



EA Engineering, Science,
and Technology, Inc.

Needs Assessment for Evaluation and Design of an Emissions Data Reporting, Management, and Tracking System



EA Engineering, Science,
and Technology, Inc.

Introduction

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Project Intent and Objectives

Intent

- **Assess needs of EDMS through Interview Workshops and Web Questionnaire**

Objectives

- **Determine the Emissions Data to be Reported and Tracked**
- **Perform a Comparative Analysis of Existing EDMS and Conceptual WRAP EDMS**
- **Prepare a Report Recommending Needs for the WRAP EDMS**

Project Timeline

Determination of Requirements

First Workshop – Santa Fe, NM	March 20
Second Workshop – Denver, CO	May 07
Web Questionnaire – wrap.east.com	March 26 - May 26
Submission of Findings	May 23

Comparative Analysis of Existing Systems

Submission of Comparative Analysis	June 02
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Final Report

Presentation of Needs Assessment Report	July 01
Final Needs Assessment Report Submission	July 11



Workshops and Questionnaire

- **Workshop I**
 - ◆ **Place/Date: Santa Fe, NM / March 20, 2003**
 - ◆ **Participants: WRAP Forum members (35)**
 - ◆ **Presentation by EA and Discussion on the EDMS needs**

- **Workshop II**
 - ◆ **Place/Date: Denver, CO / May 07, 2003**
 - ◆ **Participants: State, Tribal, Local agencies staff (13)**
 - ◆ **Presentation by EA and Discussion on the EDMS needs**

- **Web-based Questionnaire - wrap.eaest.com**
 - ◆ **Date: March 26 - May 26**
 - ◆ **34 questions designed to supplement the Workshops**
 - ◆ **20 responses**

Workshops and Questionnaire Findings (Conceptual WRAP EDMS)

- **WRAP EDMS System**
 - ◆ Different from other existing systems
 - ◆ Internet-based system
 - ◆ Repository of WRAP regional emissions inventories
 - ◆ Used to implement the emissions tracking and reporting requirements of the RHR
 - ◆ Include 6 major modules: point, area, fire, mobile, windblown dust, and biogenic source modules
 - ◆ Include GIS, QA/QC, and DBA modules
 - ◆ Include a metadata file and link to other databases
 - ◆ Managed by a DBA
 - ◆ Likely be housed by a university center

Workshops and Questionnaire Findings (Conceptual WRAP EDMS) - Cont.

- **Data Submission and Tracking**
 - ◆ **Track 9 pollutants and related source activity data**
 - **VOC, NO_x, SO₂, PM₁₀, PM_{2.5}, EC, OC, CO, and NH₃**
 - **point, area, fire, mobile, wb dust, and biogenic sources**
 - ◆ **Data tracked at the county and reservation levels for all sources and also individually for point and fire sources**
 - ◆ **Emissions data submitted by states and tribes and some will be calculated by the system and/or the DBA**
 - ◆ **Tribal emissions data may be for any available year**
 - ◆ **Open submission process**
 - ◆ **Submission format will be similar to NEI format**
 - ◆ **Accept all file formats accepted by NEI: Text, MS Access, XML**

Workshops and Questionnaire Findings (Conceptual WRAP EDMS) - Cont.

- **Data QA/QC**
 - ◆ Include a QA/QC module to perform two levels of QA/QC
 - Validation of the format of the submitted data files
 - Checks of the submitted data content
 - Check of reference values and acceptable data ranges
 - Check for completeness

- **Data Reporting and Query**
 - ◆ Produce standard reports by source type, geography, and pollutant
 - ◆ Produce RHR special reports by source type, geography, and pollutant
 - ◆ All reports in tabular, graphical, and GIS formats
 - ◆ Produce SMOKE emissions input files

Workshops and Questionnaire Findings (Conceptual WRAP EDMS) - Cont.

- **GIS Component**
 - ◆ **WRAP EDMS should include a fully functioning GIS module**
 - ◆ **GIS functionality should include:**
 - **pan, zoom, query layer information, ability to add/remove multiple layers of data, point and click, measure distances, buffer, print multiple sizes of maps, and select map features by line, rectangle, or polygon**
 - ◆ **GIS module should include the following layers of data:**
 - **county, state and country polygons, tribal reservation polygons, roadways and railroad line features, CAC polygons, international polygons, metropolitan statistical areas polygons, nonattainment area polygons, class I areas polygons, bodies of water polygons, census data polygons, other federal land polygons (i.e. national parks, monuments, forest, and refuges)**
 - ◆ **Ability to select and display emissions sources and associated emissions data by geographical area**

Workshops and Questionnaire Findings (Conceptual WRAP EDMS) - Cont.

- **User Access and Preferences**
 - ◆ All reporting features should be publicly accessible
 - ◆ STL agencies should have a non-public secure interface for data submittal
 - ◆ User interface should be easy and intuitive while providing all necessary functionality

- **Training**
 - ◆ Training workshops
 - ◆ Online Training
 - ◆ Online manuals

Workshops and Questionnaire Findings (Conceptual WRAP EDMS) - Cont.

- **EDMS will be developed and populated in 2 phases**
 - ◆ **Phase I**
 - Core database architecture, all the functioning modules, and all of the reporting and queries capabilities
 - Focus on the implementation of the emissions tracking and reporting requirements of the CAC, fire sources, stationary SO₂ sources, and mobile sources.
 - The minimum spatial resolution of the emissions data should be the county/reservation level.
 - The submittal temporal resolution of the activity data should be variable (i.e. hourly, daily, seasonal, and annual) depending on the source category.
 - Emissions should be reported and tracked on an annual temporal resolution basis.

Workshops and Questionnaire Findings (Conceptual WRAP EDMS) - Cont.

- **EDMS will be developed and populated in 2 phases (Cont.)**
 - ◆ **Phase II**
 - Could be expanded to incorporate new and updated technical functionality
 - Could allow storage, tracking, and reporting of hourly, daily, seasonal and annual emissions data if necessary
 - Could include other pollutants (e.g. CH₄, etc) and their emissions data
 - Could be used to track other RHR requirements (e.g. annual emission goals) and other regulations (e.g. Clear Skies, Greenhouse Gas, PSD, etc) requirements.

Workshops and Questionnaire Findings (Conceptual WRAP EDMS) - Cont.

- **Development timeline**
 - ◆ **Mid 2003: finish needs assessment project**
 - ◆ **Late 2003:**
 - **WRAP contractor builds and alpha tests "Phase I" EDMS**
 - **Beta test of EDMS**
 - ◆ **Early 2004:**
 - **Initiate live Phase I EDMS on web**
 - **Provide training and user support**
 - ◆ **Throughout 2004:**
 - **begin collection, processing, and QA/QC of 2002 emissions data**

Workshops and Questionnaire Findings (Conceptual WRAP EDMS) - Cont.

- **Late 2004:**
 - ◆ **Implement Phase II of EDMS**
 - ◆ **Provide training and user support**
 - ◆ **Produce emissions reports as needed for Section 308 and 309 requirements**
 - ◆ **Prepare 2002 base and 2018 projection years' emissions files for use by RMC**
- **2005-2007: ongoing operation of EDMS**
 - **Track emissions as needed for Section 308 and 309**
 - **Develop refined emissions inventories representing the effect of control strategies in 2018**
 - **Provide training and user support**
 - **Populate EDMS with annual emissions data to meet Section 308 and 309 regulatory requirements**
 - **Collection, processing, and QA/QC of 2005 emissions data**

Comparative Analysis

Conceptual WRAP and Selected Existing EDMS Comparison

	Conceptual WRAP EDMS	National Emissions Inventory	Tribal Emissions Inventory Software Solution	California Air Resources Board Emissions Inventory	Colorado Department of Health Air Pollution Inventory	Delaware Environmental Navigator
Data Tracking						
Pollutants	9	7	7	5	5	5
Sources	6	4	3	3	3	3
Activity Data	Yes	Yes	Yes	Yes	Yes	Yes
Emissions Factors	Yes	Yes	Yes	No	No	No
Temporal Resolution	Variable ¹	Annual	Annual	Annual	Annual	Annual
Spatial Resolution	County / Reservation / Point	County / Point	Reservation / Point	County / Point	County / Point	County / Point
Standard Submission Format	Yes	Yes	No ²	Yes	No ³	No
Data QA/QC						
Submission Format Check	Yes	Yes	No ²	Yes	No ³	No
Content Validation	Yes	Yes	Yes	Yes	No ³	Yes
Submission Completeness	Yes	Yes	Yes	Yes	No ³	No
Data Reporting						
Standard Summary Reports	Yes	Yes	Yes	Yes	Yes	Yes
Regional Haze Rule Specific Reports	Yes	No	No	No	No	No
Data Exports	Yes	Yes	Yes	Minimal	Minimal	Yes
Model Ready Input File, i.e. SMOKE	Yes	No	No	No	No	No
GIS Component						
Multiple Display Tools Provided	Yes	No	Yes	No	Yes	Yes
Ability to Query Emissions Database and Display Results	Yes	No	Yes	No	Yes	Yes
User Access and Preferences						
Publicly Accessible via Internet	Yes	Yes	No	Yes	Yes	Yes

¹ Some emissions data will be submitted at the hourly, daily, seasonal, or annual levels. However, the reporting temporal resolution will be annual.

² TEISS does not have one standard submission format. In fact TEISS accepts many formats.

³ This system is not the primary emission inventory system for Colorado. It is a secondary system included in this analysis because of its GIS capability.

Comparative Analysis - Cont.

- **Evaluated 5 systems and compared them to the conceptual WRAP EDMS**
 - ◆ None of the systems included all the requirements of the conceptual WRAP EDMS
 - ◆ WRAP EDMS should use some of the good features (recommended) of the existing systems
- **Key system elements that WRAP EDMS may utilize**
 - ◆ **NEI**
 - Standard submission format: NIF
 - Well-established and defined QA/QC process for submission format and data content checks
 - Adequate set of standard reports and easy and intuitive interface

Comparative Analysis - Cont.

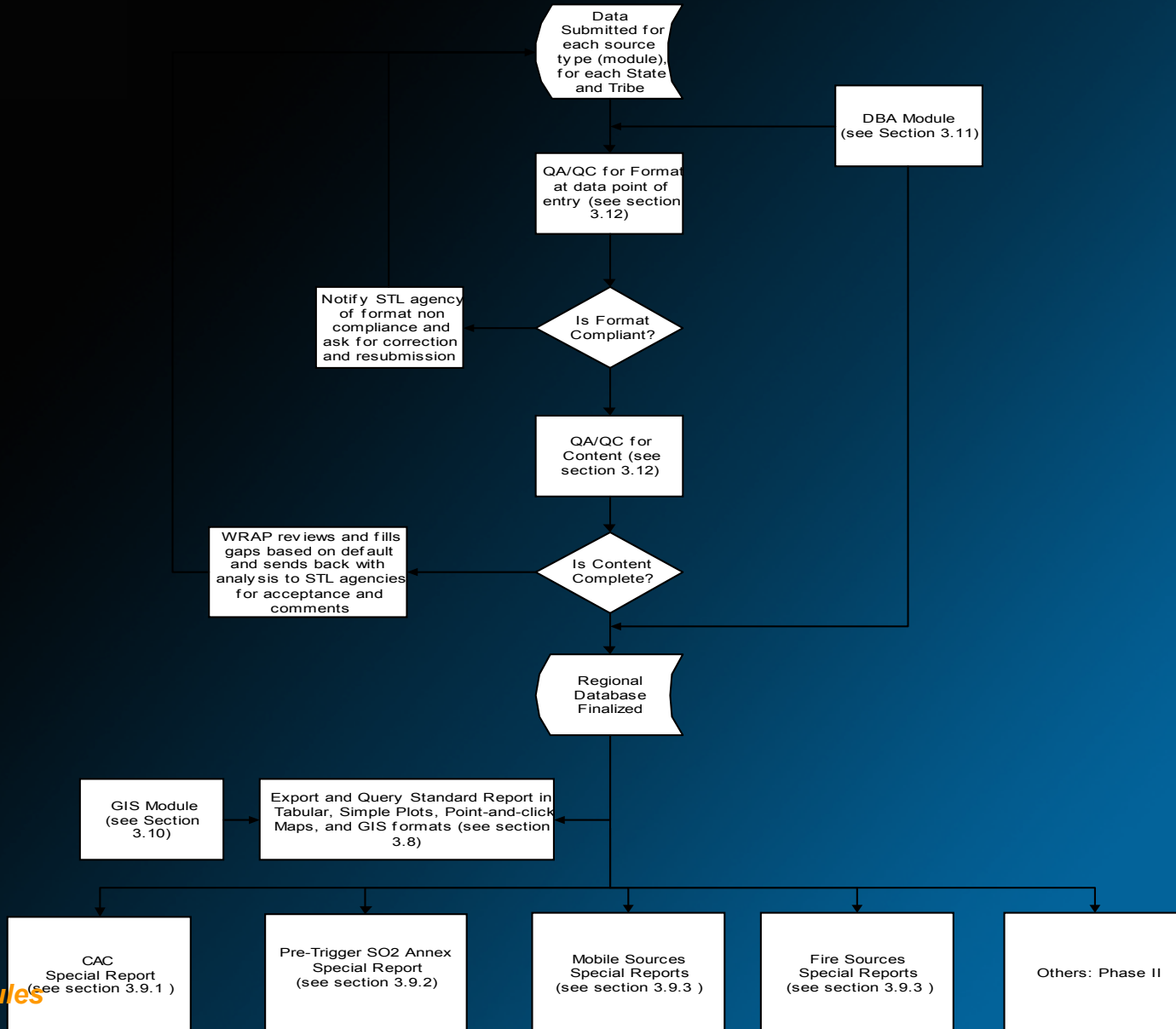
- **Key system elements that WRAP EDMS may utilize (Cont.)**
 - ◆ **TEISS**
 - TEISS has a fully functioning GIS module embedded in the system. This allows TEISS users to display map features in conjunction with relevant emissions and activity data on a real-time basis
 - TEISS has a flexible set of exporting functions to allow for multiple data export formats
 - ◆ **CARBEI**
 - CARBEI report interface is very easy to use and intuitive
 - ◆ **CAPI**
 - The CAPI includes a functioning, internet-based GIS module. The CAPI GIS module includes a full set of tools for manipulation of any map created in the system

Comparative Analysis (Cont.)

- **Key system elements that WRAP EDMS may utilize (Cont.)**
 - ◆ **DEN**
 - The DEN has a fully functioning, internet-based GIS module included in the system that includes a full set of tools for manipulation of any map created in the system

WRAP EDMS Modules

WRAP EDMS Flow Chart



WRAP EDMS Modules - Cont.

- **Point source module**
 - Inventory year
 - Inventory start date
 - Inventory end date
 - Inventory type
 - Country code
 - State and county FIPS code
 - Tribal code
 - Facility ID code
 - Point ID code
 - Process ID code
 - Stack ID code
 - Site name
 - Physical address
 - SCC code
 - Heat content (fuel) (annual average)
 - Ash content (fuel) (annual average)
 - Sulfur content (fuel) (annual average)

WRAP EDMS Modules - Cont.

- **Point source module (Cont.)**
 - Pollutant code
 - Activity/throughput (annual)
 - Activity/throughput (daily)
 - Work weekday emissions
 - Annual emissions
 - Emission factor
 - Winter throughput (%)
 - Spring throughput (%)
 - Summer throughput (%)
 - Fall throughput (%)
 - Hours/day in operation
 - Start time (hour)
 - Day/week in operation
 - Weeks/year in operation
 - X stack coordinate (latitude)
 - Y stack coordinate (longitude)

- **Point source module (Cont.)**
 - **Stack Height**
 - **Stack diameter**
 - **Exit gas temperature**
 - **Exit gas velocity**
 - **Exit gas flow rate**
 - **SIC code**
 - **Design capacity**
 - **Maximum nameplate capacity**
 - **Primary control efficiency (%)**
 - **Secondary control efficiency (%)**
 - **Control device type**
 - **Rule effectiveness (%)**

WRAP EDMS Modules - Cont.

- **Area source module (Cont.)**
 - **Inventory year**
 - **Inventory start date**
 - **Inventory end date,**
 - **Inventory type**
 - **Country code**
 - **State and county FIPS code**
 - **Tribal code**
 - **SCC code**
 - **Emission factor**
 - **Activity/throughput level (annual)**
 - **Total capture/control efficiency (%)**
 - **Rule effectiveness (%)**
 - **Rule penetration (%)**
 - **Pollutant code**
 - **Summer/winter work weekday emissions**
 - **Annual emissions**

WRAP EDMS Modules - Cont.

- **Area source module (Cont.)**
 - **Winter throughput (%)**
 - **Spring throughput (%)**
 - **Summer throughput (%)**
 - **Fall throughput (%)**
 - **Hours/day in operation**
 - **Days/week in operation**
 - **Weeks/year in operation**

WRAP EDMS Modules - Cont.

- **Mobile source module**
 - ◆ **Onroad mobile source**
 - Inventory year
 - Inventory start date
 - Inventory end date
 - Inventory type
 - Country code
 - State county FIPS code
 - Tribal code
 - SCC code
 - Emission factor
 - Activity (VMT by roadway class)
 - Pollutant code
 - Summer/winter work weekday emissions
 - Annual emission
 - Refueling emissions classification

WRAP EDMS Modules - Cont.

- **Mobile source module (Cont.)**
 - ◆ **Nonroad mobile source**
 - Inventory year
 - Inventory start date
 - Inventory end date
 - Inventory type
 - Country code
 - State and county FIPS code
 - Tribal code
 - SCC code
 - Emission factor
 - Activity/throughput level (annual)
 - Total capture/control efficiency (%)
 - Rule effectiveness (%)
 - Rule penetration (%)
 - Pollutant code

WRAP EDMS Modules - Cont.

- **Mobile source module (Cont.)**
 - ◆ **Nonroad mobile source (Cont.)**
 - **Summer/winter work weekday emissions**
 - **Annual emissions**
 - **Winter throughput (%)**
 - **Spring throughput (%)**
 - **Summer throughput (%)**
 - **Fall throughput (%)**
 - **Hours/day in operation**
 - **Days/week in operation**
 - **Weeks/year in operation**

WRAP EDMS Modules - Cont.

- **Biogenic source module**
 - Inventory year
 - Inventory start date
 - Inventory end date
 - Inventory type
 - Country code
 - State and county FIPS code
 - Tribal code
 - SCC code
 - Pollutant code
 - Summer/winter work weekday emissions
 - Annual emissions

WRAP EDMS Modules - Cont.

- **Windblown dust source module**
 - Inventory year
 - Inventory start date
 - Inventory end date
 - Inventory type
 - Country code
 - State and county FIPS code
 - Tribal code
 - SCC code
 - Pollutant code
 - Summer/winter work weekday emissions
 - Annual emissions
 - Natural or anthropogenic classification

WRAP EDMS Modules - Cont.

- **Fire source module**
 - **Inventory year**
 - **Inventory start date**
 - **Inventory end date**
 - **Inventory type**
 - **County code**
 - **State and county FIPS code**
 - **Tribal code**
 - **SCC code**
 - **Date of Burn**
 - **Duration of Burn**
 - **Burn Location Latitude**
 - **Burn Location Longitude**
 - **Area of burn**
 - **Fuel type**
 - **Pre-burn fuel loading**
 - **Type of burn**

WRAP EDMS Modules - Cont.

- **Fire source module (Cont.)**
 - Anthropogenic or natural classification
 - Pollutant code
 - Emission factor
 - Summer/winter work weekday emissions
 - Annual emissions

WRAP EDMS Modules - Cont.

- **GIS module**

- ◆ **Phase I should include the following GIS Functionality**

- Pan and zoom
- Query layer information
- Ability to add/remove multiple layers of data
- Point and click
- Measure distances
- Buffer
- Print – multiple sizes of maps
- Select map features by line, rectangle or polygon

- ◆ **Phase II could include the following additional functionality**

- Export selected maps shape files
- Generate polygons/layers from coordinates stored in the WRAP EDMS (i.e. create polygons for fire burn areas)
- Modeling grid GIS capability

WRAP EDMS Modules - Cont.

- **GIS module (Cont.)**

- ◆ **Should include the following static layers of data**

- County, state and country polygons
- Tribal reservation polygons
- Metropolitan statistical areas polygons
- Nonattainment area polygons
- Class I areas polygons
- Interstate and highway line features
- Other roadways and railroad line features
- Bodies of water polygons
- Census data polygons
- Other federal land polygons (i.e. national parks, monuments, forest, and refuges)
- CAC polygons
- International area polygons

- ◆ **Should include the following dynamic/data driven layers**

- Select and display emissions sources and associated emissions levels by geographical area

WRAP EDMS Modules - Cont.

- **DBA module**
 - ◆ **Phase I should include the following DBA Functionality**
 - User account maintenance
 - Lookup table maintenance (unit conversions, threshold values, default values, etc.)
 - Versioning/maintenance of submitted data
 - Data gap filling triggered from a QA/QC check, following specific methods that will be developed by WRAP
 - International data maintenance
 - Opt-in options for individual states, tribes, and sources
 - Other DBA module functionality requirements as necessary

 - ◆ **Phase II should include the following DBA Functionality**
 - Data warehousing/archiving
 - Historical data retrieval

WRAP EDMS Modules - Cont.

- **QA/QC module**
 - ◆ **Should perform the following types of format checks**
 - Does the file conform to the format specification?
 - Are mandatory data elements reported?
 - Does the data set contain what the STL agency said they are submitting? - The data in the file will be compared to the Inventory Submittal Form (ISF)

 - ◆ **WRAP will keep a log of errors and problems encountered with each of the data submissions, and will provide those to the STL agency when communicating with the agency**

 - ◆ **The data content will consist of two areas of QA/QC. First, the data will be checked for completeness, ensuring that all data exists for all sources and geographic areas. Second, the data integrity will be checked, ensuring that supplied values are within acceptable ranges and all codes are valid**

WRAP EDMS Modules - Cont.

- **QA/QC module (Cont.)**
 - ◆ **Perform the following types of data content checks for completeness**
 - Add records to fill in missing facilities or source categories, or to fill in for missing geographic areas (e.g., where data were not reported for entire counties)
 - Add, or solve for, data elements missing in existing records

 - ◆ **Perform the following data augmentation processes**
 - Calculate EC and OC emissions
 - Aggregate dust and biogenic source data from the supplied grid level data to county or reservation level
 - Modify county data to exclude sources and emissions from tribal reservations that are within the county's boundaries

WRAP EDMS Modules - Cont.

- **QA/QC module (Cont.)**
 - ◆ **Perform the following types of data integrity checks (based on the NEI QA/QC process)**
 - **Conditional fields - fields required by other fields in the same table. For example, if there is a PCT Capture Efficiency in the Control Equipment (CE) table, then there should also be a Primary Device Type in the CE Table**
 - **Acceptable codes - the Pollutant Code (and all acceptable codes) should be consistent**
 - **Numeric values in acceptable range - For example, the annual average days per week in the Emission Point (EP) table should be less than seven (7)**
 - **Inter-File Format - fields required by other fields in different tables. If there is an Emission Record in the Emission (EM) table, then there should be an associated activity record in the Activity Code (AC) table**
 - **Inter-source relationships**
 - **Inter-pollutant relationships**

WRAP EDMS Reports and Queries

- **Standard reports and queries**
 - ◆ **A summary report of the annual WRAP emission inventory, compiled at the county and reservation levels and totaled for each state, tribe, and the WRAP region, for all pollutants, broken down by point, area, mobile, fire, biogenic, and windblown dust source categories, and by summed total emissions for all six source categories**
 - ◆ **A summary report of the annual WRAP emissions from the stationary point sources in each county and reservation and the stationary point sources for each state, tribe and the entire region (broken down by plant name), for each pollutant**
 - ◆ **A summary report of the annual WRAP emissions from the stationary point sources in each county and reservation and stationary point sources for each state, tribe and the entire region (broken down by SCC code), for each pollutant**
 - ◆ **A summary report of the annual WRAP emissions from the area sources in each county and reservation and area sources for each state, tribe and the entire region (broken down by SCC code), for each pollutant**

WRAP EDMS Reports and Queries - Cont.

- **Standard reports and queries (Cont.)**
 - ◆ **A summary report of the annual WRAP emissions from on-road mobile sources in each county and reservation and on-road mobile sources for each state, tribe and the entire region (broken down by the sixteen (16) mobile source categories), for each pollutant and dust from paved and unpaved road**
 - ◆ **A summary report of the annual WRAP emissions from non-road mobile sources in each county and reservation and non-road mobile sources for each state, tribe, and the entire region (broken down by SCC code), for each pollutant**
 - ◆ **A summary report of the annual WRAP emissions from fire sources in each county and reservation and fire sources for each state, tribe, and the entire region (broken down by the 3 fire categories (wildfire, prescribed wild land burning, and agricultural burning activities), for each pollutant**
 - ◆ **A summary report of the annual WRAP emissions from biogenic sources in each county and reservation and biogenic sources for each state, tribe, and the entire region (broken down by emission source name)**

- **Standard reports and queries (Cont.)**
 - ◆ **Data reports in the NEI Input Format Version 3.0 (NIF V3.0) for submittal to the EPA under the CERR**
 - ◆ **For stationary point sources, data reports for all emission points on site by text description name and by Stack ID, for NEI file format stack parameters (STKHGT, STKDIAM, STKTEMP, STKFLOW, STKVEL), production rates (BOILCAP, CAP_UNITS, THRUPUT, MAXRATE, NETDC), fuel parameters (HEATCON, SULFCON, ASHCON), standard industrial classification code (SIC), location (LATC, LONG), and emission controls ("pollutant"_CE, "pollutant"_CPRI, "pollutant"_CSEC)**
 - ◆ **For stationary point sources, data reports for all emission points on site by text description name and by Stack ID, for actual emission rates of each pollutant, on an annual (tpy) and on a short term (pounds per hour) basis. This emission data will be summed for a cumulative total of emissions from each stationary point source**
 - ◆ **In addition to these standard reports, the EDMS will produce regional emission model (SMOKE)-ready emissions input files for the regional visibility modeling efforts**

WRAP EDMS Reports and Queries - Cont.

- **Special CAC reports and queries**
 - ◆ **A summary report of the annual summed total emissions for all six source categories and all of the pollutants for the entire CAC**
 - ◆ **A summary report of the annual summed total emissions for all six source categories and all of the pollutants outside the CAC**
 - ◆ **A summary report of the comparison of the annual summed total emissions for all six source categories and all of the pollutants for the entire CAC and the corresponding base year total emissions.**

WRAP EDMS Reports and Queries - Cont.

- **Special pre-trigger SO₂ reports and queries**
 - ◆ **A summary report of the annual WRAP emissions from the stationary sources emitting more than 100 tpy of SO₂ in the base year for each state, tribe and the entire region**
 - ◆ **A summary report of the new stationary sources emitting more than 100 tpy of SO₂ that were not contained in the previous year's inventory for each state, tribe and the entire region**
 - ◆ **A summary report of the stationary sources emitting more than 100 tpy of SO₂ that are retired compared to the previous year's inventory for each state, tribe and the entire region**
 - ◆ **A summary report of the regional average SO₂ emissions from stationary sources emitting more than 100 tpy of SO₂ for the last three (3) years and comparison to the regional milestone for the compliance period**
 - ◆ **A summary report of the stationary sources emitting more than 100 tpy of SO₂ which emissions exceed +/- 20% compared to the previous year's inventory for each state, tribe and the entire region**

WRAP EDMS Reports and Queries - Cont.

- **Special pre-trigger SO₂ reports and queries (Cont.)**
 - ◆ **A summary report identifying all the stationary sources emitting more than 100 tpy of SO₂ that choose to opt in the program for each state, tribe and the entire region.**
 - ◆ **A summary report identifying all the stationary sources emitting more than 100 tpy of SO₂ that were not included in the base year for each state, tribe and the entire region**

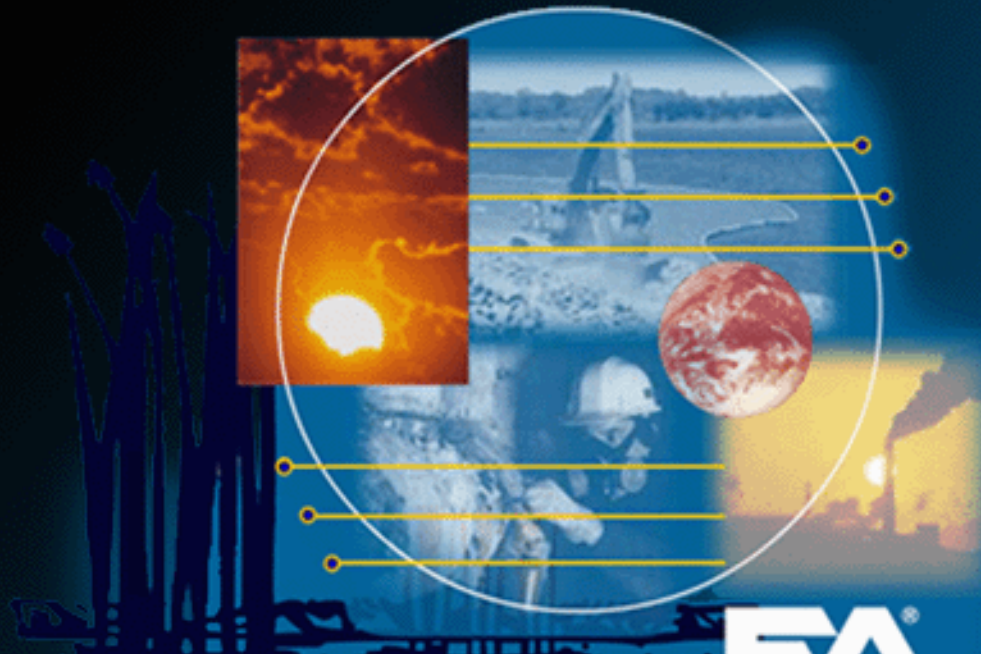
WRAP EDMS Reports and Queries - Cont.

- **Special mobile emissions reports and queries**
 - ◆ **A summary report of the comparison of annual WRAP total (on-road plus nonroad) emissions from the mobile sources (VOC, NO_x, SO₂, PM_{2.5}, EC, OC, and paved and unpaved road dust) for each state, tribe and the entire region and the corresponding previous period total emissions, for each pollutant**

WRAP EDMS Reports and Queries - Cont.

- **Special fire emissions reports and queries**
 - ◆ **Standard report**

Thank You!



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