

WESTAR-WRAP

Regional Haze analysis and planning efforts

Tom Moore

Four Corners Air Quality Group meeting

October 23, 2019

Durango, CO



Overview of WESTAR and WRAP

- Purposes
 - Service organizations
 - Assist members in achieving their air quality management goals
 - Shared footprint
- WESTAR – 15-state air agency association
 - Training
 - Provide a forum for discussion
 - Inform policy-related discussions
 - www.westar.org
- WRAP - provides regional technical support
 - Virtual organization, not incorporated – state/tribal partnership
 - 70+ member agencies include 15 state air agencies, NPS, FWS, BLM, USFS, EPA, and interested tribes and local air agencies/districts in the WRAP region
 - Board and technical committees have representatives across states, tribes, federal, and local agencies
 - www.wrapair2.org



work by Western Air Agencies for Regional Haze

- Regional Haze Rule planning for 2028 milestone year
 - SIPs due July 2021
 - EPA has released [guidance and modeling results](#)
- Planning Topics of Concern
 - Incremental additional impacts of stationary sources for 2028 progress – what are opportunities for further cost-effective controls?
 - Evaluation of “rules-on-the-books” and considerations to go further to achieve **additional Reasonable Progress**
 - Effects of mobile, international, and uncontrollable emissions for regional haze
 - Profound impacts of fire and smoke on regional haze and visibility for park and wilderness visitors

Regional Haze Rule calls for “Reasonable Progress” to improve visibility

- **Every 10 years a goal is set for each Class I area, i.e., 2018, 2028, etc.**
- **RHR assumes that “Natural Conditions” by about 2064 is a viable outcome**
- **States manage (some) emissions affecting visibility and RHR requires SIPs to determine measures “necessary to make reasonable progress”**
- **Quoting EPA guidance:**
 - The very definition of “regional haze” recognizes that progress towards natural visibility conditions will require the accumulation of reductions in air pollution and associated light extinction, achieved through emission control measures applied to many sources over a broad geographic area. The visibility benefits of these measures may not be individually perceptible.
- **Reasonable progress goal accounts for projected emissions changes in host state and upwind regions/sources contributing at that Class I area**

Process / considerations around “reasonable progress”

- The result of this decision-making process will most often depend on the outcome of a state weighing the costs of compliance and visibility benefits
 - States include their estimates of “on-the-books” emissions reductions from existing state and federal rules
- States are required in the CAA to consider 4 factors:
 - Remaining useful life of a source
 - The time necessary for compliance by setting a compliance deadline that provides a reasonable amount of time for the source to implement the measure
 - Energy and non-air quality impacts primarily as components of the costs of compliance
 - Cost of the control measure
- Optional “5th factor” is to weigh the visibility benefits
- Each state will use regional analysis results that provide related “upwind transport contribution” information for each western Class I area

Meaning of “necessary to make reasonable progress”

- **Quoting EPA guidance:**

- CAA section 169A(b)(2) requires states to develop a SIP that includes “emission limits, compliance schedules and other measures as may be necessary to make reasonable progress toward meeting the national goal.”

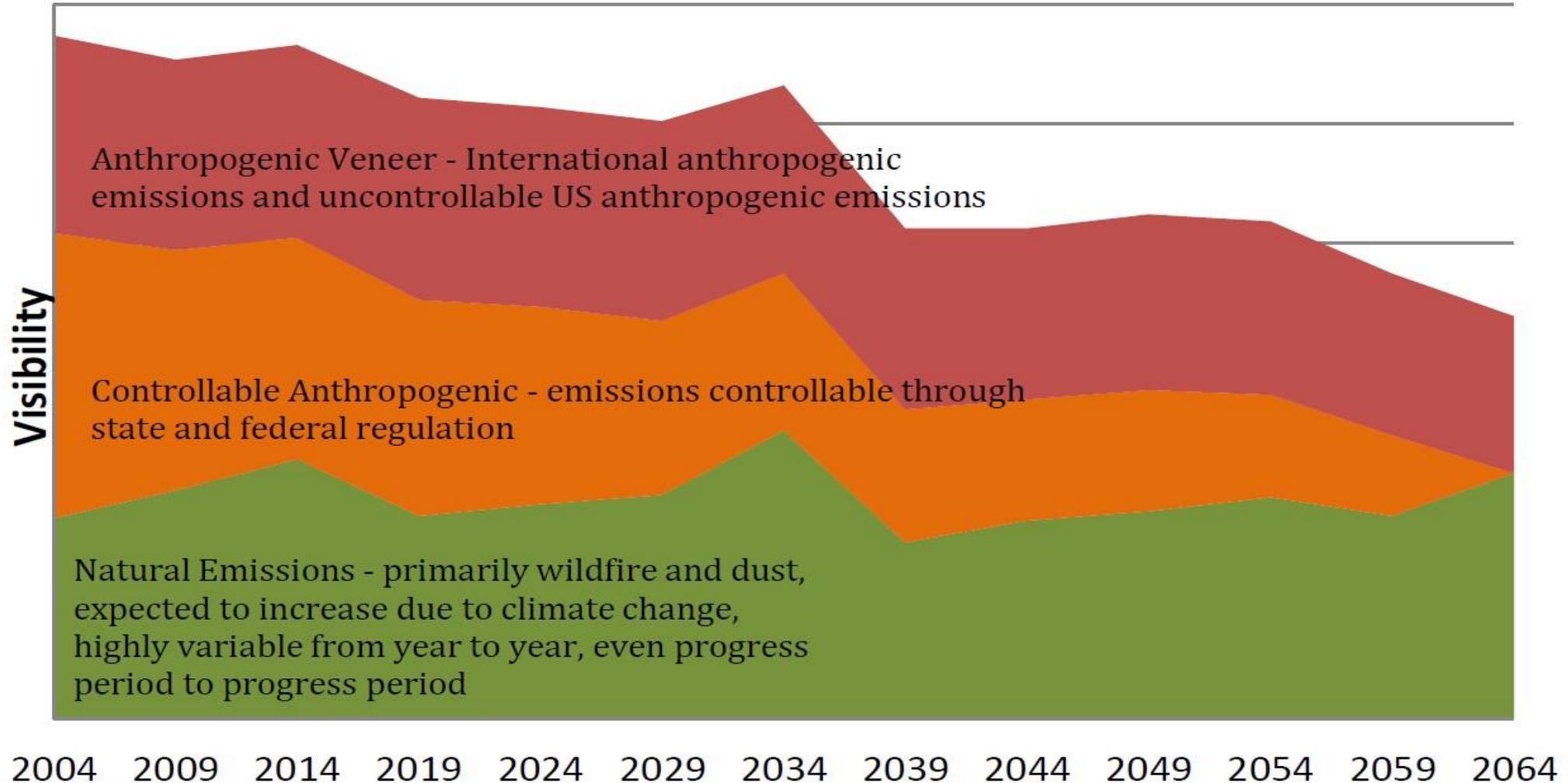


Mandatory Class I Areas



* Rainbow Lake, WI and Bradwell Bay, FL are Class 1 Areas where visibility is not an important air quality related value

Trend in emission types – western U.S.



Emissions sources – western U.S. air quality planning

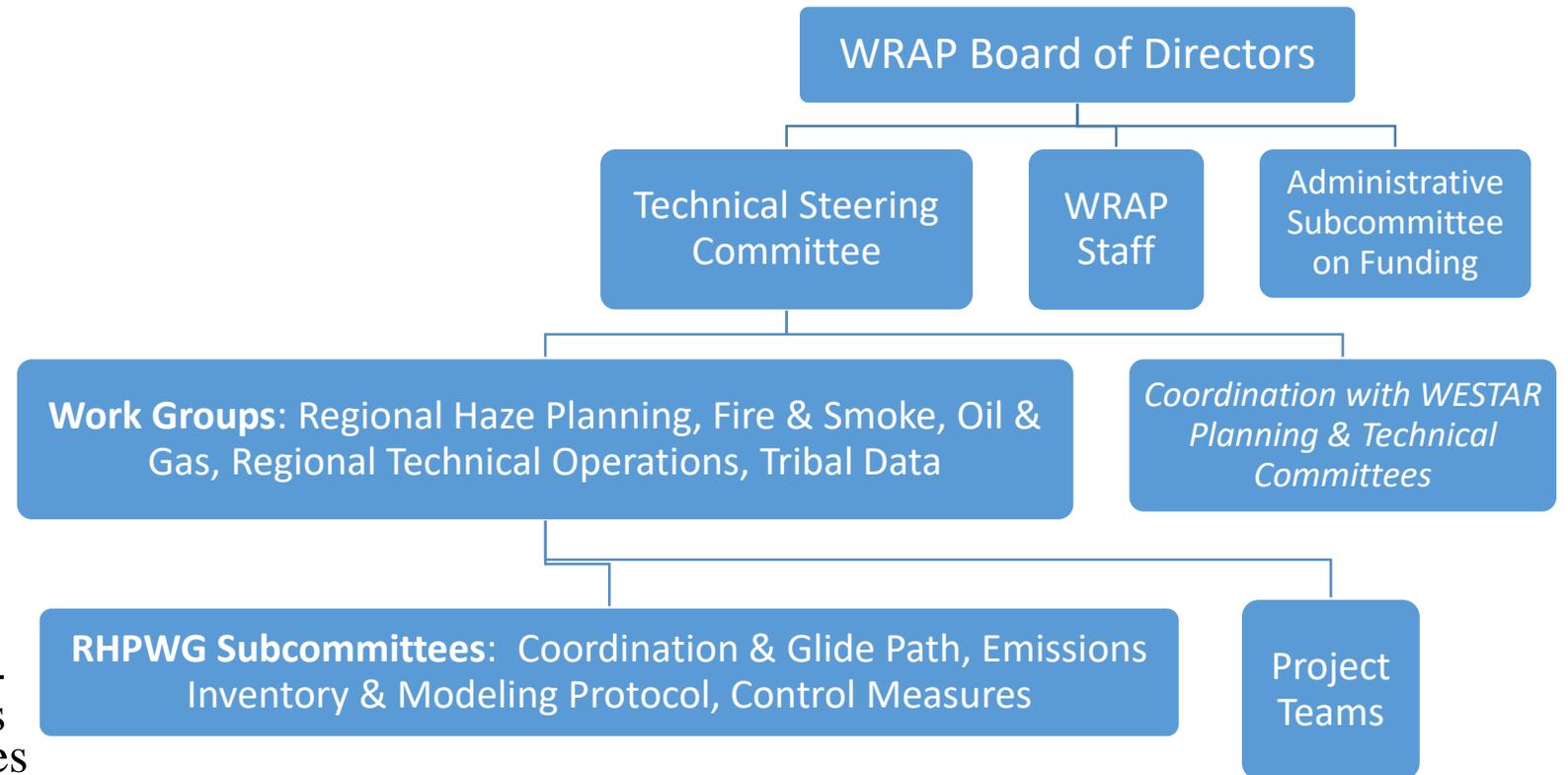
	Source	Controllability	Trend	Variability
Anthropogenic	US Anthropogenic	Some emissions are controllable	Downward as sources are controlled	Relatively stable
		Some emissions will remain after all reasonable controls implemented	Could rise because of population increases	Relatively stable
	International Anthropogenic	Not controllable by state or federal regulations	Likely increasing due to increased development worldwide and rising population	Relatively stable
Natural	Fire, Dust, Sea Salt	Natural, not controllable	Increases due to <u>climate change</u>	Highly variable
	Volcanic	Natural, not controllable	Unpredictable	Highly variable
	Other Natural Sources	Not controllable	Potentially affected by climate change, e.g., changes in temperature	Relatively stable

Table Note: Shaded areas represent emissions that states cannot control.

WRAP Organizational Structure

Technical Steering Committee

- Organizes and coordinates WRAP project activities and Work Groups
- Lead responsibility for the WRAP Workplan, regional effort is Spring 2018 through Spring 2020
- Reports progress and tracks budget for Board
- Maintains WRAP process
 - Open and transparent communication
 - Pursuing opportunities for collaboration
 - Providing TSC leadership on behalf of Board
 - Coordinate WRAP Work Groups-Subcommittees-Project Teams, as well as with WESTAR committees
 - Encourage engagement and participation to reach consensus



Current Workplan Progress by [Tribal Data Work Group](#)

- Northern AZ University’s Institute for Tribal Environmental Professionals (ITEP) and EN3 consulting firm are providing technical support to TDWG
- Recent Workplan Progress
 - EN3 finalized, distributed to TDWG final tribal contacts list with “active tribes”
 - Emissions Inventories Evaluation- Tribal Oil & Gas final report (August)
- Workplan Tasks for the Next Two Months
 - Finalize Emission Inventory Evaluation (Tribal Oil & Gas) – distribution to subject tribes, OGWG
 - WRAP webpage/maps, TSS v2, IWDW webinar with ITEP
 - Send TDWG participation letter to WRAP region tribes



Current Workplan Progress by Fire and Smoke Work Group

- Recent Workplan Progress

- Distributed Smoke Mgmt. Program (SMP) survey to state and tribal contacts – **still gathering info**
- Small contract with EPA to help with 2017 Fire NEI – **completed**
 - Distributed 2017 NEI fire activity survey to WRAP members
 - Reached out to additional members individually
 - Delivered info to EPA OAQPS
- Delivered final representative baseline fire EI to WRAP modelers
 - Baseline incorporates ranges of fire activity 2013 through 2017

- Workplan Tasks for the Next Two Months

- Collect and collate data for SMP survey
- Add SMP survey data to WRAP map
- Work on Future Fire Scenarios EI for modeling sensitivity runs
 - Will separately project increased wildfire and prescribed fire from baseline



Workplan Progress by Oil and Gas Work Group

- Recent Workplan Progress
 - OGWG and Project Management Team (PMT) review and feedback on Baseline Inventory – Complete, revised Final Report and Inventory Spreadsheet
 - Colorado O&G emissions based on new inventories provided by CDPHE & Southern Ute Indian Tribe
 - Williston Basin casinghead gas emissions correction of biased low based on EPA O&G Tool inputs
 - Model-ready inputs developed for WRAP and national modeling platforms
- Workplan Tasks for the Next Two Months
 - Additional Reasonable controls evaluation – End of 2019
 - Toolbox for agencies to select and integrate potential additional controls
 - Agency Program Review Task – End of 2019

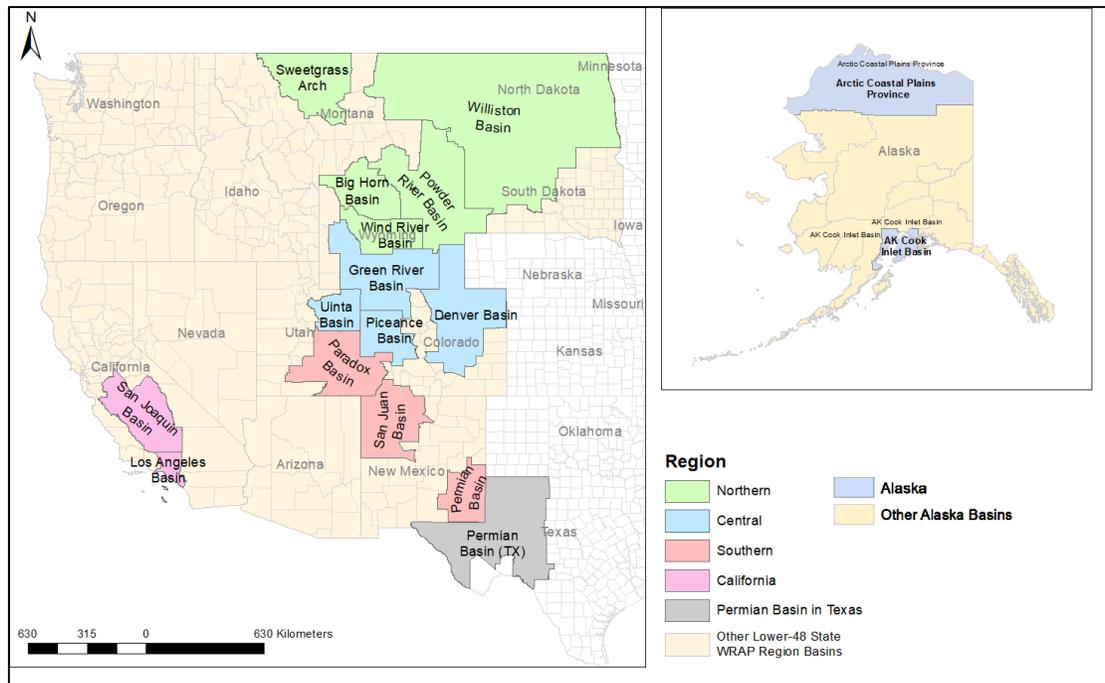


Workplan Progress by Oil and Gas Work Group, continued

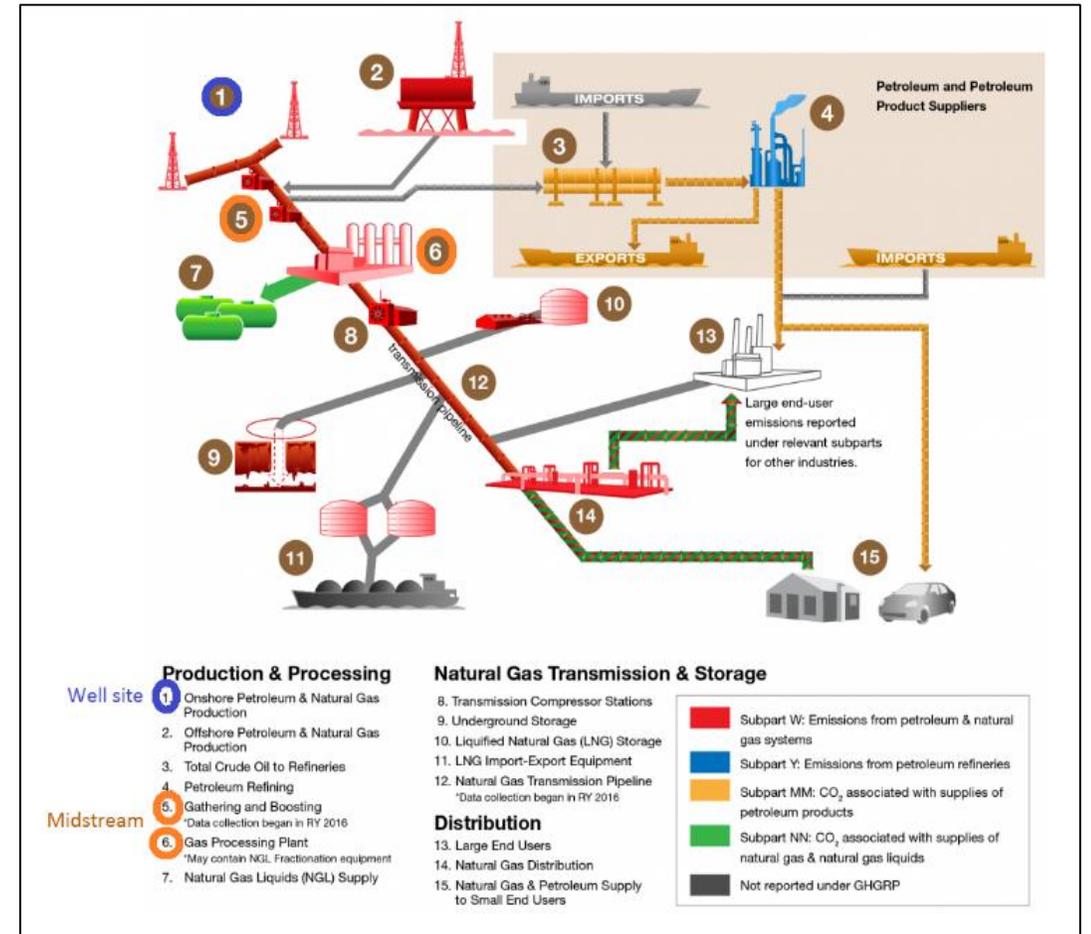
- Recent Workplan Progress - forecasting
 - Forecast 2023 Inventory to use in 2028 planning (OTB & OTW controls) – now being completed
 - “Continuation of Historical Trends” Scenario including controls analysis
- Alternate Scenarios
 - Reduced Legacy Well Activity
 - Legacy (vertical) wells: Legacy wells retire more quickly (twice as fast as historical trends scenario)
 - Multi-stage fracing (horizontal) wells: same as historical trends scenario
 - Increased Horizontal Well Activity
 - Multi-stage fracing (horizontal) wells: Increase in O&G activity by a percentage to be determined, tiered to historical trends scenario estimates
 - Legacy (vertical) wells: same as historical trends scenario

Geographical and Sector Scope

- WESTAR-WRAP Region



- Exploration, Production, and Midstream



Temporal Scope

2014 Base Year	Future Year 2023/2028
WRAP 2014 Base Year AQM	Continuation of Historical Trends Scenario to be used in WRAP Future Year Modeling and 2014-2016 Collaborative
Circa-2014 Baseline	Planning Scenarios: *Reduced Legacy Well Activity *Increased Horizontal Well Activity
WRAP Baseline AQM	
2014-2016 Collaborative	Regional Haze Additional Foreseeable Controls

Baseline Inventory

- Basis
 - Utah Air Agencies Uinta Basin Emission Inventory
 - Greater San Juan and Permian Study 2014 Emission Inventory
 - Colorado non-tribal: CDPHE 2016 Emission Inventory
 - Southern Ute Indian Tribal 2017 Emission Inventory
 - IWDW 2014 Emission Inventory
 - EPA 2014 NEIv2
 - Williston Basin Casinghead Gas Revision
 - **Survey Updates**

Survey Approach

- Agency-centric approach
 - WRAP OGWG determined target sources: drill rigs, fracing engines, tanks, well-head engines, gas compositions
 - Two surveys compiled: (1) full survey and (2) controls-focused
 - By operator O&G activity data distributed to states so that they can determine which operators to survey
 - Agency determines which basins and which survey to focus on
 - Two-tiered distribution approach: (1) to agency for internal data review and (2) agency distributes survey to operators
- Baseline subject matter: Current practices and equipment that are critical to inventories
- Forecast subject matter: Controls-focused

Survey Participation

- Broad participation across states and basins.
- Agency submissions:
 - Wyoming (2014 and 2017 operator inventories)
 - Utah (Uinta Basin engine data)
 - Montana (Gas compositions and wellsite inputs)
- 300+ gas composition files

State	Basin	No. of Returned Surveys	Percent of 2014 Basin-wide Activity Represented by Returned Surveys		
			Well Count	Oil Production	Gas Production
Montana	Big Horn	1	5%	0%	6%
	Central Montana Uplift	2	62%	5%	85%
	Powder River	1	23%	91%	90%
	Sweetgrass Arch	2	23%	19%	53%
	Williston	6	25%	64%	31%
New Mexico	Permian	4	66%	80%	86%
	San Juan	0	-	-	-
North Dakota	Williston	17	11%	25%	26%
Wyoming	Denver	1	18%	46%	52%
	Green River	4	46%	51%	53%
	Powder River	4	4%	34%	13%

Survey-based Baseline Improvements

Major Findings

- Hydraulic fracturing engines: Increased engine power
- Drill rigs: lower drilling times
- Tanks: more controls

Basin	Emissions (tons/year)	
	NOx	VOC
Hydraulic Fracturing Engin	23,096	1,933
Artificial Lift Engines	13,977	3,186
Generator Engines	2,833	334
Nonpoint Compressor Eng	2,025	31
Drill Rigs	-17,812	-789
Oil Tanks	858	-326,939
Condensate Tanks	18	537
Total Change	24,995	-321,708
Percent Change	8%	-24%
Basin	Emissions (tons/year)	
	NOx	VOC
Williston , ND	19,108	-280,542
Permian , NM	4,900	-25,719
Sweetgrass , MT	1,789	600
Williston , MT	-1,036	-16,169
Powder River , MT	-1	5
Central Montana Uplift , M	226	116
Big Horn , MT	9	0
Total Change	24,995	-321,708
Percent Change	8%	-24%

Workplan Progress by [Regional Technical Operations Work Group](#)

- RTOWG responsibilities
 - Develop and run modeling platform jointly funded by IWDW-WAQS project and combined states' Regional Haze funding – contract through WESTAR
 - Base year and baseline emissions and air quality modeling
 - 2028 future year emissions and air quality modeling
 - Source apportionment/sensitivity modeling
 - Make modeling platform available
- Recent Workplan Progress
 - Completing 2014 base year modeling simulations
 - Determine model performance for use in selecting future year air quality targets
 - Assess international transport
 - Current Baseline and 2028 “On-The-Books modeling scenarios being set up
 - Complete runs by end of 2019
 - Continue review of just-released EPA 2016 modeling data and Technical Support Document



Western Regional Modeling Plan – August 2019 update

Modeling Scenario	Timeframe	Objectives / Characteristics / Change from previous scenario(s)
2014 Shakeout v1 (actual emissions)	Dec. 2018 through early April 2019	<ul style="list-style-type: none"> • Compare Met and Biogenics datasets • Evaluate Boundary Conditions (BCs) • Uses 2014 NEIv2 data with limited corrections by states • Modeling Performance Evaluation • Identify Modeling Needs in Plan
2014 Shakeout v2 (actual emissions)	May through Sept. 2019	<ul style="list-style-type: none"> • Finalize MPE results with improved inputs • Re-run GEOS-Chem global model for BCs with natural / anthro. sensitivity • Revised emissions – all CA anthro data, OGWG inputs • Will use recommended model configuration from v1
Current/Representative Baseline (planning rather than year-specific emissions, basis of all subsequent runs)	July through October 2019	<ul style="list-style-type: none"> • Apply v2 GEOS-Chem global model BCs • Revised emissions from 2014 actual, new EGU, OGWG, and FSWG inputs <ul style="list-style-type: none"> o reflective of current emission rates and "normal" operations o "representative" annual fire emissions to smooth out variation • Basis of all 2028 scenarios, will use model configuration from v1 / v2 • Best reflect current emissions profile for each source potentially impacting Class I area visibility [source(s) identified from Q/D analysis]
Dynamic Model Evaluations (02, 14, 28)	Start Summer 2019	<ul style="list-style-type: none"> • Scoping memo in August • Use 2014 met, BCs, biogenics for all • Actual 02 and 14 emissions, OTB for 2028 • Provide modeled glide path, Regional Haze Progress for anthro emissions
2028 Emissions from Rules OTB / OTW	October through December 2019	<ul style="list-style-type: none"> • Model visibility impact / calculate Reasonable Progress Goal for each Class I area "if no additional controls" were adopted • 2028 OTB emissions <u>may be</u> same as Current/Representative Baseline rate • Add international anthro contributions from Shakeout V2 • Gridded emissions to be used for Weighted Emissions Potential analysis
2028 Source Apportionment / Sensitivity	November 2019 through early 2020	<ul style="list-style-type: none"> • 2 sensitivity runs: increased emissions separately for wildfire and Rx fire • PSAT/OSAT run for state/source sector groups
2028 Control Strategy Run	January through March 2020	<ul style="list-style-type: none"> • SCC-level "potential additional" SO₂, NO_x, PM % decreases from each state • Model visibility impact / calculate RPG for each Class I area "if additional controls" were to be adopted

Workplan Progress & Coordination by Regional Haze Planning Work Group

- Current Workplan Progress and Coordination
 - New Co-Chair: David Stroh from North Dakota
 - Final review of and consensus on the WRAP Communication Framework for Regional Haze Planning (September)
 - Review of example 4-factor analysis by North Dakota
 - October 3rd – Fall Milestone webex/call recording (MP4 format)
 - Representative Baseline Fire emissions inventory - Matt Mavko, Air Sciences, Inc. for the FSWG
 - Final Round 2 Regional Haze Planning Guidance – Liz Etchells, EPA OAQPS
 - Modeling: International vs. US Contributions – Mike Barna, RTOWG
 - Communication Framework for Regional Haze Planning – Jay Baker, RHPWG
- Workplan tasks and Coordination for the Next Two Months
 - Begin use of EPA's Regional Haze Guidance
 - Development of Regional Haze in the West Storyboard
 - Coordinate ongoing discussions of controls and modeling – both require states to consult with sources

Thank you.

Tom Moore
WRAP Air Quality Program Manager, WESTAR

