ($PM_{2.5}$ – Fil and PM_{10} – Fil) **heavy smoke**	0.02
Carbon monoxide (CO)	0.31
Nitrous oxide (N_2O)	2E-03
Carbon dioxide (CO_2)	117.65
Acetaldehyde	0.05519
Benzene	1.59E-03
Ethylbenzene	9E-05
Formaldehyde	0.08302
Hexane	7.48E-03
Toluene	1.42E-03
2,2,4 Trimethylpentane	2.11E-03
Xylenes	4E-04

* References: USEPA (1995a), Sections 13.5 and 1.4; USEPA (2015)

Flaring process emissions for SO_2, VOC, and CH_4 are calculated using different formulation, as described below. Among other differences, each requires the use of its molecular weight in lb/lb-mol, as shown below.

For SO_2, which has a molecular weight of 64 lb/lb-mol, emissions are calculated as follows:

$$E_{SO_2} = \frac{Eff}{100} \times \frac{10^{-6}}{\mathrm{ppm}} \times \frac{64\ \mathrm{lb/lb\text{-}mol}}{379.4\,\frac{\mathrm{scf}}{\mathrm{lb\text{-}mol}}} \times 1{,}000\ \times \mathrm{V} \times C_{H_2S} \qquad (\mathrm{B}-8)$$

where:

E_{SO_2} = SO_2 emissions [lb/period]

Eff = Combustion efficiency of the flare [%]
V = Total volume of gas flared (not including pilot) [Mscf/period]
C_{H_2S} = Concentration of H_2S in the flare gas [ppm]

For VOC, emissions are calculated as follows:

$$E_{VOC} = V \times \left(1 - \frac{Eff}{100}\right) \times \frac{m_{VOC} \text{ lb/lb-mol}}{379.4 \frac{\text{scf}}{\text{lb-mol}}} \times 1{,}000 \qquad (B-9)$$

where:

E_{VOC} = VOC emissions [lb/period]
Eff = Combustion efficiency of the flare [%]
V = Total volume of gas flared (not including pilot) [Mscf/period]
m_{VOC} = The mole weight of VOC [lb/lb-mol] - this is automatically calculated in OCS AQS from the provided sales gas data as shown in equation B-10:

$$m_{VOC} = \sum \frac{y_{pollutant}}{100 \times y_{VOC}} * m_{pollutant} \qquad (B-10)$$

where:

m_{VOC} = The mole weight of VOC [lb/lb-mol]

$y_{pollutant}$ = The sales gas mole composition of each VOC pollutant [%]
y_{VOC} = The summation of the sales gas compositions (provided by you under the data request tab see Figure B - 7) of all VOC pollutants [%] calculated as shown in equation B-11:

$$y_{VOC} = y_{C3} + y_{i-C4} + y_{n-C4} + y_{i-C5} + y_{n-C5} + y_{C6} + y_{C7} + y_{C8+} \qquad (B-11)$$

$m_{pollutant}$ = The mole weight of each VOC pollutant [lb/lb-mol] – See below Table B - 8 for the used mole weights for each VOC pollutant.

Table B - 8. Mole weights of VOC pollutants

VOC Pollutant	Mole Weight [lb/lb-mol]
Propane (C_3H_8)	44.097
Isobutane (i- C_4H_{10})	58.124
n-Butane (n- C_4H_{10})	58.124
Isopentane (i- C_5H_{12})	72.15
n-Pentane (n- C_5H_{12})	72.15
Hexanes (C_6H_{14})	86.177
Heptanes (C_7H_{16})	100.272
Octanes and higher hydrocarbons (C8+)	114.231

For CH_4, which has a molecular weight of 16.04 lb/lb-mol, emissions are calculated as follows:

$$E_{CH_4} = V \times \left(1 - \frac{Eff}{100}\right) \times \frac{16.04\ \text{lb/lb-mol}}{379.4\ \frac{\text{scf}}{\text{lb-mol}}} \times 1{,}000 \qquad \text{(B} - 12\text{)}$$

where:

E_{CH_4} = CH_4 emissions [lb/period]
Eff = Combustion efficiency of the flare [%]
V = Total volume of gas flared (not including pilot) [Mscf/period]

B.7.2 FLA-M01-LO Data Request

The calculator FLA-M01-LO Version 1 in OCS AQS calculates emissions from a lease operation combustion flare using the following Data Request fields in Figure B - 7 :

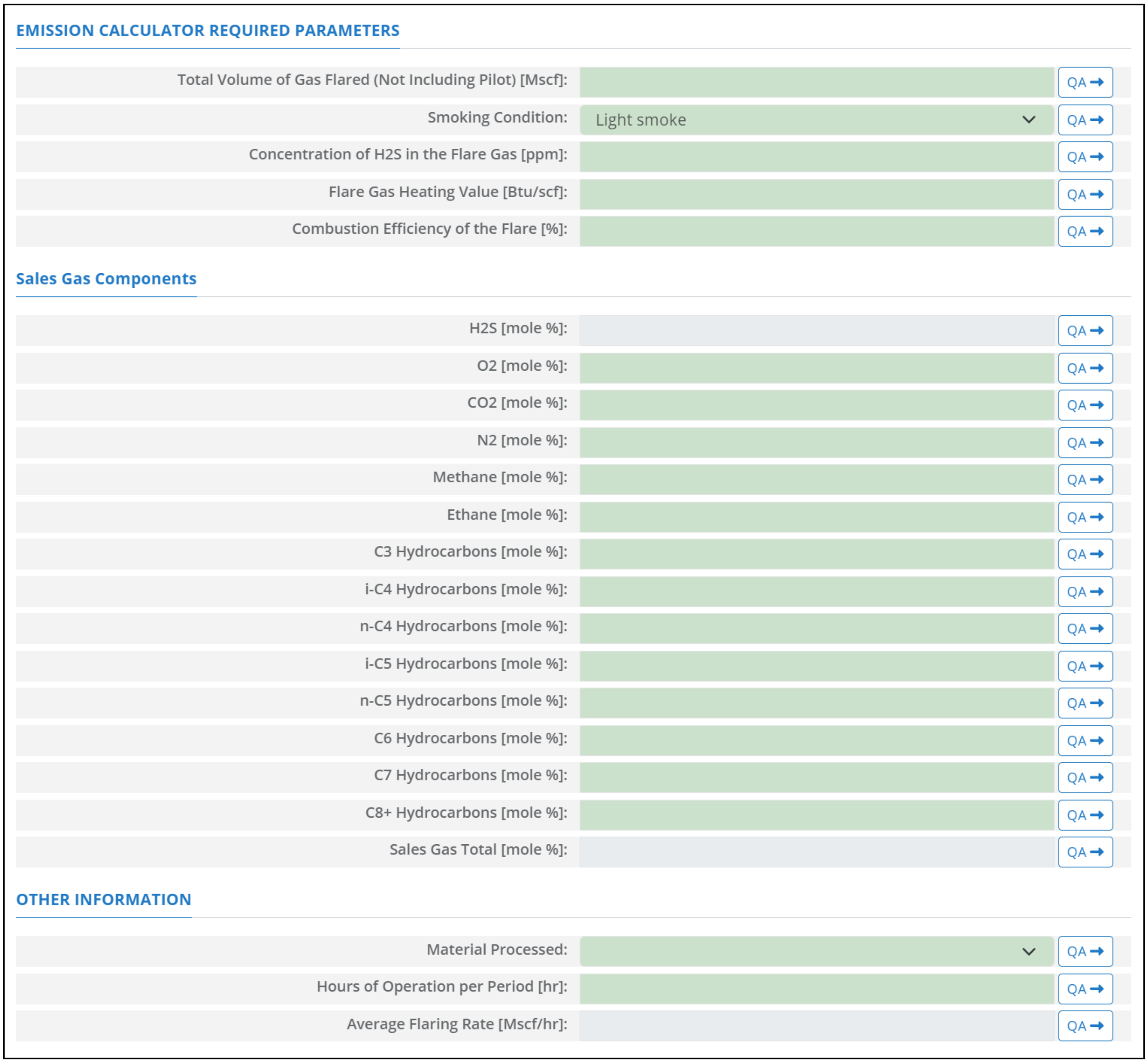


Figure B - 7. FLA-M01-LO Data Request tab

1. Total Volume of Gas Flared (Not Including Pilot) [Mscf]: The total volume of flare gas during the survey period, without the pilot flared gas.
2. Smoking Condition: A drop-down list field to specify the condition of the flare emitted smoke: No Smoke / Light Smoke / Medium Smoke / Heavy Smoke. Light Smoke is the default selection.
3. Concentration of H_2S in the Flare Gas [ppm]: The ppm concentration of hydrogen sulfide present in the flare gas.
4. Flare Gas Heating Value [Btu/scf]: The amount of heat released during the combustion of a specified amount of the flare gas.
5. Combustion Efficiency of the Flare [%]: The percentage efficiency of complete combustion, or the percentage of hydrocarbon conversion to CO_2.
6. H_2S [mole %]: H_2S mole percentage composition of the extracted sales gas.

7. O_2 [mole %]: O_2 mole percentage composition of the extracted sales gas.
8. CO_2 [mole %]: CO_2 mole percentage composition of the extracted sales gas.
9. Methane [mole %]: Methane composition of the extracted sales gas.
10. Ethane [mole %]: Ethane composition of the extracted sales gas.
11. C3 Hydrocarbons [mole %]: C3 Hydrocarbons mole percentage composition of the extracted sales gas.
12. i-C4 Hydrocarbons [mole %]: i-C4 Hydrocarbons mole percentage composition of the extracted sales gas.
13. n-C4 Hydrocarbons [mole %]: n-C4 Hydrocarbons mole percentage composition of the extracted sales gas.
14. i-C5 Hydrocarbons [mole %]: i-C5 Hydrocarbons mole percentage composition of the extracted sales gas.
15. n-C5 Hydrocarbons [mole %]: n-C5 Hydrocarbons mole percentage composition of the extracted sales gas.
16. C6 Hydrocarbons [mole %]: C6 Hydrocarbons mole percentage composition of the extracted sales gas.
17. C7 Hydrocarbons [mole %]: C7 Hydrocarbons mole percentage composition of the extracted sales gas.
18. C8+ Hydrocarbons [mole %]: C8+ Hydrocarbons (hydrocarbons with 8 or more carbon atoms in their molecular structure) mole percentage composition of the extracted sales gas.
19. Sales Gas Total [mole %]: The aggregate mole percent composition of the extracted sales gas. This field is auto-calculated using the provided mole percentages for all components listed above.
20. Material Processed: A drop-down list field to specify the processed material: Gas/ Natural Gas / Process Gas / Exhaust gas.
21. Hours of Operation per Period [hr]: The total hours of operation of the unit during the survey period.
22. Average Flaring Rate [Mscf/hr]. The flaring hourly volumetric rate. This field is auto-calculated.

B.8 FLA-M02-LO (Combustion Flare – Pilot)

B.8.1 FLA-M02-LO Calculation Method

The calculator FLA-M02-LO Version 1 in OCS AQS calculates the lease operations pilot flare process emissions as follows:

$$E = P \times D \times EF \times 0.001 \qquad (\mathrm{B}-13)$$

where:

E = Emissions [lb/period]
P = Pilot feed rate [Mscf/day]
D = Number of days per period [Day]
EF = Emission factor [lb/MMscf]

Table B - 9 shows the EFs for flare pilot.

Table B - 9. EFs for flare pilot*

Pollutant	EF [lb/MMscf]
Volatile organic compound (VOC)	5.5
Lead (Pb)	5E-04
Nitrogen oxides (NO_x)	100
Particulate matter less than 2.5 microns – Filterable ($PM_{2.5}$ -Fil)	1.9
Particulate matter less than 10 microns – Filterable (PM_{10} -Fil)	1.9
Ammonia (NH_3)	3.2
Sulfur dioxide (SO_2)	0.6
Carbon monoxide (CO)	84
Nitrous oxide (N_2O)	2.2
Methane (CH_4)	2.3
Carbon dioxide (CO_2)	120,000
Arsenic	2E-04
Benzene	2.1E-03
Beryllium	1.2E-05
Cadmium	1.1E-03
Chromium III	1.344E-03
Chromium VI	5.6E-05
Formaldehyde	0.075
Hexane	1.8
Mercury	2.6E-04
Toluene	3.4E-03

* References: USEPA (1995a), Sections 13.5 and 1.4; USEPA (2015)

B.8.2 FLA-M02-LO Data Request

The calculator FLA-M02-LO Version 1 in OCS AQS calculates emissions from a lease operation pilot combustion flare using the following **Data Request** fields in Figure B - 8:

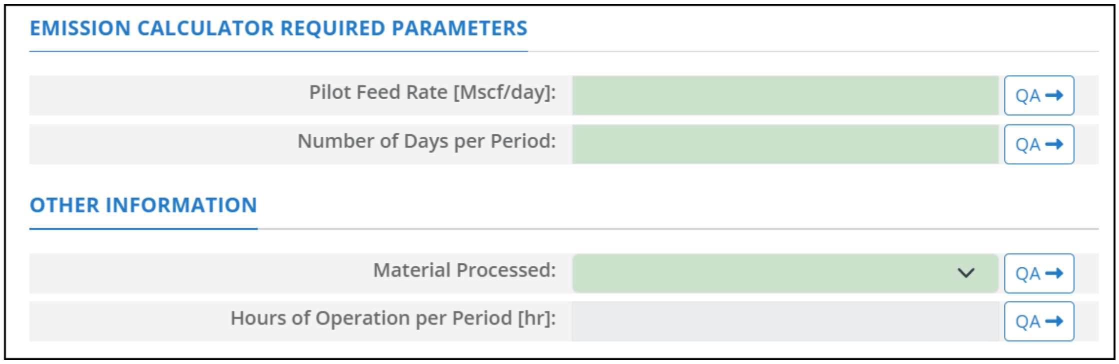


Figure B - 8. FLA-M02-LO Data Request tab

1. Pilot Feed Rate [Mscf/day]: Daily volumetric flowrate of gas fed to the pilot.
2. Number of Days in Period: The number of days in the survey period.
3. Material Processed: A drop-down list field to specify the processed material: Gas / Natural Gas / Process Gas / Exhaust gas.
4. Hours of Operation per Period [hr]: The total hours of operation of the pilot flare source during this survey period. This field is auto-calculated.

B.9 MUD-M01-LO (Mud Degassing)

B.9.1 MUD-M01-LO Calculation Method

The MUD-M01R-LO Version 1 calculator in OCS AQS calculates emissions released from the lease operations mud degassing processes as follows:

$$E = \frac{WP}{100} \times EF \times D_{drill} \qquad (B-14)$$

where:

E = Emissions [lb/period]
WP = Mud degassing speciation weight fraction [%] – See table Table B - 10
EF = Emission factor [lb/day], which depends on the type of mud indicated by the operator – See Table B - 11
D_{drill} = Days per period of drilling with mud [days]

Table B - 10. Mud degassing speciation fractions*

Component	WP - Percent Composition by Weight [%]
Methane (CH_4)	64.705
Ethane (C_2H_6)	7.834
Propane (C_3H_8)	12.977
Butane (C_4H_{10})	8.973
Pentane (C_5H_{12})	4.873
Carbon dioxide (CO_2)	0.6

* Reference: Table 4-19 (Mud Degassing Speciation Fractions) in Wilson et al. (2019)

Table B - 11.EFs for mud degassing*

Type of Mud	EF [lb THC/day]
Water-based Mud	881.84
Oil-based Mud	198.41
Synthetic Mud	198.41

* Reference: Section 4.2.1 (Mud Degassing) in Wilson et al. (2019)

B.9.3 MUD-M01-LO Data Request

The calculator MUD-M01-LO Version 2 in OCS AQS calculates emissions from the mud degassing lease operation using the following Data Request fields in Figure B - 9:

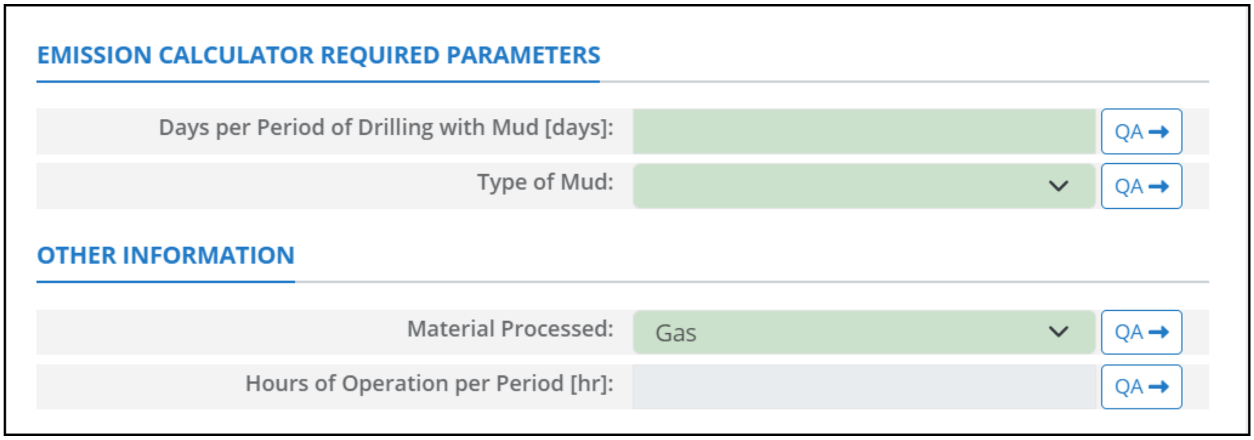


Figure B - 9. MUD-M01-LO Data Request tab

1. Days per Period of Drilling with Mud [days]: The total number of 24-hour days of drilling with mud during the specific survey period.
2. Type of Mud: A drop-down list field to specify the type of drilling mud: Water-based Mud / Oil-based Mud / Synthetic.
3. Material Processed: The type of fuel burned in the equipment: Gas / Natural Gas.
4. Hours of Operation per Period [hr]: The total hours of mud degassing operations during this survey period. This field is auto-calculated.

Appendix C – Revision History

Table C-1. Revision history

NOTE: Due to the changes in the user guide structure between versions, the cross-reference links to the body of the guide may not work, except for the most recent version.

Date	Document Version	Software Version	Changes
12/02/2024	1.14	2.8	Added new Section 11 for references and updated the in-text citations in the document.
9/26/2024	1.14	2.8	• Added Section 1.3.5, Account Management • Updated the login procedure (Section 1.4) to include the Warning Notice (System Usage Agreement and OMB Reporting Burden) • Added Production, Throughput, and Usage term definitions in Annual Production Rates (Section 3.2.2.1) • Updated Decommissioned Facilities (Section 3.2.7) • Added Mud Degassing and Combustion Flares to Emissions: Lease Operations (Section 4) • Restructured and updated Section 4.1 to break it up into two sections: Create and Edit Non-Drilling Leases and Sources (Section 4.1.1) and Update Imported Drilling Sources (Section 4.1.2) – as well as include new associated interface changes • Added a section (8.2.6) for the new Analytics card - Annual Facility Emissions – Inventory Comparison • Updated available download formats in Reports Overview (Section 9.1) • Updated Appendix A – Platform Calculator Descriptions to include calculation methods used to calculate emissions for point sources • Updated **Error! Reference source not found.** to include calculation methods used to calculate emissions for the lease operations • Updated screenshots in multiple locations to reflect latest minor interface changes • Provided minor language updates for clarification purposes

Date	Document Version	Software Version	Changes
1/19/2024	1.13	2.5	• Added Selecting Fugitives Leak Detection Approach (Section 3.2.4) • Updated Sections **Error! Reference source not found.** and **Error! Reference source not found.** to include flare and mud degassing • Enhanced Section 8.1.3 with additional content on chart customization • Minor updates in Analytics (Section 8) and Reports (Section 9) to reflect software updates • Updated Appendix A to include new fugitive calculators with leak detection\ • Updated Appendix B to include flare and mud degassing lease operations calculators
5/2/2023	1.11	2.1	• Updated the Authors list • Updated the Disclaimer page • Updated Dashboards chapter (Section 2) to account for the new features in the Main dashboard and the Operator Submittals dashboard • Added a note regarding sales gas composition default values being available in the FAQ • Updated AEM section to reflect the tab and field hints (Section 3.2) • Updated AEM section to reflect that the emission units cannot be deleted by the operator (Sections 3.2 and 3.2.6.3) and added instructions for the alternative method of removal (Section 3.2.6.5) • Updated AEM section to reflect that the release points cannot be deleted by the operator (Section 3.2.8) • Added Water Depth feature for Platforms and Lease Operations • Added section regarding Platform Building Downwash (Section 3.2.5.2) • Added section regarding zero emissions during facility transfer (Section 3.2.6.7.1) • Added Review Activity Data tool (Section 3.3) • Added Review Lease Operation Activity Data tool (Section 4.2) • Updated Complex e-GGRT Export section (Section 5.2) • Added Analytics module (Section 8) • Updated Reports module to reflect the new interface (Section 9) • Updated Appendix A – Platform Calculator Descriptions and **Error! Not a valid result for table.** to reflect updated calculators • Added alt-text to all figures

Date	Document Version	Software Version	Changes
01/31/2023	1.10	1.23	• Updated 4 (Emissions: Lease Operations): Added additional details regarding the reporting of drilling rig activity emissions including which types must report and where to find information on permitted drilling rig activities. • Updated A.13 (FUG-M01 (Fugitive Sources – Gas)): Added notes to clarify Default vs. Actual component counts for fugitives. • Updated figures and descriptions throughout to reflect OCS AQS software updates.
7/26/22	1.9	1.17	• Reformatted the manual into BOEM's Environmental Studies Program format for publication • Reorganized 1.2, 1.3, and 1.4 for better flow • Updated 3.2.3 Importing Amine & Glycol Emissions • Completed technical editing on the document • Moved Revision History to Appendix C • AT – Accepted reviewer changes • AT – Corrected author names • AT – Updated OCS AQS function map • AT – Added the "Pathway" for each applicable section • AT – De-capitalized regular instances of software terms • AT – Added "LDAR" to the list of acronyms • AT – Updated figure caption format in the appendices and created cross-references in the text • AT – Added reference description in Section 3.2.15
6/8/22	1.8	1.17	• Updated 2.2 Operator Submittals Dashboard • Updated 3.2.7.5 Delete Release Point • Removed 3.2.12 Importing Amine and Glycol Emissions (see 3.2.3) • Added 3.2.15 and 3.4.4 Adding Supporting Documentation • Added 3.5 Remove Unassigned Release Points • Updated 4 Emissions: Lease Operations • Added user-specified text to Section 4.2.2: Lease Source vs Emission Process • Updated 7.2 Gridded Emissions to include Equipment Type • Removed 9.1.1.1 Create New Inventory • Added Appendix B – Lease Operation Calculator Descriptions • Minor updates to reflect the current and most recent operator version of the application
2/25/22	1.7	1.13	• Minor updates, typo fixes

Date	Document Version	Software Version	Changes
1/27/22	1.6	1.13	• Appendix A – Updated descriptions and screenshots • Appendix A – Updated control approach descriptions for select calculators • Appendix A – Added Appendix A – List of Figures
1/14/22	1.5	1.12	• Appendix A – Calculator Descriptions has been updated to reflect the revisions done to the calculators
11/3/21	1.4	1.12	• Reviewed and expanded all sections as it pertains to the operator version of the application • Submitting Inventories has been moved and expanded under 2 (Dashboards) • Updated most screenshots
9/14/21	1.3	1.10	• Added 3.2.3 Importing Amine & Glycol Emissions • Removed Delete Release Point section • Updated QA/QC functionality during data entry and saving • Updated 3.2.13 Calculate Emissions • Added 3.2.14 Global Warming Potential Details • Updated 4.2.5 Add/Delete Lease Operation Processes • Updated Calculator Appendix • Removed GHG – Global Warming Potential section from GHG chapter • Removed Facility Transfer from Tools chapter • Updated Documents Section • Updated Reports Section • Updated Settings Section • Updated Acronyms section
5/24/21	1.2	1.7	• Updated 3.2.4 Emission Units Add Sources • Updated 3.2.11 Calculate Emissions • Update 6.1.1 Documents Viewing • Updated calculators in Appendix A with new Data Request Fields
3/23/21	1.1	1.6	• New Login page • Updated Flare release point guidance • Moved Release Point access in AEM • Updated Calculator Report • Expanded GWP description • Revised Documents module • Improved Map Overview feature • Revised Lease Operation edits for processes

Date	Document Version	Software Version	Changes
2/4/21	1.0	1.5	• New facility structure fields to describe platform parameters • “From Facility Location” button in Georeference Panel • Orphan Release Points Report • QA/QC link in inventory submittal feature To reflect these changes and also provide enhanced descriptions/clarifications for existing features, the following sections have been added or modified: • 3.2.4.1 (Structure Details) – new • 3.2.6 (Decommissioned Facilities) – new • 3.2.7.4 (Create New Release Point) – updated • 4.2.4 (Add Lease Operation Source) – updated • 7.1 (Using the Map Module) – updated • 7.2 (Gridded Emissions) – updated • 7.3 (Displayed Feature Information) – new • 8.2.10 (Other Reports) – updated • 9 (Submitting Inventories) – new • App A Calculator updates
12/30/20	0.2	1.4.26	Updated OCS AQS URL information (Section 1.2).
12/17/20	0.1	1.4.26	The following sections have been revised to reflect OCS AQS v. 1.4 release: • Section 1.8 (removed reference to the Admin module) • Section 2.1 (added a description for the new Operator Submittal dashboard) • Section 2.2 (new section describing the updated inventory submission functionality) • Section 5 (removed submittal description, now given in Section 2) • Section 8 (additional and updated information on various report features) • Appendix A – Calculator Descriptions (updated descriptions)
12/1/20	0	1.3	Original Version

U.S. Department of the Interior (DOI)
DOI protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

Bureau of Ocean Energy Management (BOEM)
BOEM's mission is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

BOEM Environmental Studies Program
The mission of the Environmental Studies Program is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments. The proposal, selection, research, review, collaboration, production, and dissemination of each of BOEM's Environmental Studies follows the DOI Code of Scientific and Scholarly Conduct, in support of a culture of scientific and professional integrity, as set out in the DOI Departmental Manual (305 DM 3).