

**Task 1.4 Emissions Inventories Evaluation**

Prepared for the Institute for Tribal Environmental Professionals (ITEP)  
and  
Western Regional Air Partnership (WRAP) – Tribal Data Work Group (TDWG)

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This report provides a comparative summary of Tribal lands oil- and gas-related emissions / source inventories developed by:

- 1) Ramboll (WRAP-WESTAR Oil and Gas Working Group [OGWG] 2014 Web Version 2 – June 10, 2019)
- 2) EN3-ITEP (Tribal Oil and Gas [O & G] emissions source inventory – prepared for WRAP in 2019)
- 3) Ute Mountain Ute Tribe (UMUT) O & G well inventories provided by J. Archuleta in June 2019)
- 4) Southern Ute Indian Tribe (SUIT) (2015 emissions inventory report from the Tribe's [website](#), and, 2017 emissions inventory spreadsheet provided by D. Powers in July 2019)

### **EN3-ITEP Emissions Inventory**

The EN3-ITEP emissions inventory, prepared in early 2019, contains Tribal O & G emissions source entries for the following reservations:

- Blackfeet Indian Reservation
- Crow Reservation
- Fort Berthold Reservation
- Fort Peck Indian Reservation
- Jicarilla Apache Nation Reservation
- Navajo Nation Reservation
- Southern Ute Reservation
- Uintah and Ouray Reservation
- Ute Mountain Reservation
- Wind River Reservation

The principal bases of the EN3-ITEP O & G emissions source inventory are as follows:

EPA regional staff working on New Source Review (NSR) registration and permitting for Tribal lands in the WRAP region provided data on O & G production emissions sources from their databases. These data were added as EPA Region-specific tabs (worksheets) in an MS Excel task workbook to compile a master list of O & G production sources on Tribal lands in the WRAP region.

Additionally, EN3 accessed and examined EPA's regional web pages for Title V permits issued to sources on Tribal lands, and generated list of the active Title V facilities in each EPA region within the WRAP domain. Two Tribes, the Navajo Nation and Southern Ute Indian Tribe, within the WRAP region have assumed Title V permitting responsibilities. Their web-based data were examined for Title V facilities to add to the Title V EPA-region-specific lists. The lists were then filtered to include only O & G production

facilities. These Title V facilities also were added to the above-described master EPA-Region-specific listing of Tribal lands O & G sources.

The source entries in the EN3-ITEP EPA region-by-region (and then reservation by reservation) inventory include coordinates, and in some cases, emissions data. A summary of emissions by reservation is provided below.

<i>Reservation/Tribe</i>	<i>PM Total</i>	<i>VOC Total</i>
	<i>(tpy)</i>	<i>(tpy)</i>
Navajo Nation	15.5	437.4
Blackfeet Indian Reservation	2.8	125.9
Crow Indian Reservation	0.0	1.5
Fort Berthold Indian Reservation	290.5	51,463.3
Fort Peck Indian Reservation	0.2	137.8
Southern Ute Indian Reservation	72.1	1722.0
Uintah and Ouray Reservation	249.2	65,869.6
Ute Mountain Indian Reservation	1.3	52.8
Wind River Indian Reservation	0.3	492.9
Jicarilla Indian Reservation	8.9	578.3

#### **Ramboll (for WRAP) Emissions Inventory**

The latest edition, 2014 Web Version 2, June 10 2019, of Ramboll’s WRAP-WESTAR OGWG comprehensive WRAP region emissions inventory consists of *Criteria Air Pollutants (CAP) Emissions Basis* that was developed from the sources summarized in the Appendix.

EN3 compiled and prepared a set of total PM and VOC emissions estimates from the Ramboll emissions inventory for point and non-point sources on O & G producing Tribal lands. Some lumping was necessary because the Ramboll emissions inventory for these sources is aggregated by County. Further San Juan County, New Mexico, contains both Navajo Nation and Ute Mountain Ute Tribe Lands. Also, there is some error because there are a number of Ute Mountain Ute Tribe emissions sources in La Plata County, CO, which also contains a multitude of Southern Ute Tribe emissions sources.

We note the following concerning Ramboll’s point and non-point source compilation for sources listed as “Tribal” in Montana. O & G emissions sources (2014 NEI, Montana DEQ) in several Montana

Counties are identified as Tribal although they contain no reservations. For Dawson, Custer, Prairie, Fallon and Wibaux counties, Tribal emissions totals are in fact zero, because while there are rows in the database for Tribal emissions, those rows do not include any emissions.

<i>Reservation Area(s)</i>	<i>PM Total (tpy)</i>	<i>VOC Total (tpy)</i>
Navajo Nation and Ute Mountain Indian Reservation (San Juan County, UT; Apache County, AZ; San Juan, & McKinley Counties, NM; Montezuma County, CO)	107.5	11,174.9  (this includes a single San Juan County source entry [Oil Tanks] with a reported VOC total of 8670.5 tpy; this entry encompasses numerous wellsite source oil tanks in San Juan county)
Blackfeet Indian Reservation	2.0	653.6
Crow Indian Reservation		
Fort Berthold Indian Reservation	169.1	30,080.0
Fort Peck Indian Reservation	2.8	680.2
Southern Ute Indian Reservation (includes some Ute Mountain Ute Tribe emissions sources in SW La Plata County)	162.0	2,614.2
Uintah and Ouray Reservation	328.1	73,316.0
Wind River Indian Reservation	11.1	476.2
Jicarilla Indian Reservation	84.2	7,130.1

**Ute Mountain Ute Tribe (UMUT) Emissions Inventory**

The UMUT O & G sources well inventory consists of two MS-Excel worksheets. One is for trust lands in Colorado and the other is for New Mexico trust lands. The tribe has a relatively small area of off-reservation trust lands and an area of reservation land in Utah. There are no reported O & G wells on those Utah lands. To our knowledge, there are no State or fee lands within UMUT reservation boundaries.

The source entries in the UMUT inventory for nearly 200 wells in New Mexico include section, Township & Range, but no coordinates and no emissions data. EN3 used an Earth Point tool (<http://www.earthpoint.us/TownshipsSearchByDescription.aspx>) to estimate the geographic coordinates (latitude & longitude) for the center of the section and assigned those coordinates to each source. The source entries for Colorado include nearly 185 wells with coordinates but no emissions data. UMUT CO & NM O & G well locations were plotted with GIS software.

### Southern Ute Indian Tribe (SUIT) Emissions Inventory

The SUIT 2015 emissions inventory is summarized in a pdf narrative without an accompanying MS-Excel or other workbook of data. The inventory summarizes emissions for the following O & G sources:

- 37 oil and gas sources permitted under EPA’s Title V program;
- 5 oil and gas sources permitted as synthetic minor permitted facilities;
- 241 registered tribal minor new source review (TMNSR) oil and gas facilities;
- 2,569 non - registered TMNSR oil and gas facilities.

Figure 84 from the SUIT 2015 emissions inventory presents the following Table of Emissions from O & G Sector Sources on the Southern Ute Indian Reservation in tons per year.

2015 – Oil and Gas Sector Emissions by Category in Tons Per Year							
Category	NOx	VOC	SO2	PM10	CO	HAP	CO2e
<b>Title V</b>	2,598.2	1,155.0	52.3	68.8	2,817.3	283.1	2,012,320
<b>Permitted TMNSR Minor</b>	342.7	173.0	5.1	9.1	187.5	16.2	120,489
<b>Registered TMNSR Minor</b>	4,895.3	964.2	23.9	51.7	3,904.8	312.5	631,332
<b>Non-Registered Minor</b>	9,959.0	902.7	-	191.6	8,354.8	255.9	1,505,611
<b>Total</b>	<b>17,795.2</b>	<b>3,194.9</b>	<b>81.3</b>	<b>321.2</b>	<b>15,264.4</b>	<b>867.7</b>	<b>4,269,752</b>

The Southern Ute Indian Tribe kindly made available to ITEP & EN3 a copy of a spreadsheet with its recently completed 2017 oil and gas point and non-point emissions inventory, inclusive of emissions and coordinates for many sources. Data sources are: SUIT Title V Emission FEE Forms, EPA Tribal Minor New Source Review Program Registrations, SUIT Clean Air Act 114 Information Collection Request responses.

Emissions sources with coordinates were plotted using GIS software. Danny Powers, the Air Quality Program Manager, explained:

*Point sources are categorized as Title V, synthetic minor, and “registered”. The synthetic minor category includes only sources that are synthetic minor for Title V purposes to avoid double counting emissions with Title V sources. We defined “registered sources” as true minor sources that were required to register with EPA Region 8 prior to promulgation of the oil and gas FIP for Indian Country or which have obtained authorization to construct under the FIP.*

*Non-point oil and gas sources are referenced as “non-registered sources” which we defined as sources with potential to emit below the de minimus emission levels of the federal Tribal Minor New Source Review Program and FIP.*

### **Qualitative Comparison of Emissions Inventories**

EN3 utilized the above inventory information in its qualitative comparison of emissions inventories using spreadsheet and GIS software. A significant challenge for a comparative assessment of the inventories is that each was developed using different criteria. For example, the UMUT inventory tabulates only O & G wells. As indicated in the Ramboll report:

*Typically, wellsite sources are included as nonpoint sources and midstream sources (e.g. compressor stations and gas plants) are included as point sources. However, this is not the case for all areas. State/local/tribal agencies may develop emission inventories and/or track and report certain wellsite emissions as point sources and/or certain midstream emissions as nonpoint sources. For example, in the Uinta Basin, several wellsite categories are included as point sources. In certain areas, lateral compressor engines at small gas gathering stations may be included as nonpoint sources.*

The Ramboll point and non-point source emissions inventory data are aggregated by County without coordinates. In general, coordinates are provided only for point sources, though not for all such sources.

The EN3-ITEP inventory (developed mostly but not entirely from EPA contacts and data) does not characterize sources as point or non-point but does include NAICS and SIC codes.

In this comparison, EN3 did not address Tribal O & G activity on fee lands or Tribal O & G holdings that may exist on lands held by other parties.

Finally, there is the additional challenge that source naming between inventories is not always consistent.

## **Observations and Recommendations**

Refining of emissions inventories for O & G activities on Tribal lands should focus on the Fort Berthold Reservation, Uintah and Ouray Reservation, Southern Ute Indian Tribe Reservation, Jicarilla Apache Reservation and Navajo Nation Reservation. These lands have the highest estimated oil- and gas-related VOC and PM emissions.

### *Fort Berthold Reservation*

The Ramboll point source O & G inventory indicates 13 compressor and transfer station sources. The non-point source inventory includes about 280 such sources in Dunn, McKenzie, McLean, Mountrail and Ward counties. The EN3 inventory indicates nearly 950 sources of all types, the majority of which are drill pad / well sources. Possibly, the Ramboll estimate of emissions for the Fort Berthold reservation area may be low. However, it is important to consider that the discrepancy between the EN3 and Ramboll inventory may be driven by 1) differing point/nonpoint criteria and 2) emission estimation methodology differences for wellsite sources estimates from permits in the EN3 inventory and from nonpoint survey data in the Ramboll inventory.

The multiple tribal authorities engaged in O & G activities, including emissions management, warrant additional outreach. A site visit to the Three Affiliated Tribes (Hidatsa, Mandan & Arikara) could be a useful action by WRAP.

### *Uintah and Ouray Reservation*

There are tens of thousands of O & G emissions sources on this reservation in both the Ramboll and EN3 inventories. A meaningful comparison was not feasible. It appears that the Ramboll inventory is more comprehensive.

This reservation is the largest source of emissions from O & G sources on Tribal lands. Additional outreach by WRAP, focused on relationship building, and perhaps including a visit to the reservation, could be very useful.

### *Southern Ute Reservation*

The Southern Ute Tribe regularly prepares what is probably the best emissions inventory of the principal oil- and gas- producing tribes. There is no better source of emissions data for this reservation area. Efforts should be sustained in maintaining the existing relationships between WRAP+ITEP and the tribal air quality program representatives, currently led by Danny Powers.

*Fort Peck Indian Reservation*

The Ramboll point source inventory indicates only one compressor station on the Fort Peck Reservation. The Ramboll non-point source inventory indicates nearly 210 non-point sources in Roosevelt, Daniels, Sheridan and Valley counties, along with one point source with multiple compressor engines. The EN3 inventory shows 7 sources in the area, but none are identified as a compressor station. These significant discrepancies should be resolved.

*Ute Mountain Ute, Jicarilla Apache Nation, Navajo Nation, Wind River, Blackfeet Indian, and Crow Reservations*

Additional outreach, including relationship building that would include site visits, to the tribal air quality and environmental program staff at these reservations would be a good investment by WRAP.

*Rocky Boy's and Turtle Mountain Reservation and Off-Reservation Trust Land*

Resources permitting, outreach, including relationship building to the tribal air quality and environmental program staff at these two reservations may be a good investment by WRAP. Both Tribes appear to have some O & G production in Montana.



## Appendix

This appendix provides background information on the Ramboll WRAP-WESTAR OGWG emissions inventory, edition of June 10, 2019

(italicized text below is directly from the inventory MS-Excel workbook.

*Primary Sources: Point and nonpoint oil and gas (O & G) CAP emissions were obtained from (1) 2014 emission inventories developed by the WESTAR-WRAP for Intermountain West O&G basins and (2) Environmental Protection Agency (EPA) 2014 National Emission Inventory (NEI) version 2.0.*

### *Basin Specific Updates:*

- 1. Updated Denver Basin, Colorado tank VOC emissions per emissions received from Dale Wells, July 11, 2018.*
- 2. Updated Uinta Basin evaporation pond emissions to be consistent with the final 2014 Uinta Basin Air Agencies Oil and Gas Emission Inventory.*
- 3. Updated selected nonpoint source emissions as per operator survey responses for (1) Big Horn , MT, (2) Central Montana Uplift , MT, (3) Permian , NM, (4) Powder River, MT, (5) Sweetgrass Arch, MT, (6) Williston, MT and (7) Williston, ND.*
- 4. Added missing minor source facility-wide emissions for Alaska.*

### *Methodology Notes:*

- 1. Nonpoint O&G emissions were extracted from the 2014 NEI V2.0 for all SCC codes beginning with "2310"*
- 2. Point source O&G emissions were extracted for the following North American Industry Classification System (NAICS) codes: 2111, 4862, 21111, 48611, 48621, 211111,211112, 213111,213112, 486110, 486210*
- 3. PM2.5 emissions were not included in several Intermountain West Basin source inventories. PM2.5 for these Intermountain West emissions were added to this inventory assuming PM2.5 emissions equivalent to PM10 emissions.*
- 4. Emissions from mud degassing were not included in several Intermountain West Basins. Emissions for this source category were added from 2014 NEI V2.0.*

*Th(e) oil and gas inventory is divided into point and nonpoint sources. Typically, wellsite sources are included as nonpoint sources, and midstream sources (e.g. compressor stations and gas plants) are included as point sources. However, this is not the case for all areas. State/local/tribal agencies may develop emission inventories and/or track and report certain wellsite emissions as point sources and/or certain midstream emissions as nonpoint sources. For example, in the Uinta Basin, several wellsite categories are included as point sources. In certain areas, lateral compressor engines at small gas gathering stations may be included as nonpoint sources.*

The Ramboll V2 2019 Inventory worksheet tabulates nearly 83055 Nonpoint and Point Oil and Gas CAP and GHG emissions sources, of which 53,133 entries are designated as Tribal, with many but not all having emissions numbers (in tons/year, or TPY). The sources in this comprehensive inventory are organized by SCC code and County, but the Tribe is not designated and source coordinates are not provided.

In a Point Source Detailed Emissions worksheet, ancillary descriptive fields, including coordinates, are included (to the extent that these fields were available in the primary source data). Our of a total of nearly 75,495 entries, 49,132 are Tribal Nonpoint and Point Oil and Gas CAP and GHG emission sources, again, with no Tribe specified and for most of which coordinate information is provided.

**It is possible in principal to process data in the County field in the first of these two inventory worksheets to identify the Tribe to which each Tribal source corresponds. One caveat is that there are two counties, San Juan and Sandoval, in New Mexico that contain more than one reservation that produces oil or gas. There appears to be little Tribal O & G production in the latter, but there is considerable production in the former. For this reason, O & G sources for the Navajo Nation and Ute Mountain Ute Tribe were lumped together for this evaluation.**

The WRAP-WESTAR 2014 emission inventories for Intermountain West O & G basins and covered the following basins individually:

Basin	Description / Source(s)
Big Horn	Nonpoint source emissions were directly provided by Wyoming Department of Environmental Quality (WYDEQ) for all Wyoming counties and emissions for Carbon County, Montana were obtained from 2014 National Emission Inventory (NEI) Final v1. Similarly, the point source emissions were obtained from WYDEQ for Wyoming Counties and 2014 NEI Final v1 for Carbon County, Montana.
Central Montana Uplift	Nonpoint source emissions were obtained from 2014 National Emission Inventory (NEI) Final v1 for Montana counties within the basin. Similarly, the point source emissions were also obtained from 2014 NEI Final v1.
Denver-Julesberg	Colorado nonpoint source emissions were obtained from the Colorado Department of Public Health and Environment (CDPHE) submittals to the 2014

Basin	Description / Source(s)
Green River	<p>National Emission Inventory (NEI) Final v1. Point source emissions were from CDPHE point source data files.</p> <p>Nonpoint source emissions were directly provided by Wyoming Department of Environmental Quality (WYDEQ) for all Wyoming counties and obtained from 2014 National Emission Inventory (NEI) Final v1 submitted by Colorado Department of Public Health and Environment (CDPHE) for Colorado counties. Similarly, the point source emissions were obtained from WYDEQ for Wyoming Counties and data provided by CDPHE for Colorado counties. For this study, Green River Basin captures emissions from all counties with the Central Western Overthrust Basin and Green River Basin.</p>
Paradox	<p>Nonpoint source county-wide emissions were obtained from 2014 National Emission Inventory (NEI) Final v1 for Colorado and Utah. Activity data were obtained from the IHS database for the calendar year 2014. The point source emissions were obtained from 2014 NEI Final v1 for counties within Utah and point source emissions for counties within Colorado were obtained from the Colorado Department of Public Health and Environment (CDPHE).</p>
Permian	<p>Estimates emissions from the Permian Basin for counties within the state of New Mexico. Oil and gas activity data were obtained from the IHS database for calendar year 2014. Major and Minor point source emissions were obtained from New Mexico Environmental Department (NMED). Point source emissions mineral designation were provided by Bureau of Land Management (BLM) for each point source. Includes GHG emissions estimates except for point sources where SCC information was not provided, in which case emissions from all greenhouse gas (GHG) pollutants i.e. CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O were not estimated.</p>
Piceance	<p>Colorado nonpoint source emissions were obtained from the Colorado Department of Public Health and Environment (CDPHE) submittals to the 2014 National Emission Inventory (NEI) Final v1. Point source emissions were from CDPHE point source data files.</p>
Powder River	<p>Nonpoint source county and SCC-level emissions were obtained from Wyoming Department of Environmental Quality (WYDEQ) for all Wyoming counties and obtained from 2014 National Emission Inventory (NEI) Final v1 for all counties in Montana and South Dakota. The point source emissions were obtained from WYDEQ, 2014 NEI Final v1 and from Environmental Protection Agency (EPA) Region 8. Point source emissions were assigned tribal or non-tribal designation based on whether a facility's emissions were reported to a state agency (non-tribal) or federal/tribal agency (tribal).</p>

Basin	Description / Source(s)
Raton	<p>Colorado and New Mexico nonpoint source emissions were obtained from the 2014 National Emission Inventory (NEI) Final v1. For Colorado State, emissions submitted by the Colorado Department of Public Health and Environment (CDPHE) were used. Point source emissions for 2014 in Colorado were obtained from CDPHE point source data files. There are no point source in the New Mexico counties per New Mexico Environmental Department (NMED) database.</p>
San Juan	<p>Oil and gas activity data are from the IHS database for calendar year 2014 and input factors from "San Juan and Permian Basin Inputs Factors Report", nonpoint source county and SCC-level bottom-up emissions were estimated. Oil and gas activity data were obtained from the IHS database for calendar year 2014. The point source emissions were obtained from New Mexico Environmental Department (NMED), CDPHE and from Environmental Protection Agency (EPA) Region 8, Region 6 and Region 9. The midstream permitted emissions data for SUIT tribal lands in EPA Region 8 were taken from the 2014 NEI v1.</p>
Sweetgrass Arch	<p>Nonpoint source county and SCC-level emissions were obtained from the 2014 (v1) National Emission Inventory (NEI). Oil and gas activity data were obtained from the IHS database for calendar year 2014. As per Environmental Protection Agency (EPA) Region 8 database, there are no point sources on tribal land.</p>
Uinta	<p>Nonpoint source county and SCC-level emissions were obtained from the 2014 (v1) National Emission Inventory (NEI) for Carbon and Daggett counties whereas Uinta and Duchesne counties emissions were provided by Utah Department of Environmental Quality (UTDEQ). As directed by UTDEQ, most of the sources were captured under point sources. Oil and gas activity data were obtained from the IHS database for calendar year 2014. Point source emissions were obtained from 2014 (v1) NEI and UTDEQ.</p>
Williston	<p>Nonpoint source county and SCC-level emissions were obtained from the 2014 National Emission Inventory (NEI) V1 for Montana, North Dakota, and South Dakota. Oil and gas activity data were obtained from the IHS database for calendar year 2014. Point source emissions were obtained from 2014 NEI (v1) and data provided by Environmental Protection Agency (EPA) Region 8 and South Dakota Department of Environment and Natural Resources (SD DENR) has also provided additional point source emissions which were not included in Title V or NEI point source database.</p>
Wind River	<p>Nonpoint source county and SCC-level emissions were obtained from the 2014 (v1) National Emission Inventory (NEI) and Wyoming Department of Environmental Quality (WYDEQ). Oil and gas activity data were obtained from</p>

Basin	Description / Source(s)
	the IHS database for calendar year 2014. Point source emissions were obtained from WYDEQ and 2014 (v1) NEI

Additionally, a dedicated 2014 base year emissions inventory for the Greater San Juan Basin in CO & NM and Permian Basin in NM was prepared by Ramboll for WRAP-WESTAR. The report indicates that:

*This effort is focused on creating a comprehensive criteria air pollutant and greenhouse gas (GHG) emissions inventory for oil and gas field operations in the Greater San Juan Basin and Permian Basin for a baseline year of 2014 including point (midstream facility) and nonpoint (well site) sources.*

*The 2014 baseline inventory is based on the following source data:*

- 1.0 *Midstream facilities in the State of Colorado permitted emissions database.*
- 2.0 *Midstream facilities in the State of New Mexico permitted emissions database.*
- 3.0 *Midstream facilities in the US Environmental Protection Agency (EPA) (on tribal land), including both Part 71 major sources and Tribal Minor New Source Review sources. Emissions from midstream facilities on tribal were also taken from the 2014 National Emission Inventory (NEI) Version 1.04.*
- 4.0 *2014 well site source input factors and oil and gas activity from the San Juan and Permian Input Factor Report (Grant et al.,2016).*

*Midstream facilities consist of point source emissions and are comprised primarily of gas gathering facilities (compressor stations) and gas processing facilities (gas plants). NAICS codes...were used to define midstream sources...*