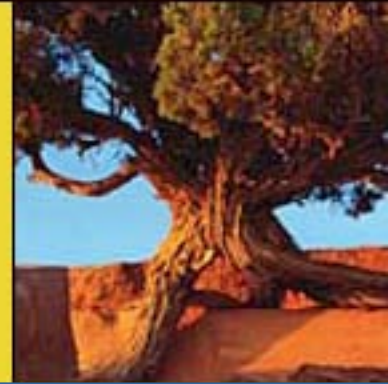


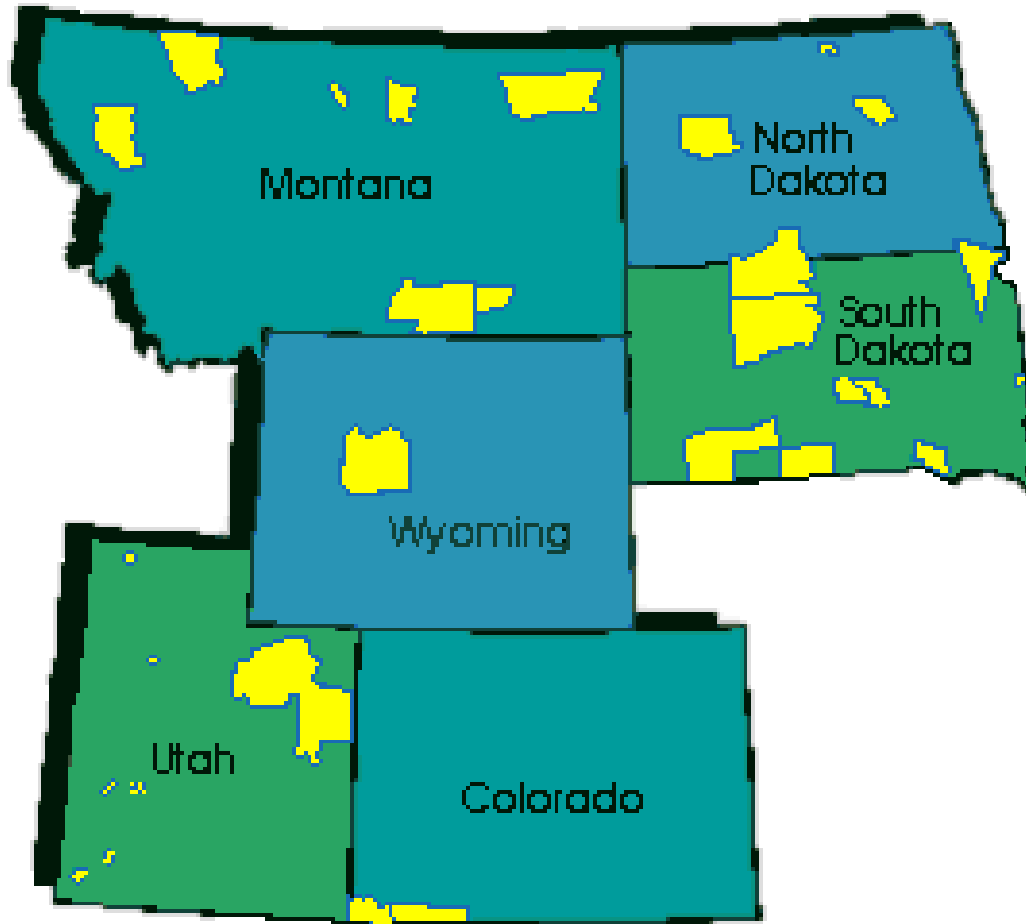
# Air Emissions Inventory



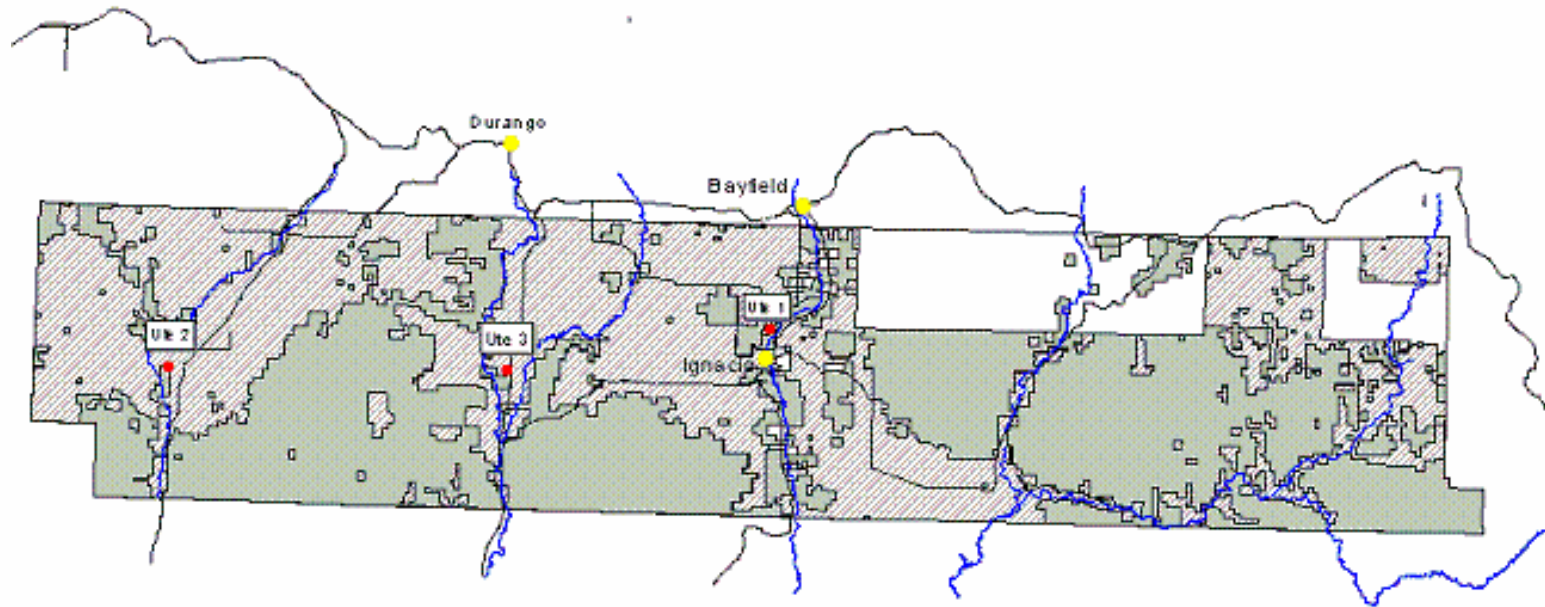
## Development of Air Emissions Inventory of Criteria and Hazardous Air Pollutants on the Southern Ute Indian Reservation



# US EPA Region VIII



# Southern Ute Reservation



- Air Monitoring Sites
  - ~ Major Rivers
  - State Highways and County Roads
  - ▭ Reservation Boundary
  - ▭ Tribal Lands
  - ▭ Private Lands
- Ute 1 Active  
Ute 2 Closed  
Ute 3 Active





# Getting Started: PLAN, PLAN, PLAN!

- Define what areas contractors will inventory.
- Define what areas your program will inventory.
- Establish QA/QC process.
- Establish priority areas.
- Keep records!
  - Notebook of conversations, notes, calculations.
  - Binder for copies of documents



# What to Include

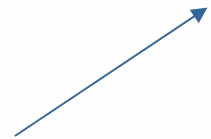
- Definition of source category.
- Procedures of data collection including difficulties.
- All assumptions.
- All calculation.
- Any improvements / Recommendations
- QA /QC Procedures

# Site Visits

- Visit some local Point, Area, and Biogenic sources.
- This gets you out of the office!



Potential PM 10 source





# The SUIT EI Purpose

- Obtain and update baseline air pollutant emissions data.
- The data will be used to track total emissions of numerous pollutants including:
  - Nitric Oxides (NO<sub>x</sub>),
  - Carbon Monoxide (CO),
  - Particulate Matter (PM 10/2.5),
  - Sulfur Oxides (SO<sub>x</sub>)
  - Volatile Organic Compounds (VOC's), and
  - Hazardous Air Pollutants (HAPs).



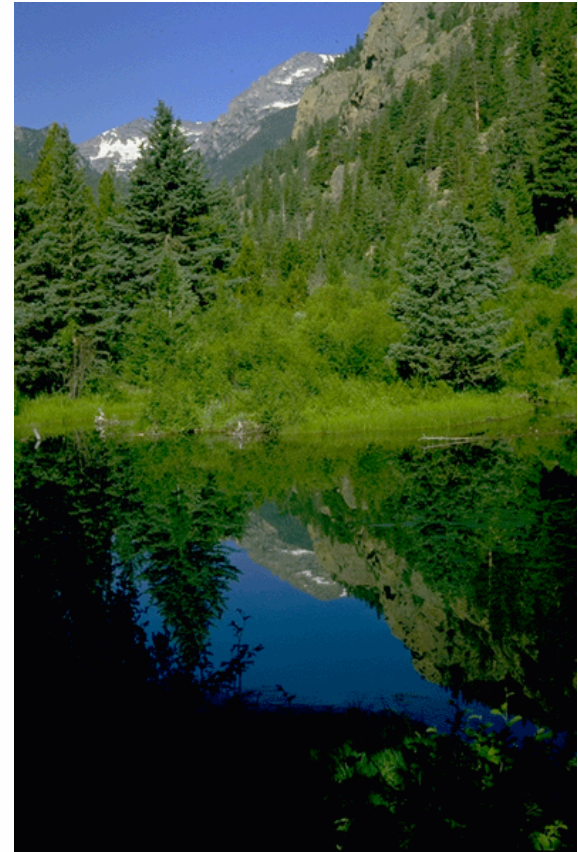
# Data collection

- The SUI Air Quality Program collected data for:  
all major point sources:
  - landfills, airports,
  - biogenic emissions, and
  - additional area sources utilizing the Tribal Emissions Inventory Software Solution (TEISS).
- ARS collected data for:
  - some area sources (excluding landfills),
  - all on-road sources and all non-road sources (excluding airports).



# Source Categories

- Point Sources
- Area Sources
- Mobile Sources
- Biogenic Sources





# Point Sources (Title V Sources)

- Potential to emit  $\geq 100$  tons per year of any criteria pollutant.
- Potential to emit  $\geq 10$  tons per year of any single HAP or  $\geq 25$  tons per year of more than one HAP.

(as defined by EPA)



# Data Collection for Point Source Emissions

- Contact EPA and or local State officials
- Emissions taken directly from Title V Permits.
- TEISS Projections
- QA/QC
  - Numerous Reviewers
  - Internal Checks
- Assumptions
  - When actual emission for Title V were not available the Potential To Emits (PTE) data was used.

# Point Source Emissions

- What should you include?
  - Table of results including all pollutants

	<b>CO</b>	<b>NO<sub>x</sub></b>	<b>PM<sub>10</sub>-Pri</b>	<b>SO<sub>2</sub></b>	<b>VOC</b>
Title V Source Totals	5063.64	5535.97	39.58	11.93	2005.35

	<b>Acetaldehyde</b>	<b>Benzene</b>	<b>Formaldehyde</b>	<b>Toluene</b>
Title V Source Totals	11.67	10.85	266.55	18.42

**2002 Point Source (Title V) Emissions on the SUIIT Reservation (tons per year)**



# Helpful Tips

- Gather emissions data from the Title V permits.
  - Contact EPA for permit info on Reservations.
- Have a clear definition of what a Title V point source is.

# Area Sources

- Actual emissions from a stationary source between 2 and 100 tons per year of any criteria pollutant.
- All other HAP emitting stationary sources that emit between 2 and 10 tons per year of any specific HAP.
  - (as defined by EPA)



# Data Collection for Area Source Emissions

- Contact State and Local Agencies.
  - Obtain list of Sources.
  - Emissions factors.
    - Northern San Juan Basin DEIS.
    - From Current State and County E.I.'s.
    - Search the web.
  - TEISS Projections





# Data Collection for Oil and Gas Specifics

- Obtained list of wells from regional commission website: “Colorado Oil and Gas Conservation Commissions”.
- Contacted companies directly
- Be professional and persistent!



# Oil and Gas Specifics

- Include emissions from:
  - Well engines,
  - Condensate Tanks,
  - Dehydrators,
  - Heaters,
  - Flares
  - Minor sources compressors





# Area Source Emissions Factors

(Example)

- Condensate Tanks: Taken from State of Wyoming Dept. of Environmental Quality.
  - Condensate Tanks output greater than 18.3 barrels per day (BPD) = 3,271 lbs. VOC per year / BPD
  - Condensate Tanks output below 18.3 BPD = 65.74 lbs. VOC per year / BPD

# Area Source Emissions ~ Break it down!

Source Type	Emissions Source	CO	NO <sub>x</sub>	VOC	PM <sub>10</sub>	SO <sub>x</sub>	HAP*
Area Sources	Oil & Gas wells	8,548.00	3,820.90	33,785.10	-	-	213.7
	Well-head compressors	2,766.10	3,099.90	1,204.10			
	Fireplace & Wood Burning Stoves	26.84	0.33	-	3.56	-	-
	Propane use	11.23	66.67	-	-	-	-
	Airports	118.33	17.56	4.83	0.23	2.35	-
	Landfills	-	-	13.07	-	-	-
	<b>Totals</b>	<b>11,470.50</b>	<b>7,005.36</b>	<b>35,007.10</b>	<b>3.79</b>	<b>2.35</b>	<b>213.7</b>

- **2002 Area Source Emissions on SUI Reservation (tons per year)**



# Helpful Tips

- Check current area resources.
  - Read current reports and compare emissions factors.
- Double check emissions factors for relevancy to your cause.
- Persistence helps when contacting Oil and Gas Companies.
- Clearly define Area sources and emissions thresholds before starting

# Mobile Sources



- On-road (paved) and On-road (unpaved)
  - **On-road sources consist of mobile sources licensed for use on highways or roadways.**
- Non-road mobile sources.
  - **Non-road sources consist of other mobile sources such as construction, lawn/garden, boats, airplanes, etc.**



# Mobile Source Emissions Calculations

- Total mileage of all roads.
  - Calculated from SUIT GIS files.
- Average Daily Vehicle Traveled
  - Obtained from CO Dept. of Transportation
- Emissions Modeling:
  - Lakes Environmental's MOBILE View
  - EPA's MOBILE6

# Mobile Source Emissions ~ break down!

Source Types	Emissions Source	CO	NO <sub>x</sub>	VOC	PM <sub>10</sub>	SO <sub>x</sub>	HAP*
On-Road Mobile Sources	On-road Mobile (paved)	3,862.95	394.06	253.21	10.14	-	-
	On-road Mobile (unpaved)	184	18.52	12.51	8,589.00	-	-
Non-Road Mobile Sources	Non-road Mobile	1,996.56	167.38	302.78	19.4	17.4	-
	<b>Total Reservation Emissions</b>	<b>6,043.51</b>	<b>579.96</b>	<b>568.50</b>	<b>8,618.54</b>	<b>17.4</b>	<b>-</b>

**2002 Mobile Source Emissions on the SUI Reservation (tons per year)**



# Helpful Tips

- Include Dust Emissions in Area Sources Section.
- Take car counts manually (if necessary).
- Compare to State and County Data.



# Biogenic

- Result from some sort of biological activity.
- Represent a significant portion of the natural source emissions acting as ozone precursors.
- Calculated using Biogenic Emissions Inventory Software (BEIS)

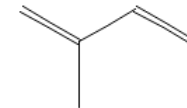


# Types of Biogenic Emissions (acting as ozone precursors)

Isoprene: (2-methyl-1,3-butadiene)

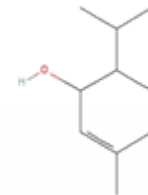
Emitted primarily from vegetation foliage, oak (mostly) but also citrus and eucalyptus.

(Chinkin et al., 1996a, 1996b)



Monoterpene (Piperitol):

Primarily emitted by pine, citrus, and eucalyptus. (Chinkin et al., 1996a, 1996b).



Biogenic VOC:

Vegetation is the predominant biogenic source of VOC's – emitting non-methane hydrocarbons (NMHC).

NO<sub>x</sub>:

Microbial activity is the predominant biogenic source for the emission of NO<sub>x</sub>. Soil microbial activity responsible for NO<sub>x</sub> emissions and comes primarily from agricultural lands and grasslands.

# Biogenic Emissions

	Isoprene	Monoterpene	Organic VOC	NO
LaPlata Totals (kg)	11,404,429.11	5,318,488.48	6,133,366.10	118,362.35
% of County covered by Res.	39.60%	39.60%	39.60%	39.60%
Archuleta Totals (kg)	11,722,611.29	5,208,588.18	5,935,871.95	45,902.41
% of County covered by Res.	29.00%	29.00%	29.00%	29.00%
LaPlata Emissions on Res. (kg)	4,516,153.93	2,106,121.44	2,428,812.98	46,871.49
Archuleta Emissions on Res. (kg)	3,399,557.27	1,510,490.57	1,721,402.87	13,311.70
Reservation Totals (kg)	7,915,711.20	3,616,612.01	4,150,215.84	60,183.19
<b>Reservation Totals (tons)</b>	<b>8,725.58</b>	<b>3,986.63</b>	<b>4,574.83</b>	<b>66.34</b>

## Biogenic Emissions on the SUIT Reservation

# Helpful Tips

- Make use of helpful Software.
  - BEIS (Biogenic Emissions Inventory Solution)
  - Other data resources.
- Visit some biogenic sites!





# 2005 SUIT EI

- The revised and update 2005 EI will include:
  - Point,
  - Area,
  - Mobile,
  - Biogenic Sources and
  - Some areas of further research looks to be completed in Fall 2006.

# Areas of Further Research

- Include:
  - A more detailed biogenic emissions section breaking the sources down into land type/vegetation.
  - A more precise airport emissions inventory including an accurate count of small (private) airplane takeoff and landings.
  - Fire and prescribed burn data.



# Closing Thoughts:

- Reproducibility:
  - Know where all the emissions factors, equations, and statistics come from.
  - Ensure that they are applicable to your project.
- Realize that an EI is a best estimate!
- Relax! It can be fun!?



# Contact Info:

- Southern Ute Indian Tribe  
Air Quality Program  
P.O. Box 737  
Ignacio CO 81137  
Tele: 970.563.4705  
Email: [jtemte@southern-ute.nsn.us](mailto:jtemte@southern-ute.nsn.us)

