

CMAS Extended Abstract: EDMS

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EDMS

The Emissions Data Management System (EDMS) is an emission inventory data warehouse and web-based application that provides a consistent approach to regional emissions tracking to meet the requirements for State Implementation Plan (SIP) and Tribal Implementation Plan (TIP) development and periodic review and updates. The EDMS serves as a central regional emissions inventory database and associated software to facilitate the data collection efforts for regional modeling, 309 tracking and resulting data analyses. The EDMS is the central repository for the data from the WRAP region that is used initially for air quality modeling in pursuit of meeting the requirements of the United States Environmental Protection Agency's (EPA) regional haze rule (RHR). The emission inventories contained within the EDMS consist of visibility impairing pollutants that are released into the atmosphere by different sources. The list of visibility pollutants contains:

- Volatile organic compounds (VOC);
- Oxides of nitrogen (NO_x);
- Sulfur dioxide (SO₂);
- Particulate matter (PM);
- PM with an aerometric diameter of less than or equal to 10 or 2.5 micrometers (PM₁₀/PM_{2.5});
- Elemental carbon (EC);
- Organic carbon (OC);
- Carbon monoxide (CO);
- Methane; and,
- Ammonia (NH₃).

The emission source categories that make up the inventory consist of:

- Point or stationary sources;
- Area/non-point sources;
- On road mobile sources;
- Off- or non-road mobile sources;
- Fires;
- Windblown dust; and,
- Biogenic sources.

The EDMS is used for technical and policy evaluations by Western Regional Air Partnership (WRAP) members, stakeholders, and other interested parties in the region. The WRAP has developed EDMS as an internet-based mapping tool that allows users to look at a map to view sources of air pollution. EDMS is about making information regarding air pollution emissions more understandable and more visual. The air pollutant emission information contained in EDMS is provided for general informational purposes only. Please consult the specific air agency entities for the most recent data available.

The development of the information contained in the EDMS is a joint effort between the Western Governor's Association and the States, Counties and Tribal entities that make up the data providers located within the WRAP region. Each entity that contributed to the EDMS system has made a major effort to make the information as accurate as possible. However, as with any system with millions of pieces of information originating from multiple sources, it is anticipated that some information may not be up-to-date or may not be accurate. Due to the manner in which emission information is reported, collected, and managed there can be a substantial lag time between when the emissions occurred and the reporting of the information to the EDMS. The WRAP entities will be making regular updates to the EDMS to correct data problems as they are identified.

What can EDMS do?

The EDMS maps can be used to answer questions like: What are the major sources of air pollution in the county where I live? What are the relative contributions of mobile sources and stationary sources? What sources are near my son or daughter's school? Which chemicals are emitted by a particular facility or mobile sources in this area?

What are EDMS' limitations?

Please keep in mind that there are limitations to EDMS, and ways to use it most effectively. Every effort has been made to provide helpful background information in the Self Help links.

1. **Emissions Are Not the Same as Exposure:** Please keep in mind that the emissions alone do not fully represent where and what extent of exposures to air pollution or possible health risks may occur. Weather and wind can result in exposures that occur in different locations from where the emissions actually occurred, and can create new pollutants due to chemical reactions in the atmosphere. Also, a larger number for emissions of a particular chemical may not be as important as smaller amounts of more dangerous chemicals. While air pollutant emissions information can serve as an indicator of local air pollution, it is the exposure to emissions that influences health effects. Exposure is the amount of pollution that someone actually breathes or otherwise ingests at a specific location. Exposure varies with distance from emissions sources, how the emissions are released into the air and dispersed by the wind, and in what locations a person spends their time doing various activities. The importance of the exposure to health risk also depends on the combination of multiple air pollutants, the relative toxicity of the pollutants, and many other factors. Exposure to air pollutants can also occur from indoor sources such as cooking, cleaning, and smoking; however, EDMS does not address the contribution of indoor sources. The EDMS does not map the exposure levels or the health risks associated with the pollutants and sources it tracks.
2. **EDMS Does Not Contain All Air Pollution Sources Or All Air Pollutants:** It is important to keep in mind that EDMS does not contain information on every source of air pollution nor does it show every chemical emitted. For example, mobile source emissions may include many criteria and some toxic pollutants, but mobile sources can also emit additional pollutants (e.g., PAHs) that are not covered in EDMS. EDMS contains facilities emitting the bulk of the criteria pollutant (smog-forming) emissions and many of the larger or important sources of toxic air pollutants. However there is a much lower number of facilities with toxic air pollutant information in EDMS than for criteria pollutants.
3. **Emission Estimates Are Based On Average Conditions:** EDMS is intended to provide a visual, map-based window into the WRAP's emission inventory database. The emission inventory covers routine, annual air pollutant emissions. Process upsets and accidental releases are not typically included.
4. **Emission Estimates Are Based On A Variety Of Factors And Assumptions, And Are Not Exact Measurements Of Emissions:** Emission inventories provide estimates of the air pollution released from sources but are not an exact accounting of actual amounts.

Emission estimates are based on overall average conditions (not any specific day), and are generally based on a limited number of source tests, available emission factors, or material balance calculations for similar types of sources. The exact locations of the releases may not be reflected in detail, nor the types of stacks or other release characteristics that influence how the emissions may affect downwind areas.

5. **Industrial And Commercial Facilities Are Not The Only Sources Of Air Pollution:** While the locations of industrial and commercial facilities may appear on the EDMS maps, they are not the only sources of air pollution. Cars and trucks are responsible for the largest percentage of air pollution in the region, and generally pose the most prevalent health risks. EDMS tools can show the combined contributions of mobile sources, together with other sources like industrial sites.
6. **Informational Purposes:** The air pollutant emission information contained in EDMS is provided for general informational purposes only. Please consult the specific air agency entities for the most recent data available.

EDMS is best viewed using Internet Explorer (version 5 or higher). Netscape Navigator (version 4.6 or higher) is also generally satisfactory. For best results, use a minimum screen setting of 1024 x 768 pixels, and use a "Text Size" setting of Medium (or Small), to ensure that all buttons will be visible without excessive scrolling or re-sizing of windows.

Overview

The EDMS system allows data to be reported by reporting agencies, performs quality inspections of submitted data, redresses specific data shortcomings, and allows the extraction of data via reports and exports. It has the additional capabilities of offering general and specific assistance to users in the form of documentation, links to other sites, and answers to frequently asked questions.

EDMS Functionality is organized by types of users based on the activities those users applicable to the user class. The user types and their description are listed below.

| | |
|---------------------|--|
| General User | The General User has capability to view data stored in the database and export predefined data sets. |
| Data Analyst | The Data Analyst has all of the capabilities of the General User and has the additional ability to perform ad-hoc queries, reports, and exports. This user role is typically used by agency personnel and air quality professionals. |
| Data Owner | The Data Owner has all of the capabilities of the Data Analyst and has the additional ability to upload data to the EDMS system. Agency personnel charged with the responsibility of reporting data occupy this role. |

There are two additional user types that are not public and are used to administer the system. In the Functionality section that follows, menus and screens are presented. Not all menus and screens are available to all user classes. Notation has been added to the menus and screens available only to certain user classes.

Standard Reports

The Standard Reports feature of the EDMS offers broad capability for data viewing and analysis. Figure IV -4 enumerates several features described in the following paragraphs.

The Standard Report page is organized using a tabular or multi-tabbed form. The tabs are organized into Standard, Clean Air Corridor (CAC), P₂TSO₂ (Pre-Trigger SO₂), Mobile, and Fire Sector groupings. Users can navigate from tab to tab by clicking on the tab of interest.

Each report is numbered and is identified by a detailed description.

Users may view data in graphical or tabular format by clicking the icon associated with the desired report under the Graphs and Tabular Data column. Figure IV-5 shows the Graph and Tabular Data screen, the features of which are detailed in the following paragraphs.

1. View Tabs

Users may select either the Graphical or Tabular views. The Tabular view shows data as numeric values in typical report format. The grouping and format of the numeric display varies by report. Users have the ability to print the report and/or export the report to Microsoft Excel or text formatted files. The remainder of this section describes features associated with the Graphical Chart View.

Users may select the data to report on using the pulldowns. Users may select the entire WRAP region or states/tribes within the region. Counties may be specified where applicable. Finally, users may report on all sectors or by individual sectors. The Report Title shown in the main portion of the screen is updated automatically when the user has confirmed the selections using the GO button at the right of the screen.

Users may select graph type by which to show the selected data. Bar, pie, doughnut, and line charts are available. The display may be either animated or static as specified in the Graph View Section. Graphs may be exported as either .JPG or .PDF files by clicking on the applicable export type once the desired graph has been obtained.

GIS/Dynamic Reports

A graphical depiction of the GIS section of the EDMS, including notation specific to the following discussion, is shown in Figure IV-6. The WRAP EDMS web map is comprised of three sections of interaction: the map container, control panel, and query interface panel. First, the map container displays the current view of the WRAP and allows for simple querying and selection of map features. The control panel contains tools for manipulating the map from zooming and panning to loading new map layers. Lastly, the query interface panel facilitates loading and displaying WRAP information from the database.

When the map first loads, the WRAP states (including Alaska and Hawaii) are displayed. In the upper left corner of the map container there is a menu that contains buttons to launch help topics for the map. The next menu buttons select between the two tools that are available for directly interacting with the map: the pointer and selection tool. When one of the tools is selected, remaining buttons on the menu represent options or actions that may be taken with that tool. The pointer tool is used for displaying map feature information and measuring distances. Measuring distances is also accomplished by using the pointer tool. Simply click the map to create a starting point and click again to set the distance to calculate. The measurement is automatically displayed in the map control panel.

The second tool used for interacting with the map container is the selection tool. By left clicking and dragging on the map container, the selection tool allows for areas of interest to be created. These areas are displayed on the map as translucent rectangles. By clicking the select button on the map container menu, the features within the area of interest become highlighted. Appending to the selected feature set is accomplished by creating a new area of interest and once again, clicking the select button. Selected features can then be used to query the database as described in subsequent sections. To un-highlight all features on the currently displayed layer, click the unselect button on the menu.

Zooming and panning as well as loading new layers into the map is easily done using the map control panel. At the top of this panel there is a thumbnail of the base map that shows the WRAP states. On top of this thumbnail lies a translucent square that represents the viewable map area. To zoom in on the map, click the magnifying glass labeled with a plus sign. This changes the magnification of the map from 100% to 200% and can be repeated up until 1600%. One should note that the viewable map area square on the thumbnail gets smaller as the magnification gets higher. Clicking on the magnifying glass marked with a minus sign causes the map to zoom out. To pan the map, left click on and drag the translucent square on the thumbnail. When the mouse button is released, the map container will refresh and will display the new viewable area. The map cannot be panned if the current zoom factor is 100%.

Below the map thumbnail is the distance tool. If a distance on the map has been specified with the pointer tool, the measurement in miles is displayed here. That measurement can be recalculated in kilometers by clicking the checkbox labeled "km". Clicking that checkbox again changes the distance units back to miles. The reset distance tool button clears the specified distance and the points that were clicked in the map container.

Aside from the WRAP states layer, there are twenty additional layers that can be loaded into the map. Generally, the lower the layer in the list, the higher precedence it has when it is loaded and hence, displayed on the map. For example, if counties, MSAs, and rivers are loaded, rivers will be displayed on top of MSAs which would be visible over the counties. Once a layer is loaded, it may be turned off by clicking the associated checkbox. This causes the layer to not be visible in the map container. Clicking a hidden layer's checkbox again turns the layer back on which makes it visible. To have access to Class 1 and non-attainment layers, click the checkbox that is labeled "Show More Layers". If selections are highlighted in a layer and that layer is either overwritten by another layer or turned off, the selections are subsequently removed.

The final section of the WRAP EDMS web map is the query interface panel. This panel is used to load data from the database and display the results in a text format or insert the data into the map. There are four steps that are required to display the results of database query:

1. select features (State/tribe, county, etc.);
2. create the selected feature list;
3. determine additional query options, and
4. fetch the results.

The selected feature list is filled by clicking the Update button. The selected features in the map container will be inserted into the list. If the list is empty after the update button is clicked, then there are no features selected on the map. Next, the query options must be set. The data year, type, and version as well as the emission sources are inputs to the query. The drop down menu and check box values may be changed to create several different query combinations. Finally, selecting the type of results and clicking Run Report will send the query to the database and return the results. If the results were to be sent to the map (GIS Display was selected), select the pointer tool and move the mouse over queried features. The data window will display a bar graph and/or text numerical values. Otherwise, a window will be opened that contains the results of the query.