Emission Data Management System for the Western Regional Air Partnership

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ABSTRACT

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 Western Regional Air Partnership (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. This Internet web page-based system is capable of:

- Receiving and storing emissions data in United States Environmental Protection Agency (EPA)-compliant emissions reporting formats commonly used by various agencies and sources with little or no additional effort;
- Receiving and storing EDMS-specific emissions information;
- Producing user-specified reports (including model-ready input);
- Performing user-selected quality control and assurance (QA/QC) tests;
- Allowing data queries and graphic display; and
- Displaying this information as geographic information system (GIS) displays, flat files, air quality model-ready input files, and in other formats.

The EDMS can also receive, store, process, and display combinations of the emissions and activity data, as well as emissions calculation methods used to estimate emissions inventories. The display capabilities include GIS functionality; tabular, and flat file data formats; graphs and charts; and the ability to capture these displays in user-defined report formats. This data system is accessible via the website: www.wrapedms.org.

INTRODUCTION

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 Western Regional Air Partnership (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 (SO_2);
- Particulate matter (PM);
- PM with an aerometric diameter of less than or equal to 10 or 2.5 micrometers (PM_{10}/$PM_{2.5}$);
- Elemental carbon (EC);
- Organic carbon (OC);
- Carbon monoxide (CO);
- Methane; and,
- Ammonia (NH_3).

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 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.

This paper is organized into sections describing the Data Management Requirements and Functional Implementation. The Data Management Requirements section generally describes the needs to be addressed by the system; the Functional Implementation section describes how those needs were addressed.

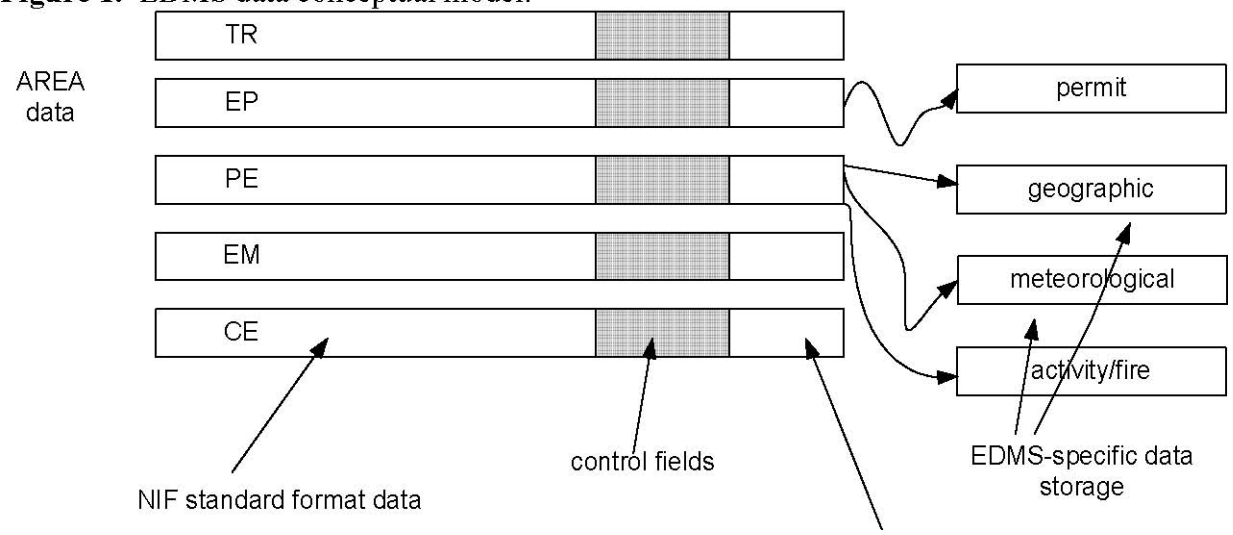
DATA MANAGEMENT REQUIREMENTS

General

The data management strategy of the EDMS is to define a database that can accept the National Emissions Inventory (NEI) Input Format (NIF) transactions from data providers as an acceptable submission, and to extend the data model such that EDMS-specific information can be submitted using

the same process. The extended data model has additional fields to accommodate the EDMS-specific information. The conceptual model is shown in Figure 1.

Figure 1. EDMS data conceptual model.



EDMS-specific fields

- keys
- versioning
- labeling

NIF-standard fields are defined by the EPA. To manage and facilitate data manipulations, Pechan has established a number of control fields for NIF data. Additionally, fields specific to the EDMS data management are appended to the existing NIF data management schema. These fields contain only keys, version indicators, and pointers to other data structures. This approach is intended to house EDMS-specific data in separate data containers to minimize redundancy and increase data consistency across sectors.

Many jurisdictions have different reporting thresholds tied to other environmental regulations. Therefore, the WRAP EDMS does not enforce a minimum emissions level in order to accept submitted data. Data providers bear the responsibility of determining which sources to report and include in the EDMS. The consequence of the variation in definition among sectors can potentially result in misleading comparisons among jurisdictions. For example, two contiguous counties of otherwise similar makeup might be shown as having very different area/nonpoint source emissions. The difference in the counties, however, lies not in different levels of activity occurring in the counties, but rather in the fact that one county includes point sources under a certain numeric emissions threshold in the area source estimate, while the other county, as a matter of policy, uses a higher or lower emissions threshold definition for point sources.

Fire

The Fire sector harbors information on five fire types: wildfires, prescribed burning, wildland fire use, agricultural burning, and rangeland burning. The Fire sector is intended to be a current repository of fire activity information, allowing users to input data in temporal periods as small as one day.
The Fire sector requires a unique format for importing data into the EDMS due to the emissions calculation capability of this sector. The Fire data input format is composed of the following tables:

- ANF Activity Fire Detail;
- ANF Activity Detail;

- ANF Activity Geographic;
- ANF Activity Meteorologic; and
- ANF Activity Permit (Phase II).

The WRAP EDMS requires the use of SCCs to track the five fire types. This data is necessary not only to distinguish the different fire types, but also for use in exporting fire data into the NEI, which uses the SCC as a key data component. Thus, using SCCs will be essential for NIF data exports. Wildland Fire Use is a synthesis of the wildfire and prescribed fire types. EPA reports data concerning this fire type under either the wildfire or prescribed burning SCCs. SCCs for Wildland Fire Use and Rangeland Burning fire types will be defined by the EPA's Emission Factor and Inventory Group.

The science of collecting and storing fire emissions is an emerging practice. Pechan worked closely with the WRAP's Fire Emissions Joint Forum on the specifications and behaviors of the EDMS Fire Module. Fire information is currently stored in EDMS using a point source file format.

Tribal/County Emissions Accounting

The EDMS is designed to include emissions estimates and related data developed by Tribes for their reservations for all sectors. With the exception of the point source sector, data submitted by tribes will overlap with county level data developed by EPA, state, and/or local agencies. The EDMS data structure includes a NAR/County Overlap Table that houses jurisdictional overlaps for counties and tribes in the WRAP geographic area. This table was prepared by the Institute of Tribal Environmental Professionals (ITEP). In cases where both the county and tribe have submitted emissions data, personnel from the WRAP, the EDMS database administrator, the state/county/local agency, the tribal agency, ITEP, and/or the National Tribal Environmental Council meet to resolve the overlap by determining the appropriate activity level, emission factor, and/or emission estimate for the overlapping source categories.

Audit/Control Requirements

Each table in the system has an associated audit table to track all modifications to the table. The audit table contains one record for every new addition and two records for every change (the "before" copy and the "after" copy), and a copy of every deleted record from the main table. The audit table contains a timestamp field to indicate when the change/addition/deletion occurred, a primary key to indicate uniqueness, and a field to indicate the type of change that occurred.

Data Versions

The EDMS database is composed of a set of tables to store and manage the emissions information. Each set of tables houses multiple versions of the emissions data according to the following scheme:

- An actual, or base year, inventory of data from the data providers will be maintained as the baseline inventory.
- The baseline inventory will change over time as data providers update, remove, or add data. On a periodic and/or on demand basis, the DBA locks the *Actual* version of the database (e.g., Version 1.2). No modifications to a version are possible after the database has been locked, however, modifications to the *Actual* data can be applied under a different version number (e.g., Version 1.3). Locking events will be announced through email to users that have expressed interest in receiving such notifications. A Version Content Report is available in the Standard Reports section that identifies locked versions and their content.

- Only data provided by data providers appears in the *Actual* inventory type. Data originating from sources other than the data providers, including gap-filled data, appears in a different inventory type, such as Modeling.
- The database also houses multiple inventory types for a given baseline inventory. For example, Planning, Sensitivity Runs and Forecast inventories based on a particular version of the baseline inventory can be stored.
- The method by which database types other than *Actual* are spawned is through a cloning event. In phase I, the DBA creates a clone of the *Actual* database for the intended purpose, such as forecasting or sensitivity analyses.

The fundamental identifiers for an inventory are accordingly Year, Type, and Version. The number of versions and inventory types is virtually limitless within the confines of the database. Each emissions inventory-related record in the database has an inventory identification field associated with it. A unique inventory is identified by year (e.g., 2002), an inventory type (e.g., Modeling, Planning, Sensitivity Run, Forecast), and version name.

The Inventory Description Document available through the EDMS interface is a spreadsheet that details the history and contents of each inventory available in the EDMS. Through this tool, users know the precise composition of each inventory.

FUNCTIONAL IMPLEMENTATION

The EDMS system allows data to be reported by state/local/tribal 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 via documentation, links to other sites, and answers to frequently asked questions.

EDMS Functionality is organized by types of users based on the activities 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 have this status.

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.

Users submit their registration information securely; the request is entered in "*Pending Authorization Mode"*. Email will be sent to this new user regarding this pending status and another email will be sent to EDMS DBA. The DBA logs into the Administrator Module and approves/disapproves the user and assigns correct user rights. A final email is sent to the

new user confirming approval/disapproval. Users can expect response from the EDMS DBA within one business day.

All persons logging on and requesting access to the EDMS are granted General User status. The EDMS Database Administrator is authorized to grant these requests without review by the WRAP Emissions Forum or Technical Coordinator. All persons requesting Data Analyst or Data Owner status are advised that their request is under review, and their registration information is shared with the WRAP Technical Coordinator. The EDMS Database Administrator and WRAP Technical Coordinator review and act on these requests within 7 days, and for approved requests, the EDMS Database Administrator notifies the person by e-Mail. If a request cannot be resolved by consultations between the EDMS Database Administrator and the WRAP Technical Coordinator, then the person will be notified that their request needs the review and approval of the WRAP Emissions Forum. Additional information may be requested of the person requesting Data Analyst or Data Owner status prior to action by the Emissions Forum.

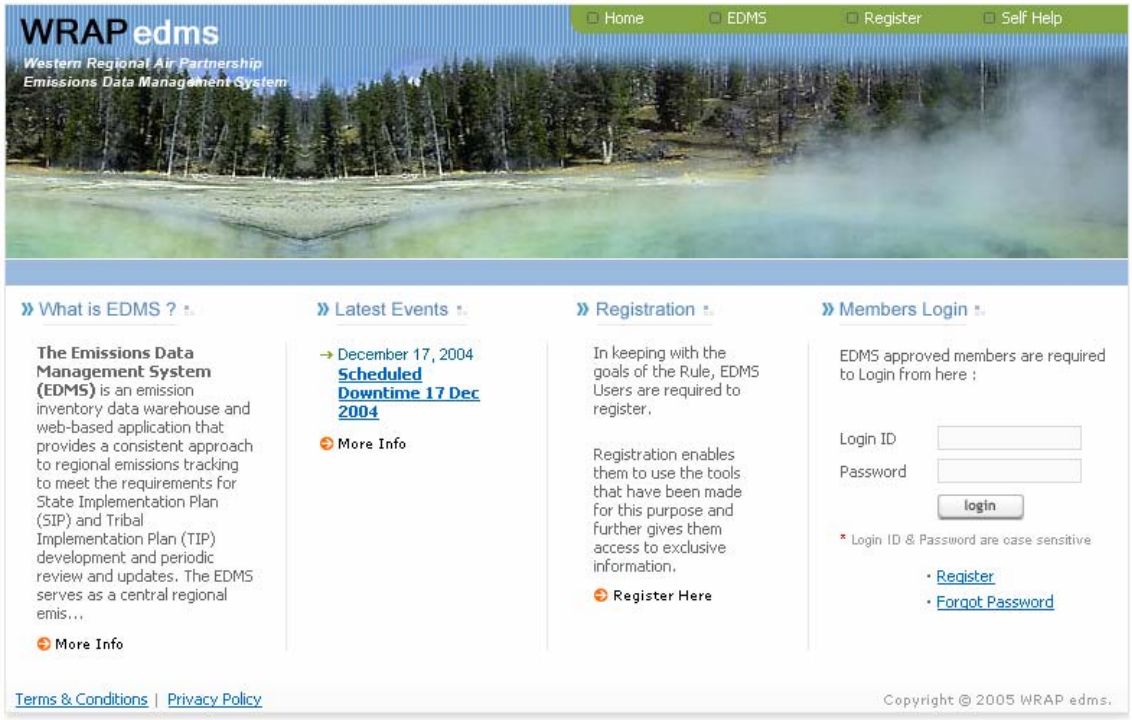
The following sections detail functionality available to users. Some functionality is available only to certain user classes. These features and the associated restrictions have been noted for clarity.

Login Page

The web address of the site is: www.wrapedms.org. A graphical representation of the Login Page appears as Figure 2. Significant functionality is available on the Login page, including:

- **What is EDMS?** – provides summary descriptive information about the EDMS for new or otherwise uninformed users.
- **Latest Events** -lists upcoming events relevant to the EDMS community.
- **Registration** - collects user information and permits the registration of user name and password. The EDMS system is available to all users, however, all users must register.
- **Documents** - offers reference materials to the EDMS user community.
- **Important Links** -contains hyperlinks to sites of interest to the EDMS community.
- **Forgot password** – allows users to receive their password at their registered email address.
- **FAQ** - provides users the answers to commonly asked questions without requiring the user to look up the information in the User Manual or other documentation.
- **Terms and Conditions, Privacy Policy** - contain policy information about the EDMS.
- **Contact Us, Report a Problem** -allow users to contact the WRAP directly, providing contact information as well as the ability to send email from within the EDMS application.

Figure 2. The EDMS login screen.



General User Capabilities

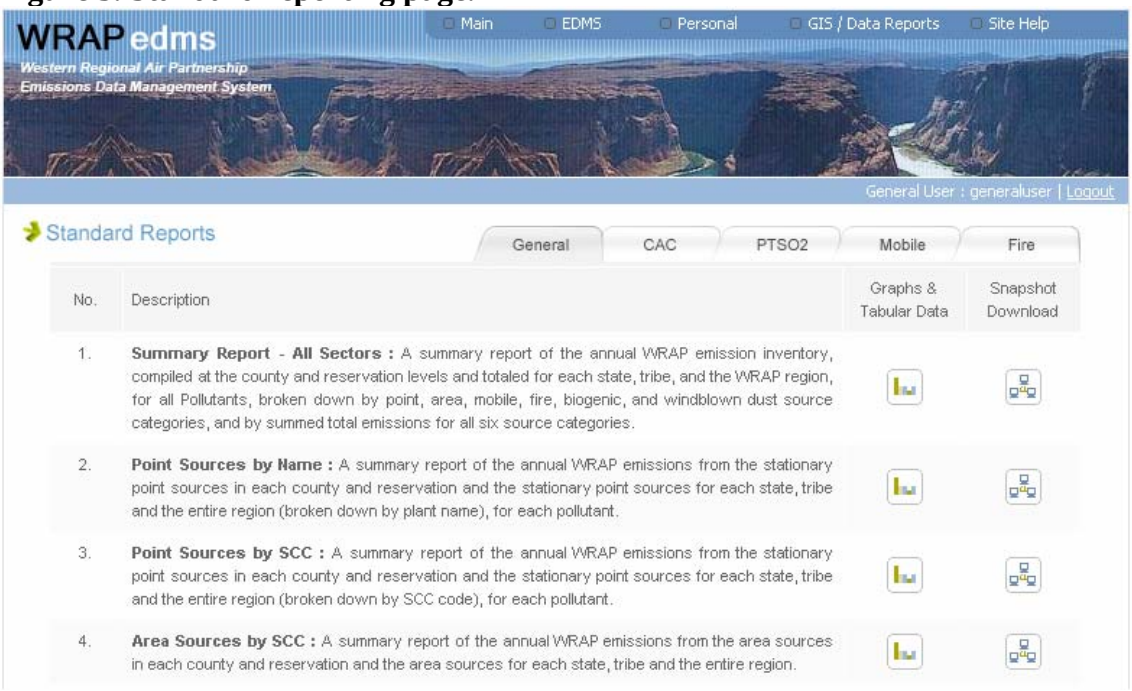
This section describes the features available to General Users that have not been described in the previous sections. The Menu Selections available to General Users follow.

Menu Selections:

• Main Dashboard	• EDMS What is EDMS? Contact Us	• Personal Edit Personal Info	• GIS/Data Reports Standard Reports GIS/Dynamic Reports	• Site Help FAQs Events Documents Public Links Report a Problem

The Dashboard serves as a "home-base" for users and shows user-specific statistics relevant to the EDMS system. The Edit Personal Information page allows users to update their information, including password and username management. The Standard Reports interface, as shown in Figure 3, offers broad capability for data viewing and analysis.

Figure 3. Standard reporting page.



The Standard Report page is organized using a tabular or multi-tabbed form. The tabs are organized into Standard, Clean Air Corridor (CAC), PTSO2 (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 download comma-delimited files of the data snapshot from with reports are taken. The comma-delimited information can be loaded into the user's analysis tool of choice, such as Access, Excel, FoxPro, GIS applications, or others. 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 4 shows the Graph and Tabular Data screen, the features of which are detailed in the following paragraphs.

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.

Users may also select the data to report using the pulldowns. Geographic selections include the entire WRAP region, states/tribes within the region, or Counties. Finally, users may select report for all or 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 among graphical display alternatives which include bar, pie, doughnut, and line charts. 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 accessed.

Figure 4. Graph and tabular data screen.

GIS/Dynamic Reports

A graphical depiction of the GIS section of the EDMS, including notation specific to the following discussion, is shown in Figure 5. The WRAP EDMS web map includes 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.

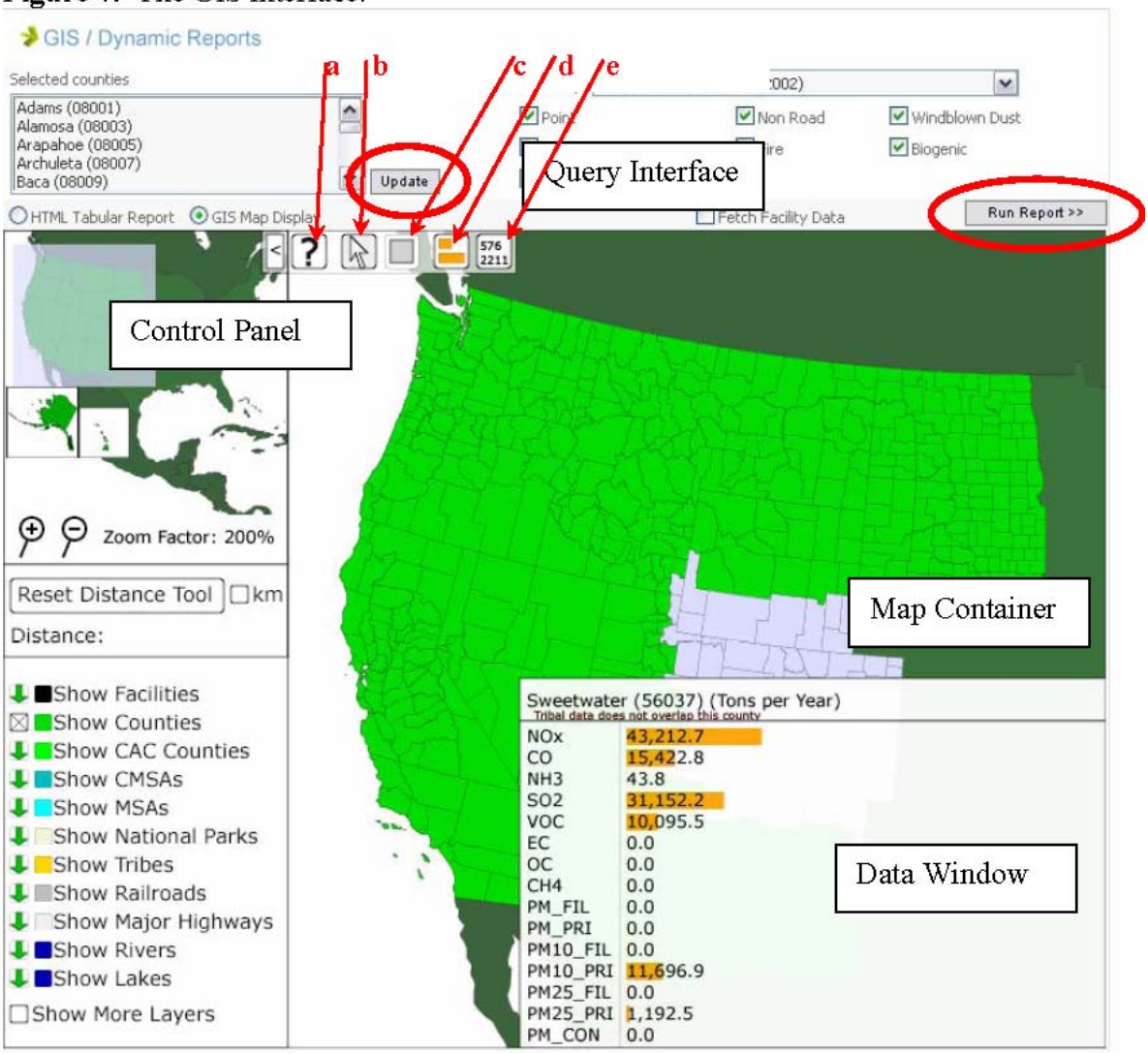
Zooming and panning as well as loading new layers into the map is easily done using the map control panel. At the top of this panel there is a thumbnail of the base map that shows the WRAP states. On top of this thumbnail lies a translucent square that represents the viewable map area. To zoom in on 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%.

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.

Jim, I can't change this figure #.without the original figure file. This Figure number is actually part of the figure itself. Now figure 5.

Figure 7. The GIS interface.



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:** select features (State/tribe, county, etc.); create the selected feature list; determine additional query options, and fetching 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.

To open a window that contains information for a particular visible feature, move the mouse over that object. For example, to see the information that is currently loaded for California, move the mouse over the state. A translucent window will appear in the lower right corner of the map container – this is called the Data Window. The Data Window displays the name and emission summaries that are currently loaded for a specified feature (note that emission data needs to be returned from the database before it is displayed). Emissions are displayed in the Data Window as graph bars and/or text numerical values. These Data Window options can be turned on and off by clicking the related buttons (see *Histogram Toggle* and *Values Toggle* below) in the map container menu.

The help button (a) provides users with directions on how to extract and view data via the GIS interface. The pointer tool (b) 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.

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.

By left clicking and dragging on the map container, the selection tool (c) 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.

The histogram toggle (d) controls whether the data window includes horizontal bars proportional to the emissions in the display. Clicking the control changes its state (histogram on or off). The values toggle (e) controls whether the data window includes emissions values in tons in the display. Clicking the control changes its state (values on or off).

Data Analyst Capabilities

The Data Analyst has all the capabilities of the General User, plus the ability to use the Ad-hoc report writer and Modeling export features. This section describes the features available to Data Analysts that have not been described in the previous sections.

Modeling

This interface produces an IDA-format file for subsequent processing in the SMOKE model (see Figure 6). The *Modeling Query* tab is used to specify criteria to define the query producing the modeling file. As criteria are selected, more specific criteria are given. If the report is small, it will be run immediately. If the report cannot be run immediately, it will be scheduled for overnight processing. The *Modeling Query Results* tab displays the status of scheduled queries. The *Modeling File Exports* tab is used to select and download completed reports.

Each field on the form can be used to define the parameters of the query. The buttons at the bottom of the form may be used to initiate processing of the modeling file, or to reset the form to its default values.

Ad-Hoc Query

The Ad-Hoc Query page, shown graphically in Figure 7, is used to generate a data file that can be used for specific user reporting and subsequent analysis. By changing the values of search criteria, a specific dataset can be created. The Ad-Hoc Query interface operation is similar to the Modeling Interface described above.

Figure 6. Modeling interface.

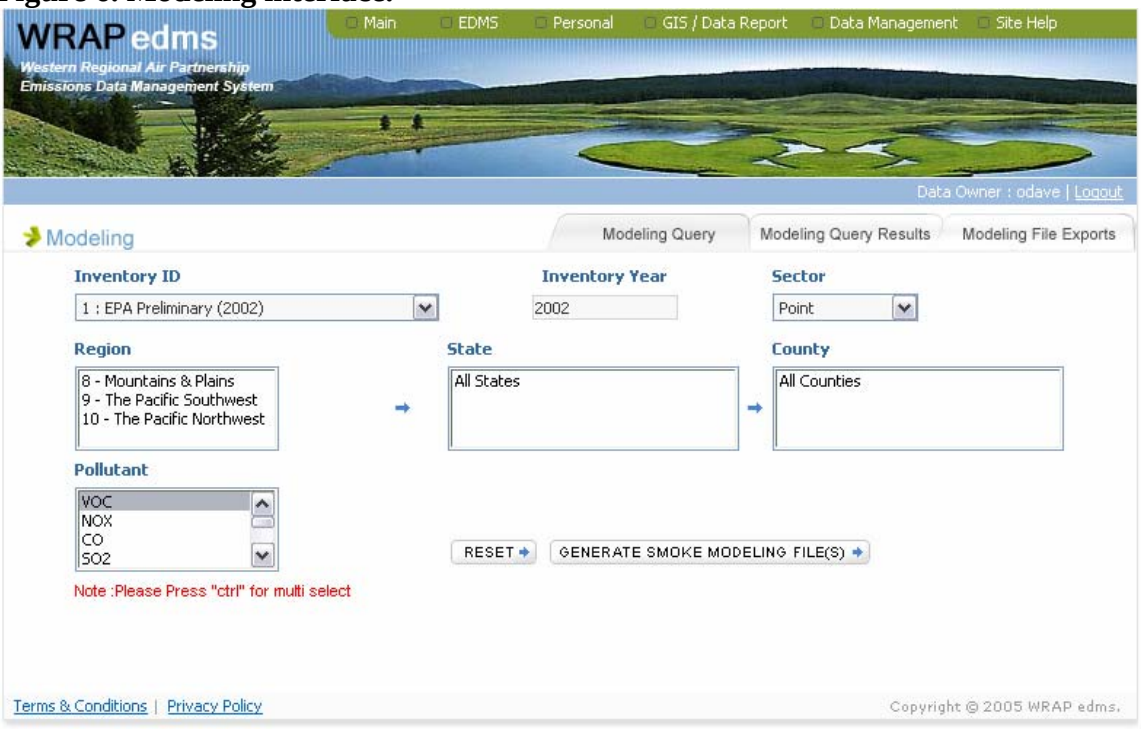
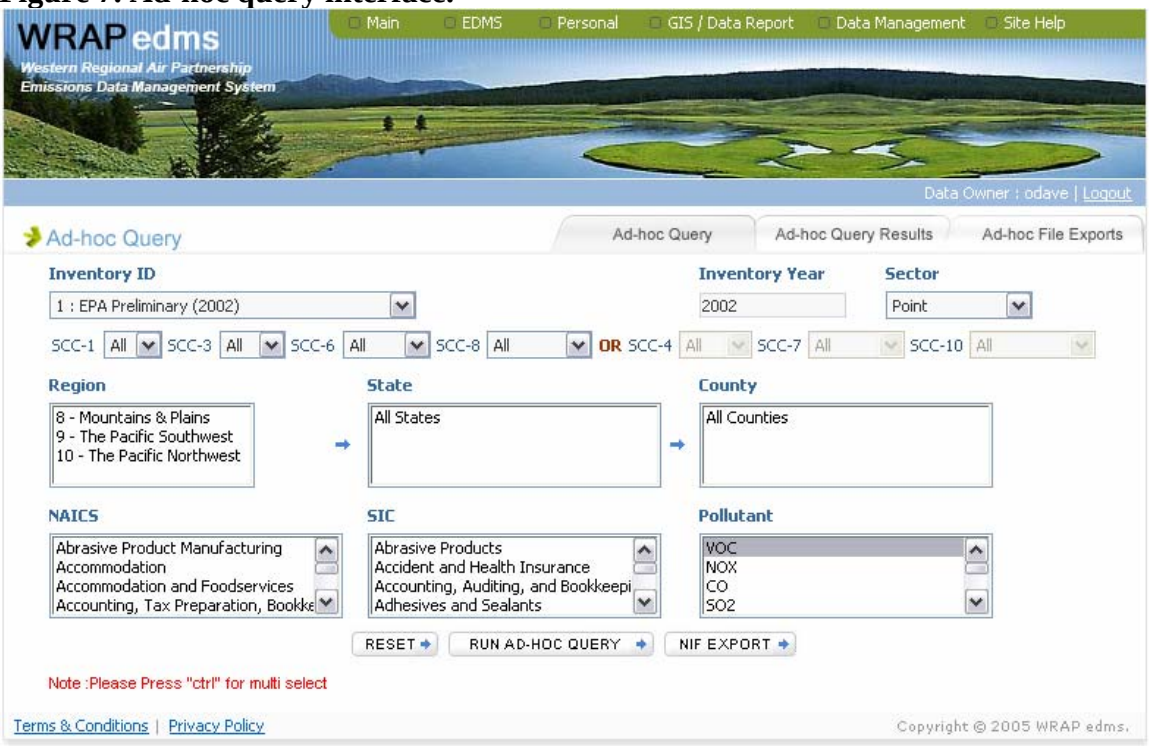


Figure 7. Ad-hoc query interface.



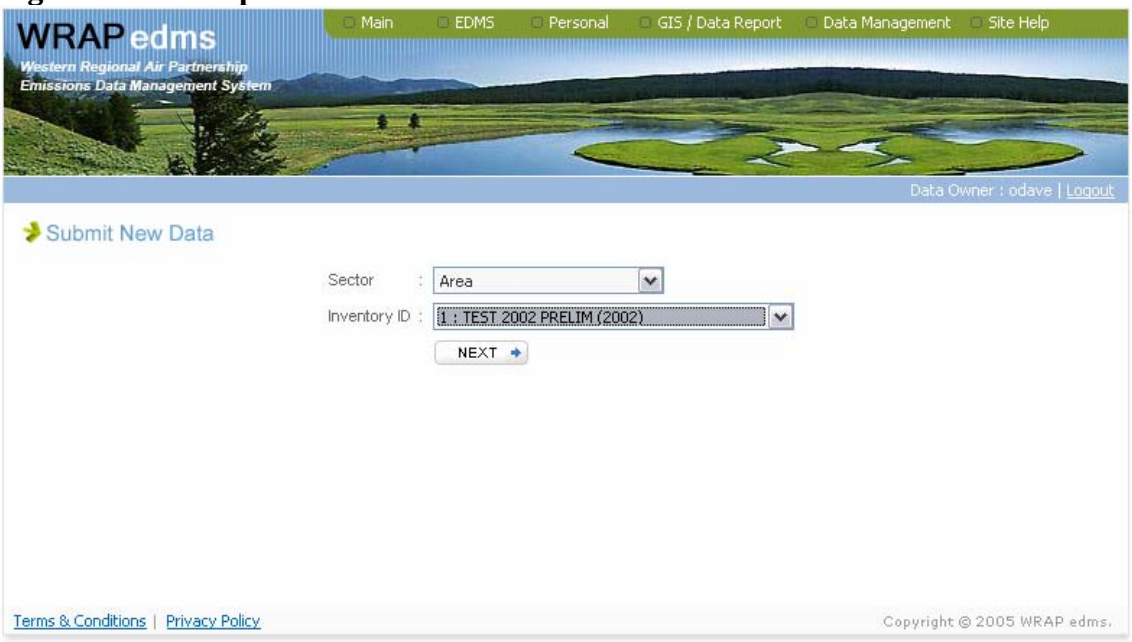
Data Owner Capabilities

The Data Owner has all the capabilities of the Data Analyst, plus the ability to upload data to the EDMS system. This section describes the features available to Data Owners that have not been described in the previous sections.

Submit New Data

The Submit New Data capability gives qualified users the ability to upload data to the EDMS database for inclusion in the database. The initial screen is shown in Figure 8.

Figure 8. Initial upload screen.



Users are prompted for the sector and the number of counties that include Native American Lands. Users must select an inventory to which the data is to be uploaded. Clicking the Next button advances the user to the subsequent screen.

On the following screen, the user is prompted for the file to be uploaded, and for any comments associated with the upload. By clicking the Browse button, users may select a file from their local computer or network for upload using the standard file selector interface. Upload files should be compressed using the ZIP protocol. The Zip file should contain a complete set of EPA's NIF 3.0 files for a sector in .MDB format. The zip file name should be the same as the Access MDB filename (including letter case) except for the filename extension. The NIF 3.0 format specifications and related files are available at http://www.epa.gov/ttn/chief/nif/index.html.

Users are advised immediately as to the success or failure of the upload process. Subsequent data processing is discussed in the following section.

File/Data Import Status

Processing of files uploaded to the EDMS is a timed event that occurs overnight. Users can track the progress of their upload using the File/Data Import Status screen (see Figure 9). This screen shows each job with its submittal data, file name, sector, inventory ID, and Transfer Job ID (a unique identifier). A legend for the symbols used in these columns appears in the lower left-hand corner of the screen. Each record has associated with it a detail screen that shows all information on the upload status, including error messages associated with any action in the upload process. The transformation of uploaded data into production or final EDMS data is discussed in the following paragraphs (see Figure 10).

Transfer Database

When a submittal from a data provider is processed, the data is added first to the Transfer Database. These tables serve as an initial holding area for the data submittal. If the submittal should fail at any point, the entire submittal run is removed. After the submittal is complete, a report is generated comparing the counts/sums of the original data file to the information in the Transfer Database. Data in this set of tables is not available for users to view. Data can be submitted only to a current, unlocked inventory version. If the data is successfully loaded to the Transfer database, it is forwarded automatically to the Transaction Database.

Figure 9. View submitted data screen.

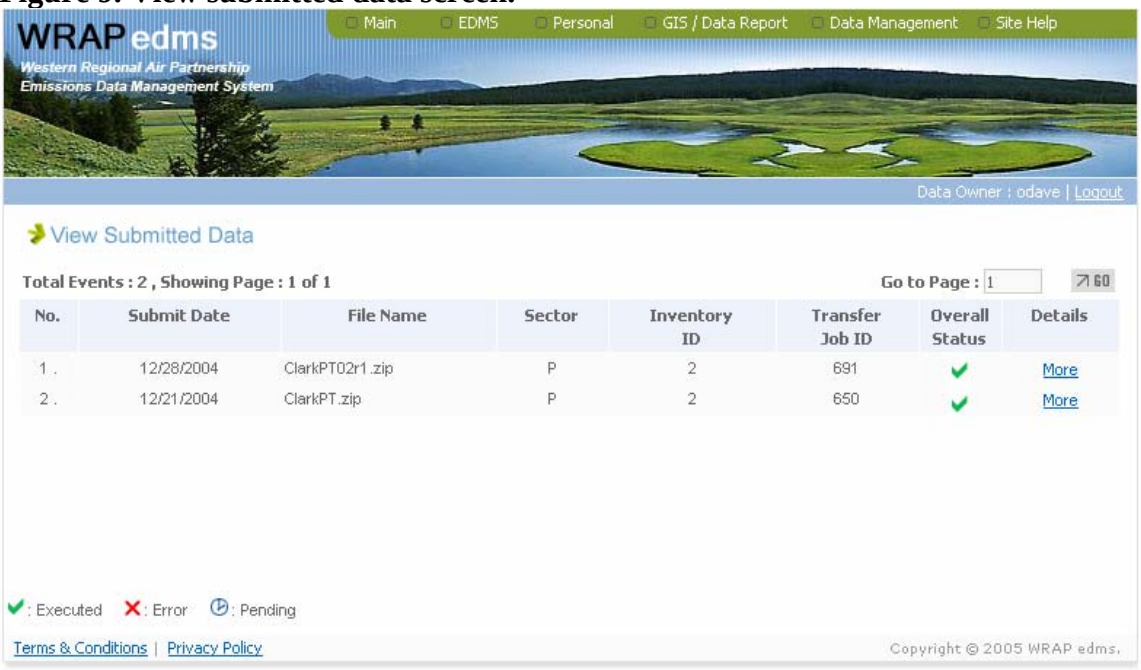
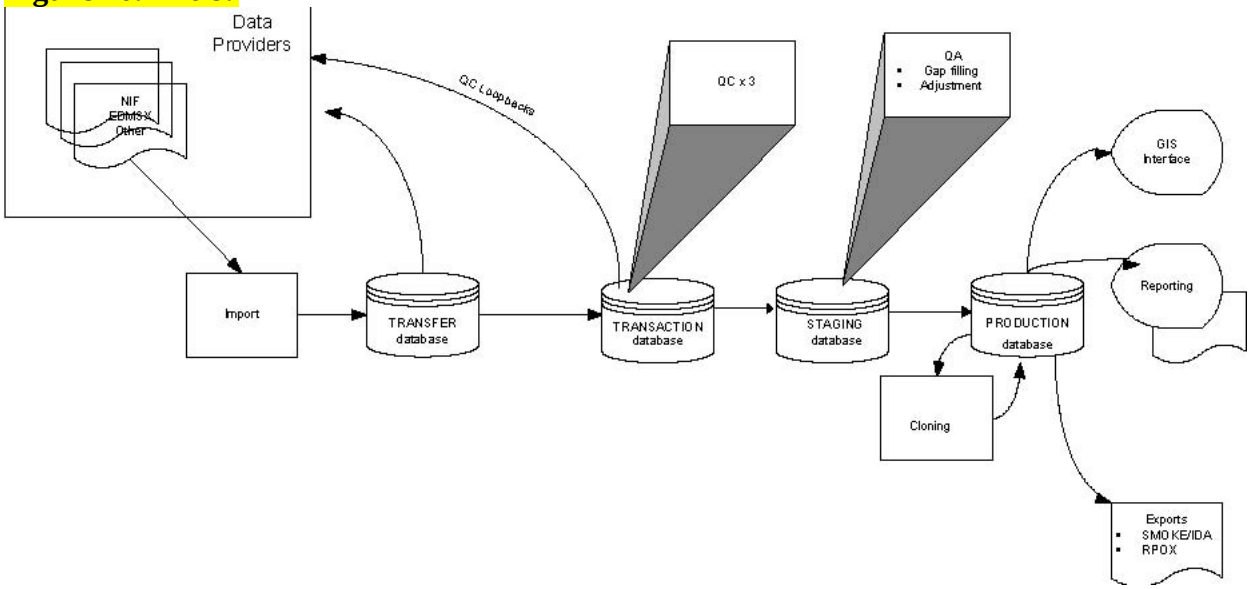


Figure 10. Title?



Transaction Database

The Transaction Database mirrors the standard EDMS data format, but additionally includes audit mirror tables. During the transfer of the information from the transfer database to the transaction database, certain potential irregularities in data format are addressed such as trimming spaces and upper casing of certain fields. After the data has been loaded into the transaction database, quality control routines are applied to the data. Quality Control routines diagnose duplication errors, referential integrity errors, valid range errors, null checks for required fields, and valid value errors. This report is returned to the data provider within 24 hours and will be provided by both email and status report visible through the EDMS interface. Data in this set of tables is not available for users to view. Once the transaction data is accepted, it is automatically applied to the Staging Database.

Staging Database

After the data has been applied to the staging database, quality assurance routines such as gap filling for missing or unprovided sites, counties, SCCs or pollutants may be run, consistent with the version and typing restrictions enforced by the EDMS. For example, if a submittal does not include a particular county for point sources, that county may be brought forward from a previous year or previous version of the inventory. If an area source submittal does not include certain pollutants for an SCC, those pollutants may be brought forward from a previous version of that year's inventory. This process is currently initiated by the EDMS DBA or designee.

Remediation routines such as stack parameter augmentation procedures may also be run. Null non-mandatory data such as seasonal percentages may be filled in with defaults as required or normalized. Gap-filling procedures are subject to the restrictions and guidance of WRAP policy. Unlocked data versions are retained in the Staging Database. Data in this set of tables is available for certain security levels, such as data providers, to view.

Production Database

After QA routines and a diagnosis of the staging database are complete, the data can be moved to the production database and versioned. This process is currently initiated by the EDMS DBA or designee. No changes occur in the production database. The production version houses all locked emission inventories. It is available for reporting, querying, and exporting as appropriate for a user's security access. Note that data in not be continually moved to production; in general a number of changes are collected in the staging database before releasing the data to production.

Hardware

The EDMS database is housed at the University of North Carolina (UNC) on a production database server featuring multiple processors and Gigabytes of random-access memory. The current database, including multiple inventories, requires fewer than 25 Gigabytes of storage. The application server is similarly housed at UNC, enabling rapid interaction between the application server and the database. Physical security of these assets is provided by the UNC, as are monitoring, backup, and recovery services.

Deployment

The EDMS was Beta-tested by a third-party contractor. The findings of the testing process were catalogued and addressed by the Pechan development team. The remaining steps in implementation were documented in an Acceptance Plan that is the basis for final testing and acceptance.

The EDMS was officially rolled-out on January 12, 2005, one year after project inception. As of April 2006, there are more than 200 registered users. Communication with users is facilitated via the use of a listserv system specifically for the EDMS. Each class of users (general users, data analysts, and data owners) can be contacted through email using the listserv mailing list. This approach allows issues to be targeted to the relevant groups of users.

Web-based, email-based, and telephone support is available for the EDMS. The support is designed so that users can maximize the productive time while using the site; simplify the process of learning about the site; and reduce the barriers to effective use.

Though the EDMS is easy to use, users bear the responsibility to be informed on the content of the inventories and the sources of the data. The Inventory Description Document, as shown in Figure 11,

is used to convey the contents of the various inventories housed in the EDMS. Users can examine the jurisdictional data submission report/map to determine all of the data applicable for a geographic area. Using these tools, users will be advised that in order to analyze all of the applicable data for the geographic area described by the borders of the State of Montana, for example, they would need to include data from the Fort Peck Reservation as well.

Figure 11. Title?

InventoryDescriptionRev1ElevatedUsers.xls

	A	B	C	D	E	F	G
2	**Inventory: Actual Version 1.0 (2002)**						
3	**Accessibility: Public**						
4	**Release Date: 12 Jan 2005**						
5							
6							
7							
8		**Point Data Sources**	**Area Data Sources**				
9	**Data Provider**	**Status**	**Status**				
10	Alaska	Updated Inventory from Data Provider	EPA 2002 Preliminary loaded				
11	Arizona	CERR data via EPA	EPA 2002 Preliminary loaded				
12	Arizona Maricopa	Updated Inventory from Data Provider	Updated Inventory from Data Provider				
13	California	CERR data via EPA	CERR data via EPA				
14	Colorado	CERR data via EPA	CERR data via EPA				
15	Idaho	CERR data via EPA	CERR data via EPA				
16	Montana	CERR data via EPA	EPA 2002 Preliminary loaded				
17	Nevada	CERR data via EPA	EPA 2002 Preliminary loaded				
18	Nevada Clark Co	Updated Inventory from Data Provider	Updated Inventory from Data Provider				
19	Nevada Washoe Co	Updated Inventory from Data Provider	Updated Inventory from Data Provider				
20	New Mexico	CERR data via EPA	EPA 2002 Preliminary loaded				
21	New Mexico Bernalillo Co	Updated Inventory from Data Provider	CERR data via EPA				
22	North Dakota	CERR data via EPA	EPA 2002 Preliminary loaded				
23	Oregon	CERR data via EPA	CERR data via EPA				
24	Oregon Lane County	CERR data via EPA	CERR data via EPA				
25	South Dakota	CERR data via EPA	EPA 2002 Preliminary loaded				
26	Utah	CERR data via EPA	CERR data via EPA				
27	Washington	Updated Inventory from Data Provider	CERR data via EPA				
28	Washington Puget Sound	CERR data via EPA	CERR data via EPA				
29	Washington Olympic	CERR data via EPA	CERR data via EPA				
30	Wyoming	Updated Inventory from Data Provider	Updated Inventory from Data Provider				
31	Tribal	Revised data received, potential overlaps under analysis	Revised data received, potential overlaps under analysis				
32							
33		Submittal Loaded					
34		Gap-filled					
35		Under analysis					
36							
37	**OTHER SECTORS**						
38	Non-Road Mobile - Data gap-filled from 2002 EPA Preliminary Inventory.						
39	On-road Mobile - Data gap-filled from 2002 EPA Preliminary Inventory						
40	Biogenic - Data loaded from Regional Modeling Center results.						
41	Fire - Modeled data to be loaded into future inventory version. Some data providers provided fire data in area source submittals.						
42	Wind-blown Dust - Modeled data into be loaded to future inventory version.						
43							
44	**NOTES**						
	o The EPA contractors from which CERR data was received differed in their approach to managing jurisdictions within states;						

Title Page | Inv. 1 - EPA Prelim. (2002) | **Inv. 2 - Actual Ver. 1.0 (2002)** | Inv. 3 - EPA Ver. 3 (2001) | Inv. 5 - Training (

KEY WORDS
Emissions inventory
Repository
Database
GIS
Reporting