

Streamlining the State Emissions Inventory Data Management and Development Processes: Texas Air Emissions Repository (TexAER)

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ABSTRACT

The Texas Commission on Environmental Quality (TCEQ) uses emissions data from a variety of sources to support state implementation plan (SIP) and US EPA reporting requirements, including information from internal and external (e.g., councils of government and other local planning organizations) stakeholders. In the past, TCEQ used a labor intensive process with manual steps to store and manage emissions data, as well as to compare and combine inventory data sources to meet Clean Air Act and Consolidated Emissions Reporting Rule (CERR) reporting requirements.

ERG developed with TCEQ a web-based tool, the Texas Air Emissions Repository (TexAER, formerly referred to as the State Implementation Plan Emissions Data Management system (SIP EDMS)). TexAER allows users to upload, manage, query, and report on inventory data submitted to or generated by TCEQ. TCEQ can also store in the database, search for, and retrieve documentation related to the uploaded emissions inventory data. The documentation can be in virtually any electronic file format.

TexAER supports emissions data analysis by consolidating emissions data and providing a web interface to an Emissions Comparison Tool. The Emissions Comparison Tool allows for display, side-by-side, of up to five sets of emissions data, arranged in a hierarchy by location, source classification code (SCC), or SCC class (a TCEQ grouping of SCCs). The data can be sorted on-line to assist in the identification of outliers, and statistics such as percent of inventory total or subinventory total can be displayed. Additional statistics that indicate how the sets of data relate to one another, such as difference and percent difference, can also be viewed.

TexAER streamlines the inventory preparation process by providing a web interface to an Audit/Merge, or Inventory Builder, Tool. The Audit/Merge Tool allows TCEQ staff to easily compare and select the best emissions data to create a new inventory in an automated manner. After creating the new inventory, TexAER can quality assure the data using checks similar to those in the EPA Format and Content Checker Tool, as well as additional data reasonableness checks. Users can export the data in NIF 3.0 format for submission to EPA. TexAER also maintains an audit trail that can be used to recreate earlier saved versions of an inventory.

INTRODUCTION

TexAER is a centralized data management system that TCEQ uses to archive, access, and secure area, non-road mobile, on-road mobile, and biogenic emissions data. Ultimately, TexAER will store

summarized point source data as well. Before TexAER, TCEQ maintained non-point source data on the individual desktop computers of the staff who performed air quality analysis and assessments, and provided responses to internal and external customers. Individual TCEQ staff were responsible for tracking, formatting, maintaining, and reporting data to EPA. With increased data volumes and the promulgation of the Federal Consolidated Emissions Reporting Rule (CERR), this decentralized and somewhat manual approach could no longer meet all of TCEQ's needs. TCEQ decided to automate as many data processing functions as possible so staff could quickly, and with confidence, provide the standardized emissions data necessary for the development of SIPs, the assessment of control strategies, to respond to requests from the public and government entities, and to support the efforts of local entities to address air quality issues in non-attainment and near non-attainment areas.

To begin the process of centralizing data and automating these functions, TCEQ prepared a listing of requirements and contracted ERG to implement TexAER. TexAER is a web application that communicates with an Oracle database to support these activities through the following functionality:

- **Security Component:** Provides for secure access to the application and allows Administrator users to assign and manage user roles and access rights.
- **Maintenance Component:** Allows Administrator users to add, update, and delete supporting data that classify or identify emissions. Examples include SCCs, pollutants, and geographic locations.
- **Querying and Reporting Component:** Allows users to query TexAER emissions subinventory data by any combination of location, location group, SCC, SCC class, pollutant, pollutant group, time period/unit of measure. Users can generate a viewable report or create an extract that can be downloaded in a delimited format. Small reports are returned immediately; large reports are scheduled and users can return later to download the report.
- **Document Storage, Search, and Retrieval Component:** Allows users to store inventory supporting documentation and metadata in the TexAER database as binary large objects (BLOBs). Electronic files of virtually any type can be stored. The interface also allows users to search the document catalog by keyword and any of the metadata elements, retrieve, and download files of interest.
- **Emissions Comparison Tool:** Allows users to select up to five different emissions inventory data sets for comparison side-by-side on a web page. Users can also view summarized and detailed emissions data, such as emissions by location or SCC, and can add to the display statistics that indicate how the subinventories compare to one another.
- **Audit/Merge Tool:** Provides a structured inventory creation process that incorporates peer review and traceability. Allows users to combine subsets of multiple inventories to create a new inventory. Users can also peer review subinventory data to be combined and flag questionable selections for further review.
- **NIF 3.0 Export Tool:** Extracts, quality assures, and exports subinventories in the National Emissions Inventory Format (NIF) required for reporting air quality information to EPA.
- **Control Strategy Analysis:** Allows users to view details about programs that describe recommended or required equipment and techniques that can be used to reduce air emissions. Users will also be able to select and apply various control strategies to specific sets of emissions to model the expected reductions. This functionality is currently in development.

- Emissions Projections: Allows users to apply growth and control data to base inventory to estimate projected future emissions. This functionality is currently in development.
- External Reporting. A publicly available interface that will support querying, viewing, and downloading emissions data from TexAER. This functionality is currently in development.

The TexAER technology platform consists of the following:

Database: Oracle 9i, approximately 10 gigabytes;
Interface: ColdFusion MX and Flash MX 2004 Professional;
Additional supporting code: PL/SQL.

This paper focuses on the functionality provided by the Emissions Comparison Tool, the Audit/Merge Tool, and the NIF Export Tool; the TexAER components critical to TCEQ's inventory data analysis, inventory development, and required reporting processes.

BODY

Emissions Comparison Tool

The emissions data and emissions estimation techniques available to TCEQ are developed by a wide variety of sources, including TCEQ staff, councils of governments, local planning organizations, academia, US EPA, regional planning organizations, other states, the modeling community, private entities, industry, and other resources. In preparing emissions inventories to support various federal and state requirements, TCEQ reviews and analyzes this information to identify the most representative emissions data for different emissions sources. Given the amount and volume of data available to TCEQ, development of a tool that could facilitate compilation and review of the data was critical. The TexAER Emissions Comparison Tool allows TCEQ users to compare emissions data for a selected set of sources from up to five inventories at the same time. It also provides spreadsheet-like functionality on the web. The main elements of the Emissions Comparison Tool allow users to:

- Select one to five inventories (i.e. 2002 statewide inventory) and subinventories (i.e., area, non-road, on-road, biogenic) to compare (required).
- Filter which portions of the subinventories are displayed (optional, recommended).
- Select how the data are grouped, sort the data, and show or hide various statistics (optional).
- Freeze, sort, show and hide columns on the display (optional)
- View and compare the data after the selections are applied.

Additional detail about each of these elements is provided below:

Select Subinventories

The Emissions Comparison Select Subinventories functionality allows users to choose one to five inventories and subinventories for comparison purposes. Figure 1 presents the Select Subinventories web interface.

Select Subinventories

Please select up to five subinventories to compare. You must select at least one subinventory.

Subinventory 1 (* Required)
 PEI - 1999 AREA Review Documents

Subinventory 2
 "TRENDS" BACKCAST - 1990 AREA Review Documents

Subinventory 3
 "TRENDS" BASE YEAR - 1999 AREA Review Documents

Subinventory 4
 "TRENDS" PROJECTED - 2005 AREA Review Documents

Subinventory 5
 STATE - 1999 AREA Review Documents

Choose Selection Criteria to filter the emissions estimates in your comparison, Display Options to format your comparison, or Column Order to arrange the data columns in your comparison. You can return to any of these screens or proceed to the Data Comparison screen at any time. To view your comparison with default selection criteria, display options, and column ordering, choose Data Comparison now.

Figure 1. Select Subinventories Interface

Selection Criteria

Users can filter the set of emissions data to be viewed in the Emissions Comparison Tool by applying a variety of criteria. Figure 2 presents the Emissions Comparison Selection Criteria web interface, which includes the following options:

- Location: select one or more of the 254 counties in Texas.
- Location group: select one or more sets of grouped locations, such as all of the counties in a non-attainment area (e.g., the eight counties in the Houston-Galveston-Brazoria area).
- Pollutant: select one or more pollutants of interest, such as VOC, NO_x, or PM-10.
- Pollutant group: select one or more sets of grouped pollutants, such as criteria pollutants.
- Source Classification Codes (SCCs): select one or more SCCs of interest.
- SCC class: select one or more sets of grouped SCCs, such as Lawn and Garden or Construction Equipment.
- Time period: select one or more time periods of interest, such as ozone-season daily or annual.

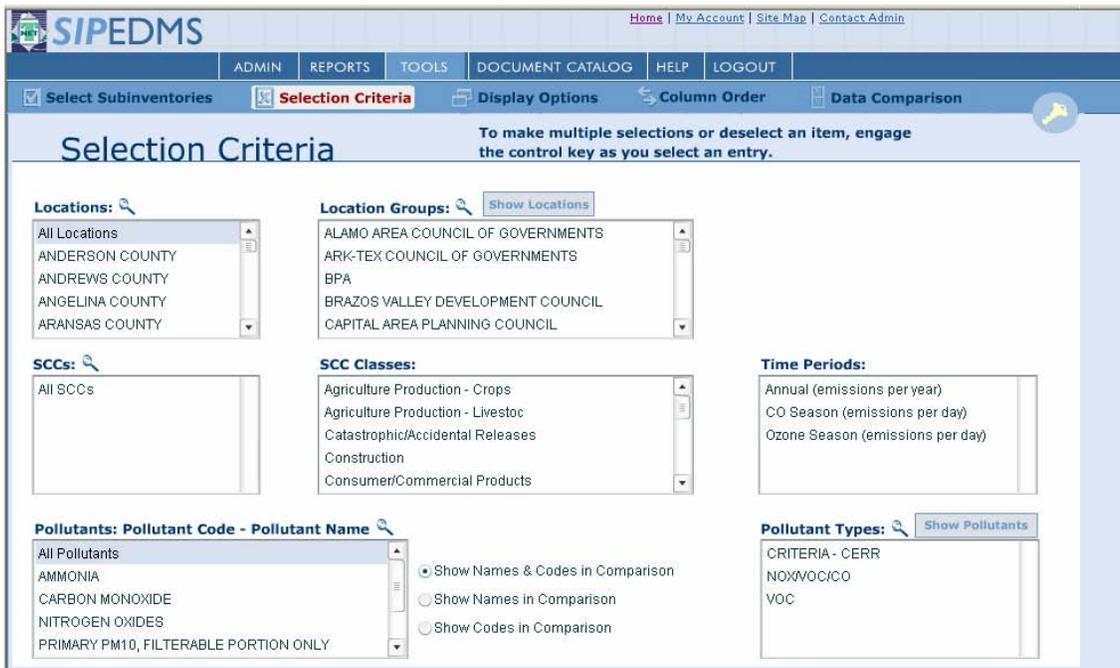


Figure 2. Selection Criteria Interface

Display Options

Users can also customize the way the data are presented in the Emissions Comparison Tool. Figure 3 presents the Emissions Comparison Display Options interface, which includes the following:

View By:

- SCC: Displays summed emissions by SCC and pollutant. The emissions are initially displayed for Level 1 SCCs. To view additional detail for Level 2 or lower level SCCs, the user clicks on a Level 1 SCC. Once the lowest level SCCs are displayed, clicking on an SCC displays emissions data by location for that SCC.
 - SCC Class: Displays summed emissions by SCC Class. To view emissions for the SCCs that are part of a class, the user clicks on the SCC Class and the summed emissions for the Level 1 SCCs in the class are displayed. To view additional detail for Level 2 or lower SCCs, the user clicks on a Level 1 SCC. Once the lowest Level SCCs are displayed, clicking on an SCC displays emissions by location for that SCC.
 - Class permutations: Because the same SCC may be associated with more than one SCC Class, the Class Permutations display presents data for non-overlapping combinations of SCC Classes. For example, forklifts may be in a class for gasoline engines as well as industrial equipment.
 - Location: Displays summed emissions by location. To view emissions by the lowest level SCCs available for a location, the user clicks on the location.
 - All: Displays emissions data in a different format, without the ‘tree view’ on the left.
- Statistics: Users can choose to generate and display the statistics listed below to compare or QA inventories:
 - % of subinventory total
 - % of selected total

- Difference between the base and other selected emissions (subinventory n – subinventory 1)
- % difference between the base and other selected emissions (subinventory n – subinventory 1)/ subinventory 1*100
- % of inventory total

Note that the “base” subinventory is the first subinventory selected by the user on the Select Subinventories tab.

- Display UOM: Users can select from a wide variety of units of measure for emissions, including tons, pounds, grams, etc. TexAER stores data in a base unit of grams and converts the data to the selected unit for display.
- Sort By: Users can choose up to three columns to sort the display and specify ascending or descending order. For example, ordering by emissions in descending order when viewing by location would show the pollutant with the largest emissions for each location first.

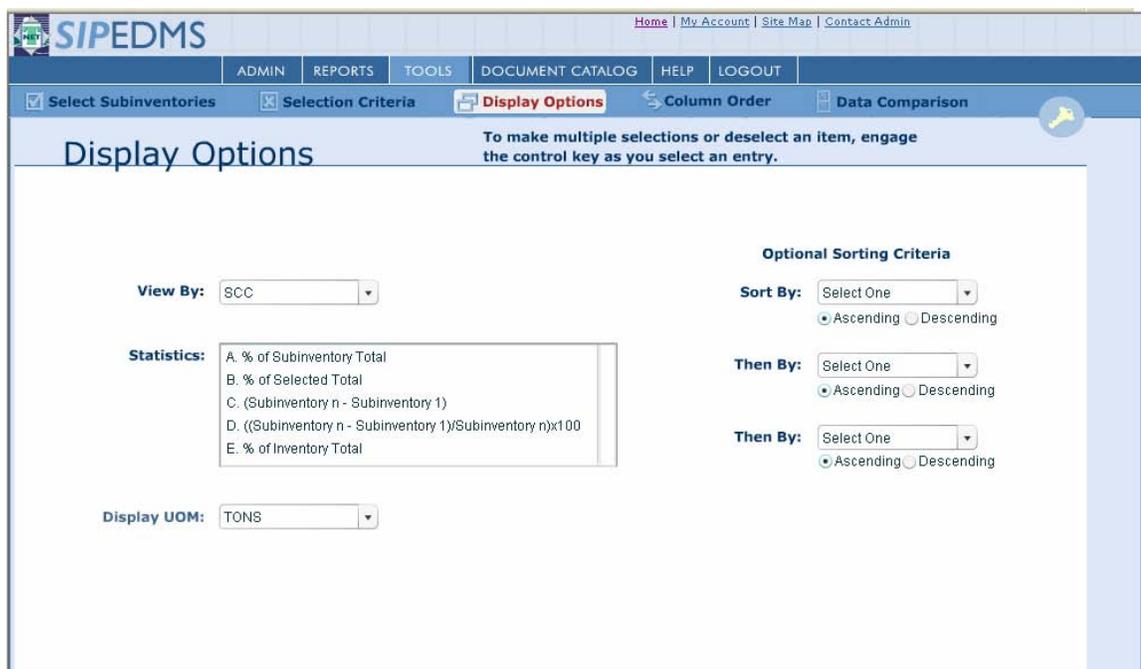


Figure 3. Display Options Interface

Column Order

The Emissions Comparison Column Order interface, shown in Figure 4, allows users to further customize the display by freezing, hiding, and reordering data columns. For example, the user might want to always keep the emissions data in the base inventory and one other selected inventory visible, and scroll through the other available information. The user could freeze those columns using the Column Order tab (similar to the Freeze Panes option in Microsoft Excel). Or, a user may want to view % Difference information side by side for all of the selected inventories. The user could order the columns so that these would appear side-by-side on the display using the Column Order page.

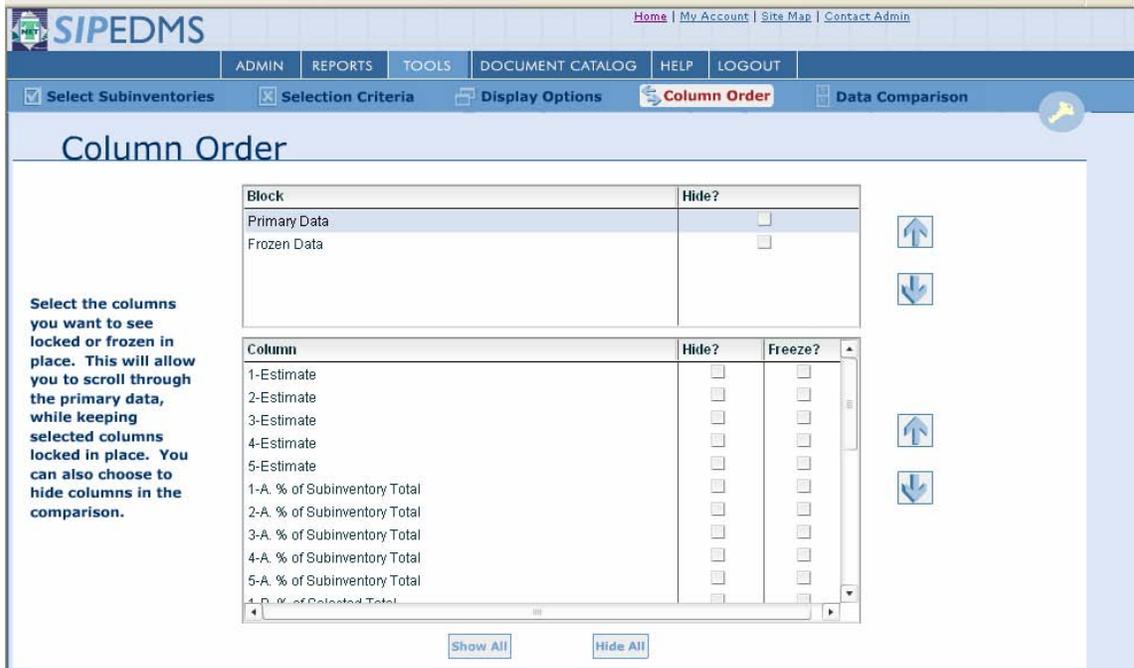


Figure 4. Column Order Interface

Data Comparison

The Emissions Comparison Data Comparison page is divided into two sections:

- **Tree View:** an expandable listing of information on the left, similar to Windows Explorer display. Arrows next to folder icons in the tree view indicate that the folders can be expanded. When users click an arrow, the arrow changes from pointing right to pointing downward to show that the folder has been expanded, and the contents of the folder appear indented beneath the folder.
- **Data View:** emissions data and statistics values in the columns on the right that correspond to each row in the Tree View.

Users can navigate to and change selection criteria, display options, and column order at any time and then return to the Data Comparison page. The display will change to reflect any settings changed on those pages.

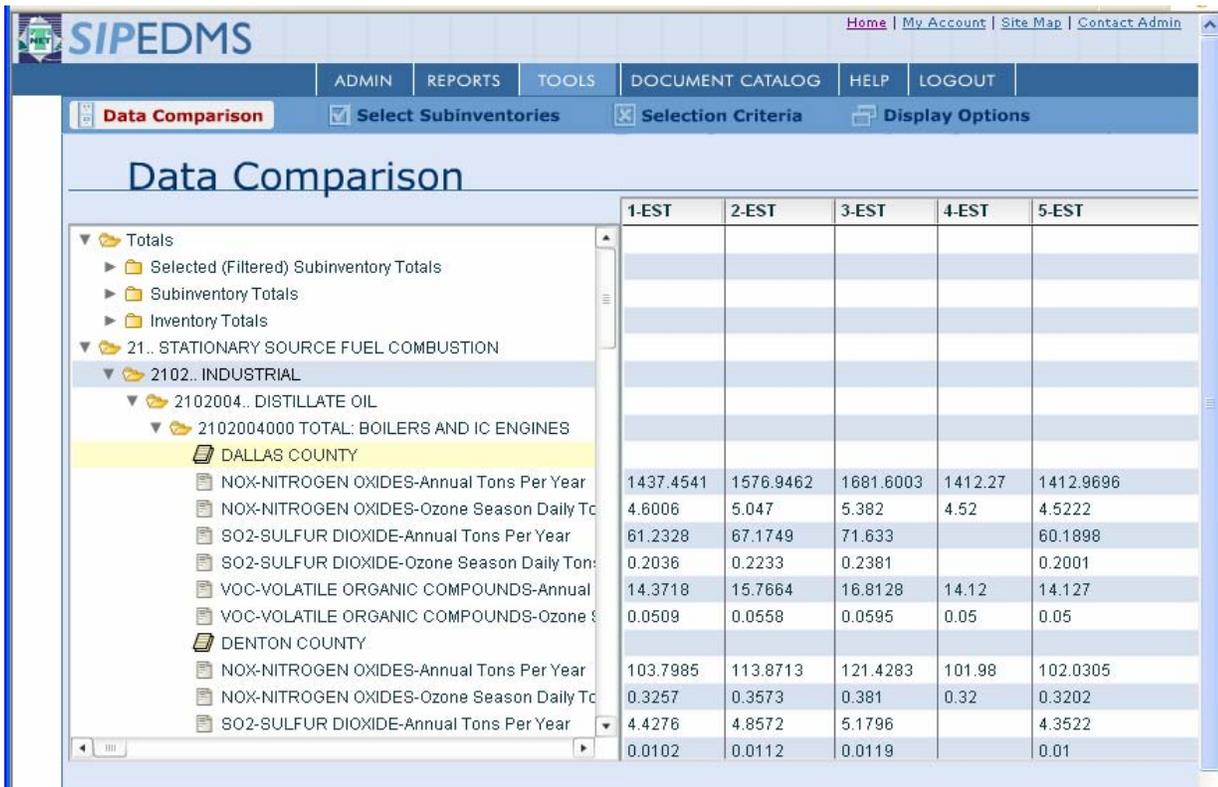


Figure 5. Data Comparison by SCC Interface

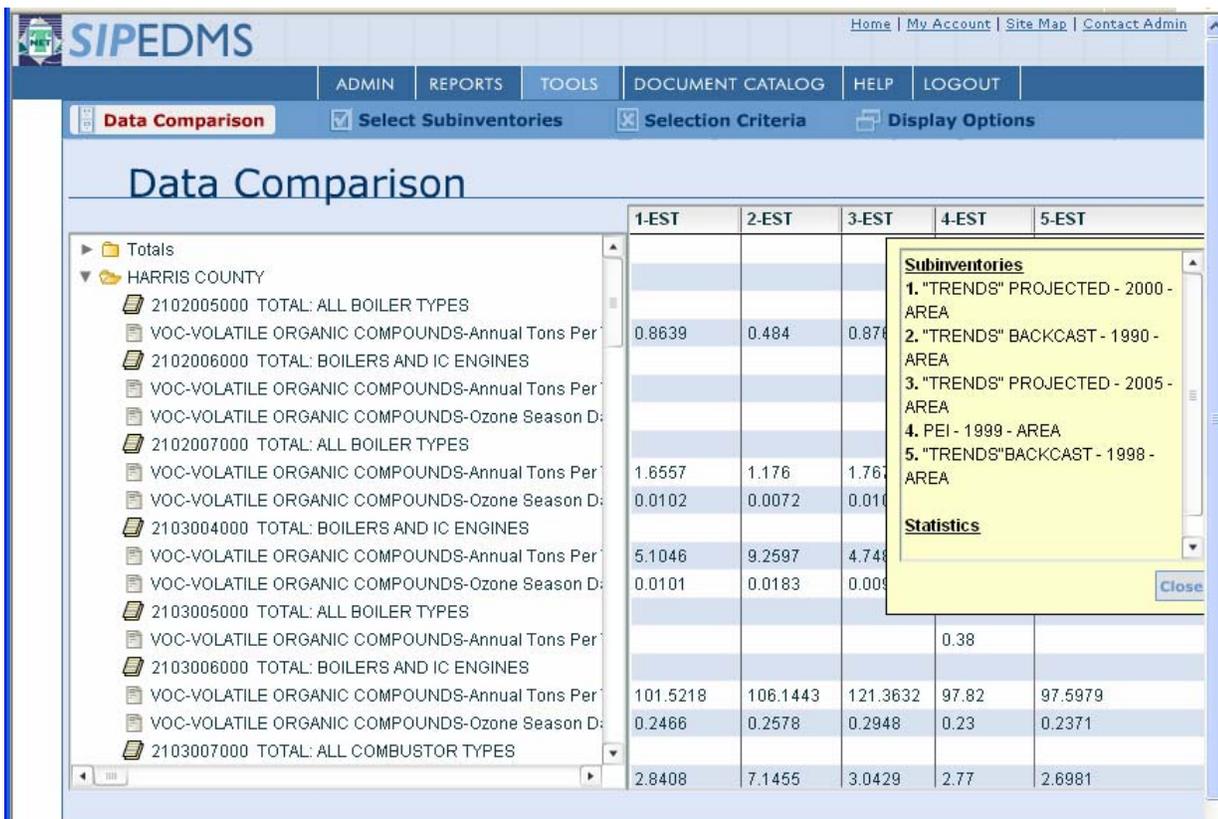


Figure 6. Data Comparison by Location and SCC Interface

By applying selection criteria, and setting display and sorting options, users can compare different sources of emissions data to identify the most representative emissions, quickly and easily identify the largest emissions sources contributing to an inventory or subinventory total for a particular pollutant, identify potential outliers, view emissions changes over time for specific sources and pollutants, and view the impact of differences in inventory preparation methods on overall emissions.

Inventory Preparation

Another key component of TexAER is the functionality that allows TCEQ to combine inventory and subinventory data provided by multiple stakeholders to prepare emissions inventories to meet various reporting requirements. Prior to implementation of TexAER, TCEQ used a somewhat labor intensive and relatively manual process to complete these activities. In this process, Data Coordinators would prepare a series of spreadsheets that consolidated extracts of various sources of inventory and subinventory data. The spreadsheet extracts would be assigned to Auditors to select and document reasons for selecting certain sources of emissions data for particular locations, SCCs, pollutants, etc. A QA/QC process would then be run to identify missing documentation, missing data, or other errors. Errors would be returned to the Auditors for further review and resolution. The final spreadsheets would be forwarded to the Data Coordinators to consolidate to build the final inventory/subinventory. The subinventory was then exported in NIF format and submitted to EPA. There were several issues associated with this process:

- Managing the logistics was cumbersome given the number of spreadsheets and auditors involved.
- Extracting and preparing the data and data review formats for auditors were labor intensive.
- Auditors often inadvertently edited the format of the spreadsheets, making it difficult to consolidate their selections to create the new subinventory.
- There was no mechanism or process for documentation of a formal peer review of auditor selections.
- Verifying that all sources for a subinventory were accounted for and assigned could be difficult at times.
- Auditors often had other sources of data that were not available to the Data Coordinators for use in inventory preparation.
- Auditors often had to prepare additional spreadsheets to complete detailed calculations needed to support their selection process.

To identify portions of this process that could potentially be streamlined using a more automated tool, ERG modeled TCEQ's inventory development process. The first step in this effort was to identify and fully describe the roles of staff that participated in the inventory/subinventory development effort. These roles include:

- **Audit Manager:** Determines which inventories and data sources should be considered when preparing the new inventory and identifies criteria for the blocks of emissions sources to be reviewed. A block is a subset of emissions, grouped by any combination of SCCs, SCC classes, locations, and pollutants. The Audit Manager typically defines blocks based on the expertise of the Auditors and Peer Reviewers, and then assigns those blocks, along with due dates, to Auditors and Peer Reviewers. The Audit Manager has final authority in the event of conflicting data selection recommendations between Auditors and Peer Reviewers.
- **Data Coordinator:** Writes programs to compile multiple sources of inventory data, extract subsets of data for auditors, prepares spreadsheet format, populates spreadsheets with data for

Auditors, reviews completed spreadsheets to verify that no formatting changes were made, adjusts format if necessary, and combines completed spreadsheets to create a new inventory.

- Auditor: Reviews assigned blocks of emissions data, determines which source of data best represents the emissions, or enters an alternate emissions value. Auditors are also responsible for documenting the reason for each selection or entry and providing additional comments as appropriate.
- Peer Reviewer: Reviews the selections made by the Auditor and notes any alternative recommended selections. The Peer Reviewer also provides comments for the Auditor and Audit Manager to consider when evaluating the recommended alternative selections.

We reviewed this process with TCEQ and determined that the logistics associated with the process and addressing formatting issues before combining Auditor and Peer Reviewer selections were the most complicated and labor intensive steps. We then looked for ways to apply existing TexAER functionality to streamline or automate these processes. We found that we could expand the existing TexAER Emissions Comparison Tool functionality to eliminate the Data Coordinator role, freeing those staff for other duties, improve the logistics of the process in an automated manner through implementation of work flow management tools, provide a mechanism for a formal, documented peer review, and enhance inventory versioning and traceability. TexAER Audit/Merge Tool includes the following key components:

- Manage Subinventory Builds: This functionality is accessible to Audit Managers only. It allows the Audit Manager to direct and oversee the inventory development process by selecting subinventory data sources, preparing blocks of emissions data for review, assigning blocks to Auditors and Peer Reviewers, tracking the progress of blocks through the review process, performing final review, and merging blocks to create new inventories.
- Review Subinventory Builds: This functionality is accessible to Auditors and Peer Reviewers; the display is customized based on the user logged in and accessing the Review Subinventory Builds functionality.
 - Auditor: allows Auditors to view their assigned subinventory blocks and due dates, customize the display options for each block, complete and document their audit selections, and respond to peer review comments.
 - Peer Reviewer: allows Peer Reviewers to view their assigned subinventory blocks and due dates, customize the display options for each block, and complete and document their peer review.

Additional detail about the Manage Subinventory Builds and Review Subinventory Builds functionality is provided below. Because Auditors and Peer Reviewers have many of the data comparison and analysis needs that are accessible via the Emissions Comparison Tool, the core Review Subinventory Builds data selection and documentation functionality was implemented as an expansion of that interface.

Manage Subinventory Builds: Audit Manager

Audit Managers use the Manage Subinventory Build functionality to select subinventories to be used as source data, set up blocks of subinventories for Auditors to review, assign Auditors and Peer Reviewers, assign audit and peer review due dates, automatically send notifications to Auditors and Peer Reviewers via email, resolve conflicts between Auditors and Peer Reviewers, and merge Auditor selections to create the new subinventory.

Audit Managers can also monitor the inventory building work flow as blocks progress through the review process using the Manage Subinventory Builds interface. Figure 9 shows the Audit Manager interface page listing of the inventories and subinventories being built and a summary of the review status of the associated blocks. Audit Managers can click on a block name to view assigned Auditors and Peer Reviewers and due dates. The Audit Manager can also access other TexAER functionality to identify portions of an inventory/subinventory build that have not been included in blocks and assigned to Auditors and Peer Reviewers.

SIB Name ▲	Inventory Name	Total Block	Number of Blocks in Each Stage						Delete
			Audit	Peer Review	Auditor Response	Conflict	Manager Review	Complete	
Historical State 1990	Texas State Sample Inventory	10	2	2	1	3	0	2	Delete
State Ozone Season	Texas State Sample Inventory	8	4	2	0	0	1	1	Delete
Texas 2005	Texas State Sample Inventory	3	3	0	0	0	0	0	Delete

Figure 7. Manage Subinventory Builds Interface

Review Subinventory Builds: Auditor

The Review Subinventory Builds Auditor functionality includes a Block Assignment interface and a Block Audit interface.

The Block Assignment interface presents Auditors with the full, customized listing of subinventory blocks, associated inventories, due dates, and status of blocks assigned to the Auditor. The Auditor can also view a summary of each block that lists the block filter criteria defined by the Audit Manager and the Auditor selection statistics, such as the number of times a particular source was used, peer reviewer rejections, and other information.

The Block Audit interface, shown in Figure 8, can only be accessed after the Auditor selects a block from the Block Assignment interface. This interface is an expansion of the Emissions Comparison Tool. Auditors can customize the display of source data for a block being reviewed by applying filters (e.g., SCCs, locations, pollutants, etc.), view by options, sort options, column freezing and hiding options, as well as statistics that indicate how the various sources of inventory data are related to each other (e.g., percent difference, percent of inventory total, etc.) using the Selection Criteria, Display Options, and Column Order functionality described previously. The Block Audit Data Comparison interface, however, includes the following two sections in addition to the tree view and data view:

- **Audit View:** columns that allow the Auditor to select the subinventory data to be used for each emissions source, a standard list of reasons for the data selection or entry of a different reason, and space to enter comments about a specific selection or for the entire block.

- Peer Review View: read-only columns that display peer reviewer rejections and comments. These columns are displayed to the Auditor only after peer review is complete.

	1-EST	2-EST	3-EST	4-EST	FINISH	WHICH	REASO	AUDIT	QTY	COM
VOC - VOLATILE ORGANIC COMPOUNDS-Ozone Season D	0.0200	0.0628			<input type="checkbox"/>	2	R1-DEF.			
2810030... STRUCTURE FIRES					<input type="checkbox"/>					
2810030000 TOTAL					<input type="checkbox"/>					
COLLIN COUNTY					<input type="checkbox"/>		R1-DEF.			
CO - CARBON MONOXIDE-Annual Tons Per Year	31.5200	31.5200		10.4190	<input checked="" type="checkbox"/>	2	R1-DEF.			
CO - CARBON MONOXIDE-Ozone Season Daily Tons	0.0900	0.0900		0.0285	<input checked="" type="checkbox"/>	2	R1-DEF.			
NOX - NITROGEN OXIDES-Annual Tons Per Year	0.7400	0.7400		0.2431	<input checked="" type="checkbox"/>	4	R4-Surv			
NOX - NITROGEN OXIDES-Ozone Season Daily Tons				0.0007	<input checked="" type="checkbox"/>	4	R4-Surv			
PM10-FIL - PRIMARY PM10, FILTERABLE PORTION C				1.8754	<input checked="" type="checkbox"/>	4	R1-DEF.			
PM10-FIL - PRIMARY PM10, FILTERABLE PORTION C				0.0051	<input checked="" type="checkbox"/>	4	R1-DEF.			
PM25-FIL - PRIMARY PM2.5, FILTERABLE PORTION C				1.7066	<input checked="" type="checkbox"/>	4	R1-DEF.			
PM25-FIL - PRIMARY PM2.5, FILTERABLE PORTION C				0.0047	<input checked="" type="checkbox"/>	4	R1-DEF.			
VOC - VOLATILE ORGANIC COMPOUNDS-Annual Tor	5.7800	5.7800		1.9101	<input checked="" type="checkbox"/>	2	R1-DEF.	Values c	19.1	
VOC - VOLATILE ORGANIC COMPOUNDS-Ozone Sea	0.0200	0.0200		0.0052	<input checked="" type="checkbox"/>	2	R1-DEF.	Values c	0.052	
DALLAS COUNTY					<input type="checkbox"/>		R1-DEF.			
CO - CARBON MONOXIDE-Annual Tons Per Year	142.2700	142.2700		121.9920	<input type="checkbox"/>	2	R1-DEF.			
CO - CARBON MONOXIDE-Ozone Season Daily Tons	0.3900	0.3900		0.3342	<input type="checkbox"/>	2	R1-DEF.			
NOX - NITROGEN OXIDES-Annual Tons Per Year	3.3200	3.3200		2.8465	<input type="checkbox"/>	2	R1-DEF.			
NOX - NITROGEN OXIDES-Ozone Season Daily Tons	0.0100	0.0100		0.0078	<input type="checkbox"/>	2	R1-DEF.			
PM10-FIL - PRIMARY PM10, FILTERABLE PORTION C				21.9586	<input type="checkbox"/>	X	R1-DEF.			
PM10-FIL - PRIMARY PM10, FILTERABLE PORTION C				0.0602	<input type="checkbox"/>	X	R1-DEF.			
PM25-FIL - PRIMARY PM2.5, FILTERABLE PORTION C				19.9823	<input type="checkbox"/>	X	R1-DEF.			
PM25-FIL - PRIMARY PM2.5, FILTERABLE PORTION C				0.0547	<input type="checkbox"/>	X	R1-DEF.			
VOC - VOLATILE ORGANIC COMPOUNDS-Annual Tor	26.0800	26.0800		22.3652	<input type="checkbox"/>	2	R1-DEF.			
VOC - VOLATILE ORGANIC COMPOUNDS-Ozone Sea	0.0700	0.0700		0.0613	<input type="checkbox"/>	2	R1-DEF.			

Figure 8. Block Audit Data Comparison Interface

Review Subinventory Builds: Peer Reviewer

The Review Subinventory Builds Peer Reviewer interface includes a Block Assignment interface and a Block Peer Review interface.

The Block Peer Review interface, shown in Figure 9, can only be accessed after the Peer Reviewer selects a block from the Block Assignment interface. The Block Peer Review interface is an expansion of the Emissions Comparison Tool. Peer Reviewers can customize the display of source data for a block being reviewed by applying filters (e.g., SCCs, locations, pollutants, etc.), view by options, sort options, column freezing and hiding options, as well as statistics that indicate how the various sources of inventory data are related to each other (e.g., percent difference, percent of inventory total, etc.) using the Selection Criteria, Display Options, and Column Order functionality described previously. The Block Peer Review Data Comparison interface, however, includes the following two sections in addition to the tree view and data view:

- Audit View: read-only columns that display Auditor source data selections, reasons, and comments.
- Peer Review View: columns that allow the Peer Reviewer to reject the Auditor selection for an emission source and to enter comments about a rejection.

The screenshot shows the SIPEDMS Data Comparison interface. The browser title is 'SIP EDMS Version 3.3' and the URL is 'Fuseaction = ReviewSIB.emco | Block_id=1513'. The interface includes a navigation menu with 'ADMIN', 'REPORTS', 'TOOLS', 'DOCUMENT CATALOG', 'HELP', and 'LOGOUT'. Below this is a sub-menu with 'Audit/Peer Review', 'Selection Criteria', 'Display Options', 'Column Order', and 'Data Comparison'. The main area is titled 'Data Comparison' and contains a table with the following columns: 1-EST, 2-EST, 3-EST, 4-EST, REASO, AUDIT (, QTY, CO, REJECT, and PEER COMME. The table lists data for COLLIN COUNTY and DALLAS COUNTY across various pollutants like CO, NOX, PM10, and PM25. Two rows for VOC are marked as 'REJECT' with a checkmark in the REJECT column and a note 'Use survey data' in the PEER COMME column.

	1-EST	2-EST	3-EST	4-EST	REASO	AUDIT (QTY	CO	REJECT	PEER COMME
2810030000 TOTAL									<input type="checkbox"/>	
COLLIN COUNTY									<input type="checkbox"/>	
CO - CARBON MONOXIDE-Annual Tons Per Year	31.5200	31.5200		10.4190	R1-DEF.				<input type="checkbox"/>	
CO - CARBON MONOXIDE-Ozone Season Daily To	0.0900	0.0900		0.0285	R1-DEF.				<input type="checkbox"/>	
NOX - NITROGEN OXIDES-Annual Tons Per Year	0.7400	0.7400		0.2431	R4-Surv				<input type="checkbox"/>	
NOX - NITROGEN OXIDES-Ozone Season Daily To				0.0007	R4-Surv				<input type="checkbox"/>	
PM10-FIL - PRIMARY PM10, FILTERABLE PORTION				1.8754	R1-DEF.				<input type="checkbox"/>	
PM10-FIL - PRIMARY PM10, FILTERABLE PORTION				0.0051	R1-DEF.				<input type="checkbox"/>	
PM25-FIL - PRIMARY PM2.5, FILTERABLE PORTION				1.7066	R1-DEF.				<input type="checkbox"/>	
PM25-FIL - PRIMARY PM2.5, FILTERABLE PORTION				0.0047	R1-DEF.				<input type="checkbox"/>	
VOC - VOLATILE ORGANIC COMPOUNDS-Annual T	5.7800	5.7800		1.9101	R1-DEF.	Values	19.1		<input checked="" type="checkbox"/>	Use survey data
VOC - VOLATILE ORGANIC COMPOUNDS-Ozone E	0.0200	0.0200		0.0052	R1-DEF.	Values	.052		<input checked="" type="checkbox"/>	Use survey data
DALLAS COUNTY					R1-DEF.				<input type="checkbox"/>	
CO - CARBON MONOXIDE-Annual Tons Per Year	142.270	142.270		121.9920	R1-DEF.				<input type="checkbox"/>	
CO - CARBON MONOXIDE-Ozone Season Daily To	0.3900	0.3900		0.3342	R1-DEF.				<input type="checkbox"/>	
NOX - NITROGEN OXIDES-Annual Tons Per Year	3.3200	3.3200		2.8465	R1-DEF.				<input type="checkbox"/>	
NOX - NITROGEN OXIDES-Ozone Season Daily To	0.0100	0.0100		0.0078	R1-DEF.				<input type="checkbox"/>	
PM10-FIL - PRIMARY PM10, FILTERABLE PORTION				21.9586	R1-DEF.				<input type="checkbox"/>	
PM10-FIL - PRIMARY PM10, FILTERABLE PORTION				0.0602	R1-DEF.				<input type="checkbox"/>	
				19.9823					<input type="checkbox"/>	

Figure 9. Bock Peer Review Data Comparison Interface

Build a New Inventory/Subinventory

After the Auditor and Peer Reviewer processes are complete, the Audit Manager performs a final review of each block. The Audit Manager can then select blocks to be merged to create a new subinventory. After it is created, users can access, analyze and manage the inventory using any of the other functions of TexAER, including querying/reporting, emissions comparison, and adding/associating documents.

Export Inventory for Reporting Requirements

TexAER export functionality allows TCEQ to select an inventory, perform a QA similar to that performed by EPA Format and Content Checker Tool as well as additional data reasonableness checks, and create a file in the NIF 3.0 format that can be submitted to EPA.

Conclusions

TexAER has provided TCEQ with a robust and scalable infrastructure needed to store, manage, and provide access throughout the Agency to a consistent set of inventory and subinventory data. The Emissions Comparison Tool allows users to complete detailed analysis and summaries of emissions data used in the inventory preparation process, and QA inventory and subinventory data available from various sources. This has allowed users to quickly and easily access data needed to respond to internal and external stakeholder requests.

The Audit/Merge Tool streamlines the inventory preparation work flow process by eliminating the need for Data Coordinators and providing Audit Managers with easy-to-use tools to select sources of emissions data, create/assign blocks to Auditors and Peer Reviewers, track the progress of the review process, and create new inventories with a few clicks. The improved work flow process has freed up

TCEQ staff to focus efforts on other Agency business, and is expected to facilitate TCEQ's on-time reporting efforts. This Tool also tracks and stores inventory selections, and provides for inventory version control and traceability.

The next step is TexAER development is to leverage this robust infrastructure to support implementation of additional functionality enhancements, including creating libraries of control strategy and growth factor data, selecting and applying control strategies and growth factors to existing subinventories to generate projected emissions, and implementing an external reporting interface to allow the general public to access high quality inventory data.

KEYWORDS

Inventory

Emissions

Data Management

SIP EDMS

TexAER