WRAP 2018 Preliminary Reasonable Progress (PRP) Emission Inventory and Modeling Analysis

Implementation Workgroup

April 17, 2007

Schedule for PRP analysis

- **February – analyze existing data from Base18b**
- **March – review with states, collect, and begin data processing**
- **April:**
  - **Complete revised EI data processing**
  - **Begin emissions modeling at RMC**
- **May:**
  - **Run regional model (PRP18a)**
  - **Load emissions data into TSS**
- **June:**
  - **Present regional modeling results for PRP18a at TSS workshop**
  - **Load visibility modeling results into TSS**

PRP EI activities

- **For PRP: revise Base18b EI for point and area sources:**
  - **Correct projection errors**
  - **Include BART control limits where available**
    - **If not available for EGUs, use presumptive limits**
    - **If not available for Non-EGUs, leave as projected for 2018**
  - **Oil & Gas EI Phase II project**
    - **New 2018 projections**
    - **Based on producer data by field**
    - **Includes controls "on-the-books" by state**
  - **No other WRAP region 2018 EI changes for PRP analysis**

Non-WRAP region EI changes for PRP18a

- **CENRAP:**
  - **Area source fires**
  - **Point and area sources**
- **VISTAS:**
  - **Fires**
  - **Point and area sources (2018g)**
  - **Mobile sources**
- **MidWest RPO:**
  - **Mobile sources (2018K)**
  - **Point and area sources (2018k)**
- **MANE-VU:**
  - **Mobile sources**
  - **Checking on availability of other updated data**
- **Mexico – 1999 point, area, mobile - updates for the Northern states and new emissions for the Southern states**
- **Canada - use 2020 projections for point, area, mobile**
- **Off-shore marine shipping - checking on data:**
  - **Likely no changes for eastern Pacific**
  - **Likely to add emissions for Gulf and Atlantic**

"Final" Reasonable Progress Analyses

- **Final "Plan02d" emissions/modeling analysis late 2007/early 2008:**
  - **Address corrections to EIs used in Plan02c + other RPOs**
  - **Revised CA mobile**
  - **Identify "subject-to-BART" sources**
  - **Make other changes noted in PRP18a analysis**
- **"FRP18" emissions/modeling analysis immediately following "Plan02d" analysis**
  - **Revised CA mobile**
  - **Use permitted emission limits for "subject-to-BART" sources**
  - **Address remaining corrections to EIs used in Plan02d + other changes noted in PRP18a analysis, and other RPOs**

WRAP 2018 PRP Emission Inventory Analysis – Point and Area Sources

Eastern Research Group

WRAP PRP 2018 EI Update

- Objectives
  - Provide technical basis for making preliminary evaluation of reasonable progress toward individual Class I area visibility goals
  - Update previous 2018 version 1 emissions inventory
- Scope: Point and Area Sources, excluding:
  - Area source oil & gas (by ENVIRON)
  - Point source oil & gas for SO2 (by ENVIRON)
  - Other area source fugitives (wind erosion, fires, paved/unpaved roads, ammonia)
  - Onroad motor vehicles, nonroad mobile sources

Task 1: 2018 Summary Tables and List of Potential Changes

- Status: Complete
- Significant Findings/Results:
  - Updated ERG 2018 projection inventory (database) to be consistent with WRAP RMC 2018-18b inventory
  - Developed point and area source spreadsheets with top 80% emissions by SCC for each pollutant
  - Developed “Proposed Changes” spreadsheet listing other items for which S/L agencies were to provide feedback:
    - Pechan 2006 Report on SO2 Emissions for §309 States
    - Any BART emission limits?
    - Others

Task 2: Input from S/L Agencies

- Status: Complete
- Significant Findings/Results:
  - Held conference calls with all S/L agencies March 9-19, 2007 and compiled notes from call
  - Received and compiled written comments/data into spreadsheet, along with responses for all 13 states
  - BART limits:
    - Received for all subject facilities in ND, CO, UT
    - Received for some subject facilities in OR, ID (pending)
  - Estimated impacts from O&G condensate controls in CO (Reg 7) will reduce VOC emissions statewide
  - Assessed for changes to 2002 EI data for final “Plan02” series late 2007/early 2008:
    - Changes to be made affecting PRP demonstration
    - Other changes deferred to “final” RP runs early 2008

Task 2: Input from S/L Agencies - continued

- Significant Findings/Results – continued:
  - Updated coal-fired EGU projections using 2007 EIA generation data and input from S/L agencies:
    - Revised 2018 required generation, increased >7% based on 2005 EIA data previously used
    - Under construction and permitted capacity increased from 31.5 billion kWh to 73 billion kWh
    - Allowed reduction in future new plants needed from 18 to 14
    - State allocation remains the same as 2018-18b projection, with exceptions:
      - ND has adequate EGUs under construction/being permitted
      - ID has coal EGU moratorium
  - Discovered numerous probable miscoding of industrial boilers as “electric generating units” (i.e., used SCC 101xxx instead of 102xxx)

Task 3: WRAP 2018 PRP EI for Point and Area Sources

- Status: In Progress
  - Changes to 2018-18b inventory are underway
  - List of comments received and changes made will be posted on WRAP Website
  - Draft technical memo: April 20
    - Introduction, Background, Methodology, Results
    - State tables showing (a) 2018-18b tpy by pollutant, (b) net individual source/SCC tpy changes (±) by pollutant, (a-b) resulting 2018 PRP EI tpy by pollutant
  - Comments due no later than: April 27 to:
    - paula.fields@erg.com
    - mooret@cira.colostate.edu
    - lg@westgov.org
  - Final memo and revised pivot tables: May 14

WRAP Oil & Gas:

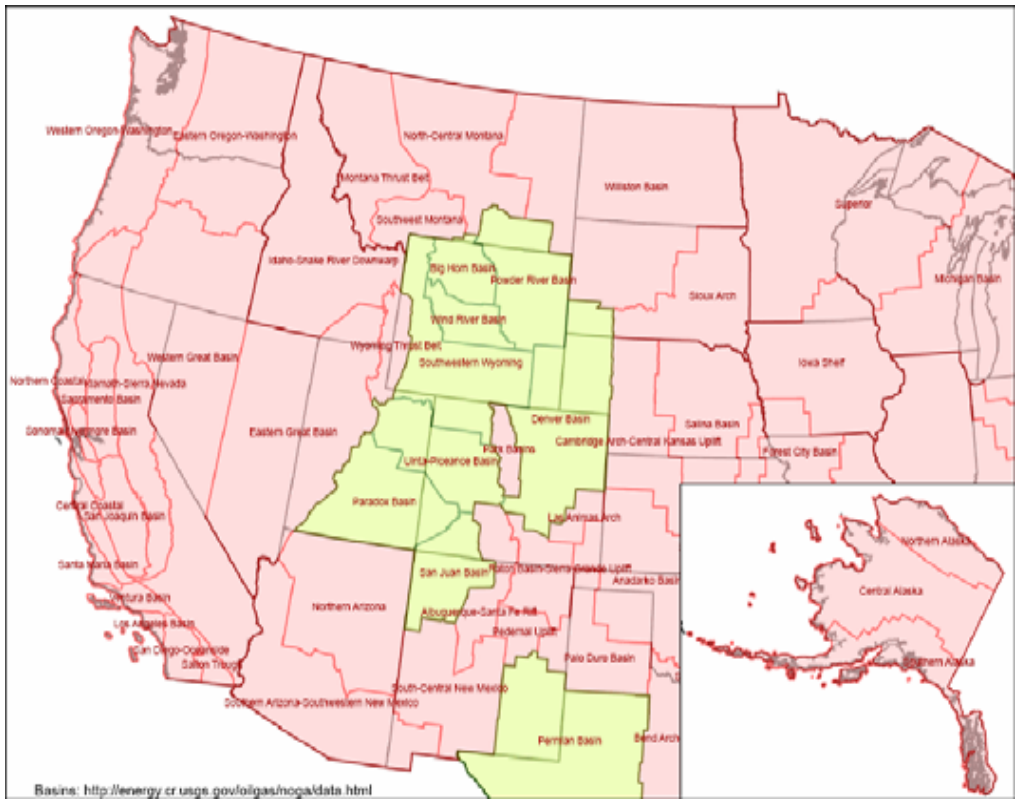
2002/2005 and 2018 Area Source Inventory Improvements and Area Source Controls Evaluation

ENVIRON

WRAP Phase II Project Overview

- Project is focused on developing an improved emissions inventory of oil and exploration and production area sources in the WRAP region
- Area source categories include compressor engines, drilling rigs, heaters and other wellhead equipment
- Previous emission inventory (EI) efforts:
  - WRAP Phase I analysis, 2002 and 2018 (completed 2005)
  - NMED EI for San Juan and Rio Arriba counties (completed 2006)
- Specific objectives of the Phase II project:
  - Emissions inventory methodology improvements
  - 2018 growth factor projections improvements
  - Control technology evaluations and control strategies scenarios

Western States Oil & Gas Regions of Interest



Major basins of O&G activity in Phase II analysis:

- Permian Basin (NM)
- San Juan Basin North (CO)
- Denver-Julesburg Basin (CO)
- Green River Basin (WY)
- Big Horn Basin (WY and MT)
- San Juan Basin South (NM)
- Uinta-Piceance Basin (CO and UT)
- Paradox Basin (UT)
- Wind River Basin (WY)
- Powder River Basin (WY and MT)

Data Collection from O&G Producers

· Data were collected from all major and some medium-sized and independent oil and gas companies operating in the WRAP region

• Data collection was in the form of a questionnaire sent to each producer

• Information was provided on:

- Overall activity (i.e. number of wells, gas production, etc.)

- Equipment used and equipment counts

- Emissions controls in use or planned

- Projections of future activity, demand, and production in the region

Brief Overview of Methods

· **Basin-specific emissions estimates were made using activity and equipment information provided directly by the producers**

  - Previous Phase I work used available data from limited areas and generalized to WRAP region

• For Phase II EI improvements, focus is on well-head compressors and drilling rigs as area sources

• Focused basin list only – these are the areas where major oil and gas activity is occurring or expected to occur

• Updated baseline emissions year from 2002 to 2005

• Revised 2018 projections using most recent planning information available and producer data where available

Controls Evaluated

- Developed a series of white papers on control technologies for drill rigs and compressors and some VOC sources

- White papers describe control technology, cost, emissions reduction potential, cost-effectiveness, and technical feasibility

- White papers include only those technologies deemed technically feasible now

- List of control technologies includes:

  - Engine modifications (e.g., lean-burn engines, ignition timing)
  - Aftertreatment control devices (e.g., catalysts, exhaust gas recirculation)
  - Engine replacement/repowering
  - VOC controls (e.g., dehydrators, pneumatics)

2018 Emissions

· **Emissions estimates for county-level emissions in WRAP region of NOx, SO_2, VOC, and CO**

• **Emissions include growth projections from Resource Management Plans and National Energy Forecast released by the Energy Information Administration (EIA)**

• **State controls evaluated:**

- **Wyoming BACT requirements for permitted sources**
- **Colorado controls requirements for point sources (ERG)**

• **Federal controls evaluated:**

- **Federal nonroad engine standards**
- **EPA nonroad diesel fuel sulfur content standards**

2018 Emissions Control Scenarios

· For each viable control technology, estimate emissions reduction potential for O&G area sources in each state

- Analysis focuses on compressors and drill rigs only
- Scenarios will show emissions reductions for a range of
  - Growth projections
  - Control technology penetration rates
- Estimated costs to be provided for each scenario

Project deliverables and status

Task/deliverable	Status	Date
Project workplan	Completed and reviewed by SSJF working group	November 2006
Questionnaire to major producers	Completed and responses compiled	March 2007
2002 EI update	Completed, results in SMOKE-ready files	April 2007
2002 → 2005 baseline scale-up	Completed	April 2007
2005 → 2018 EI projections	Completed, results in SMOKE-ready files	April 2007
Control technology evaluation	Completed control technology white papers	March 2007
Control scenarios	In process	Mid-May
Final report		End of May
Presentation of EI results to SSJF Oil and Gas Work Group		Mid-May
Presentation of controls analysis to SSJF Oil and Gas Work Group		End of May