ACAM

U.S AIR FORCE

AIR CONFORMITY APPLICATION MODEL

QUICK START GUIDE

June 2025

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1 INTRODUCTION

As amended, Section 176(c) of the Clean Air Act (CAA) requires Federal agencies to assure and make evident that every action and decision conforms to applicable air quality requirements including State Implementation Plan (SIP) for purposes of attaining the National Ambient Air Quality Standards (NAAQS). The U.S. Environmental Protection Agency (EPA) published its final conformity rules in November 1993 (amending 40 Code of Federal Regulations (CFR) 51 and 93); establishing procedures and requirements that Federal agencies must satisfy in determining whether a certain action will conform. The conformity regulations differentiate Federal actions into transportation actions and non-transportation-related actions; however, most Air Force proposed actions consist of non-transportation related projects. Therefore, the Air Force has developed an automated screening tool known as the Air Conformity Applicability Model (ACAM) to perform a simplified General Conformity Rule Applicability Analysis for non-transportation proposed actions and projects.

ACAM is a computer model used by Air Force planners and Environmental Impact Analysis Process (EIAP) personnel in the determination of General Conformity applicability for proposed actions in nonattainment or maintenance designated areas. This tool is used to identify proposed actions and alternatives which would likely result in no or minimal emission increases, and those actions which may result in no or minimal emission increases, and those actions which may require further air quality analysis and undergo a General Conformity determination. ACAM calculates criteria pollutants, hazardous air pollutants (HAPs), and greenhouse gases (GHG) for proposed Air Force actions while requiring minimal inputs from the user. The resultant calculations are entered into standardized reports that follow the requirements for the Air Force's Record of Conformity Analysis (ROCA) reporting format.

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1.1 ACAM Software Installation and Uninstallation Instructions

1.1.1 SYSTEM REQUIREMENTS

ACAM is a standalone desktop application for use on Standard Government Computers running Microsoft Windows XP service pack 3 through Windows 11.

1.1.2 INSTALLATION

Obtain the latest version of ACAM from Solutio Environmental Inc. by completing a SAAR form found on AQhelp.com and sending to ACAM@solutioenv.com.

To install ACAM, double-click to run the ACAM installer File (e.g. ACAMSetup111413.exe), then follow the instructions in the Setup Wizard. ACAM creates a desktop icon automatically after installation.

1.1.3 UNINSTALLATION

ACAM can be uninstalled through Microsoft Window's Control Panel and following the normal steps to uninstall a program on a PC.

1.2 Interface and Features

ACAM implements a results-oriented interface to provide an environment in which a user can quickly create, modify, and finalize an air analysis for various Air Force activities. The results-oriented interface inherits many designs and features from Microsoft Office products, such as Microsoft Word, to give a familiar feel to the user. This assists in the ease of usability of the program, as the user will likely possess knowledge of how certain aspects operate.

The interface of ACAM is divided into 3 main sections, shown below in Figure 1.1. The 3 main sections will be referred to as the Ribbon, Status Panel, and the Workspace.

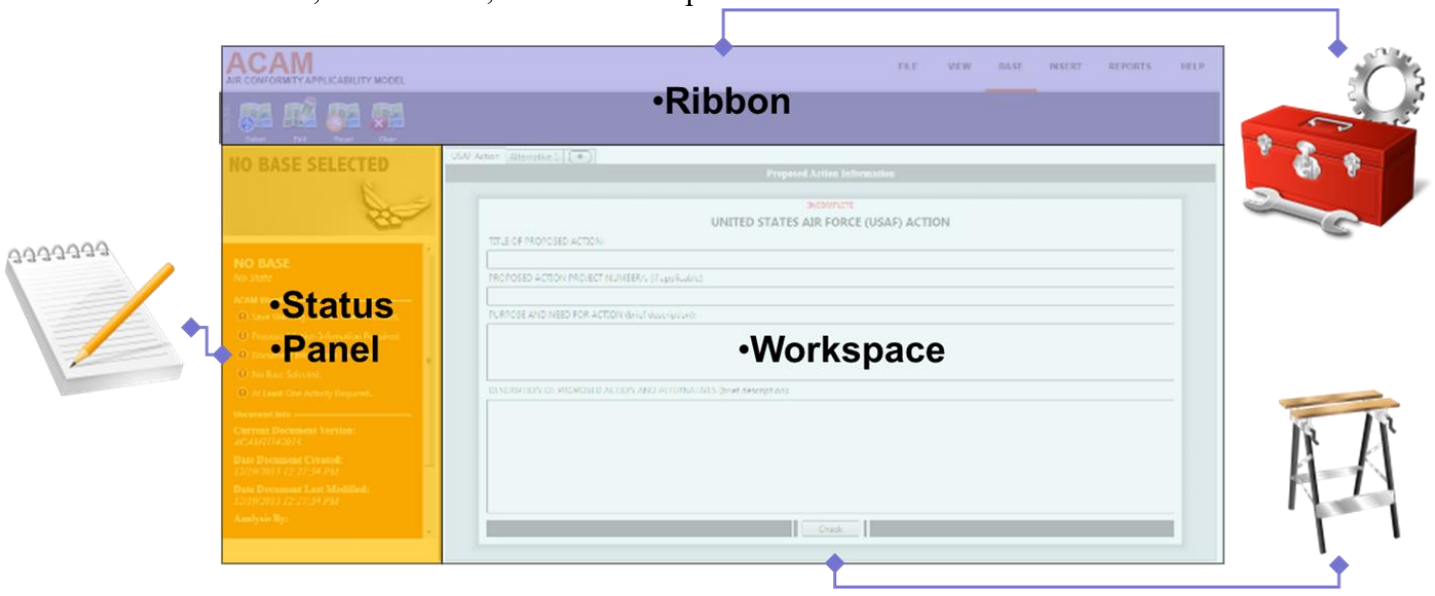
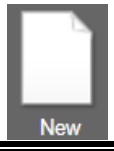
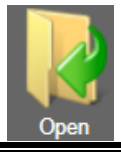
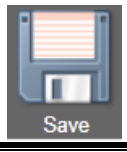
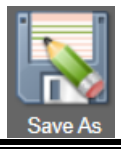
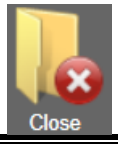
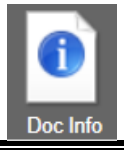


Figure 1.1 ACAM Application Main Section

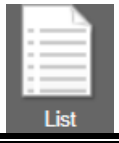
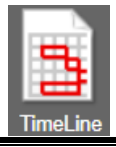
1.2.1 RIBBON

The first main section of ACAM's results-oriented interface is the Ribbon. ACAM's Ribbon is the area above the Workspace and the Status Panel. The Ribbon section is made up of tabs (the upper white portion) and their menus (the lower gray portion). This section gives the user easy 2-click access to all functions in the program.

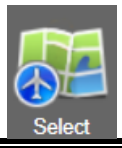
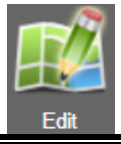
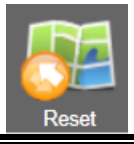
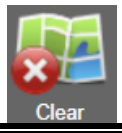
RIBBON – FILE MENU

Button	Button Name	Button Use (What is it for?)
	New	Creates a new ACAM file (and closes the currently open ACAM file).
	Open	Open an existing ACAM file (and closes the currently open ACAM file).
	Save	Saves all changes made to the current ACAM file.
	Save As	Saves all changes made to the current ACAM file in a specified file.
	Close	Closes the current ACAM file.
	Document Information	Displays the Document Information window.
	Fleet Mixture	Displays the vehicle Fleet Mixture window.
	SC-GHG	Displays the Social Cost of Greenhouse Gasses (GHG) window.

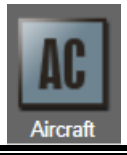
RIBBON – VIEW MENU

Button	Button Name	Button Use (What is it for?)
	List View	Changes ACAM's Workspace current display format to a list view.
	Timeline View	Change ACAM's Workspace current display format to a timeline view.

RIBBON – BASE MENU

Button	Button Name	Button Use (What is it for?)
	Select	Displays the Base List window for Base selection.
	Edit	Displays the Base Emissions window.
	Reset	Resets all Base and Base Emission data previously inputted.
	Clear	Clears all Base and Base Emission data inputted into the ACAM file.

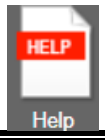
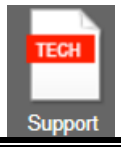
RIBBON – INSERT MENU

Button	Button Name	Button Use (What is it for?)
	Aircraft	Displays the Aircraft Activity window.
	Fire Training	Displays the Fire Training Activity window.
	Paint Booth	Displays the Paint Booth Activity window.
	Degreaser	Displays the Degreaser Activity window.
	Const/Demo	Displays the Construction/Demolition window.
	Heating	Displays the Heating Activity window.
	Emer Gen	Displays the Emergency Generators Activity window.
	Personnel	Displays the Personnel Activity window.
	Tanks	Displays the Tanks Activity window.

RIBBON – REPORTS MENU

Button	Button Name	Button Use (What is it for?)
	Microsoft Word Reports	Displays the Microsoft Word Reports window for generating ACAM reports.

RIBBON – HELP MENU

Button	Button Name	Button Use (What is it for?)
	Help	For further assistance when using ACAM, clicking this button opens the point of contact for additional help.
	Support	If encountering an issue with ACAM not addressed in this Guide, clicking this button will display contact information for additional technical support.
	About	Displays background information for owners/creators of ACAM.

1.2.2 STATUS PANEL

The second main section of ACAM's result-oriented interface is the Status Panel. As shown previously in Figure 1.1, the Status Panel is the area to the left of the workspace. The purpose of the status panel is to give the user a fast and easy-to-use summary of the minimum report requirements needed to generate an ACAM Report with the current ACAM File.

This section is broken up into four parts, starting from top to bottom:

1. Base Selection
2. ACAM Warnings
3. Document Information
4. Application Information

The four parts listed above are shown in Figure 1.2.

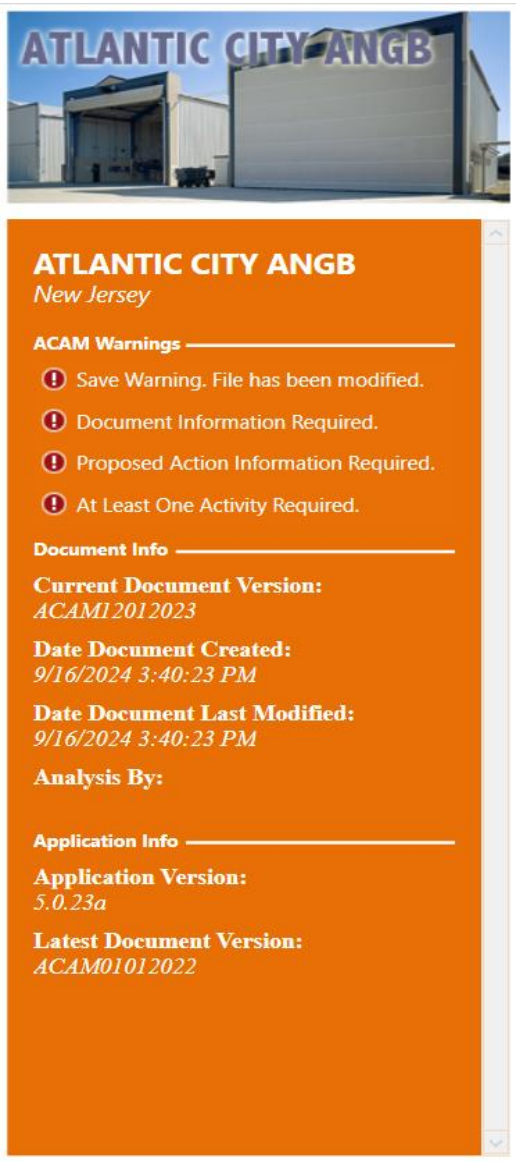


Figure 1.2 ACAM Status Panel

Base Selection displays information about the Air Force base that the air analysis is for. This includes the base name and state that the base is located in.

ACAM warnings displays a list of tasks that are the minimum requirements to complete an ACAM file. This part of the Status Panel lists out all of the tasks required to complete an ACAM file, and subsequently generates an ACAM Report, in order from top to bottom (the first task is the top warning, and the last task is the bottom).

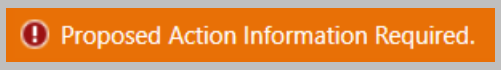
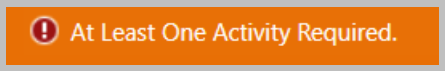
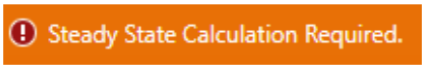
Documentation Information displays data about the current

ACAM file document and who is conducting the analysis.

Application Information displays data about the ACAM program. This is where a user can see what version of the ACAM program he/she has.

The best way to complete an ACAM file is to start at the top of the ACAM warnings list and work your way down. Doing this will allow the user to take advantage of all the smart features that make completing an ACAM file easy. The warnings presented when opening an ACAM file, as well as other frequent warnings will be discussed on the following page.

STATUS PANEL – ACAM WARNINGS LIST

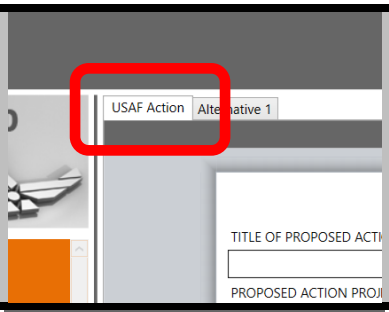
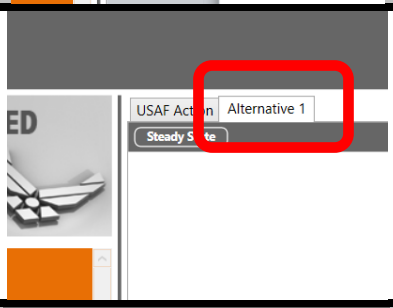
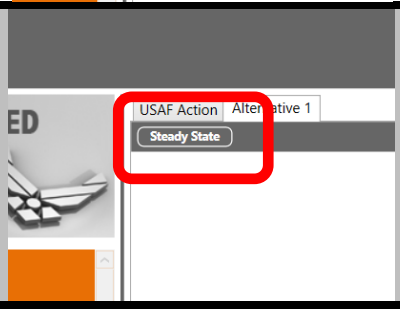
Warning / Button	Task Required to Complete	What the Button Does When Clicked
	Indicates that the ACAM file has been modified and the user should save the file.	Button will save all changes made to the current ACAM file.
	Indicates that the Document Information and Regulatory Area Standards are not complete.	Button will display the Document Information window.
	Indicates that the Proposed Action Information is not complete.	Button will navigate the user's workspace to the "USAF Action" tab.
	Indicates that no Air Force base is selected.	Button will bring the Base selection window up.
	Indicates that no Activities have been added to the ACAM file.	Button will navigate the user's ribbon to the "Insert" tab.
	Indicates that the ACAM file needs to re-calculate when air emission steady state will occur.	Button will re-calculate air emissions steady state.

1.2.3 WORKSPACE

The third and final main section of ACAM's results-oriented interface is the Workspace. ACAM's Workspace is the area below the Ribbon and to the right of the status panel. Refer to Figure 1.1 for reference. The Workspace section is made up of tabs and pages, similar to Microsoft Excel's tabs and spreadsheets.

Buttons specific to the Workspace will be discussed in the table below.

WORKSPACE – TABS / BUTTONS

Tab / Button	Tab / Button Name	What the Tab/Button Does When Clicked
	Proposed Action Information (USAF Action) Tab	Tab will display the proposed action information tab on the user's workspace.
	Alternative 1 Tab	Tab will display the different views (List or Timeline) of the activities inputted into ACAM.
	Re-Calculate Steady State Button	Button will re-calculate steady state for the currently displayed alternative.

1.3 Flow and Results-Oriented Design

ACAM's results-oriented design also provides the user with a clear and easy to follow path for completing an ACAM Report. This is achieved with three interface designs:

1. The Status Panel
2. Check and Status Forms
3. Numbered Status Tabs

1.3.1 The Status Panel

As stated previously, the Status Panel gives the user a quick and easy-to-use summary of the minimum requirements needed to generate an ACAM Report with the current ACAM file. The Status Panel can be thought of as a roadmap for creating an ACAM Report. This roadmap contains two great features that help to make using ACAM fast and easy. The first feature is every warning listed in the ACAM Warnings list is a button that will either open the appropriate window or will navigate the user to the section of the ACAM file that needs to be completed. The second feature that enhances the user's experience is that these Warnings are displayed to the user in the most optimal order (from top to bottom) to be addressed in the process of completing the ACAM file. These two features working together gives the user a "one stop shop" for completing the ACAM file.

NOTE: A user can click on the first ACAM warning until all of the warnings are gone, to complete an ACAM file.

1.3.2 Check and Status Forms

Every screen or form that requires user input in ACAM follows the same design; a Check Form Button (Figure 1.3) at the bottom of the form, and a Form Completion Status Indicator (Figure 1.3) at the top of the form. Clicking on the check button will start a validation process in which ACAM will check the entire form for correctness and completion. If any field is incorrectly filled out or empty, ACAM will highlight the field(s) in red and the form completion status indicator will display "Incomplete". If all fields are filled out correctly, ACAM will update the form completion status indicator with "Complete". Check and Status Forms provide the user with immediate feedback on the correctness and completion of all user inputs for any given form in ACAM.

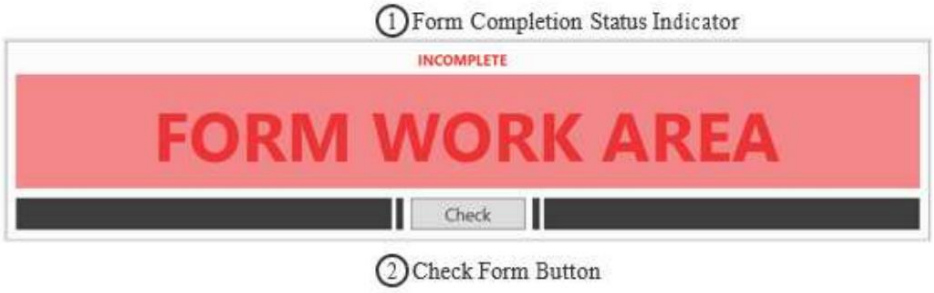


Figure 1.3 ACAM Check and Status Forms

1.3.3 Numbered Status Tabs

A window that contains multiple forms implements ACAM's numbered status tabs (Figure 1.4). Numbered status tabs are tabs that indicate the completion status of the form in the tab area, and are ordered in a way that allows the user to take advantage of all the smart features that make completing an ACAM file easy.

NOTE: Some smart features and automations in ACAM require the user to complete all tabs in the order that they are numbered

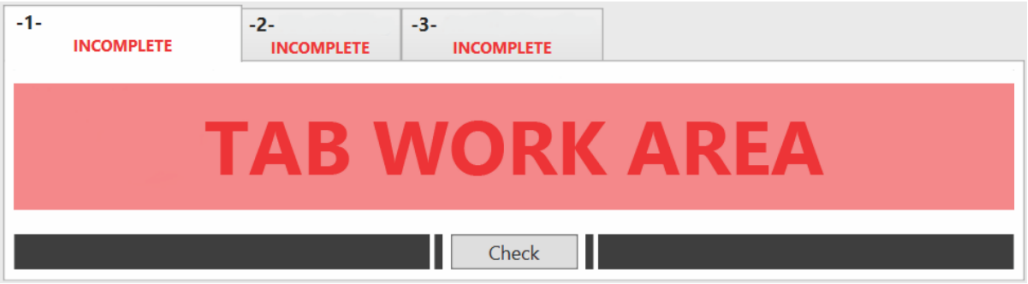


Figure 1.4 ACAM Number Status Tabs

2 BASIC ACAM OPERATIONS

2.1 Running and Exiting ACAM

Windows usually provides more than one way to perform a task and starting ACAM is no exception. The standard way to get ACAM started is double-clicking the ACAM program icon (Figure 2.1) on your desktop. This will open a new ACAM file.

Another way to start ACAM is by double-clicking the name or icon of an ACAM file (Figure 2.2) in Windows Explorer or My Computer. This will open the ACAM file that the user double-clicked on.

Figure 2.1 Program Icon

Figure 2.2 File Icon

Exiting ACAM is just like any other Microsoft Office product, just click on the "x" icon in the upper right-hand corner (Figure 2.3); just as would be done when exiting any program on a PC.

Figure 2.3 "x" Icon

NOTE: If there are any unsaved changes to the current ACAM file, the user will be prompted with the option to save, such as when exiting a Microsoft Word document.

2.2 ACAM Files and Reports

ACAM has two basic outputs:

1. ACAM File (.ACAM)
2. ACAM Report (.docx)

These outputs are vastly different but can be easily confused. To help understand the difference, we will compare ACAM to Microsoft Word and its outputs.

2.2.1 ACAM FILE

An ACAM file can be used to store and share user inputs via email, flash drives, shared drives, and by using other mediums, so long as the other user has the same version of ACAM installed on their computer. Once the file is shared, changes can be made or updated and then be shared again. ACAM provides the user(s) with immense flexibility in usage and storage.

ACAM files are created by either opening the ACAM program in the manners previously discussed, or if the program is already open by clicking the "New" button, shown in Figure 2.4; this button is located by clicking the "File" button in the Ribbon of ACAM.

Figure 2.4 "New" button

2.2.2 ACAM REPORTS

An ACAM report can be thought of as the final product of an ACAM file. Similarly, a printed paper from Word can be thought of as the final product of a Word file. ACAM reports are just like files that can be emailed and shared with anyone. ACAM reports can be created after an ACAM file is complete and has no warnings listed in the Status Panel.

There are four types of ACAM reports, ACAM Summary Report (Air Conformity Applicability Model Report), ACAM Detail Report, ACAM Greenhouse Gasses (GHG) Report and the optional ACAM Social Cost of Greenhouse Gasses (SC-GHG) Report.

The ACAM Summary Report compiles the total yearly emissions for a given set of activities in the ACAM file. The report will flag any pollutant thresholds that are exceeded. This type of report is beneficial in determining if the selected Air Force Base exceeds any thresholds or just displays the amount of pollutant contributed by the base activity by displaying an indicator level.

The ACAM Detail Report provides more information regarding the actual pollutant sources. Each activity in the ACAM document has its own section in the detailed report, which helps show which activities are causing the most pollution. It should be noted that the values for the activities are the total amount for the time period; they are not annual values.

The ACAM GHG Report provides the total combined direct and indirect GHG emissions that are associated with the action. Estimations through ACAM are calculated on a calendar-year basis from the action's start through the action's "steady state" (SS, net gain/loss in emission stabilized and the action is fully implemented) of emissions. All GHG emissions estimates were derived from various emission sources using methods, algorithms, emission factors, and global warming potentials from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The optional ACAM Social Cost of Greenhouse Gasses Report calculates the total, direct, and indirect emissions associated with the action, from the action start through the expected lifecycle of the action. This report will also calculate the social cost of greenhouse gas estimates associated with those greenhouse gas emissions. The SC-GHG estimates are derived using the methodology and discount factors in the "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990," released by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG SC GHGs) in February 2021. This report is now optional because Executive Order 13990 (Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis) was rescinded.

ACAM Reports can be created after an ACAM file is complete (i.e. all activities for the action are inserted) and has no warnings in the status panel. Steps for creating an ACAM report will be discussed later in this document.

2.3 ACAM Views

ACAM allows the user to analyze and interact with data through two different layouts called “views”. The two types of views are accessed by clicking on the “VIEW” tab in the ribbon of ACAM. The user will then be presented with two options: List View and Timeline View.

List View, like the name suggests, lists all of the activity inputs (in the Workspace) compiled by the user, as well as the emission totals for the entire activity, or annually, if it is set to run indefinitely for each individually created activity. These summary blocks are designed to be easy to read and refer to, so the user can make observations before generating a report. Furthermore, activities can be edited or deleted by clicking the corresponding buttons. For reference, an example of activities in a given ACAM file in List View are shown below, in Figure 2.5

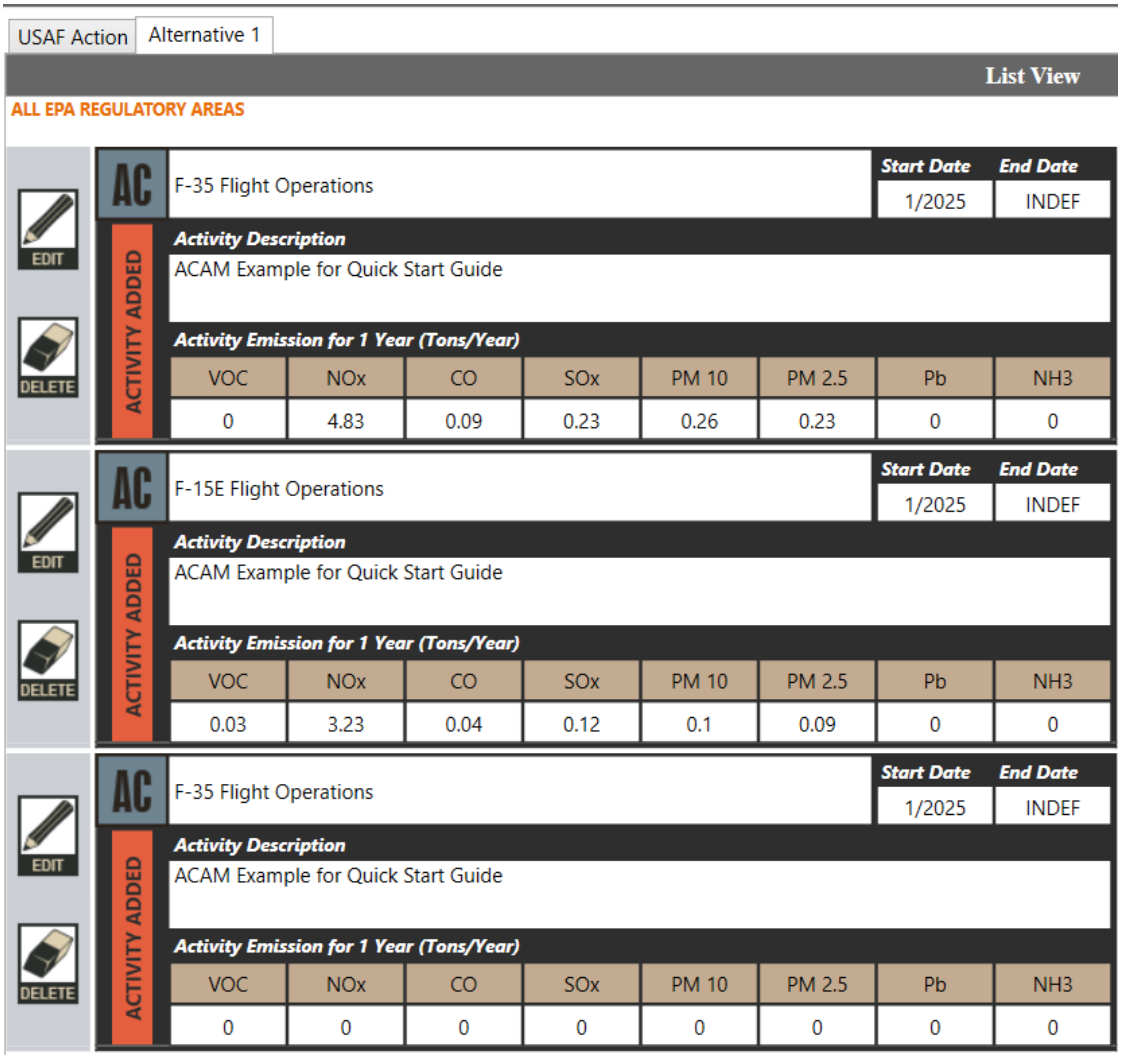


Figure 2.5 ACAM List View

Timeline View provides the user with an interactive timeline for all activities. The timeline is broken up by year blocks and displays emissions threshold for that year. If the total yearly emissions are below emissions thresholds designated by the regulatory areas that encompass the Air Force Base selected, then the number displayed for a given criteria pollutant represents the total tons **under** the emission threshold and will be green in color. If the total yearly emissions exceed a threshold, then the number will represent the total ton **over** the emissions thresholds. Refer to Figure 2.6 for reference.

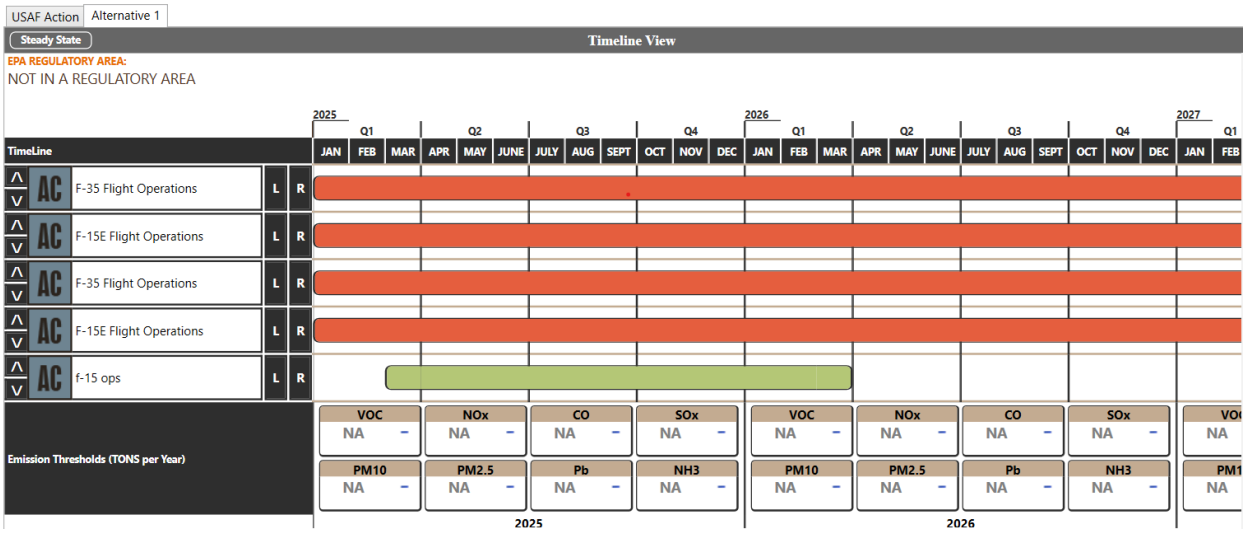


Figure 2.6 Timeline View

2.4 ACAM Activities

Individual activities that result in increases or decreases in air emissions can be thought of as a set of Building Blocks, pictured in Figure 2.7. Each block can be stacked together to create (build) air emissions estimates. Multiple of the same type of block can be stacked together, for example, two “Flight Ops” can be stacked together for an air emission estimate.

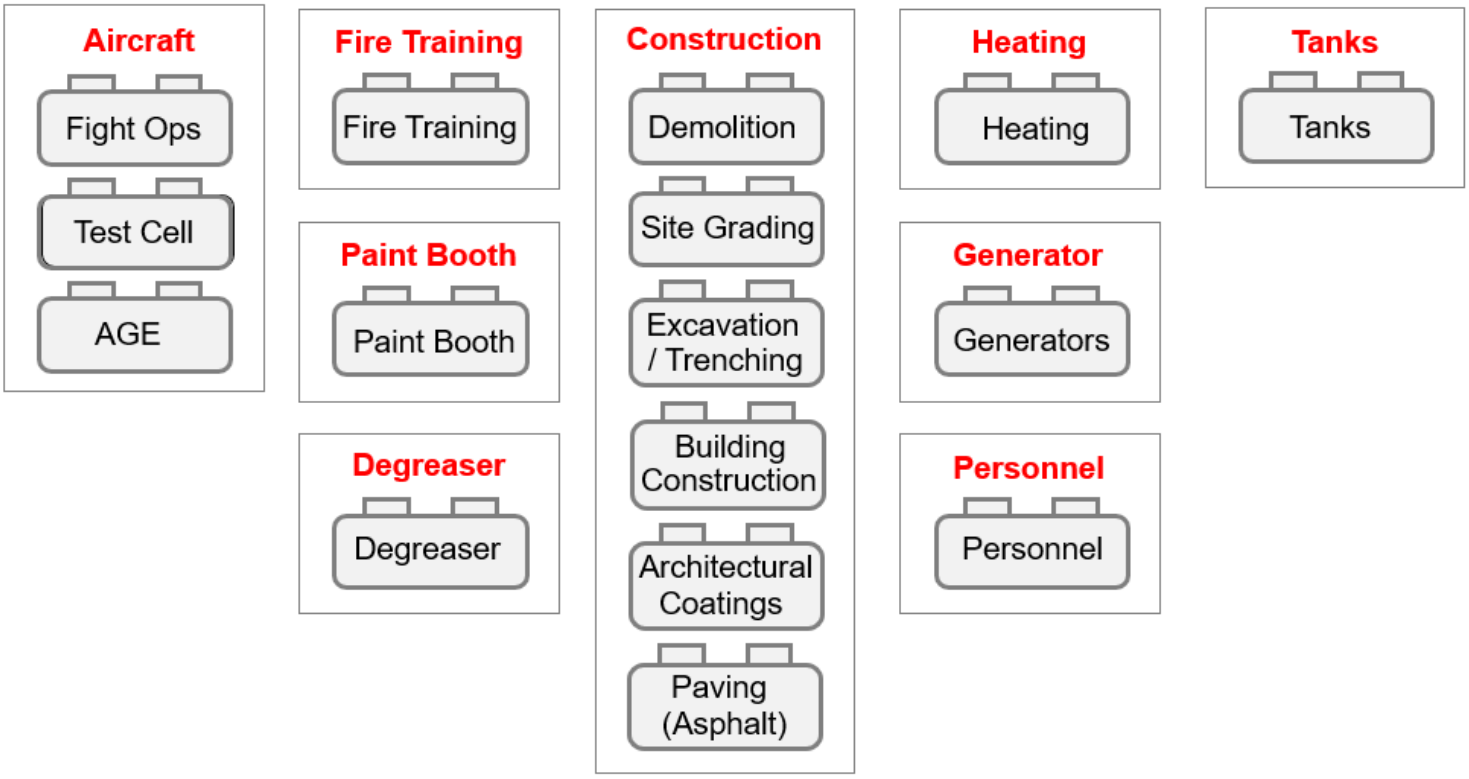


Figure 2.7 ACAM Activities “Building Blocks"

2.4.1 Aircraft (AC)

Aircraft (AC) activities include Flight Operations, Engine Test Cell, and Aerospace Ground Equipment. Aircraft Operations estimates are in accordance with the most current DAF, EPA, and California regulations and guidance:

- 40 CFR 51, Appendix W, *Guideline on Air Quality Models* (Revised), U.S. Environmental Protection Agency, EPA Publication No: EPA-450/2-78-027R
- 40 CFR 93, Subpart B, *Determining Conformity of General Federal Actions to State or Federal Implementations Plans*
- San Joaquin Valley Air Pollution Control District (2009), *2007 Area Source Emissions Inventory Methodology, 810 – Piston Aircraft – Military, 810 – Jet Aircraft – Military,* Revised 13 June 2009
- United States Environmental Protection Agency (2002). *Procedures for Emission Inventory Preparation, Volume IV: Mobile sources.* EPA Publication No: EPA-420-R-92-009
- *Air Emissions Guide for Air Force Mobile Source.* United States Air Force (July 2024)

2.4.2 Fire Training (FT)

The Fire Training (FT) activity is used to create estimates in accordance with DAF Stationary Source Guide and EPA AP-42 methodology. Estimates for FT activity are based on the fuel used and the number of burns per year. Default values associated with FT activity estimates are based on a DAF-wide study.

2.4.3 Paint Booth (PB)

The Paint Booth (PB) activity estimates are in accordance with the DAF Stationary Source Guide and the EPA AP-42 methodology. Estimates are based on the coating used (percentage of volatile organic compounds [VOCs], and the specific gravity), and the control device efficiency. Default PB activity estimate values are based on quick dry enamel.

2.4.4 Degreaser (DG)

The Degreaser (DG) activity estimates are in accordance with the DAF Stationary Source Guide and the EPA AP-42 methodology. DG activity estimates are based on the type of solvent used (percentage of volatile organic compounds [VOCs], and the specific gravity), and the control device efficiency. Default PB activity estimate values are based on mineral spirits.

2.4.5 Tanks (TK)

Tank activity estimates are in accordance with the DAF Stationary Source Guide, the EPA TANKS model, and the EPA AP-42 methodology. Tanks can either be horizontal or vertical, and above-ground or under-ground.

2.4.6 Construction (CD)

Construction/Demolition activity estimates are in accordance with the DAF Mobile Source Guide, and the EPA MOVES, URBEMIS, and CalEEMod models. Default values for construction/demolition estimates are based on the DAF-wide study, URBEMIS, and CalEEMod models. The phases for construction/demolition activities are shown in figure 2.8.

Phase	Unique Phase Emission Classes					
	Fugitive Dust	Construction Exhaust	Vehicle Exhaust	Worker Trips	Vendor Trips	Off-Gassing
Demolition	X	X	X	X		
Site Grading	X	X	X	X		
Trenching/Excavation	X	X	X	X		
Building Construction		X	X	X	X	
Architectural Coatings				X		X
Paving (Asphalt)		X	X	X		X

Figure 2.8 Construction Phases

2.4.7 Heating (HT)

Heating activity estimates are based on one of two methods: the Rated Capacity Method and the Heat Energy Requirement Method. The Rated Capacity Method generates estimates in accordance with the DAF Stationary Source Guide and the EPA AP-42 methodology and is based on fuel usage (heating value), boiler rated capacity, and runtime. The Heat Energy Requirement Method is the alternative method used when the actual equipment is not known. This method predicts heating requirements based on the U.S. Department of Energy's energy intensity values and specific climatic data.

2.4.8 Generator (GN)

The Generators (GN) activity estimates are in accordance with DAF Stationary Source Guide and the EPA AP-42 methodology. Estimates are based on the type of fuel used, the horsepower (hp) of generators, and their runtime. Default GN activity estimate values are based on a DAF-wide study.

2.4.9 Personnel (PN)

Personnel activity estimates are in accordance with the DAF Mobile Source Guide and the EPA MOVES emission factors, based on personnel change and vehicle miles from traveled emissions. Default values for personnel activity estimates are based on a DAF-wide study.

3 NINE STEPS TO CREATE AN ACAM REPORT

3.1 Introduction

ACAM can create air emissions analysis reports in nine easy steps. To make this process easier, ACAM also provides an interactive road map in the form of the Status Panel as previously mentioned. In this section of the ACAM Quick Start Guide. An overview of the nine steps is provided below, and each step will be discussed in further detail in the following pages of this Guide.

3.1.1 THE 9 STEPS TO CREATE AN ACAM REPORT

Step 1: Launch ACAM and Save/Create the ACAM File

Step 2: Input Document Information

Step 3: Select Desired USAF Base

Step 4: Proposed Action Information

Step 5: Add All Desired Activities

Repeat until all Activities are inputted and reviewed for accuracy

Step 6: Calculate Steady State (whenever prompted in the Status Panel)

Step 7: Analyze Proposed Action

Step 8: Re-Calculate Steady State

Step 9: Create the desired ACAM Report(s)

NOTE: Be sure to save any changes to the ACAM File when prompted to in the Status Panel.

3.1.2 Step 1: Launch ACAM and Save/Create ACAM File

Launch ACAM, as previously discussed, by clicking on the ACAM Icon on the Desktop of the in-use Personal Computer (PC), or wherever the program launch icon is located. The user will be greeted with the default ACAM opening page, with numerous warnings located in the status panel. The user should tackle these warnings in order from top to bottom. The first warning presented to the user is shown below.

Figure 3.1 "Warning" Button

Figure 3.2 "Save" Button

Figure 3.3 "Save As" Button

By clicking this warning, or by navigating to the "FILE" menu in the ribbon of ACAM and clicking the "Save" or "Save As" button (pictured above), the user will be prompted with the save window presented when saving any file on a PC for the first time.

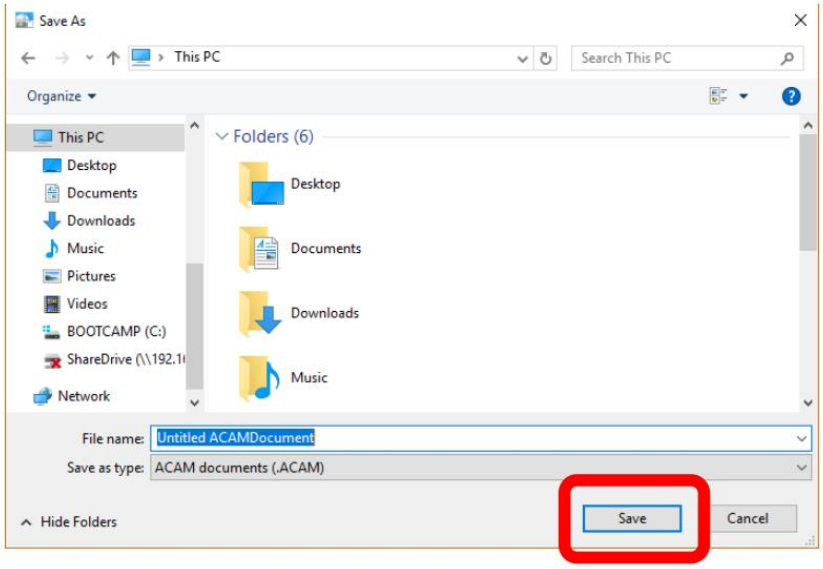


Figure 3.4 Save As Window

Title the ACAM document and select a desired location on the PC in use to save the file. Finalize the process by clicking "Save" on the Save Window.

NOTE: Once this step is completed, the save warning in Figure 3.1 will pop up anytime the document is changed. Clicking it updates any changes made to the document.

If the user does not want to make any changes to the current document, but wants to continue to alter it, click "Save As" (shown in Figure 3.3) to save another version of the current document.

3.1.3 STEP 2: Input Document Information

The second warning in the ACAM Status Panel is the Document Information Warning. By clicking on the warning (Figure 3.6) or the "Doc Info" button in the "FILE" menu of the ribbon (Figure 3.5), a Document Information Window will open.

Figure 3.6 "Document Information Warning" Button

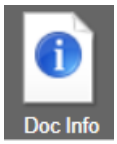


Figure 3.5 "Document Information" Button

The user will be prompted to fill out the required information in both tabs, shown in Figure 3.7 and Figure 3.8 "Check" at the bottom of each tab to ensure all the required information is entered. Click "OK" once both tabs have been completed.

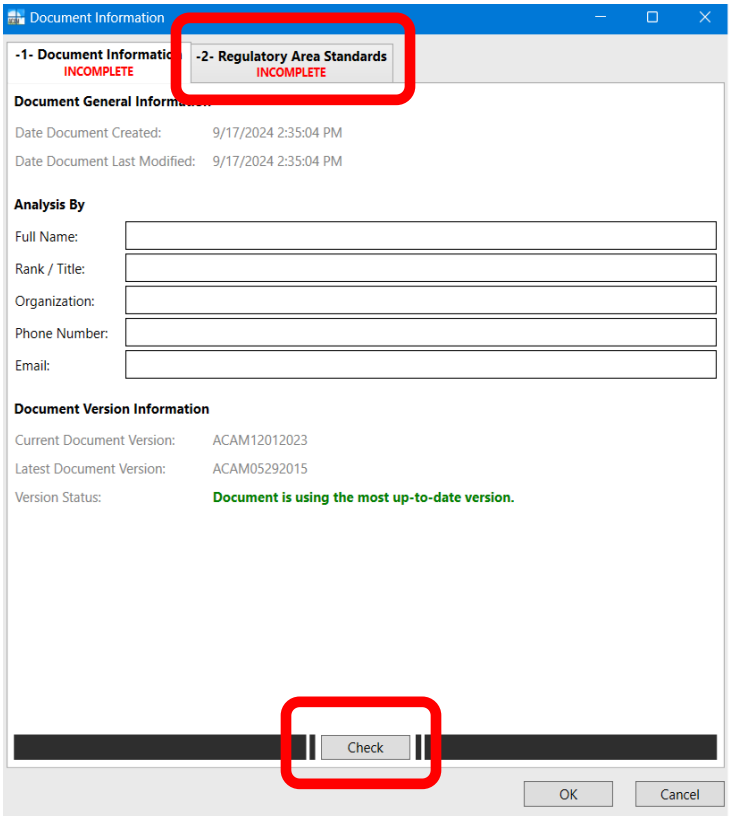


Figure 3.7 Document Information Window

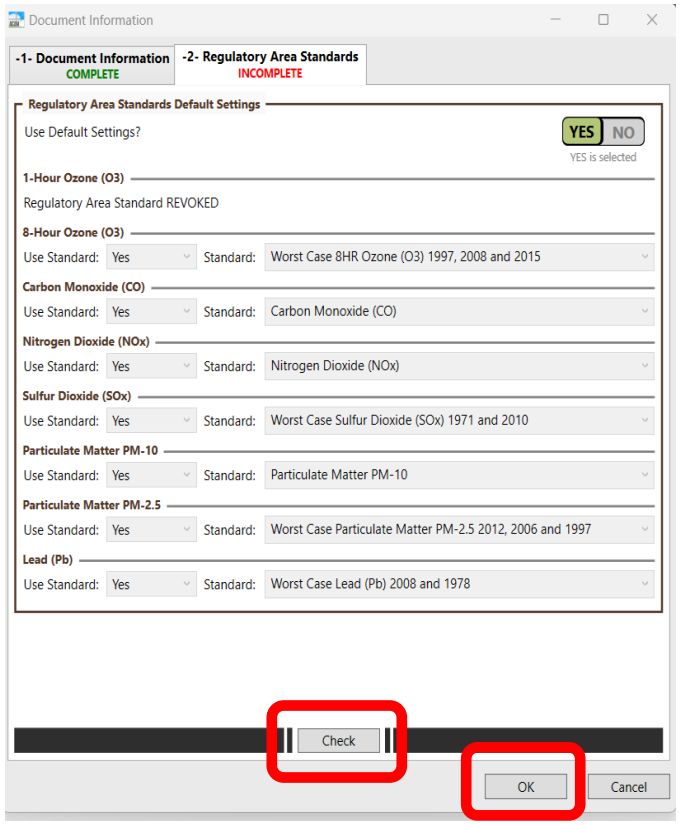


Figure 3.8 Regulatory Area Window

NOTE: Once this step is completed, the save warning Figure 3.1 will pop up anytime the document is changed. Clicking it updates the changes made to the document.

3.1.4 STEP 3: Select Desired Air Force Base

The next ACAM warning in the status panel is shown in Figure 3.9 Clicking this warning, or navigating to the "BASE" menu in the ribbon, and clicking "Select" (pictured in Figure 3.10) opens a window that allows the user to select the Air Force Base the proposed action is taking place at.

Figure 3.9 "No Base Selected" Waring Button

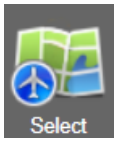


Figure 3.10 Base "Selected" Button

Clicking on either of these buttons opens the window shown in Figure 3.11. The user should navigate through this list and then click on their desired base, once they locate it in the list. The drop-down menus for filter and filter-type can be utilized for easier location of the desired base. Click "OK" once the base has been selected.

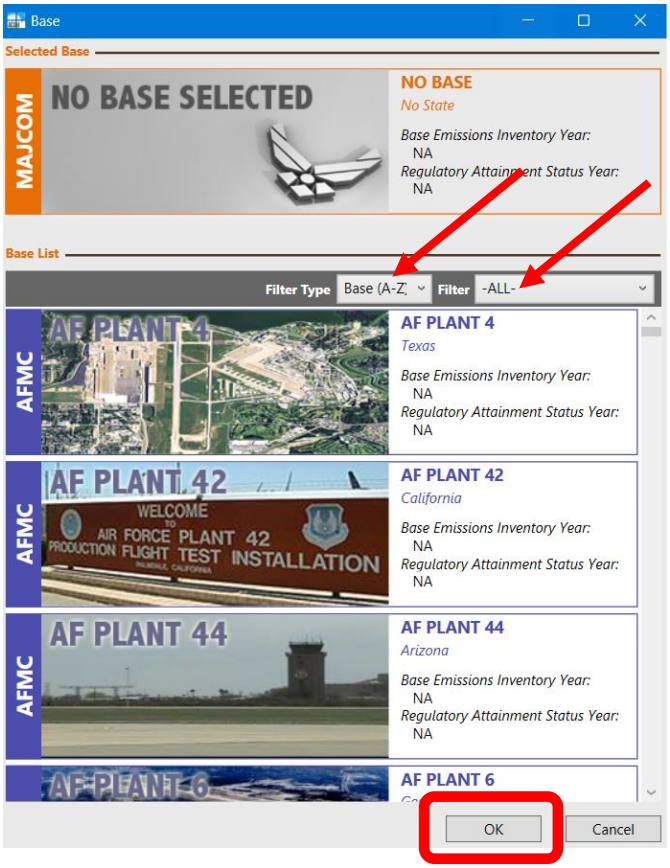


Figure 3.11 Base Selection Window

NOTE: Once this step is completed, the save warning in Figure 3.1 will pop up any time the document is changed. Clicking the save button updates the changes made to the document.

3.1.5 STEP 4: Proposed Action Information

Step 4 requires the user to enter the Proposed Action Information. This is where the user will give an overview of the proposed action, as well as a title for ACAM report purposes. By clicking on either the warning in the ACAM Status Panel (Figure 3.12) or the USAF Action tab in the Workspace (Figure 3.13), the table shown in Figure 3.8 will be shown in the Workspace.

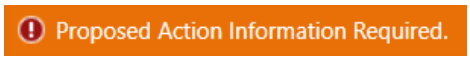


Figure 3.12 Proposed Action Waring Button

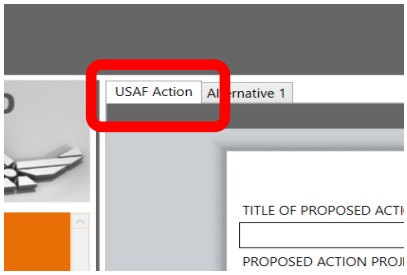


Figure 3.13 Proposed Action Tab

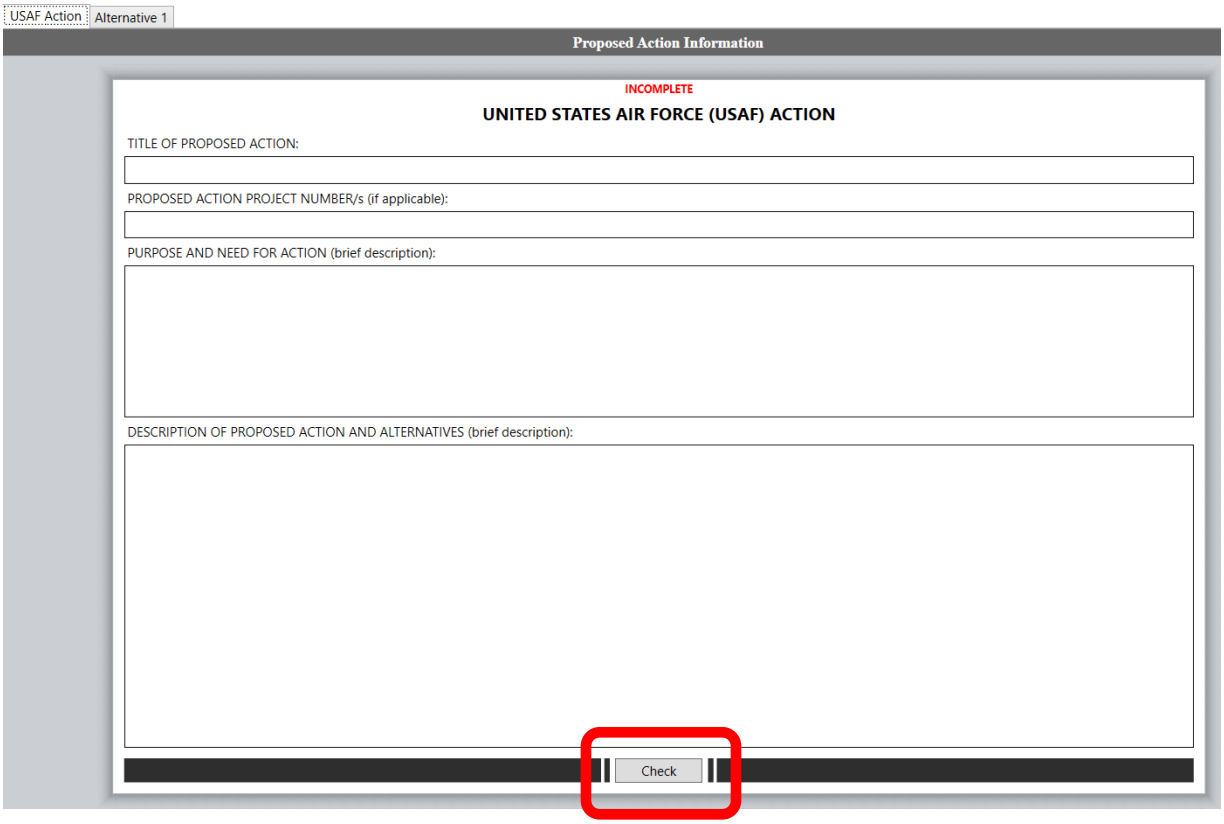


Figure 3.14 Proposed Action Information

Type all the required information in the respective text boxes, then click “Check”.

NOTE: Once this step is completed, the save warning in Figure 3.1 will pop up any time the document is changed. Clicking the save button updates the changes made to the document.

3.1.6 STEP 5: Add All Desired Activities

Step 5 is perhaps the most important step in the process of creating an ACAM document. This step is where the user will add all the necessary activities related to the proposed action. Clicking the warning in the Status Panel (Figure 3.15) or by clicking the "INSERT" menu tab (Figure 3.16) in the ribbon will display all the options for activities in ACAM (Figure 3.17).

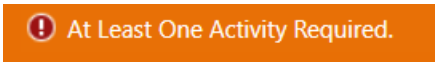


Figure 3.16 Activity Warning

Figure 3.15 Activity "insert" Button

It is recommended the user review their proposed action documentation and construct a list of all proposed actions for a given Alternative. Once this list has been constructed, click on the desired activity(s) for the proposed action. All the Activities in ACAM are shown below, in Figure 3.17

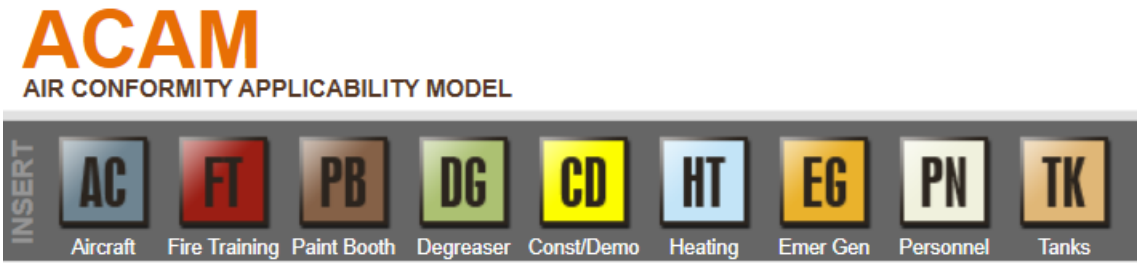


Figure 3.17 ACAM Activities

Clicking on the desired icon (located in the ribbon) opens that activity's corresponding window. The user will need to complete each numbered tab in numerical order by entering in the appropriate data and reviewing the default data settings to ensure they adequately reflect the proposed action. Each time a tab is completed, click "Check" to ensure all required information is entered.

This step will need to be repeated until all activities are added or removed from the desired Alternative in ACAM.

NOTE: Once this step is completed, the save warning in Figure 3.1 will pop up any time the document is changed. Clicking the save button updates the changes made to the document.

The steady state warning that will appear after each activity is added or altered will be discussed in Step 6.

3.1.7 STEP 6: Calculate Steady State

A steady state calculation **must** be done before producing an ACAM Report; however, it is recommended to calculate steady state each time the warning (Figure 3.18) presents itself in the Status Panel of ACAM.

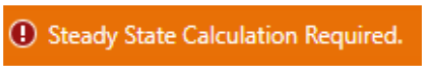


Figure 3.18 "Steady State Calculation" Warning

Clicking this button calculates steady state. The user can also calculate steady state manually by navigating to the "Timeline View" via the "VIEW" menu in the ribbon, and by clicking the steady state button in the Workspace, as shown in Figure 3.19.

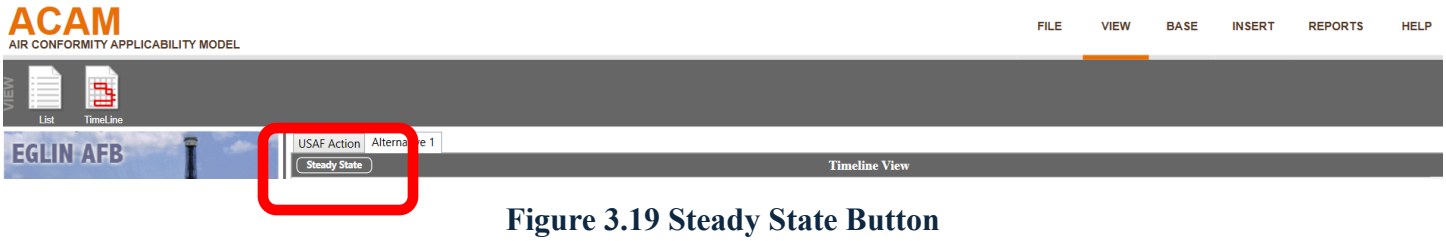


Figure 3.19 Steady State Button

NOTE: Once this step is completed, the save warning in Figure 3.1 will pop up any time the document is changed. Clicking the save button updates the changes made to the document

3.1.8 STEP 7: Analyze Proposed Action

Once the user has added all relevant activities and calculated steady state for a proposed action, the user should now review the emission totals from the proposed action. As previously discussed in this Guide, it is beneficial to use the List View, under the "VIEW" menu in the ACAM ribbon, to review emission totals from each given activity. It is useful to utilize the Timeline View, so to see emission totals for all activities for the year(s) being analyzed. Figure 3.20 displays an example of activities in the List View, and Figure 3.21 displays the same activities in the Timeline View.

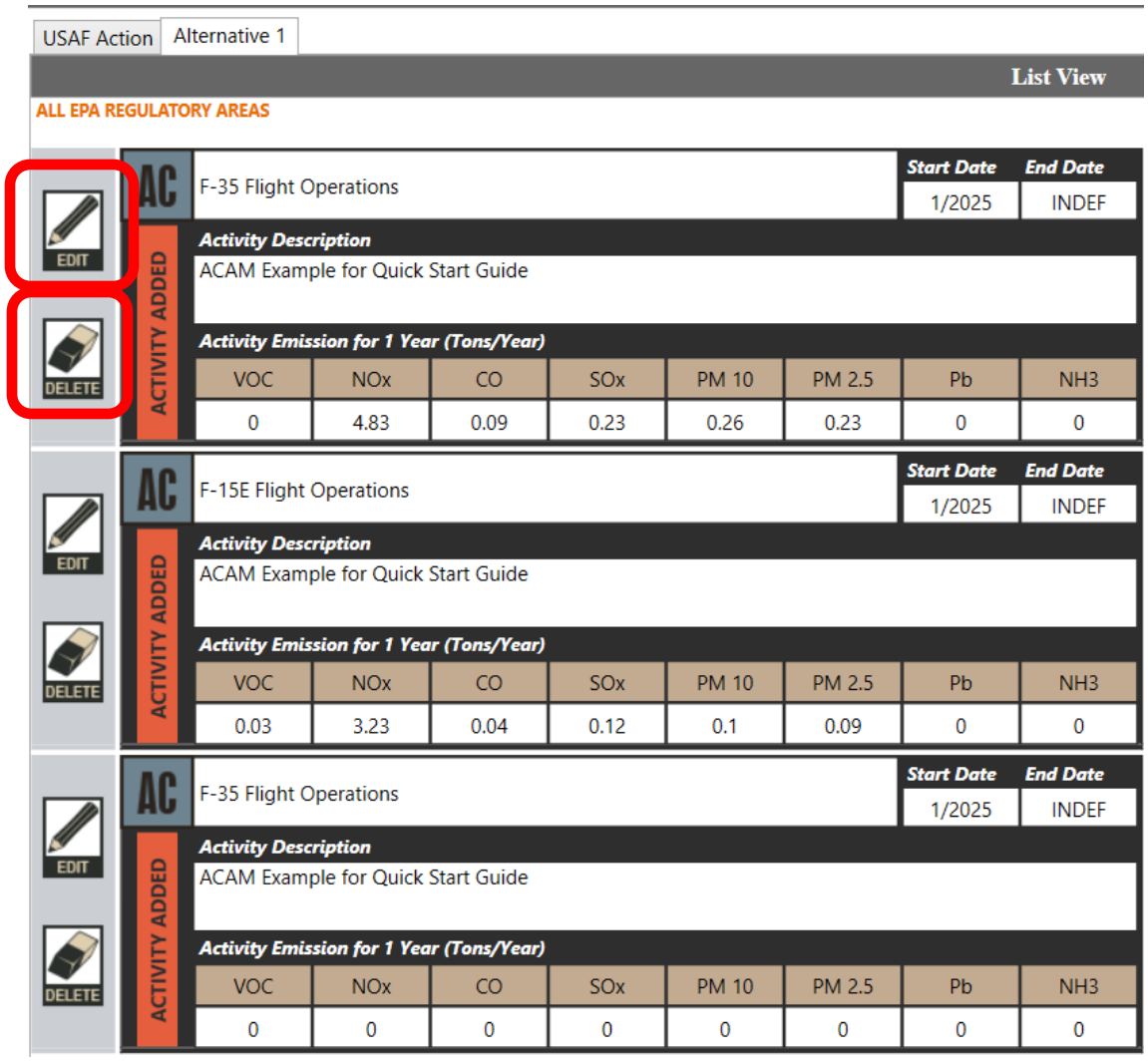


Figure 3.20 Activity List View

In the List View, the user can utilize the "EDIT" button to the left of each individual activity to review any inputted data or make any changes.

The "DELETE" button can be used to remove an activity entirely. **Use caution when deleting an activity, as it cannot be recovered and the user will have to re-enter all information should it be necessary to add the deleted activity back.**

The Timeline View gives the user the option to adjust the start dates for an activity by clicking the "L" and "R". This allows the user to reanalyze emission totals by time. Since emission thresholds or indicators are relevant for one year, having the ability to alter the activities by time allows the user to explore other alternatives if the proposed action is exceeding a threshold.

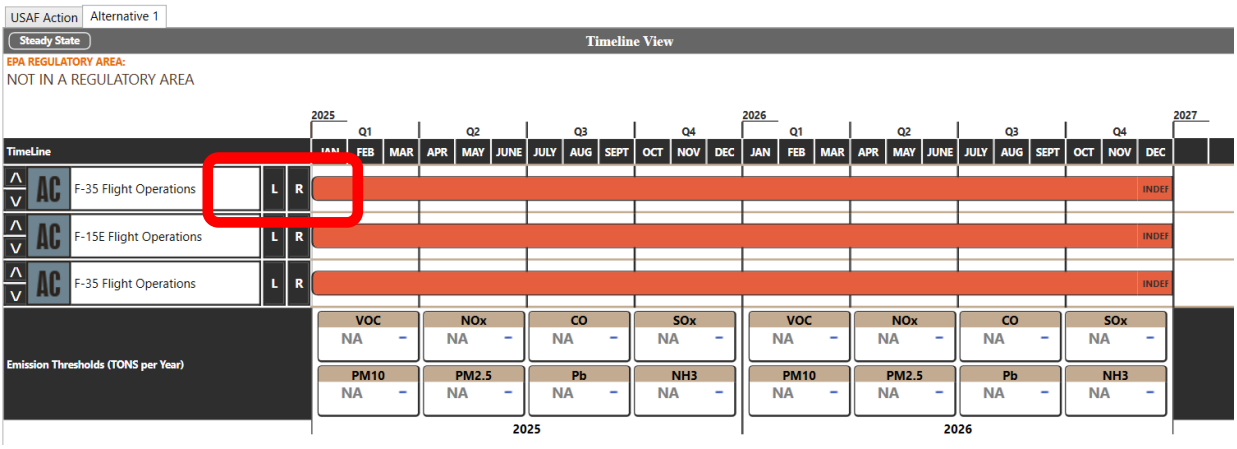


Figure 3.21 Timeline View

NOTE: Once this step is completed, the save warning in Figure 3.1 will pop up any time the document is changed. Clicking the save button updates the changes made to the document.

3.1.9 STEP 8: Re-Calculate Steady State

Step 8 is identical to Step 6. If any changes were made to the activities in Step 7, the user will be prompted with the ACAM warning to calculate steady state (Figure 3.22).

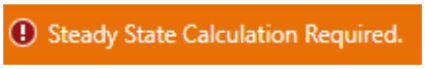


Figure 3.22 "Steady State Calculation Required" Button

Clicking on this button will re-calculate steady state just as it did before. After clicking, the user will be shown another warning requiring the document to be saved.

3.1.10 STEP 9: Creating the ACAM Report(s)

Once all the information has been reviewed by the user and steady state for the finalized data has been calculated, the user can now create an ACAM Report. As mentioned before in the Basic ACAM Operation section of this guide, there are four types of ACAM Report that can be generated. The process for generating a report, regardless of which one(s) selected by the user, is identical. The user should navigate to the "REPORTS" menu in the ribbon. Clicking the "MS Report" button shown in Figure 3.23, brings forth the window shown in Figure 3.24.

Figure 3.23 ACAM Report Icon

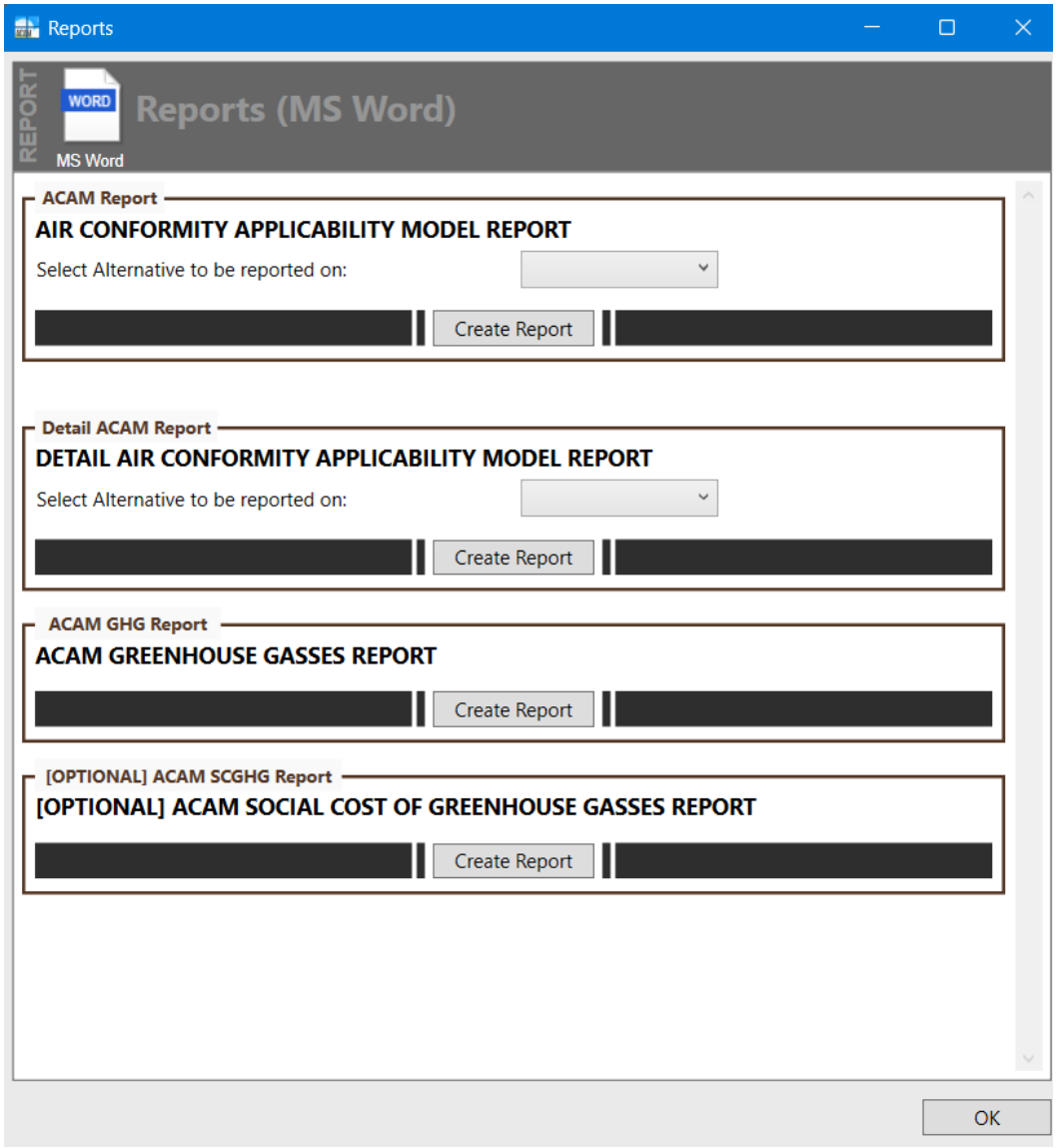


Figure 3.24 ACAM Report Window

By utilizing the drop-down menus for the report respectively, the user can select the Alternative in ACAM they wish to create a report for (Note there will only be one option to choose from, “alternative 1”). Clicking the “Create Report” button within the desired report type’s tab work area will create the report in Word document form.

The user will be presented with the save window shown in Figure 3.25.

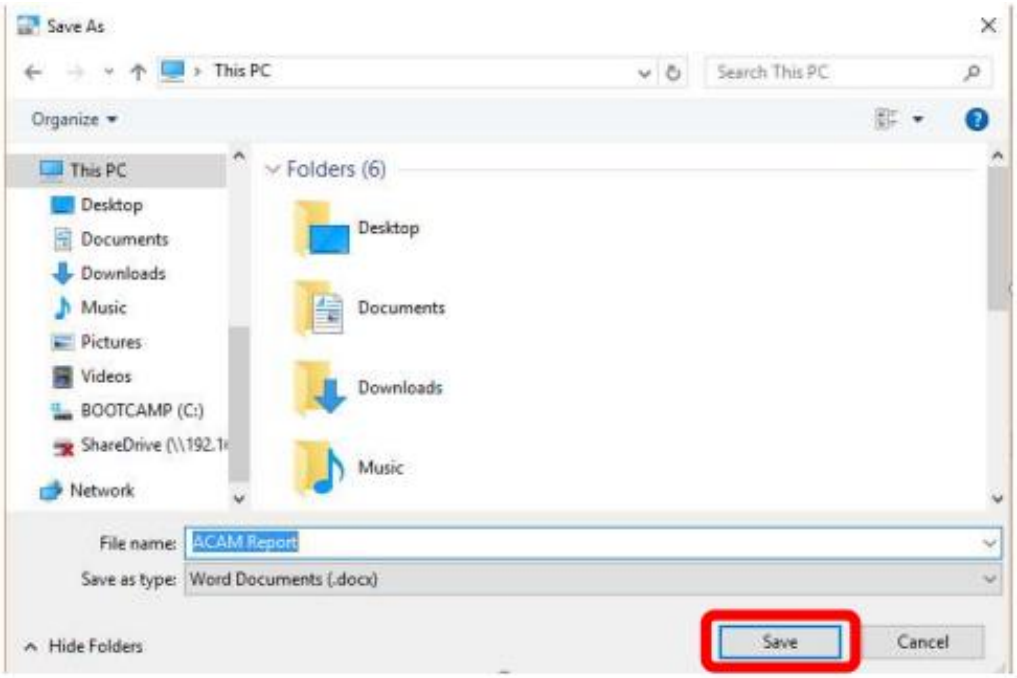


Figure 3.25 ACAM Report Save Menu

The user will need to name the ACAM Report and select a location to save it on their PC. Once the file has been named and a location is selected, click “Save” to close the window.

The user has now completed all the steps to create an ACAM File. The ACAM Report(s), as well as the ACAM File, can be shared with other individuals. The ACAM File can also be altered in any way the user deems necessary based upon the data presented in the report(s). Any changes should follow the general 9 step process discussed in this guide. Once any changes are made to the file, a new ACAM Report(s) can be created.

4 CONSTRUCTION CASE STUDY

4.1 Introduction

Construction activities are often associated with proposed action of the USAF. ACAM fully automates most construction activities a user may need to estimate emissions for in a proposed action. ACAM includes Demolition, Site Grading, Excavating and Trenching, Building Construction, Architectural Coatings, and Paving (asphalt). This case study provides a general overview of how to use the construction activity module in ACAM.

To begin, select the "Const/Demo" icon in the Ribbon, picture in Figure 4.1.

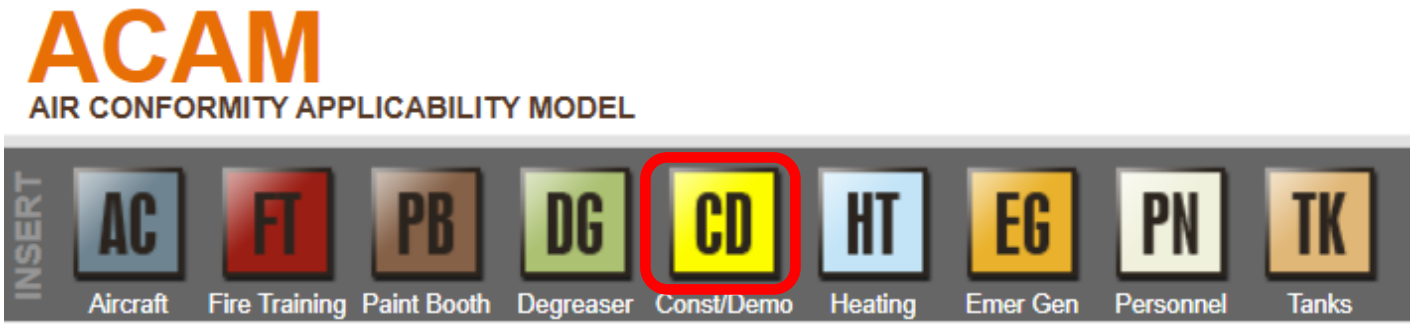


Figure 4.1 Construction and Demolition Activity

4.1.1 General Information

Selecting the Const/Demo icon will bring forth the ACAM window pictured in Figure 4.2. The user should begin with tab 1, titled "General Information". It should be noted that the General Information is different for Construction / Demolition than for every other activity since the duration of each construction phase needs to be individually known.

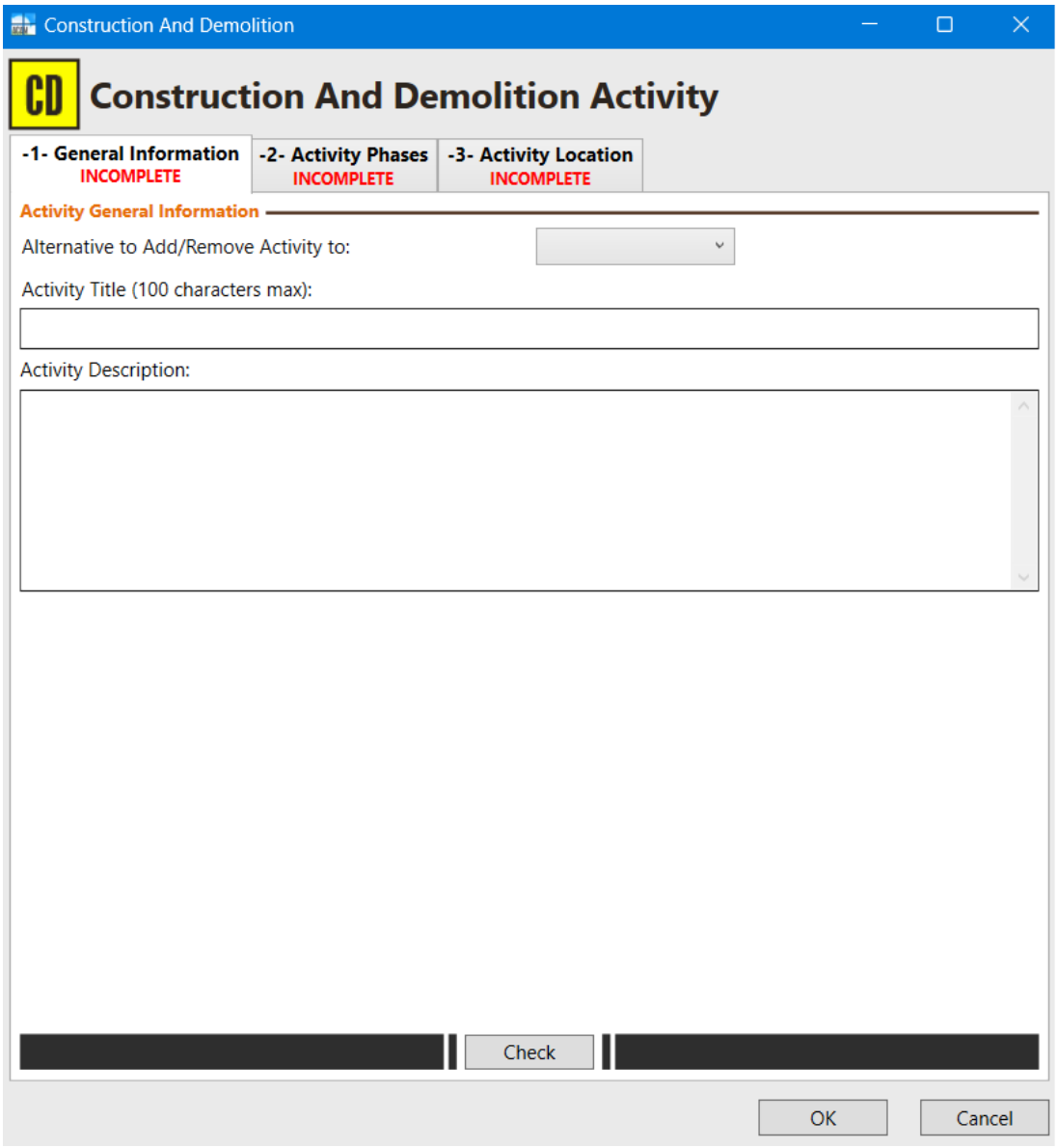


Figure 4.2 Construction and Demolition General Information Tab

Begin by using the drop-down menu to the right of the "Alternative to Add/Remove Activity to" to determine which Alternative scenario the activity will be added or removed to.

It is now required to give the activity a title. ACAM limits the title to 100 characters or less. It is recommended to keep the title as concise as possible. If the user wishes to make more in depth notes regarding the activity, they can be listed in the Activity Description text box. It should be noted that this text box is not required to proceed, and its use is optional.

Once completed, select “Check”, located at the bottom center of the Construction and Demolition Activity window. If the minimum amount of information required has been correctly inputted as per the instructions given, tab 1 will display “Complete” under its title, as shown in Figure 4.3.

Figure 4.3 General Information Tab ‘Complete’

4.1.2 Activity Phases

Now, proceed to tab 2, titled “Activity Phases”, by clicking on it. This window, pictured in Figure 4.4, will give the options for certain activities involved in the construction or demolition of a structure. The user should verify which of the activities will be necessary before proceeding with the scenario, and it is important to think about the analysis logically. For instance, building construction will almost always require site grading, excavating and trenching, and architectural coatings. Analyze each phase as applicable to the proposed project at hand.

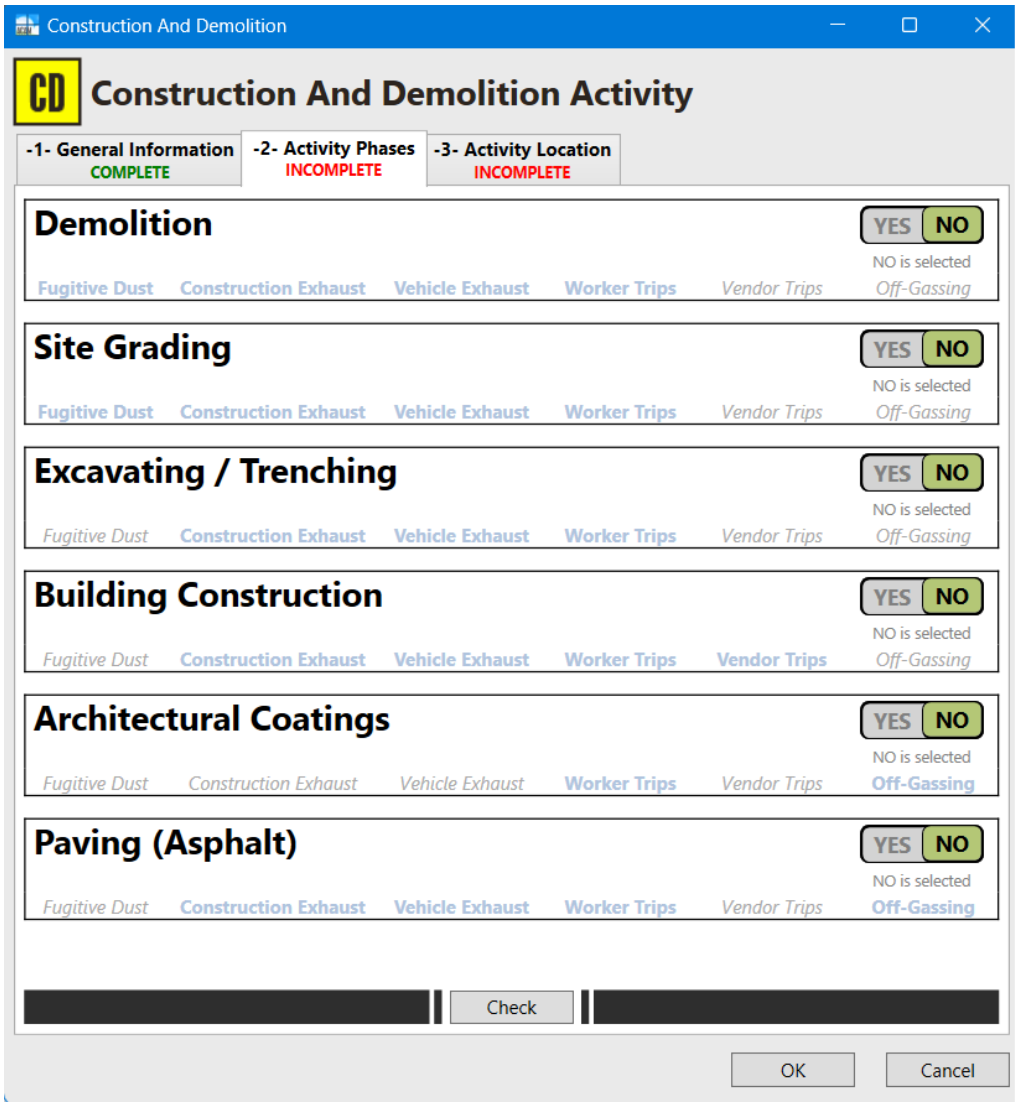


Figure 4.4 Construction Activity Phases Toggled OFF

As shown above, all the Activity Phases will default to "NO", which indicates that the phase's emission sources will not be included in the ACAM calculations. In order to include an activity phase, click the YES-NO tab and be sure that "YES" appears in black lettering and green background, as shown in Figure 4.5.

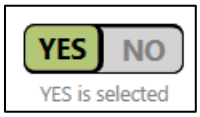


Figure 4.5 "YES NO" Toggle

After selecting all the appropriate select "Check" located at the bottom center on the Construction and Demolition Activity window. At this point, a number of new tabs will appear at the top of the window. Depending upon which Activity Phases were selected, as shown in Figure 4.6.

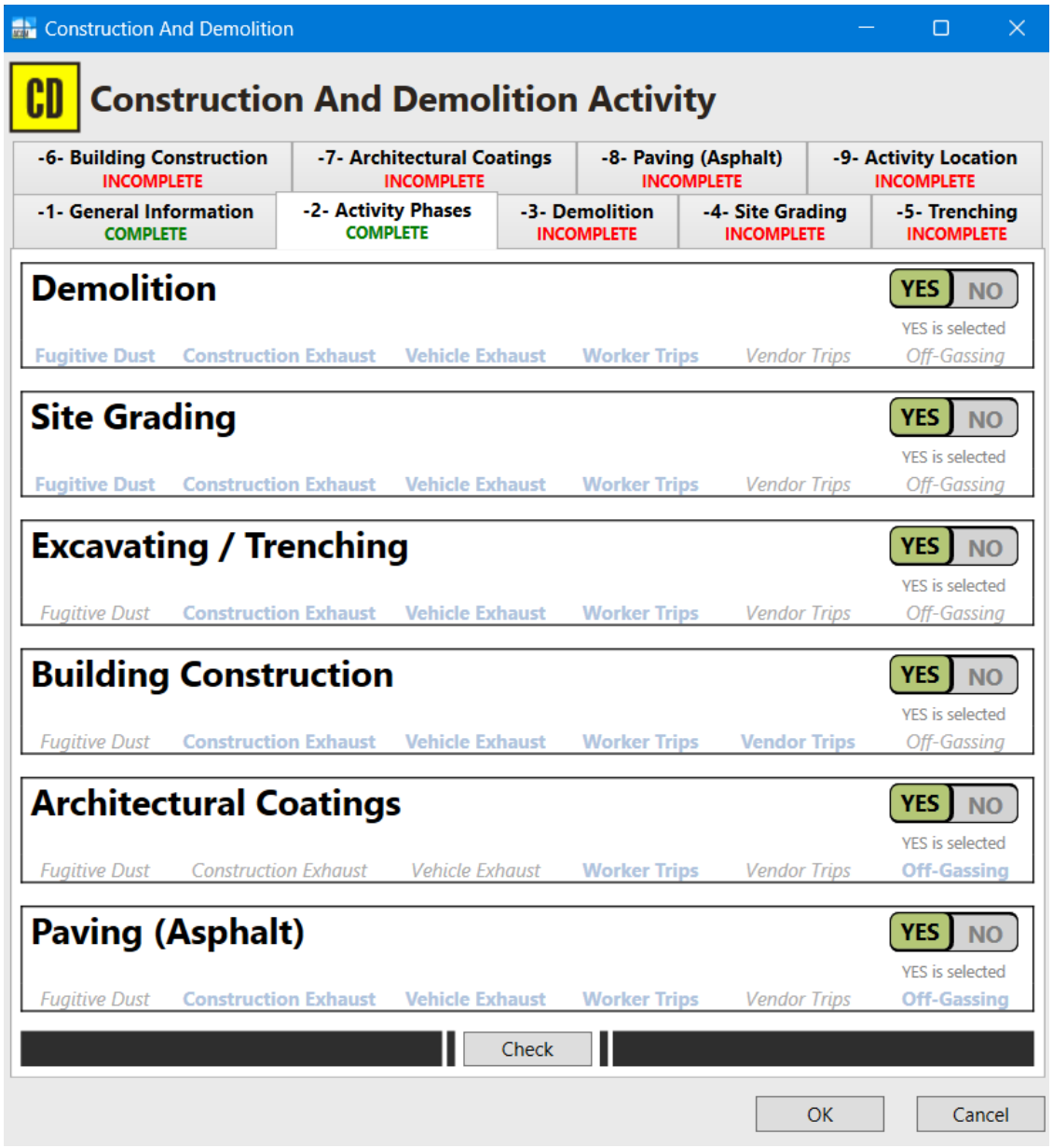


Figure 4.6 Construction Activity Phases Toggled ON

4.1.3 Demolition

Selecting the Demolition tab by clicking on it will bring forth the options presented in Figure 4.7.

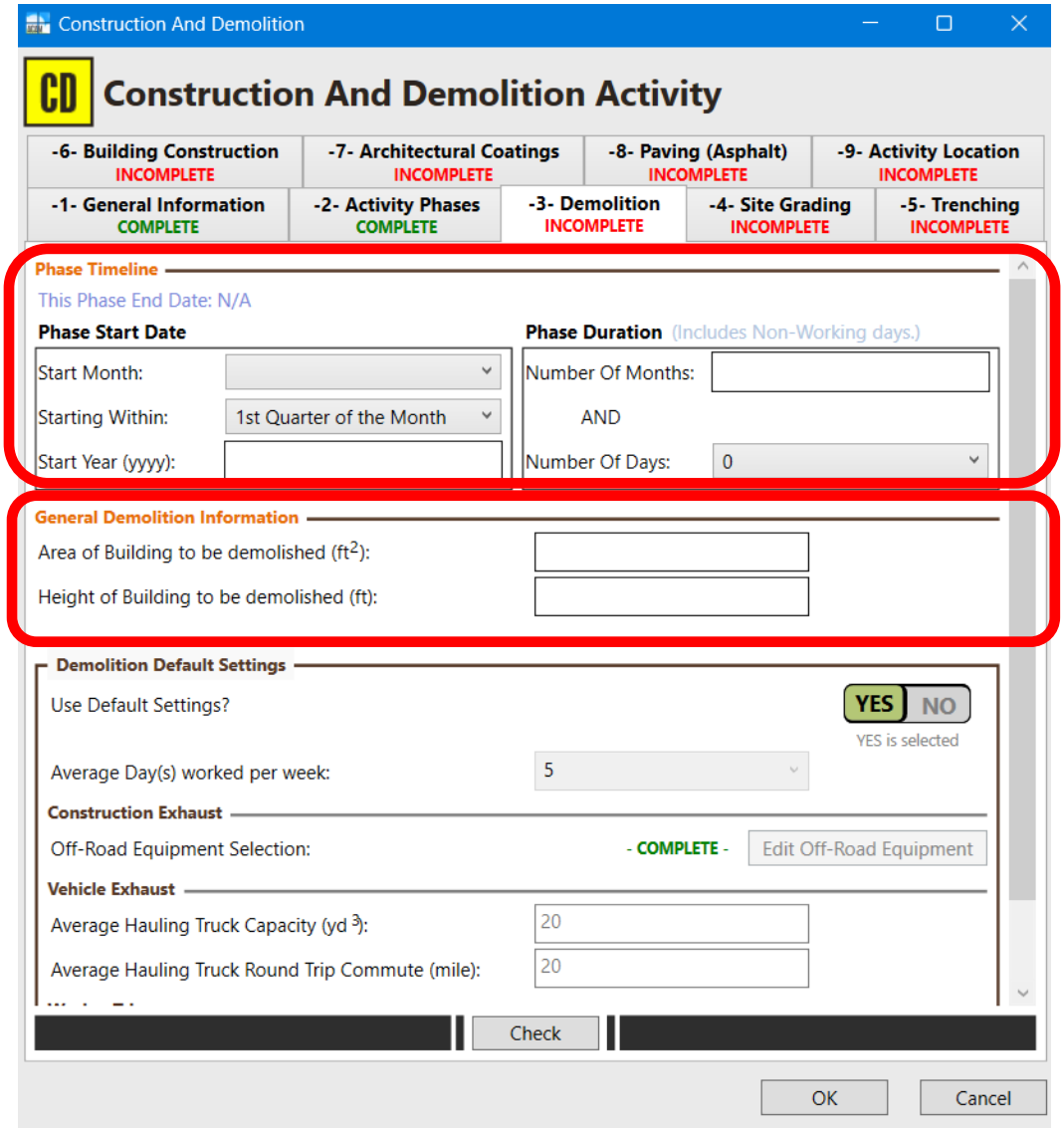


Figure 4.7 Demolition Phase Tab Window

The user should start with the Phase Start Date, followed by the Phase Duration, shown in Figure 4.8. It should be noted that this step is identical for each construction phase, and thus will only be discussed this one time.

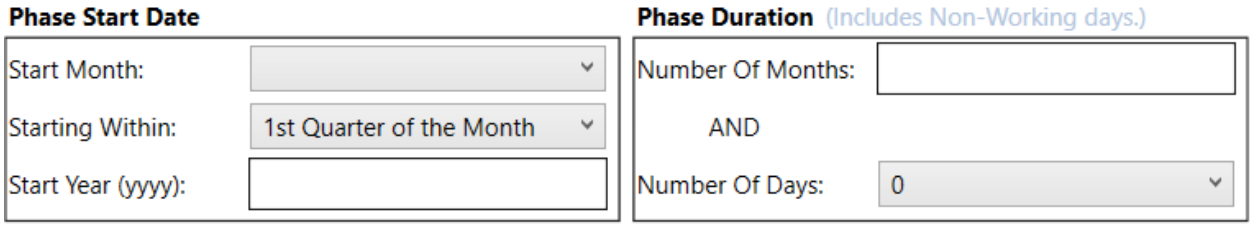


Figure 4.8 Construction Activity Phasing

Using the drop-down menu to the right of "Start Month:", select the month in which the demolition phase will begin. Proceed to the drop-down menu just below pertaining to "Starting Within" and choose the time period during the month selected when the demolition will begin. Finally, type the year for the phase start date in the text box to the right of "Start Year (yyyy):". Continuing to refer to Figure 4.8, the Phase Duration must now be addressed. Type the number of months the demolition will last in its respective text box, and then using the drop-down menu, select the number of days if it is not a whole number of months. If the user is unsure about the time frame of each phase, a helpful tool to estimate construction phase durations can be found at https://www.aqhelp.com/AQtools.html and is titled "Construction Phase Duration & Date Estimator".

The next information to provide is the Area of Building to be demolished (in square feet), and the height of the building (in feet). The length (L), width (W), and height (H) of the structure will need to be known. Refer to Figure 4.10.

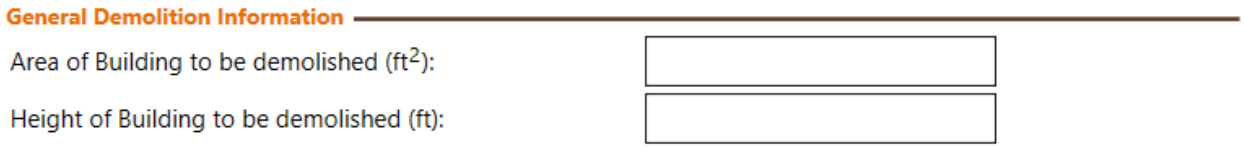


Figure 4.9 Demolition Inputs

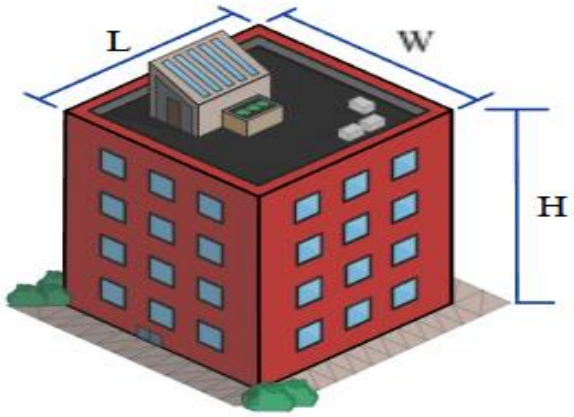


Figure 4.10 Length, Width, and Height Diagram

4.1.4 Site Grading

Selecting the Site Grading tab by clicking on it will bring forth the options presented in Figure 4.11.

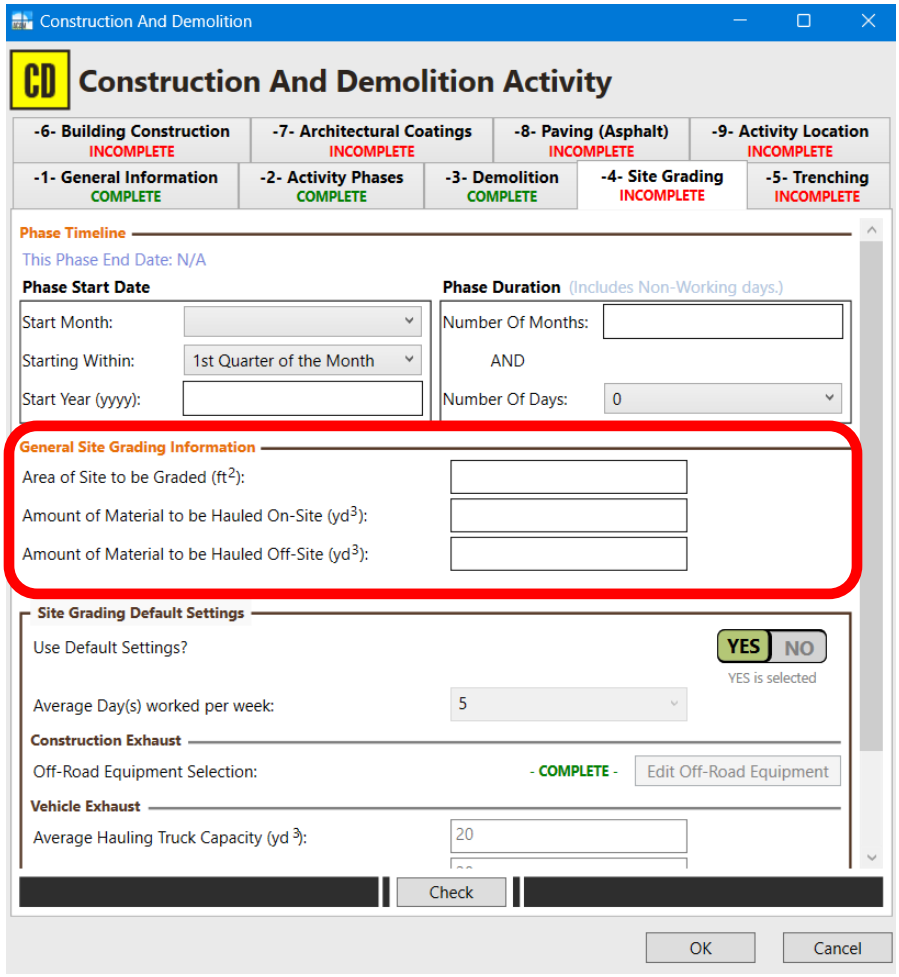


Figure 4.11 Site Grading Phase Tab

Referring to Figure 4.12, the next information to provide is Area of Site to be Graded, Amount of Material to be Hauled On-Site, and Amount of Material to be Hauled Off-Site. Type these values in their respective text boxes. Be sure to pay close attention to the units. Typically, Site Grading is calculated by doubling the footprint of the structure to be constructed. Occasionally, the user will know the entire ground area to be disturbed; if this is the case, use this value.

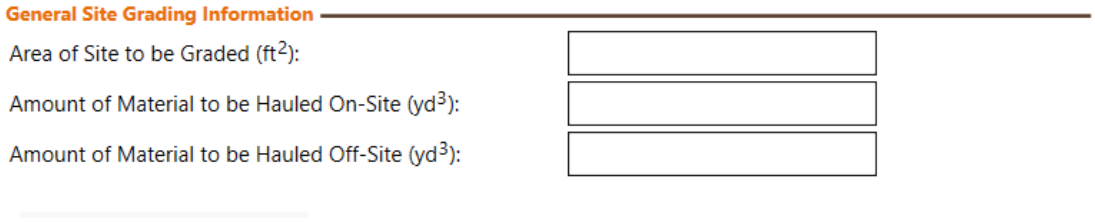


Figure 4.12 Site Grading Input

4.1.5 Trenching

Selecting the Trenching tab will bring forth the options shown in Figure 4.13.

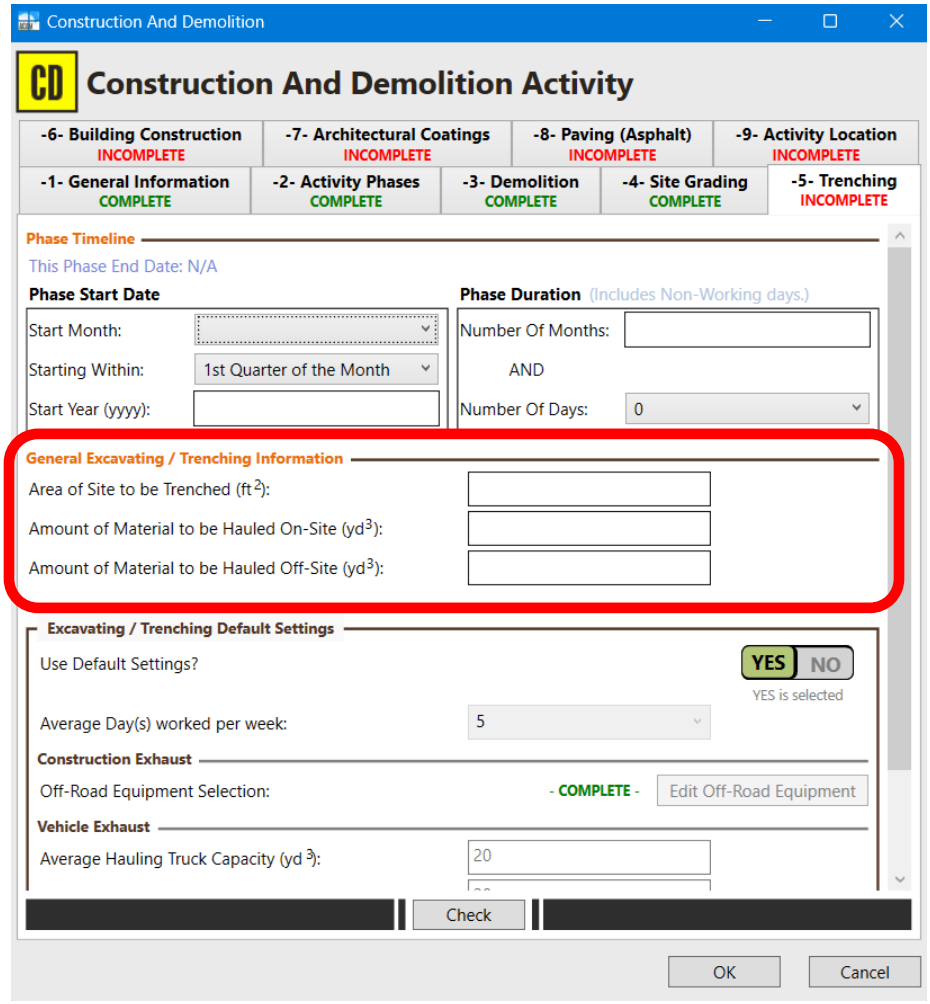


Figure 4.13 Trenching Phase Tab

Referring to Figure 4.14, the next information to provide is the Area of Site to be Trenched (in square feet), Amount of Material to be Hauled On-Site (in cubic yards), and the Amount of Material to be Hauled Off-Site (in cubic yards). Type these values into their respective text boxes. To calculate the area of the site to be trenched, the linear foot length of the trench needs to be known, along with the width of the trench. A safe, conservative assumption assumes that trenches will be 3 feet wide.

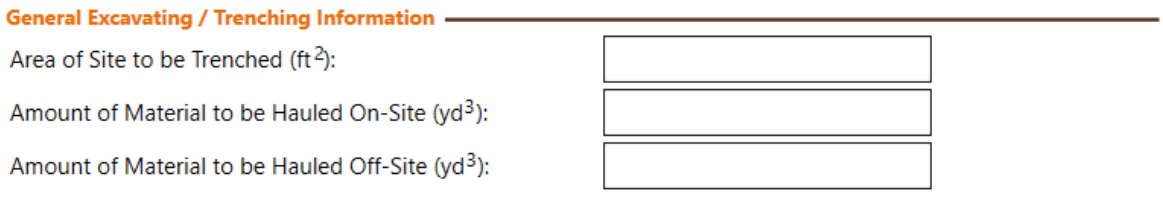


Figure 4.14 Excavating/Trenching Inputs

4.1.6 Building Construction

Selecting the Building Construction tab by clicking on it will bring forth the options presented in Figure 4.15.

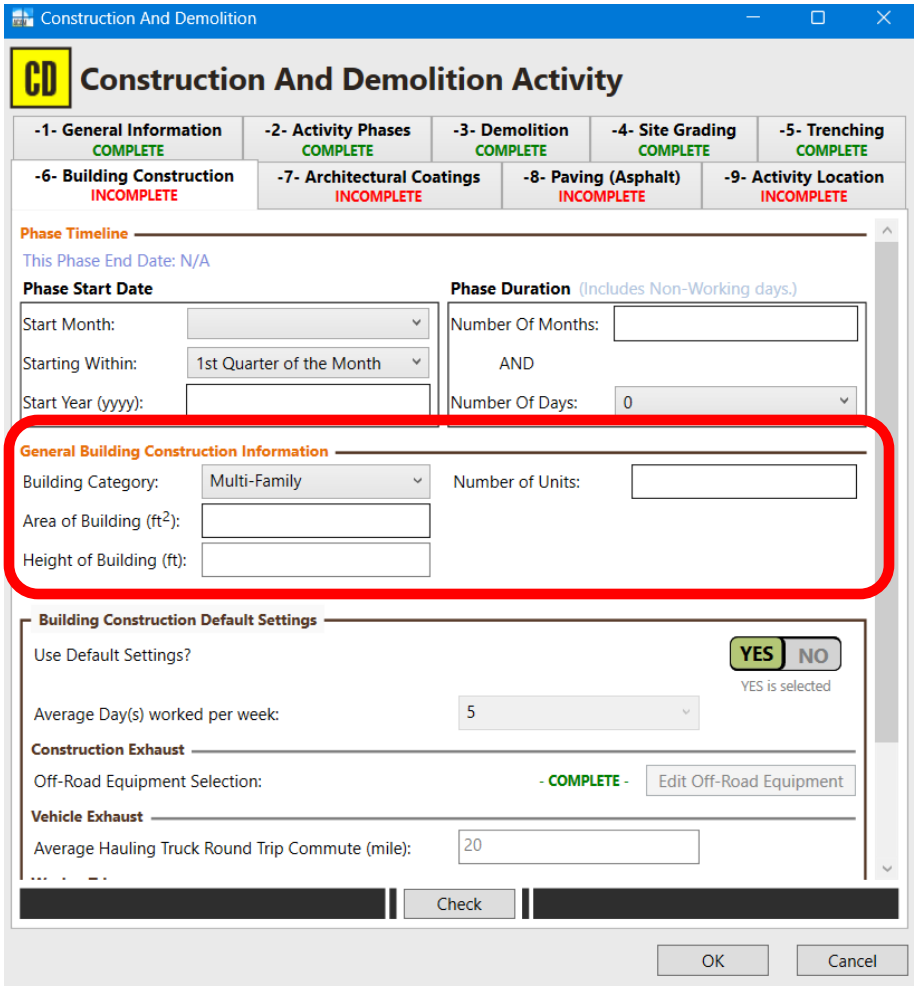


Figure 4.15 Building Construction Phase Tab

The area of the building, (footprint, not living space or interior square footage), must be provided in square feet, followed by the height of the building, and finally, the number of units being constructed. Type these values in their respective text boxes, shown in Figure 4.16. Depending on the type of building category selected, different inputs must be provided. For instance, if "Single Family Housing" is selected, the height is not required, but the building's footprint and the number of units will be required. A helpful hint is to assume 10 feet per story, if the building's height is unknown.

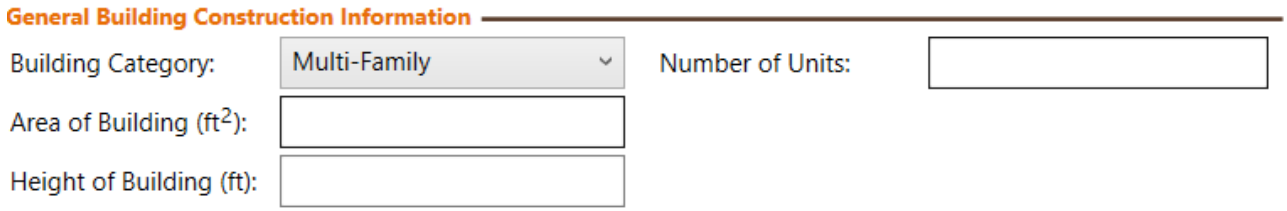


Figure 4.16 Building Construction Inputs

4.1.7 Architectural Coatings

Selecting the Architectural Coatings will display the information shown in Figure 4.17.

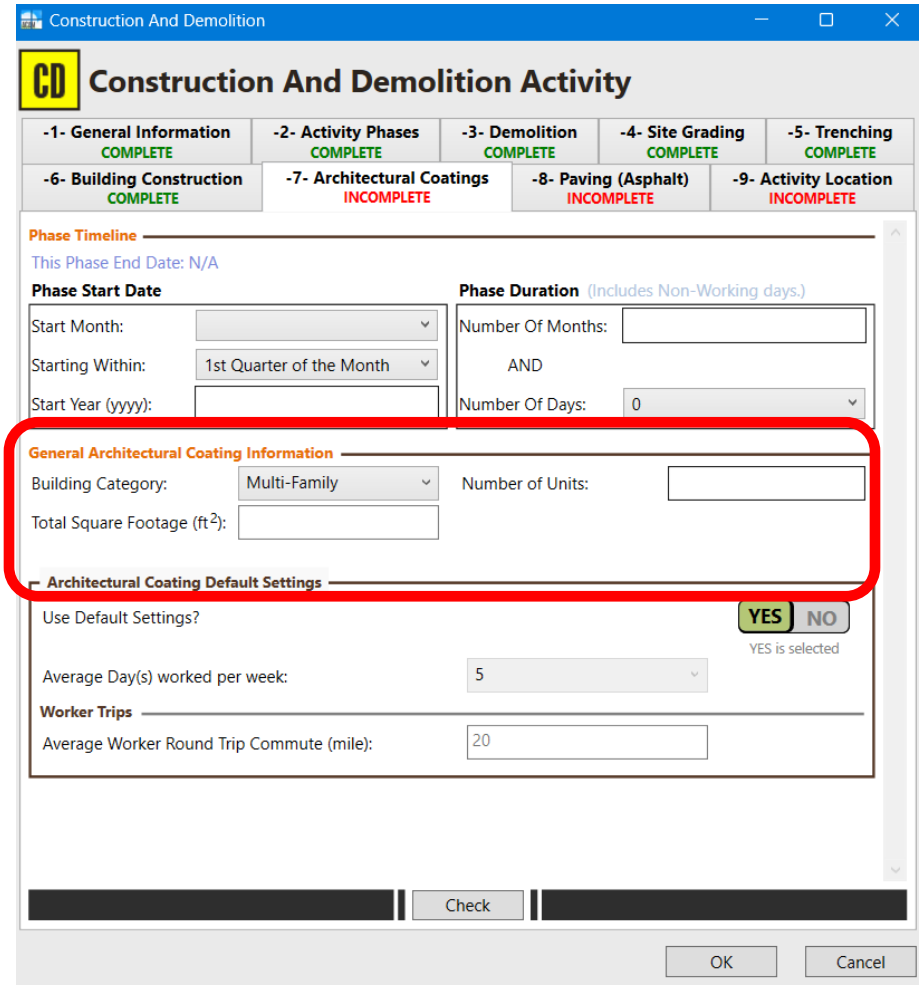


Figure 4.17 Architectural Coatings Phase Tab

Referring to Figure 4.18 below, the building category must be selected using the respective drop-down menu. The total exterior surface area square footage of the building and the total number of building units must be input into their respective text boxes, depending on the building category selected. As a helpful hint, occasionally, only the footprint of the building is known. In this instance, assume the building is a square (length = width), and as in the previous construction phases, assume 10 feet per story.

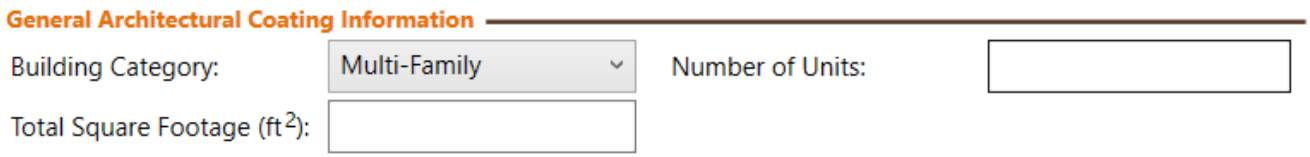


Figure 4.18 Architectural Coatings Inputs

4.1.8 Paving

Selecting the Paving (Asphalt) tab will bring forth the following options in the Construction and Demolition Activity window, pictured in Figure 4.19.

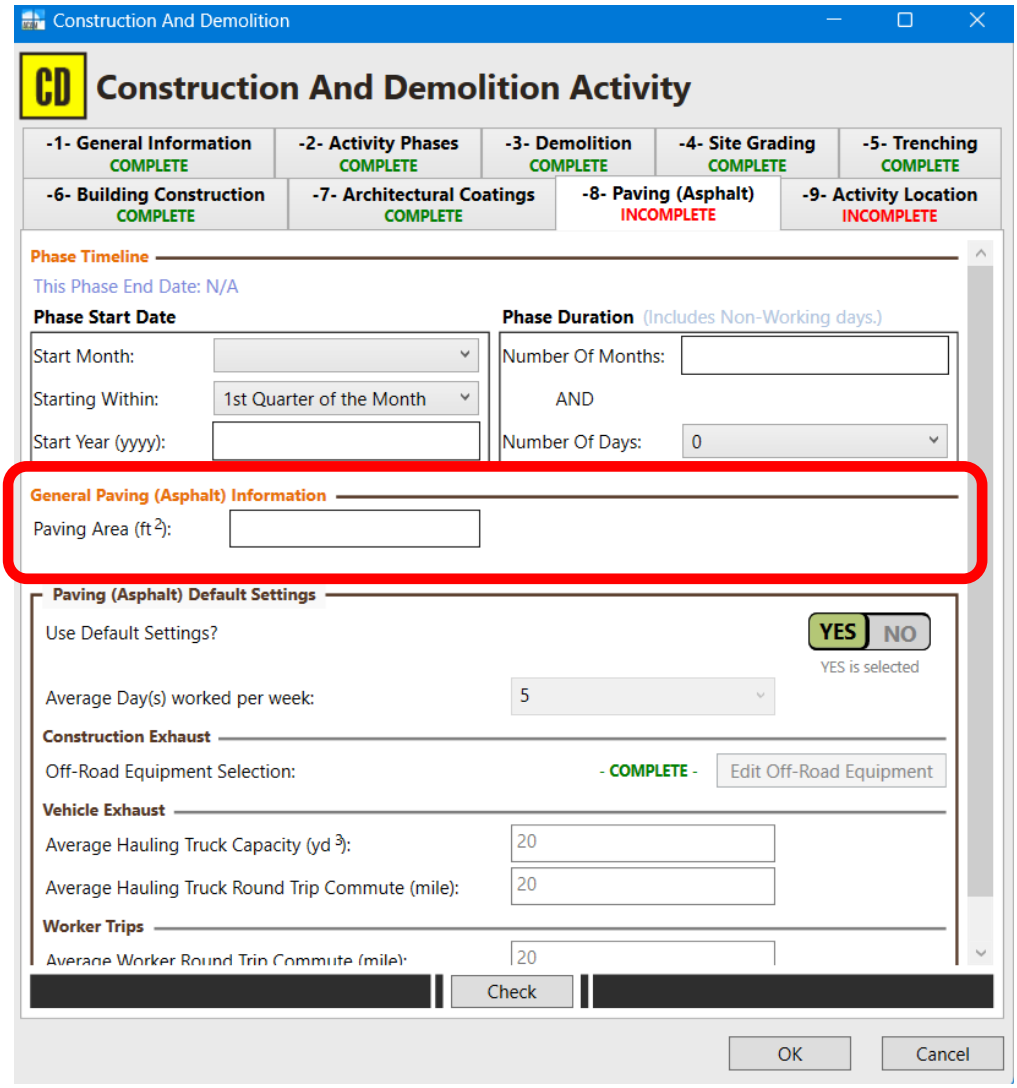


Figure 4.19 Paving Phase Tab

Referring to Figure 4.20, the paving area must be input as square feet, in its respective text box.

Figure 4.20 Paving Input

4.1.9 Activity Location

Selecting the Activity Location tab will bring forth the following options in the Construction and Demolition Activity window, pictured in Figure 4.21. In this window, use both drop-down menus to select the county and the base where the construction/demolition will take place.

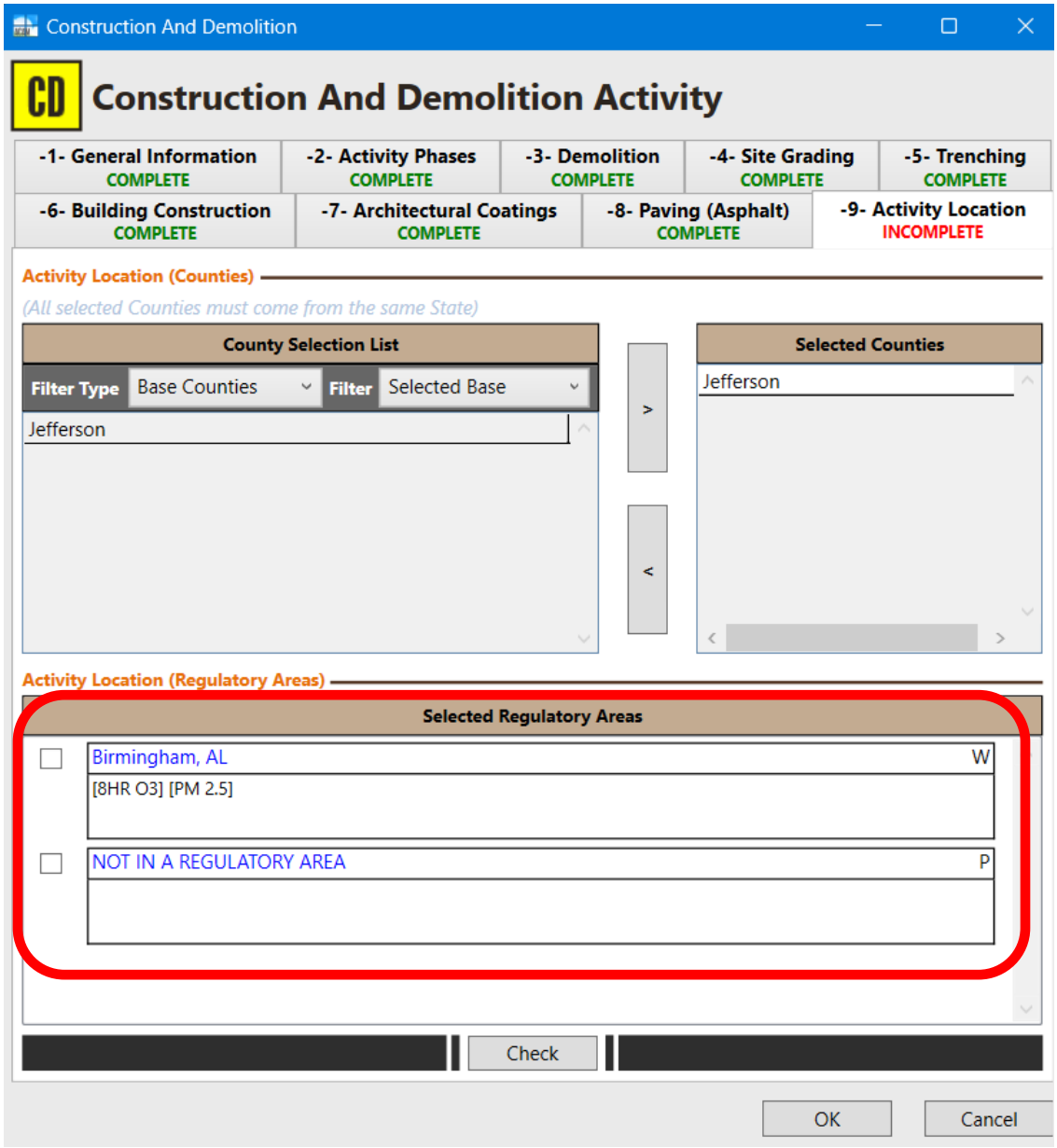


Figure 4.21 Activity Location Phase Tab

The Regulatory Area Section pictured in figure 4.22 informs the user of the attainment status of the selected counties. Based on the location of the base, the regulatory area will be whole (W) or a partial (P). Check the output given in the Regulatory Area section of the window (shown in red in figure 4.20) to complete the Construction Demonstration activity.

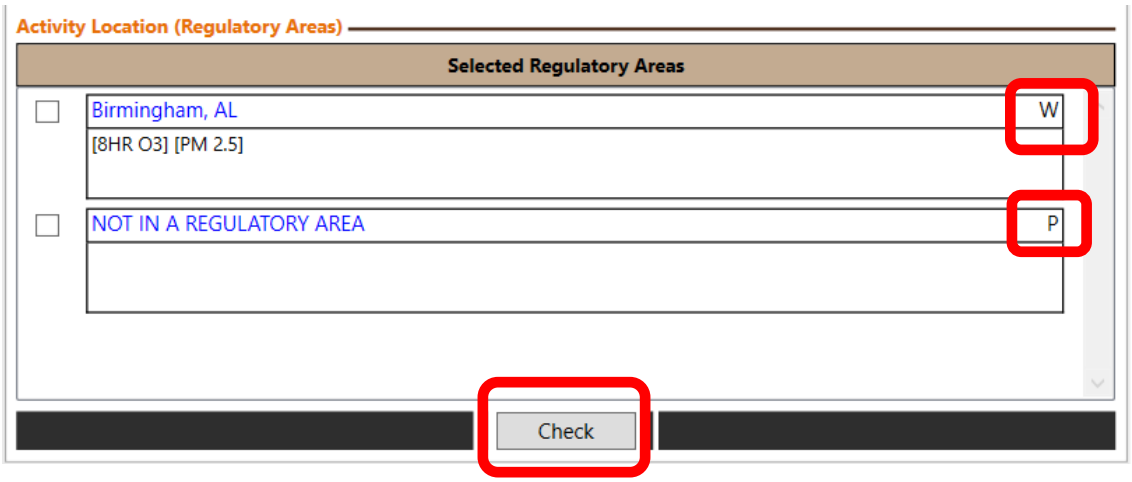


Figure 4.22 Selected Regulatory Area Section

NOTE: Partial regulatory areas must verify which areas pertain to your air force base.

5 AIRCRAFT FLIGHT OPERATIONS CASE STUDY

5.1 Introduction

ACAM is currently the only USAF approved tool that can handle all emissions generating activities, resulting from fixed-wing aircraft, including Flight Operations, Aerospace Ground Equipment (AGE), and Engine Test Cell. ACAM includes a list of nearly all fixed-wing USAF aircraft, with approved default values for different aircraft engine settings, in order to keep the analysis as simple as possible. Default values and equipment for Auxiliary Power Unit (APU), Engine Test Cell, and AGE are preloaded into the ACAM Aircraft Activity. This case study will walk the user through the Aircraft Activity tab in ACAM.

5.2 General Aircraft Terminology

Before proceeding into the ACAM analysis, a basic understanding of aircraft terminology, relating to air quality, is necessary. It is important to note that aircraft operations are calculated differently for noise and air, and they cannot be used interchangeably.

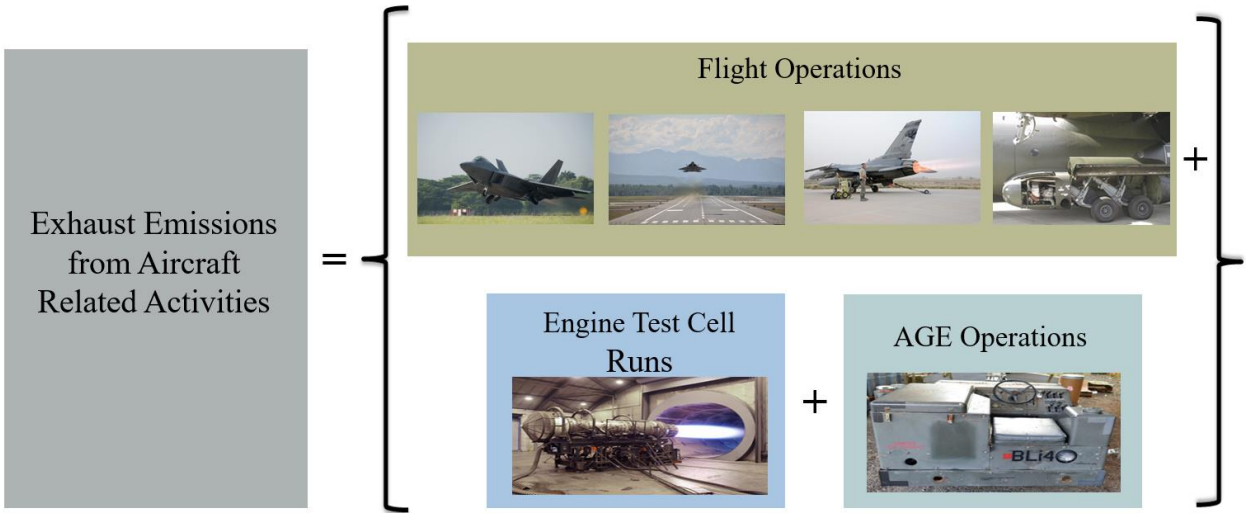


Figure 5.1 Aircraft Activity accounted for in ACAM

NOTE: You must contact AFCEC/CZTQ for base-specific TIM data for flight operations. This requires noise BaseOps information.

5.2.1 Time-in-Mode (TIM)

Flight Operations Cycles (i.e. LTO, CP, are defined by the TIMs, or length of time an aircraft spends in each of the five Engine Power Setting (i.e., idle, approach, intermediate, military, and afterburner).

5.2.2 Landing and Takeoff Cycle (LTO)

The EPA has established formal procedures for calculating exhaust emissions associated with aircraft operations based on a Landing and Takeoff (LTO) Cycle (USEPA 1992). Under the EPA procedures, an emissions inventory for aircraft operations focuses on the emissions in the vertical column (generally bound by the perimeter of the base) of air referred to as the "mixing zone" or "inversion layer". Exhaust emissions occurring within this area are calculated for one complete LTO cycle for each aircraft type by applying aircraft engine-specific emission factors (EFs). These EFs are derived from fuel flow rates, and the period of time (or time-in-mode, TIM) that each engine operates at a power setting during an LTO. Additionally, EFs are derived from activity based operational data, such as the number of aircraft, the number of engines per aircraft, the annual number of LTOs, etc. Emissions occurring above the mixing zone are typically not considered during the emissions inventory process.

Each LTO cycle for fixed-wing aircraft is comprised of five flight modes that operate in different power settings: taxi out, takeoff, climb out, approach, and taxi in. The five flight modes are described below:

- Taxi out: The time from engine startup to takeoff.
- Takeoff: Characterized by full engine thrust, the time it takes the aircraft to reach between 500 and 1,000 feet above ground level. This transition height is typical and does not vary much from location to location or among aircraft categories.
- Climb out: The time following takeoff that concludes when an aircraft exits the mixing zone and continues to cruise altitude.
- Approach: The time from the moment the aircraft enters the mixing zone until the aircraft lands.
- Taxi in: The time spent after landing, until the aircraft is parked, and the engines are turned off.

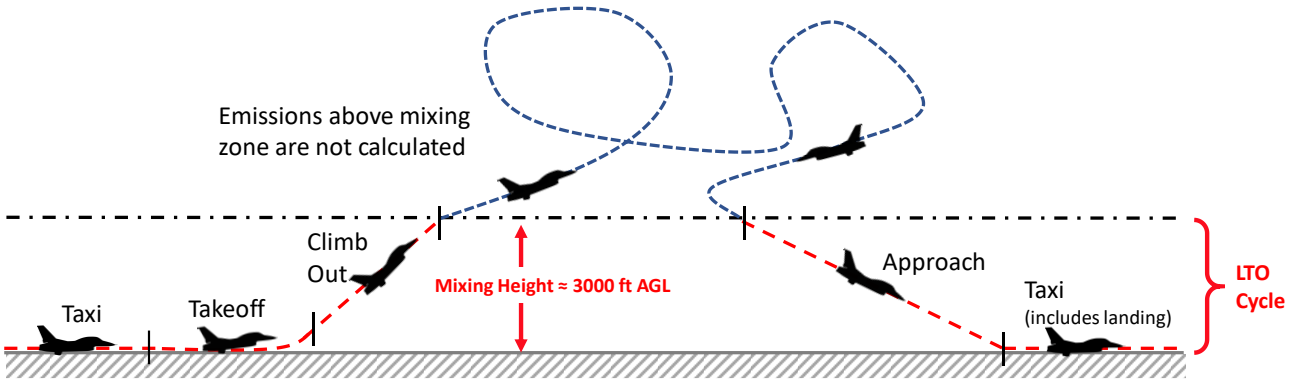


Figure 5.2 Landing Take Off Cycle

5.2.3 Close Pattern (CP) Cycle

A CP cycle (also known as Touch and Go or T&G cycle with a return loop) is a flight maneuver that involves practice landing on a runway by briefly touching the landing gear to the runway (or coming very close), transitioning immediately into climb out, and then a return loop maneuver into another practice landing. As with an LTO cycle, you only account for aircraft flight below the mixing height (EPA default = 3,000 ft AGL).

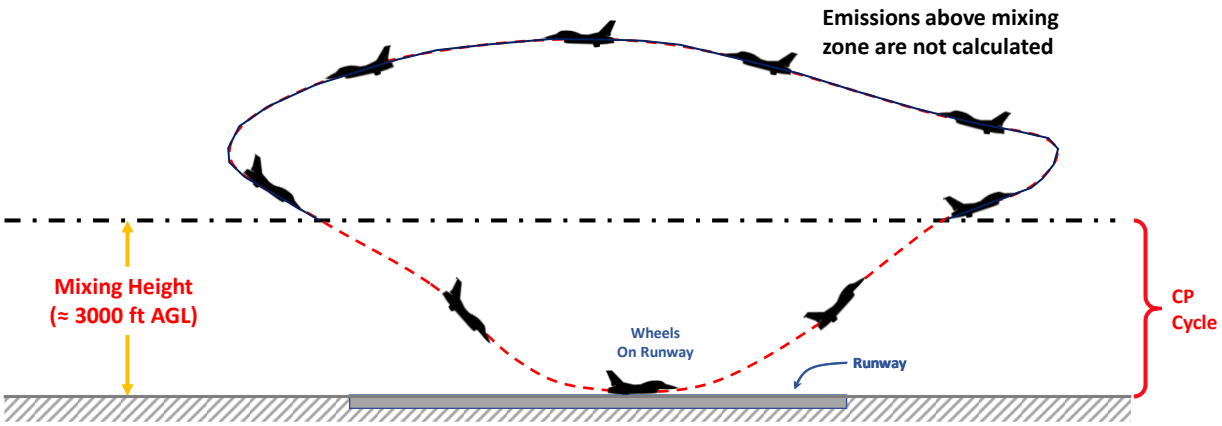


Figure 5.3 Close Pattern Cycle

5.2.4 Low Flight Pattern (LFP)

A LFP is a flight maneuver that occurs below the mixing height that is not part of an LTO or CP cycle.

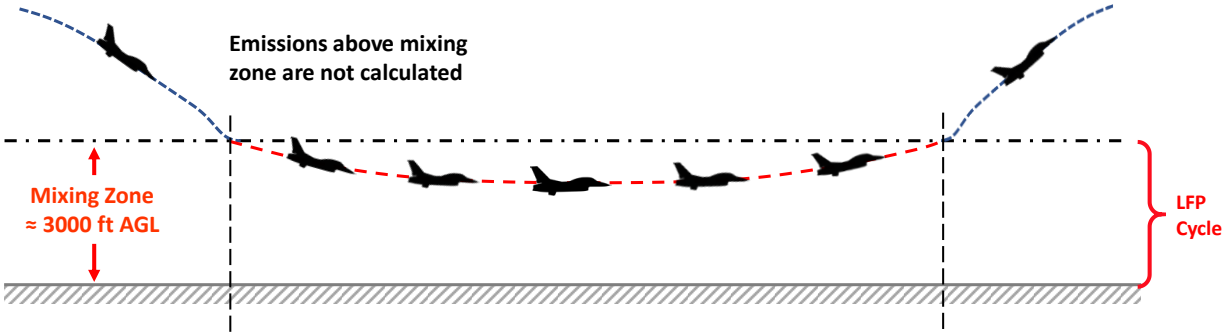


Figure 5.4 Low Flight Pattern Cycle

5.2.5 Auxiliary Power Unit (APU)

APU provides power to an aircraft while it is on the ground and sometimes through takeoff and climb out. APUs are turbine-powered generators, usually ranging in size from 50-400 horsepower, and they burn JP-8 fuel, thus causing them to be an emissions source within the mixing zone. This will need to be accounted for, depending on the aircraft activity type.

5.2.6 Aircraft Activity Overview

To begin an Aircraft Activity in ACAM, select the Aircraft Activity button, as shown in Figure 5.5.

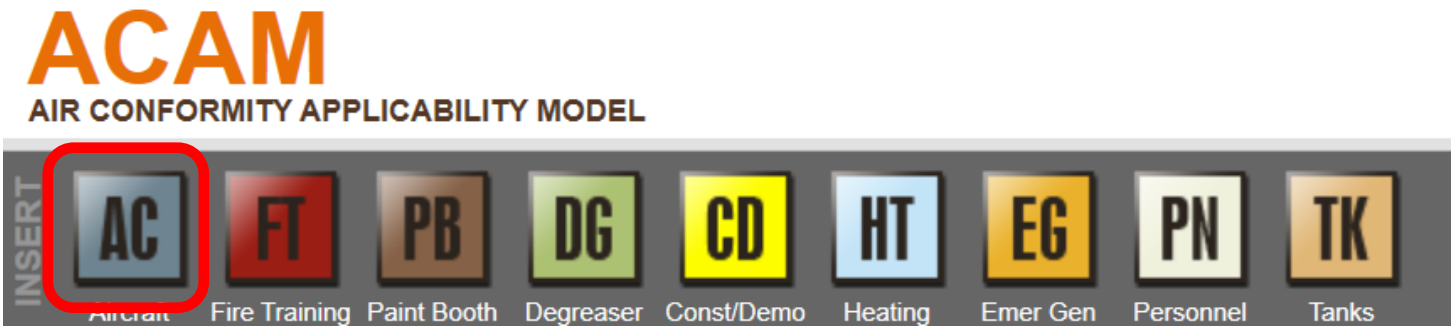


Figure 5.5 Aircraft Activity button

5.2.7 General Information

Selecting the Aircraft Activity icon will bring forth the ACAM window pictured in Figure 5.6. The user should begin with tab 1, titled “General Information”.

The user should work from top to bottom, making sure each information entry is filled in.

Figure 5.6 General Information window

The user should first use the drop-down menu, pictured in Figure 5.6, to inform if they are adding or removing aircraft from the base, by selecting “Add” or “Remove”, respectively. Then, the Alternative scenario should be selected to add or remove the activity to. It is now required to give the activity a title.

ACAM limits the title to 100 characters or less. It is recommended to keep the title as concise as possible. If the user wishes to make more in-depth notes regarding the activity, they can be listed in the Activity Description text box

The user will now need to state the time frame for the activity. The user first needs to determine if the activity is indefinite. If it is, be sure the button in the Activity Timeline is showing "YES" highlighted in green as shown in Figure 5.7. If it is not indefinite, be sure "NO" is selected, as it is in Figure 5.6.

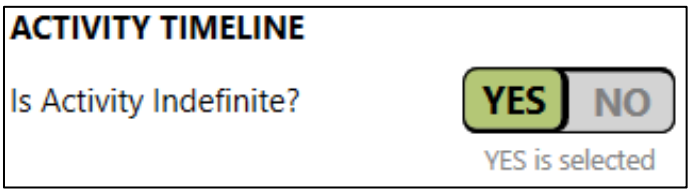


Figure 5.7 Activity Indefinite Tab

Next, the Activity Start Date and Activity End Date are required. If the activity is indefinite, only an activity starts date needs to be inputted. Referring to Figure 5.8, the start month and end month will be selected from the drop-down menu. The start year and end year should be typed in their respective text boxes in the format (yyyy).

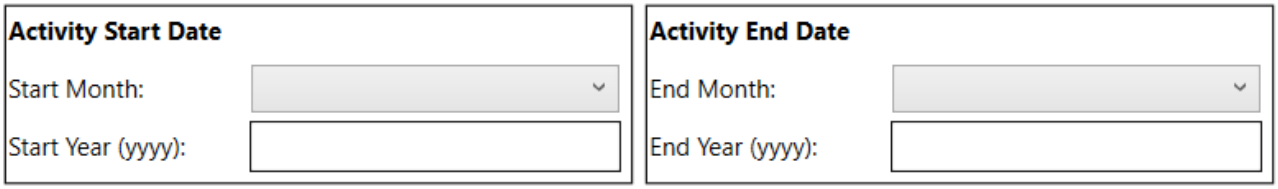


Figure 5.8 Activity Phasing

After entering in the dates, select the "Check" button. If the previous instructions were followed, and the correct formatting was used where necessary, the General Information tab will display "COMPLETE" in green lettering, as shown in Figure 5.9.

Figure 5.9 General Information Complete

5.2.8 Activity Type

The user will now select tab 2, titled “Activity Type”. Selecting this tab will bring forward the options shown in Figure 5.10. All the Activity Types are defaulted to “NO”. The user will need to click on that button to toggle the response to “YES”, for each activity documented. For the purposes of this case study, all Activity Types are toggled to “YES”, as depicted in Figure 5.11.

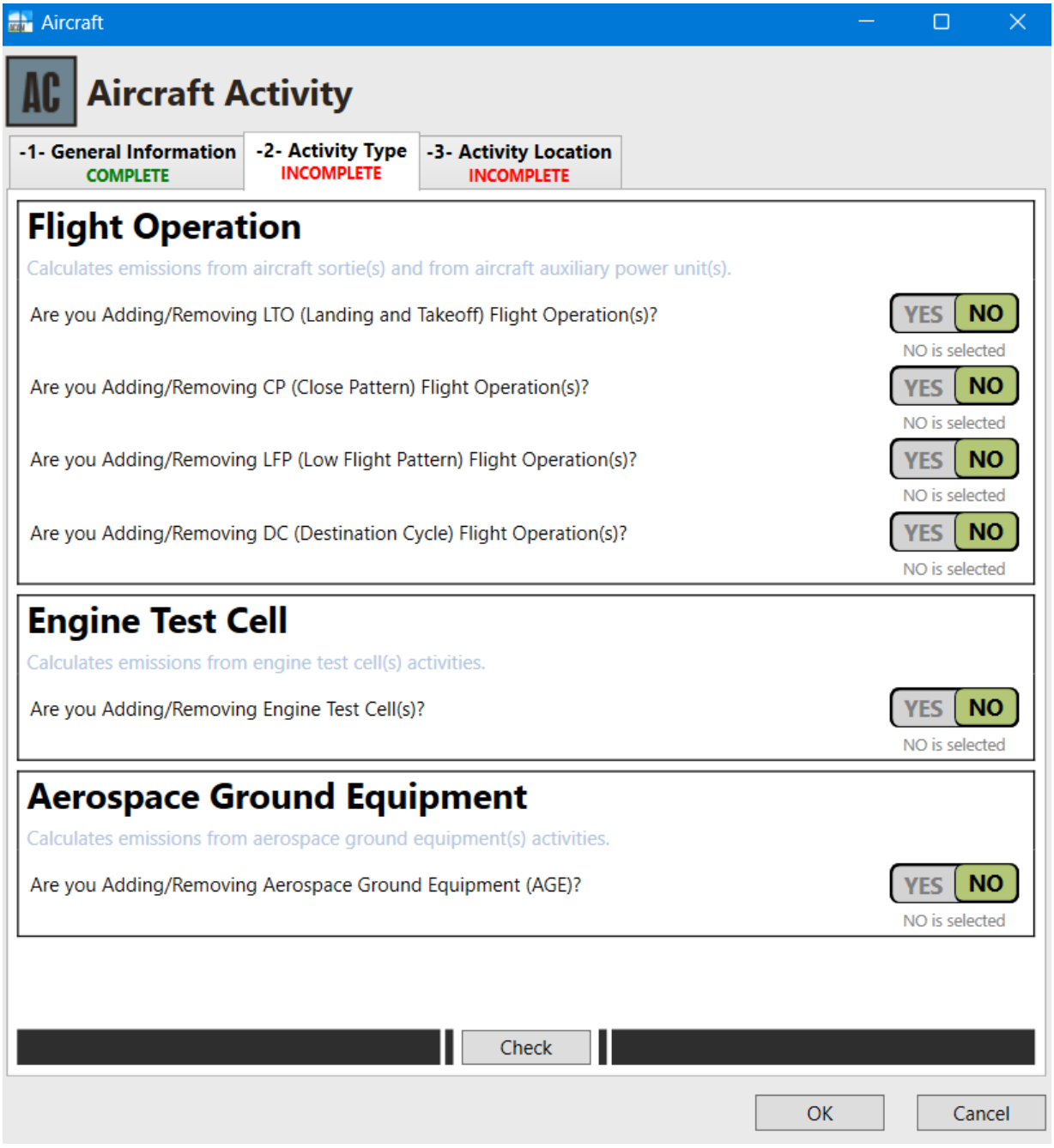


Figure 5.10 Activity Type

Three Activity Types are presented: Flight Operation, Engine Test Cell, and Aerospace Ground Equipment. Determine which options are relevant to the aircraft activity being conducted. Selecting “YES” will include emissions or the relevant sources, while selecting “NO” excludes those emissions from the activity. At least one

activity must be selected to continue. In order to continue, select "Check", regardless of which Activity(s) are selected.

Selecting "Check" will change the layout of the window by adding additional tabs. The tabs will differ, depending on which Activity Types were selected in tab 2. Figure 5.11 displays the tabs as if the user selected all the Activity Types. If not all the Activity Types were selected, there will be less tabs present. The list, shown below, gives an overview of which tabs will appear, depending on the Activity Type selection.

Flight Operations:

- LTO
  - Aircraft & Engine
  - LTO Flight Operation(s)
  - APU
- CP
  - Aircraft & Engine
  - CP
- LFP
  - Aircraft & Engine
  - LFP
- DC
  - Aircraft & Engine
  - DC

Engine Test Cell:

- Aircraft & Engine
- Engine Test Cell(s)

Aerospace Ground Equipment:

- AGE

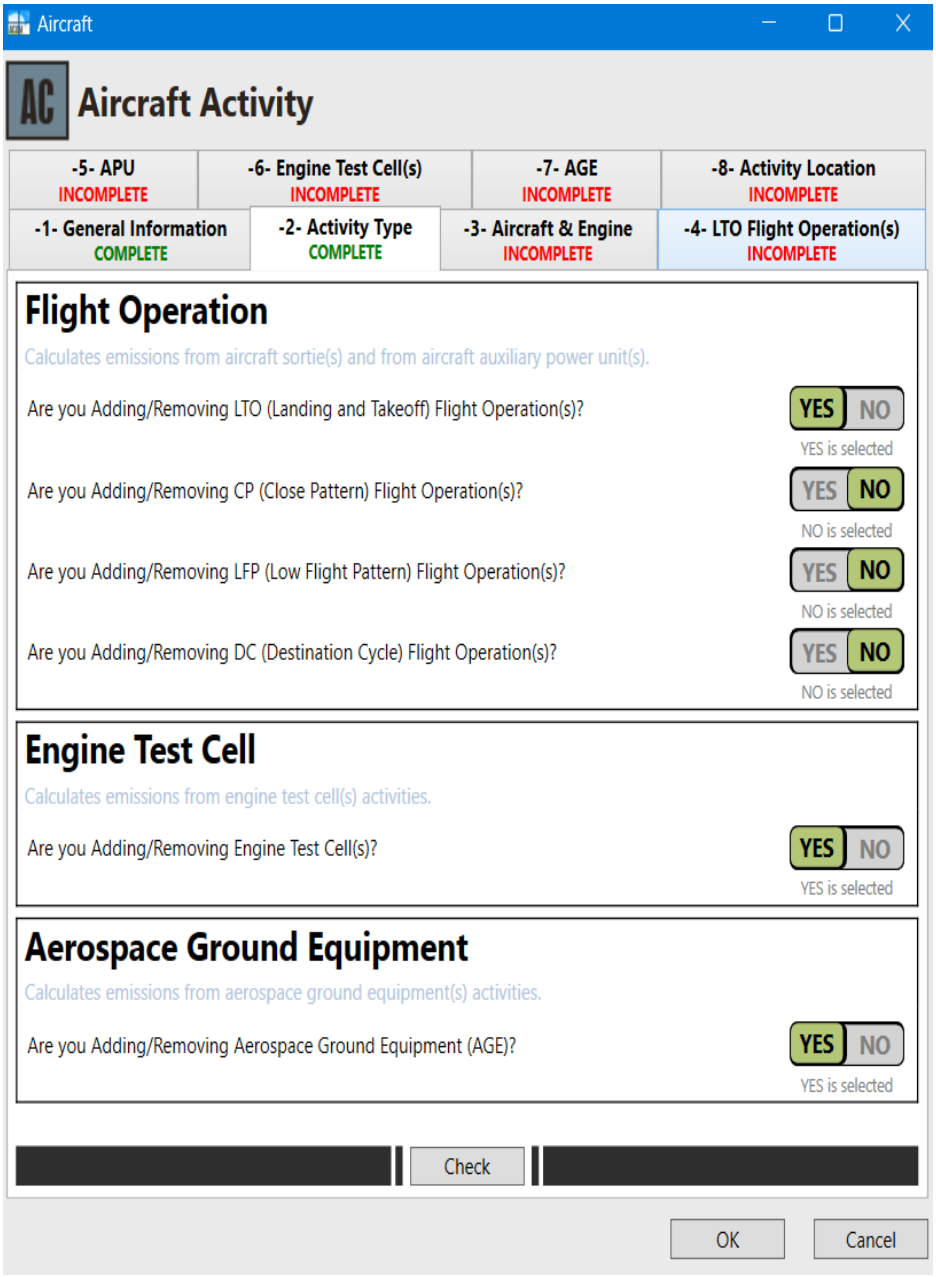


Figure 5.11 Activity Type (All Selected)

5.2.9 Aircraft and Engine

Tab 3 is where the aircraft and engine is selected in ACAM. The aircraft are listed in alphabetical order. The user should exhibit caution when selecting the aircraft, as many of the same aircraft models have different engines.

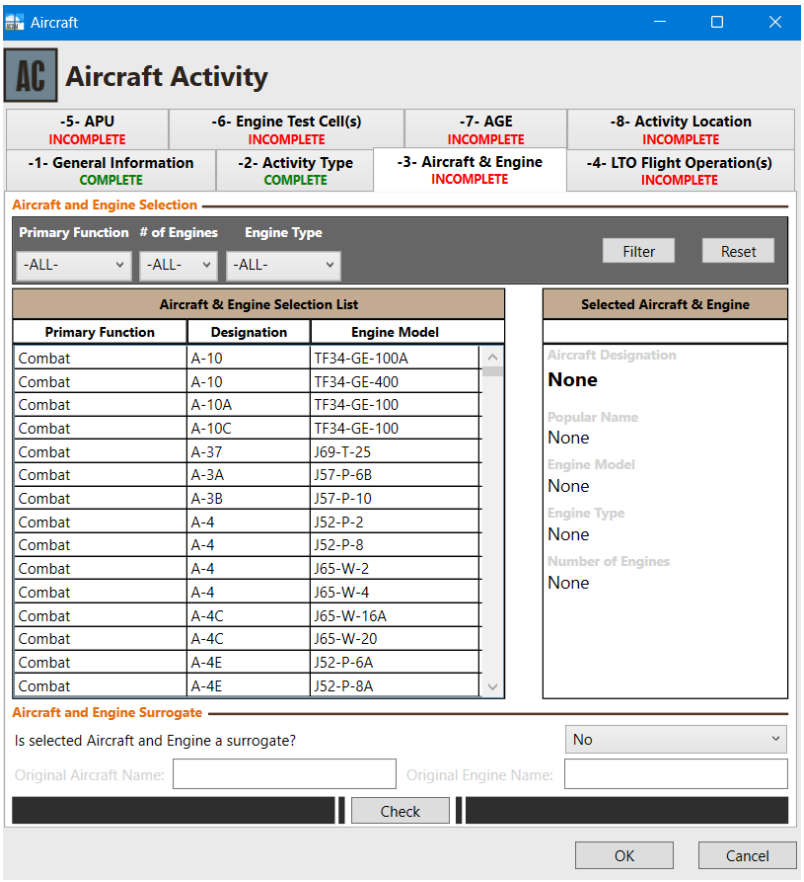


Figure 5.12 Aircraft and Engine

If the user cannot locate their desired aircraft, a surrogate aircraft will need to be utilized. ACAM contains a viable surrogate for nearly every fixed-wing aircraft. If assistance is required in finding a viable surrogate, please contact AFCEC/CZTQ.

After finding a suitable surrogate with similar engine specifications, use the drop-down menu to select "YES" for the question "Is selected Aircraft and Engine a surrogate?", as shown in Figure 5.13. The original aircraft name and original engine name will need to be provided in their respective text boxes, following the surrogate question.

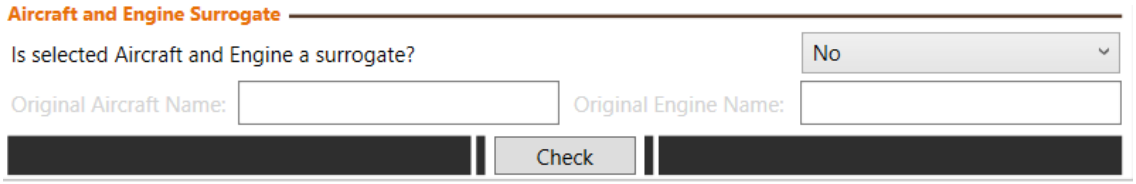


Figure 5.13 Aircraft Surrogate Information (if applicable)

Once the aircraft and relevant surrogate information has been provided, select "Check" and proceed to the next tab.

5.2.10 Flight Operations

The flight operations tab is pictured in Figure 5.14.

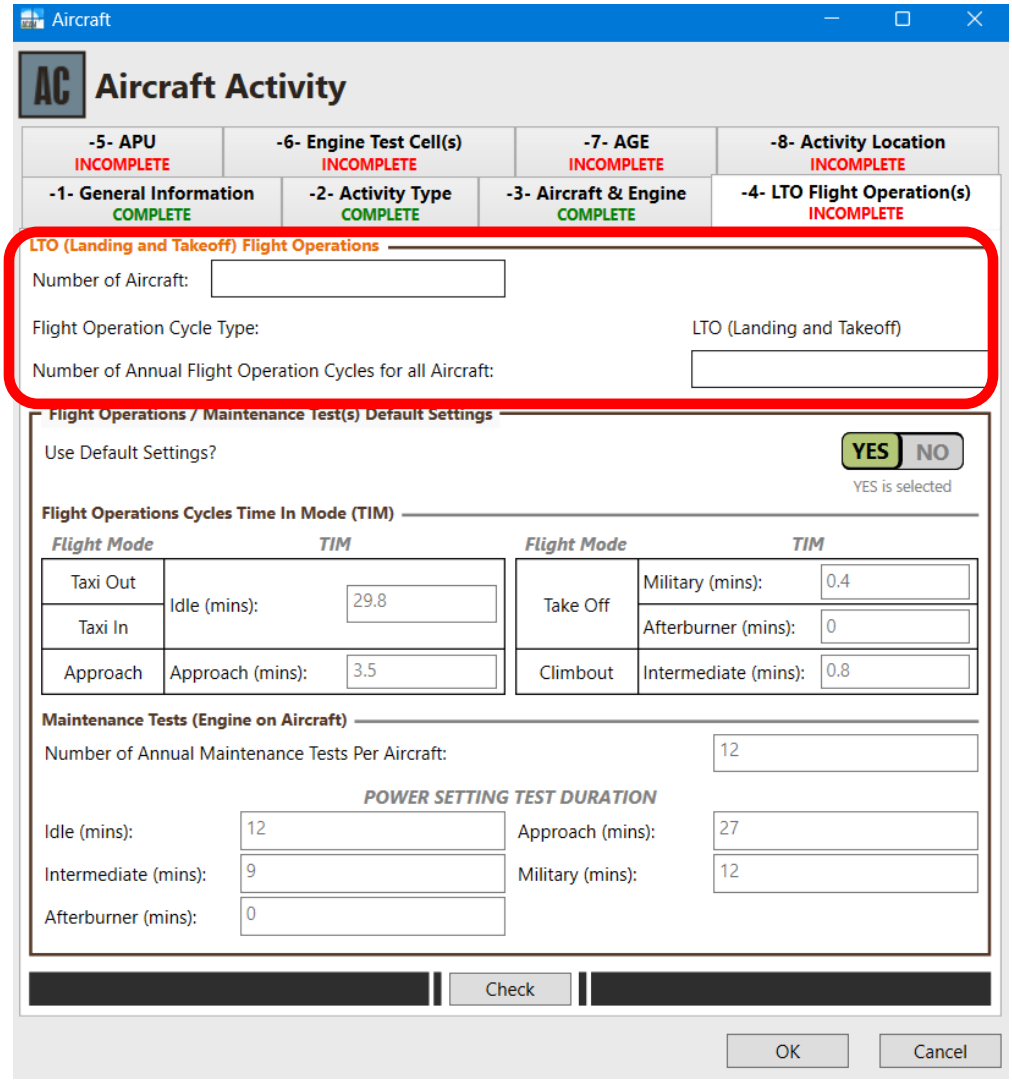


Figure 5.14 Flight Operations Tab

The total number of aircraft, as a result of the action (of a specific type), should be entered into the first text box, along with the number of LTOs, CPs, and LFPs as applicable to the definitions presented previously. **It should be noted that the values entered for LTOs, CPs, and LFPs are for <u>all aircraft of a type.</u> Meaning that these values are total values, not an individual value for each aircraft.** If there are more than one type of aircraft resulting from a proposed action, multiple Aircraft Activities must be present in ACAM.

NOTE: The default Time-in-Mode (TIM) for flight operations are only valid for general screening purposes, and for temporary beddown of aircraft. If a major beddown of an aircraft occurs, TIMs based off site specific noise data will be developed in house at the Air Force Civil Engineering Center

5.2.11 Auxiliary Power Unit

The APU tab is pictured in Figure 5.15. The APU tab is preloaded with applicable equipment, based on the aircraft selected. The user only needs to click the "Check" button and proceed to the next tab.

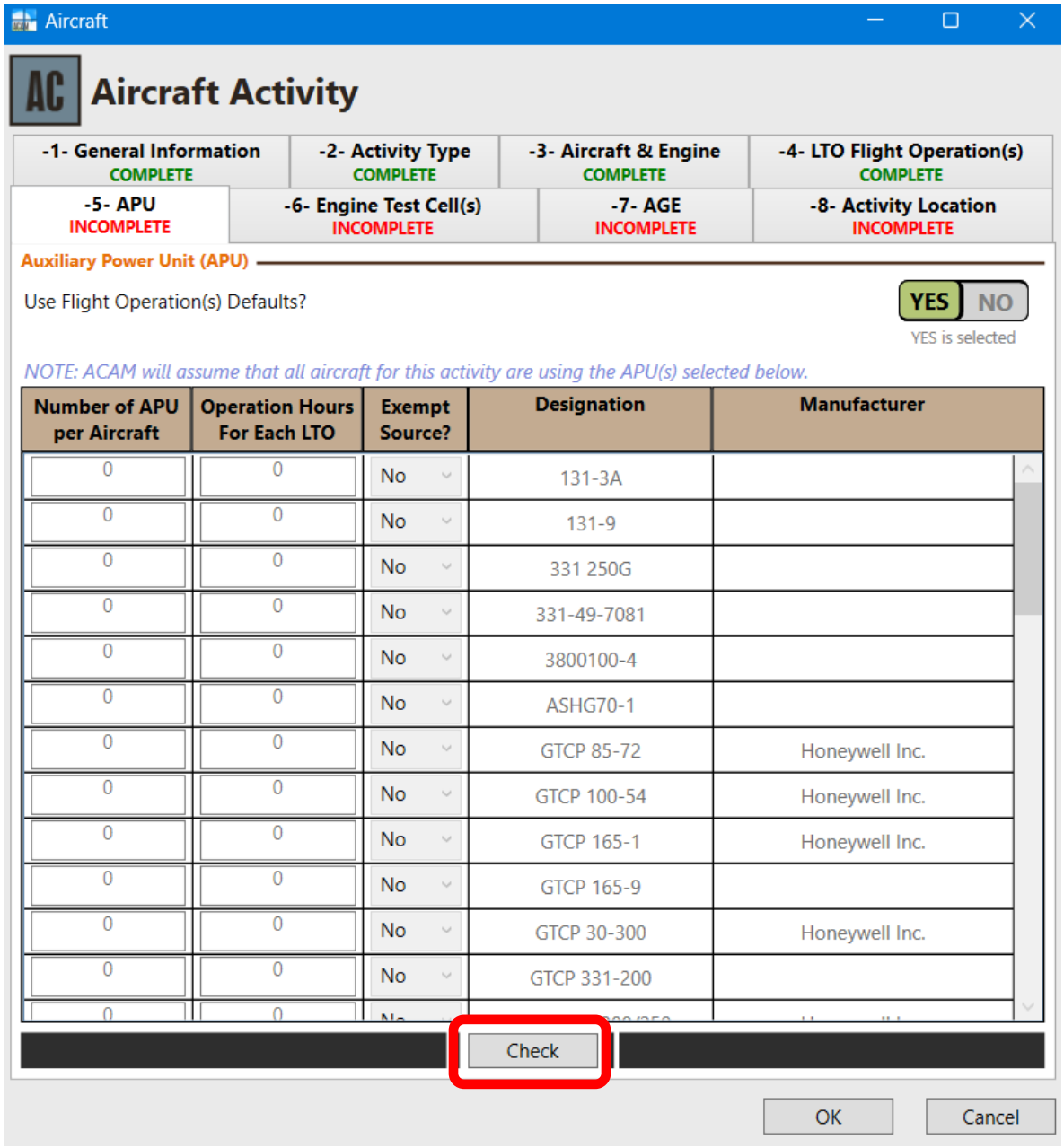


Figure 5.15 APU Tab

5.2.12 Engine Test Cell(s)

Similar to the APU tab, the Engine Test Cell tab (Figure 5.16) is preloaded with the applicable equipment and default values, based off previously input aircraft information. The user only needs to select "Check", then proceed.

Figure 5.16 Engine Test Cell(s) Tab

5.2.13 Aerospace Ground Equipment

Similar to APU and Engine Test Cell tabs, the Aerospace Ground Equipment tab (Figure 5.17) is preloaded with all the applicable equipment, based on the aircraft selected. The user only needs to select "Check" to complete this tab.

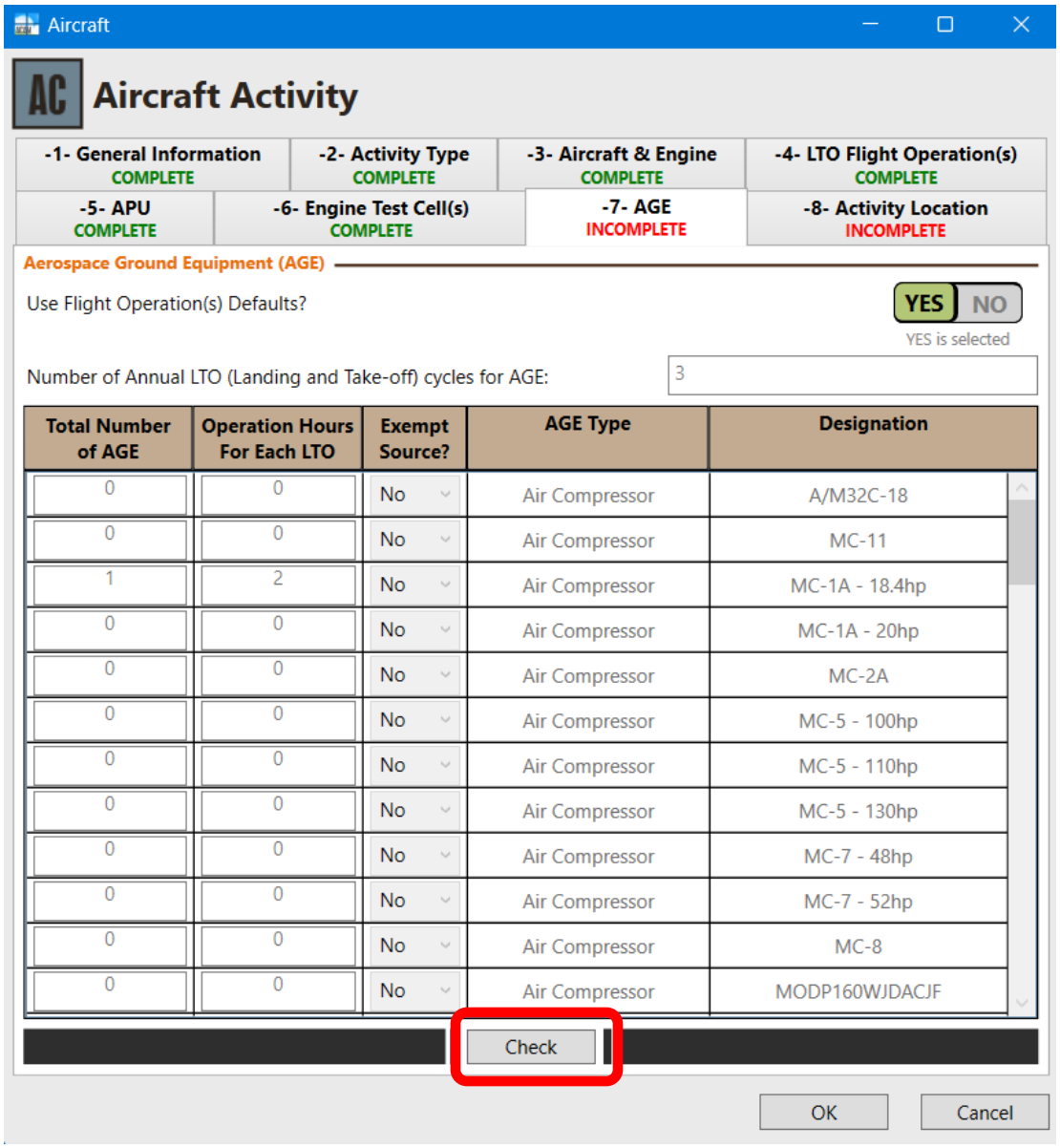


Figure 5.17 AGE Equipment Tab

5.2.14 Activity Location

Selecting the Activity Location tab will bring forth the following options in the Aircraft Activity window, pictured in Figure 5.18 In this window, use both drop-down menus to select the county and the base where the construction/demolition will take place.

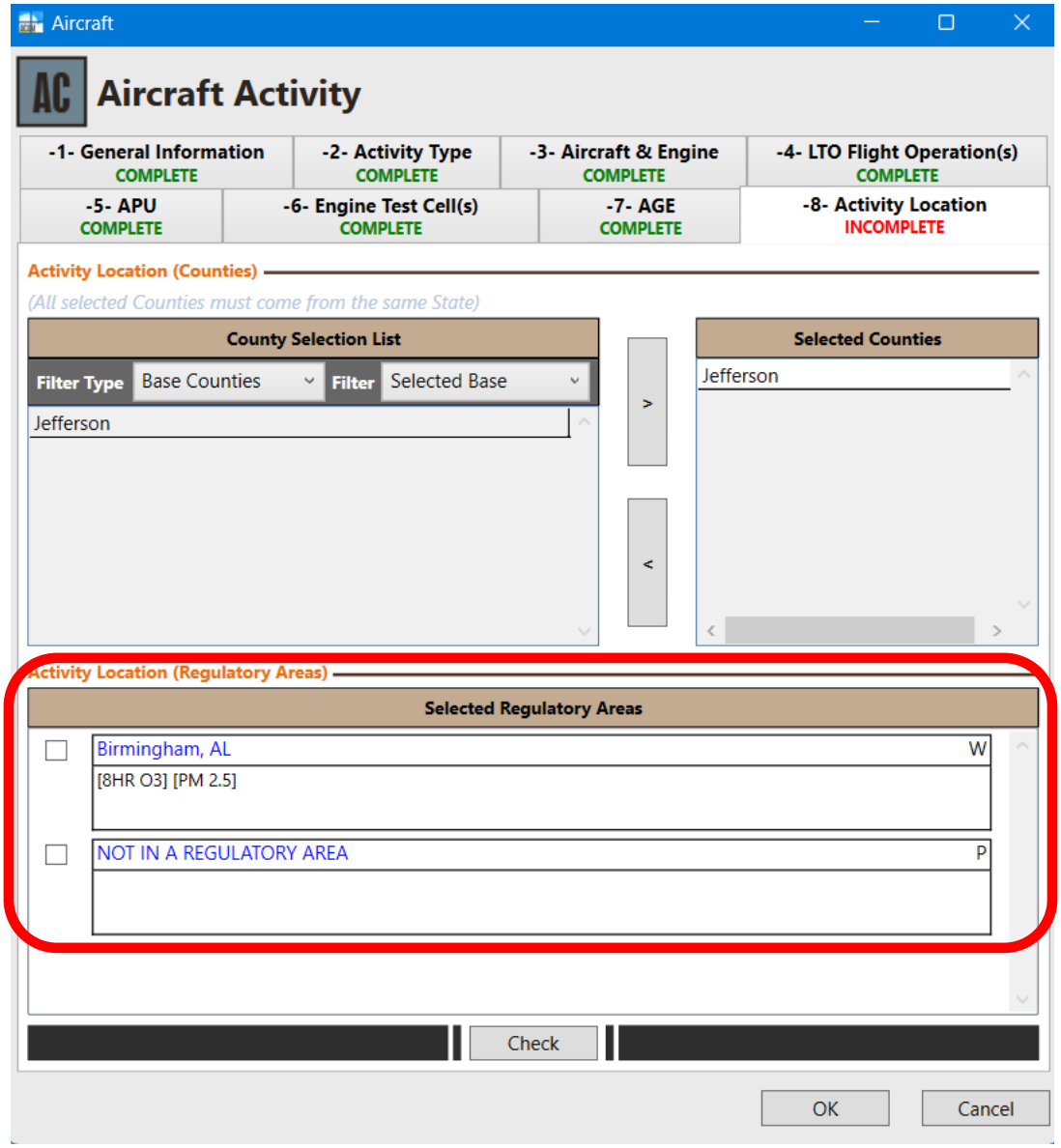


Figure 5.18 Activity Location Phase Tab

The Regulatory Area Section, pictured in figure 5.18 informs the user of the attainment status of the selected counties. Based on the location of the base, the regulatory area will be whole (W) or a partial (P). Check the output given in the Regulatory Area section of the window (shown in red in figure 5.19) to complete the Construction Demonstration activity.

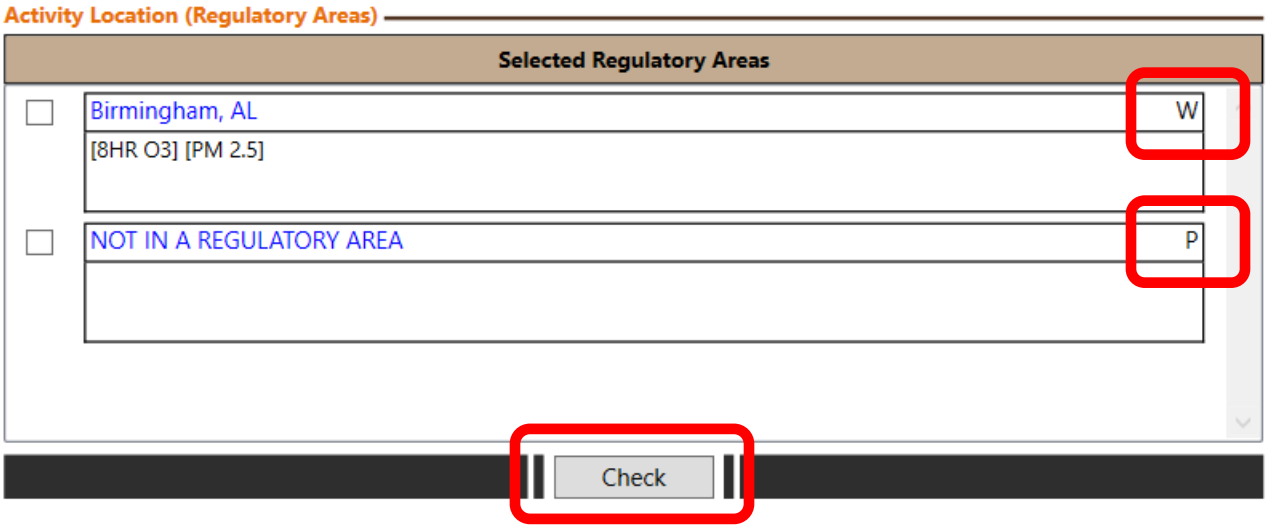


Figure 5.19 Selected Regulatory Area Section

NOTE: Partial regulatory areas must verify which areas pertain to your air force base.