Keweenaw Bay Indian Community 2020 Emission Inventory



September 2023

Prepared by Teal Sackett

TABLE OF CONTENTS

Executive Summary 4	
Introduction	4
Results	4
Introduction 6	
Reservation Location	6
Emissions Area	7
Point Sources 8	
Criteria Pollutant Emissions	8
Ammonia (NH3)	8
Carbon Monoxide (CO)	9
Oxides of Nitrogen (NO _x)	10
Particulate Matter 10 micrometers in diameter or smaller, including filterables and condensibles (PM ₁₀ -PRI)	10
Particulate Matter 2.5 micrometers in diameter or smaller, including filterables and	
condensibles (PM _{2.5} -PRI)	11
Sulfur Dioxide (SO ₂)	12
Volatile Organic Compounds (VOC)	12
Lead (Pb)	13
Greenhouse Gasses (GHG)	14
Carbon Dioxide (CO ₂)	14
Methane (CH4)	14 15
Summary and Recommendations - Point Sources	15 16
Nonpoint Sources 16	
Criteria Pollutant Emissions	16
Ammonia (NH3)	10
Carbon Monoxide (CO)	10
Oxides of Nitrogen (NO _x)	18
Particulate Matter 10 micrometers in diameter or smaller, including filterables and	
condensibles (PM ₁₀ -PRI)	19
Particulate Matter 2.5 micrometers in diameter or smaller, including filterables and	
condensibles (PM _{2.5} -PRI)	20
Sulfur Dioxide (SO ₂)	21
Volatile Organic Compounds (VOC)	22
Greenhouse Gasses (GHG)	23
Carbon Dioxide (CO ₂)	23

Methane (CH ₄)	24
Nitrous Oxide (N ₂ O)	24
Summary and Recommendations - Nonpoint Sources	25
Non-Road Mobile Sources 25	
Criteria Pollutant Emissions	25
Ammonia (NH3)	25
Carbon Monoxide (CO)	26
Oxides of Nitrogen (NO _x)	27
Particulate Matter 10 micrometers in diameter or smaller, including filterables and condensibles (PM ₁₀ -PRI)	28
Particulate Matter 2.5 micrometers in diameter or smaller, including filterables and	
condensibles (PM _{2.5} -PRI)	29
Sulfur Dioxide (SO ₂)	29
Volatile Organic Compounds (VOC)	30
Lead (Pb)	31
Greenhouse Gasses (GHG)	31
Carbon Dioxide (CO ₂)	31
Methane (CH ₄)	32
Nitrous Oxide (N ₂ O)	33
Summary and Recommendations - Non-Road Mobile Sources	33
On-Road Mobile Sources 33	
Criteria Pollutant Emissions	33
Summary and Recommendations - On-Road Mobile Sources	34

Executive Summary

Introduction

This 2020 emission inventory (EI) for the Keweenaw Bay Indian Community (KBIC) was developed to identify sources of air pollution that may affect the KBIC air quality and L'Anse Reservation. This EI is a Level 4 EI and is composed entirely of emissions data already calculated and available from the EPA national database of reported emissions (NEI). This inventory used these available data, imported into software that allows mapping and reporting of sources, to analyze what information is already known about sources near and on the reservation. The tribe is using this analysis of existing data to determine what sources on the reservation to focus on when a future plan for a Level 1, 2, or 3 EI is developed. (EIs of Levels 1, 2 or 3 are those in which source data are gathered by the tribe to use in calculations.) The source categories in this EI include point, nonpoint, non-road, and on-road. The EI is limited to these EPA criteria pollutants:

- Ammonia (NH₃)
- Carbon Monoxide (CO)
- Oxides of Nitrogen (NO_x)
- Particulate Matter ten micrometers in diameter or smaller (PM₁₀)
- Particulate Matter two and a half micrometers in diameter or smaller (PM_{2.5})
- Sulfur Dioxide (SO₂)
- Volatile Organic Compounds (VOCs)
- Lead (Pb).
- Greenhouse Gas
 - Carbon Dioxide (CO₂)
 - Methane (CH₄)
 - Nitrous Oxide (N₂O)

Results

The tribe used a buffer of approximately 50 miles from the reservation boundaries, due to treatment in a similar manner as states (TAS) status, to determine what point sources to include in the EI. For nonpoint, non-road, and on-road sources, the same 50-mile emissions area, that surrounds the reservation, is used. Table 1 shows the total emissions in the area of interest, in tons, for each source type.

Table 1: Emissions (tons) in the 50-Mile Emissions Area. Data is collected from the EPA National Emissions Inventory (NEI) and processed through TEISS View. Prepared by Teal Sackett.

Source Type	со	NH3	NOX	PM10-PRI	PM2.5-PRI	SO2	VOC	Lead	CO2	CH4	N2O
Point	1911.34	263.42	11670.75	530.64	469.15	936.37	314.93	0.15	3010000.00	4798.63	27.17
Nonpoint	19938.72	2660.14	2681.02	13971.37	3678.80	117.61	43459.25	NR	81251.95	15.42	0.25
Non-Road	22533.81	4.25	1299.99	194.29	179.52	1.97	6397.70	NR	342699.32	194.75	NR
On-Road	8380.00	44.00	1040.00	92.00	38.00	5.00	609.00	NR	NR	NR	NR
Total	52763.87	2971.81	16691.76	14788.30	4365.47	1060.95	50780.88	0.15	3433951.27	5008.80	27.42

*NR=Not Reported

- As shown in Table 1, the nonpoint category accounts for the majority of the emissions, minus the GHG, NOX, SO2 and Lead.
- Non-Road sources accounts for higher levels of emission sin the majority of the categories when compared to On-Road sources.

Based on this EI and the concerns voiced by the community KBIC will decide on future methods needed to take place on or outside the reservation. KBIC does have PM_{2.5} air monitors throughout Baraga County to observe fluctuations in the air quality. In addition to these PM monitors, KBIC hopes to eventually implement a federally regulated air monitor.

Introduction

This 2020 emission inventory (EI) for the Keweenaw Bay Indian Community (KBIC) was developed to identify sources of air pollution that may affect the KBIC air quality. This EI is a Level 4 EI and is composed entirely of data already reported to the EPA's National Emissions Inventory (NEI). These data include emissions estimates for nonpoint, non-road, and on-road sources that include portions of reservation land, because in most cases, county emissions estimate for these source types do not exclude the portions of the source (e.g., unpaved roads) on reservation land. Most point sources, excluding airports, that are on the reservation are not included in the NEI unless the tribe has reported them. This inventory is intended to provide critical information on what sources in our area emit what pollutants, and the relative magnitudes of these pollutants, as already calculated and in the NEI. This is a recommended first step toward understanding what is in our air and where it came from, and preparing an EI that includes emissions calculated by the tribe with activity data the tribe gathers for specific sources on tribal land.

The source categories include point, nonpoint, non-road, and on-road. The EI is limited to these EPA criteria pollutants:

- Ammonia (NH₃)
- Carbon Monoxide (CO)
- Oxides of Nitrogen (NO_x)
- Particulate Matter ten micrometers in diameter or smaller (PM₁₀)
- Particulate Matter two and a half micrometers in diameter or smaller (PM_{2.5})
- Sulfur Dioxide (SO₂)
- Volatile Organic Compounds (VOCs)
- Lead (Pb).
- Green House Gasses (GHG) (CO₂, N₂O, CH₄)

This is the second EI that has been completed for KBIC and the primary purpose is to review existing emissions data from the EPA National Emission Inventory (NEI) database. From this analysis of the existing data, the tribe can determine what sources on the reservation to focus on when a future plan for a Level 1, 2, or 3 EI is developed. It can also be used to focus attention on what sources should be controlled to improve the L'Anse Reservation air quality and in the determination of locations for potential air monitoring stations.

Reservation Location

Keweenaw Bay Indian Community (KBIC) is located in the Western Upper Peninsula of Michigan in a rural and pristine area of the state. The KBIC L'Anse Reservations is located on the Keweenaw Bay of Lake Superior in Baraga County and is KBIC's main land base. The Reservation is composed of 59,067 acres, 17 miles of Lake Superior shoreline, 80 miles of streams and rivers, 15,000 acres of lakes, and 3,000 acres of wetlands. KBIC has over 3,200 tribal members and provides air quality services and outreach to those members as well as non-tribal members living on the reservation.

Emissions Area

The tribe used a buffer of approximately 50 miles from the reservation boundaries to determine what point sources to include in the EI. A 50-mile radius is being used as much of the area around the reservation is rural and undeveloped as well as its TAS status. For nonpoint, non-road, and on-road sources, the same 50-mile radius is considered the emissions area.

The 2020 NEI version 1.0 General Purpose Release (GPR) data for Baraga County were downloaded from the NEI as a zipped file, then converted to a format that is importable into the Tribal Emission Inventory Software Solution (TEISS). TEISS is an emission inventory development software that is available at no charge to federally recognized tribes through the Institute of Tribal Environmental Professionals (ITEP) at Northern Arizona University (NAU). TEISS has a geographic information system (GIS) interface allowing the data to be mapped. Figure 1 shows a map of the L'Anse Reservation with the 50 mile buffer for point sources (Point Source Emissions Area).

TEISS allows the user to select point sources and identify where they are and their estimated emissions, and view nonpoint emissions as reported for the surrounding county. In this way, we can evaluate what existing information there is on the relative importance of various types of sources and identify what point sources are most important for our air quality.



Figure 1. Reservation and Point Source Emissions Area, Zoomed Out. Screenshot taken from TEISS View. Made by Teal Sackett, Sept 2023. Prepared by Teal Sackett.

Point Sources

There are 45 facilities that are within the 50-mile radius of the reservation boundaries, as shown by Figure 1. TEISS View was used to identify these sources and measure the approximate distance from the reservation boundaries (Table 2)

Facility Name	Approximate Distance from Reservation Boundary (miles)	Facility Name	Approximate Distance from Reservation Boundary (miles)	Facility Name	Approximate Distance from Reservation Boundary (miles)
L'Anse Warden Electric Company	>1	Tilden Mining Company	20	Great Lakes Transmission Station #8	40
Certainteed Ceilings Corp	>1	Robbins Inc	21	Stambaugh	43
Upper Michigan Energy Resources - A.J. Mihm	3	Warm Rain Corporation	22	Iron County Airport	45
Marquette Branch Prison	7	Houghton County Memorial Airport	22	Louisisana -Pacific Corp Sagola Plant	45
Northern Michigan University	10	Payne Dolan Inc	23	White Pinte Electric Power LLC	48
Marquette Board of Light and Power	11	Peninsula Copper Industries	23	Northwoods Airport	48
Payne Dolan Inc	12	Eagle Mine-Humbolt Mill	23	Billerud Quinnesec LLC	50
Sawer International Airport	12	Calumet Electronics Corp	27	Ford Airport	50
Upper Michigan Energy Resources F.D. Kuester	13	KW Landfill	27	Grede LLC	50
Upper Peninsula Power Company - Portage	17	Edward F Johnson Airport	28	Nelson Paint Co	50
Prickett-Grooms Fld	17	Connor AGA Sports Flooring LLC	32	Boss Products	50
Empire Iron Mining Company LC	17	Huber Airport	35	Northern Star Industries	50
Eagle Mine LLC	19	Ontonagon County Airport	39		

Table 2: List of Facilities within 50-Mile Buffer Zone. Facilities are sorted on their distance from any reservation location (Baraga County or Marquette County). Prepared by Teal Sackett.

Criteria Pollutant Emissions

Ammonia (NH3)

Ammonia emissions were reported to NEI within the Point Source Emissions Area. The top ten facilities out of the 45 within the buffer are displayed (Table 3). Peninsula Copper Industries INC located in Houghton county has the highest ammonia emissions at just over 210 tons. Please note that if the other facilities have reported ammonia emissions, the EPA point source reporting threshold is 100 tons per year.

Table 3. Ammonia emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emis	missions for Point Sources by Facility Top 10							
Inventory Emissior	y Year: 2020 Reporting Period: n Unit: [tons]	ANNUAL (Jan 01 to Dec 31)					
Michig	an		NH3 - Ammonia					
Rank	Facility Name	FID	Location Name	Emissions	% of Total			
1	PENINSULA COPPER INDUSTRIES INC (B8596)		Houghton	210.31	79.84%			
2	Billerud Quinnesec, LLC (B7192)		Dickinson	50.24	19.07%			
3	TILDEN MINING COMPANY LC (B4885)		Marquette	2.27	0.86%			
4	Calumet Electronics Corp (A1430)		Houghton	0.50	0.19%			
5	CERTAINTEED CEILINGS CORP (B1479)		Baraga	0.04	0.01%			
6	Marquette Branch Prison (K2153)		Marquette	0.02	0.01%			
7	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)		Dickinson	0.02	0.01%			
8	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	0.01	0.00%			
9	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)		Baraga	0.01	0.00%			
10	Marquette Board of Light and Power (P0668)		Marquette	0.01	0.00%			
				Total Emissions: 263.42 [tons]	100.00%			

Carbon Monoxide (CO)

These ten facilities in the Point Source Emissions Area accounted for 98% of the CO emissions (Table 4). Billerud Quinnesec, LLC, Tilden Mining Company LC, and Louisiana-Pacific Corp Sagola Plant account for 78% of that 98% summing up to over 1500 tons. Overall, these ten facilities emit over 1900 tons of CO.

Table 4. Carbon Monoxide emissions for Point Sources by the top 10 facilities within the 50mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emis	missions for Point Sources by Facility Top 10							
Inventory Emission	y Year: 2020 Reporting Period: i Unit: [tons]	ANNUAL (Jan 01 to Dec 31)					
Michig	an	со	- Carbon Monoxide					
Rank	Facility Name	FID	Location Name	Emissions	% of Total			
1	Billerud Quinnesec, LLC (B7192)		Dickinson	710.86	36.59%			
2	TILDEN MINING COMPANY LC (B4885)		Marquette	428.96	22.08%			
3	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)		Dickinson	382.91	19.71%			
4	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)		Baraga	155.18	7.99%			
5	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	71.56	3.68%			
6	Houghton County Memoria (AIRPORTCMX)		Houghton	54.48	2.80%			
7	Sawyer International (AIRPORTSAW)		Marquette	49.58	2.55%			
8	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)		Baraga	24.74	1.27%			
9	Ford (AIRPORTIMT)		Dickinson	23.04	1.19%			
10	GREAT LAKES GAS TRANSMISSION STATION #8 (N3760)		Iron	10.04	0.52%			
				Total Emissions: 1,911.34 [ton:	s] 98.39%			

Oxides of Nitrogen (NO_x)

These ten facilities in the Point Source Emissions Area accounted for 99% of the NOX emissions (Table 5). Tilden Mining Company LC account for 85% of that 99% equating to over 9,900 tons. Overall, these ten facilities emit over 11,000 tons of NOX.

Table 5. Oxides of Nitrogen emissions for Point Sources by the top 10 facilities within the 50mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emi	ssions for Point Sources by Facili	у Тор	10		
Inventor Emission	y Year: 2020 Reporting Period n Unit: [tons]	ANNUAL (Jan 01 to Dec 31)		
Michig	an	NO	K - Nitrogen Oxides		
Rank	Facility Name	FID	Location Name	Emissions	% of Total
1	TILDEN MINING COMPANY LC (B4885)		Marquette	9,962.18	85.13%
2	Billerud Quinnesec, LLC (B7192)		Dickinson	1,100.46	9.40%
3	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)		Baraga	231.29	1.98%
4	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)		Dickinson	130.71	1.12%
5	GREAT LAKES GAS TRANSMISSION STATION #8 (N3760)		Iron	111.09	0.95%
6	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	49.94	0.43%
7	CERTAINTEED CEILINGS CORP (B1479)		Baraga	32.57	0.28%
8	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)		Baraga	20.54	0.18%
9	Marquette Board of Light and Power (P0668)		Marquette	16.03	0.14%
10	Houghton County Memoria (AIRPORTCMX)		Houghton	15.95	0.14%
				Total Emissions: 11,670.75 [ton	s] 99.73%

Particulate Matter 10 micrometers in diameter or smaller, including filterables and condensibles (PM₁₀-PRI)

These ten facilities in the Point Source Emissions Area accounted for 98% of the PM_{10} -PRI emissions (Table 6). Billerud Quinnesec LLC and Tilden Mining Company LC account for 72% of that 98% equating to over 390 tons. Overall, these ten facilities emit over 530 tons of PM_{10} -PRI. Please note that the PM_{10} -PRI emissions for the remaining eight facilities are below the EPA point source reporting threshold of 100 tons per year.

Table 6. PM_{10} emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emis	missions for Point Sources by Facility Top 10							
Inventory Emission	y Year: 2020 Reporting Perio n Unit: [tons]	od: ANNUAL (Jan 01 to Dec 31)					
Michig	an	PM10-PRI -	PM10 Primary (Filt + Co	ond)				
Rank	Facility Name	FID	Location Name	Emissions	% of Total			
1	Billerud Quinnesec, LLC (B7192)		Dickinson	202.51	37.35%			
2	TILDEN MINING COMPANY LC (B4885)		Marquette	191.29	35.28%			
3	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)		Dickinson	34.95	6.45%			
4	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)		Baraga	32.54	6.00%			
5	Marquette Board of Light and Power (P0668)		Marquette	24.93	4.60%			
6	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	13.15	2.43%			
7	GREDE LLC - IRON MOUNTAIN (B1577)		Dickinson	11.31	2.09%			
8	EAGLE MINE LLC (N7581)		Marquette	7.37	1.36%			
9	CERTAINTEED CEILINGS CORP (B1479)		Baraga	7.07	1.30%			
10	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)		Baraga	5.53	1.02%			
				Total Emissions: 530.64 [tons	97.88%			

Particulate Matter 2.5 micrometers in diameter or smaller, including filterables and condensibles (PM_{2.5}-PRI)

These ten facilities in the Point Source Emissions Area accounted for 98% of the $PM_{2.5}$ -PRI emissions (Table 7). Billerud Quinnesec LLC and Tilden Mining Company LC account for 72% of that 98% equating to over 340 tons. Overall, these ten facilities emit over 460 tons of $PM_{2.5}$ -PRI per year. Please note that the $PM_{2.5}$ -PRI emissions for the remaining eight facilities are below the EPA point source reporting threshold of 100 tons per year.

Table 7. $PM_{2.5}$ emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emis	Emissions for Point Sources by Facility Top 10						
Inventory	y Year: 2020 Reportir	ng Period:	ANNUAL (Jan 01 to Dec 31)			
Emission							
Michig	an	PN	125-PRI - I	PM2.5 Primary (Filt + Co	ond)		
Rank	Facility Name		FID	Location Name	Emissions	% of Total	
1	TILDEN MINING COMPANY LC (B4885)			Marquette	177.05	37.02%	
2	Billerud Quinnesec, LLC (B7192)			Dickinson	169.98	35.54%	
3	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)			Dickinson	30.93	6.47%	
4	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)			Baraga	29.50	6.17%	
5	Marquette Board of Light and Power (P0668)			Marquette	24.93	5.21%	
6	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)			Marquette	13.15	2.75%	
7	GREDE LLC - IRON MOUNTAIN (B1577)			Dickinson	10.21	2.14%	
8	CERTAINTEED CEILINGS CORP (B1479)			Baraga	5.78	1.21%	
9	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)			Baraga	5.53	1.16%	
10	EAGLE MINE LLC (N7581)			Marquette	2.09	0.44%	
					Total Emissions: 469.15 [tor	ns] 98.10%	

Sulfur Dioxide (SO₂)

These ten facilities in the Point Source Emissions Area accounted for 99% of the SO₂ emissions (Table 8). Tilden Mining Company LC, L'Anse Warden Electric Company LLC, and Billerud Quinnesec LLC account for 98% of that 99% equating to nearly 920 tons. Overall, these ten facilities emit over 930 tons of SO₂ per year. Please note that the SO₂ emissions for the remaining seven facilities are below the EPA point source reporting threshold of 100 tons per year.

Table 8. Sulfur dioxide emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emis	Emissions for Point Sources by Facility Top 10							
Inventory Emission	y Year: 2020 Reporting Period: n Unit: [tons]	ANNUAL (Jan 01 to Dec 31)					
Michig	an	so	02 - Sulfur Dioxide					
Rank	Facility Name	FID	Location Name	Emissions	% of Total			
1	TILDEN MINING COMPANY LC (B4885)		Marquette	365.82	39.01%			
2	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)		Baraga	336.67	35.90%			
3	Billerud Quinnesec, LLC (B7192)		Dickinson	216.51	23.09%			
4	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)		Dickinson	9.17	0.98%			
5	Houghton County Memoria (AIRPORTCMX)		Houghton	1.69	0.18%			
6	GREDE LLC - IRON MOUNTAIN (B1577)		Dickinson	1.60	0.17%			
7	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	1.46	0.16%			
8	Sawyer International (AIRPORTSAW)		Marquette	1.25	0.13%			
9	Marquette Board of Light and Power (P0668)		Marquette	1.22	0.13%			
10	Ford (AIRPORTIMT)		Dickinson	0.98	0.11%			
				Total Emissions: 936.37 [tor	ns] 99.85%			

Volatile Organic Compounds (VOC)

Though these ten facilities accounted for 94% of the total VOC emissions, these facilities are below the EPA point source reporting threshold of 100 tons per year (Table 9). Tilden Mining Company LC, and Billerud Quinnesec LLC were the two sources of VOC emitting nearly 50% of the emissions, or a combined 160 tons in 2020.

Table 9. Volatile Organic Compounds emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emis	missions for Point Sources by Facility Top 10							
Inventory Emission	y Year: 2020 Reporting Peri n Unit: [tons]	iod: ANNUAL (Jan 01 to Dec 31)					
Michig	an	VOC - Vola	atile Organic Compounds					
Rank	Facility Name	FID	Location Name	Emissions	% of Total			
1	TILDEN MINING COMPANY LC (B4885)		Marquette	95.09	28.53%			
2	Billerud Quinnesec, LLC (B7192)		Dickinson	68.53	20.56%			
3	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)		Dickinson	35.47	10.64%			
4	WARM RAIN CORPORATION (N0544)		Houghton	34.18	10.25%			
5	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	26.91	8.07%			
6	GREDE LLC - IRON MOUNTAIN (B1577)		Dickinson	16.83	5.05%			
7	Marquette Board of Light and Power (P0668)		Marquette	11.52	3.46%			
8	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)		Baraga	9.67	2.90%			
9	Sawyer International (AIRPORTSAW)		Marquette	8.64	2.59%			
10	Houghton County Memoria (AIRPORTCMX)		Houghton	8.09	2.43%			
				Total Emissions: 314.93 [ton	s] 94.48%			

Lead (Pb)

Pb emissions from these facilities are below the EPA point source reporting threshold of 0.5 tons per year (Table 10). Tilden Mining LC emitted 0.05 tons of Pb in 2020, this is the highest amount of lead emissions reported and as shown, is below the 0.5 threshold.

Table 10. Lead emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emis	Emissions for Point Sources by Facility Top 10							
Inventor Emission	y Year: 2020 h Unit: [tons]	Reporting Period: ANNUAL	(Jan 01 to Dec 31)					
Michig	an		7439921 - Lead					
Rank	Facility Name	FID	Location Name	Emissions	% of Total			
1	TILDEN MINING COMPANY LC (B4885)		Marquette	0.05	33.95%			
2	Houghton County Memoria (AIRPORTCMX)		Houghton	0.03	16.88%			
3	Sawyer International (AIRPORTSAW)		Marquette	0.02	15.60%			
4	Billerud Quinnesec, LLC (B7192)		Dickinson	0.02	14.76%			
5	STAMBAUGH (AIRPORTY73)		Iron	0.01	3.71%			
6	Ford (AIRPORTIMT)		Dickinson	0.00	3.24%			
7	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)		Dickinson	0.00	2.32%			
8	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)		Baraga	0.00	2.30%			
9	CONNOR AGA SPORTS FLOORING LLC (B7099)		Iron	0.00	1.89%			
10	HUBER (AIRPORT39MI)		Iron	0.00	1.83%			
				Total Emissions: 0.15 [ton:	s] 96.47%			

Greenhouse Gasses (GHG)

Greenhouse gasses trap heat in our atmosphere which cause the planet to become warmer overall (EPA). Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), and Fluorinated gases are what make up GHG in our atmosphere. This report will cover emissions from CO₂, CH₄, and N₂O as fluorinated gases only make up 3% of GHG.

Carbon Dioxide (CO₂)

These ten facilities in the Point Source Emissions Area accounted for 99% of the CO_2 emissions (Table 11). Billerud Quinnesec LLC and Tilden Mining Company LC account for over 70% of that 99% equating to over two million tons. Overall, these ten facilities emit over three million tons of CO2 per year.

Table 11. Carbon dioxide emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Inventory Emission	r Year: 2020 Reporting Perio I Unit: [tons]	d: ANNUAL (Jan 01 to Dec 31)		
Michig	an	со	2 - Carbon Dioxide		
Rank	Facility Name	FID	Location Name	Emissions	% of Total
1	Billerud Quinnesec, LLC (B7192)		Dickinson	1.26E+6	41.56%
2	TILDEN MINING COMPANY LC (B4885)		Marquette	935,742.75	30.88%
3	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	288,379.46	9.52%
4	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)		Baraga	215,261.26	7.10%
5	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)		Baraga	135,883.04	4.48%
6	LOUISIANA-PACIFIC CORP SAGOLA PLANT (N1315)		Dickinson	75,234.00	2.48%
7	CERTAINTEED CEILINGS CORP (B1479)		Baraga	29,093.75	0.96%
3	GREAT LAKES GAS TRANSMISSION STATION #8 (N3760)		Iron	28,681.04	0.95%
Э	NORTHERN MICHIGAN UNIVERSITY (M3792)		Marquette	24,215.00	0.80%
10	GREDE LLC - IRON MOUNTAIN (B1577)		Dickinson	17,386.54	0.57%

Methane (CH₄)

These ten facilities in the Point Source Emissions Area accounted for 99% of the CH_4 emissions (Table 12). K & W Landfill INC and Billerud Quinnesec LLC account for nearly 95% of that 99% equating to over 2,500 tons. Overall, these ten facilities emit over 4,500 tons of CH_4 per year.

Table 12. Methane emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emissions for Point Sources by Facility Top 10										
Inventory Year: 2020 Reporting Period: ANNUAL (Jan 01 to Dec 31) Emission Unit: [tons]										
Michigan CH4 - Methane										
Rank	Facility Name	FID	Location Name	Emissions	% of Total					
1	K & W LANDFILL INC (N6039)		Ontonagon	2,400.07	50.00%					
2	Billerud Quinnesec, LLC (B7192)		Dickinson	2,140.49	44.59%					
3	GREAT LAKES GAS TRANSMISSION STATION #8 (N3760)		Iron	156.16	3.25%					
4	EAGLE MINE LLC (N7581)		Marquette	59.15	1.23%					
5	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)		Baraga	30.52	0.64%					
6	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	5.43	0.11%					
7	TILDEN MINING COMPANY LC (B4885)		Marquette	2.59	0.05%					
8	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)		Baraga	2.56	0.05%					
9	GREDE LLC - IRON MOUNTAIN (B1577)		Dickinson	1.09	0.02%					
10	CERTAINTEED CEILINGS CORP (B1479)		Baraga	0.55	0.01%					
				Total Emissions: 4,798.63 [ton:	s] 99.97%					

Nitrous Oxide (N_2O)

These ten facilities in the Point Source Emissions Area accounted for 99% of the N_2O emissions (Table 13). Billerud Quinnesec LLC and L'Anse Warden Electric Company LLC account for over 90% of that 99% equating to over 25 tons. Overall, these ten facilities emit nearly 30 tons of N_2O per year.

Table 13. Nitrous oxide emissions for Point Sources by the top 10 facilities within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI and table produced using TEISS View. Prepared by Teal Sackett.

Emissions for Point Sources by Facility Top 10									
Inventory Year: 2020 Reporting Period: ANNUAL (Jan 01 to Dec 31) Emission Unit: [tons]									
Michig	an	N2	O - Nitrous Oxide						
Rank	Facility Name	FID	Location Name	Emissions	% of Total				
1	Billerud Quinnesec, LLC (B7192)		Dickinson	16.63	61.16%				
2	LANSE WARDEN ELECTRIC COMPANY LLC (B4260)		Baraga	8.69	31.97%				
3	Upper Michigan Energy Resources -F.D. Kuester G.S. (P0797)		Marquette	0.54	2.00%				
4	NORTHERN MICHIGAN UNIVERSITY (M3792)		Marquette	0.44	1.63%				
5	TILDEN MINING COMPANY LC (B4885)		Marquette	0.26	0.95%				
6	Upper Michigan Energy Resources -A.J. Mihm G.S. (P0796)		Baraga	0.26	0.94%				
7	GREDE LLC - IRON MOUNTAIN (B1577)		Dickinson	0.15	0.56%				
8	Marquette Branch Prison (K2153)		Marquette	0.09	0.33%				
9	CERTAINTEED CEILINGS CORP (B1479)		Baraga	0.06	0.20%				
10	GREAT LAKES GAS TRANSMISSION STATION #8 (N3760)		Iron	0.05	0.20%				
				Total Emissions: 27.17 [ton	s] 99.95%				

Summary and Recommendations - Point Sources

As seen in the emissions by facility tables, Billerud Quinnesec LLC, TildenMining Company, and L'Anse Warden Electric Company are some of the largest emitters in the Point Source Emissions Area in 2020. L'Anse Warden Electric Company is the closest facility to the reservation at approximately <1 mile from reservation boundaries. KBIC will consider what was learned from this EI for future projects and analyses.

Nonpoint Sources

To identify sources of concern, the KBIC analyzed the top 10 nonpoint emission sources in within 50 miles of the L'Anse Reservation for each pollutant of interest.

Criteria Pollutant Emissions

Ammonia (NH3)

One source in the Non-Point Source Emissions Area accounted for nearly 80% of the Ammonia (NH₃) emissions, that source being fertilizer application (Table 14). Fertilizer application emitted over 2,000 tons per year. Overall, these ten sources emit over 2,500 tons of Ammonia per year.

Table 14. Ammonia emissions for Nonpoint Sources by the top 10 sources within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Ammonia 2020 Top 10 Nonpoint Emissions Sources, Summary (tons)		
	Emissions (tons per year)	Percentage
Miscellaneous Area Sources, Agriculture Production - Crops, Fertilizer Application	2,134.62	79.55%
Waste Disposal, Treatment, and Recovery, Open Burning, All Categories	151.20	5.63%
Miscellaneous Area Sources, Agriculture Production - Livestock, Dairy cattle composite	139.44	5.20%
Stationary Source Fuel Combustion, Residential, Wood	73.30	2.73%
Miscellaneous Area Sources, Agriculture Production - Livestock, Poultry production - turkeys	51.95	1.94%
Stationary Source Fuel Combustion, Residential, Natural Gas	44.25	1.65%
Miscellaneous Area Sources, Agriculture Production - Livestock, Beef cattle production composite	31.13	1.16%
Miscellaneous Area Sources, Agriculture Production - Livestock, Poultry production - broilers	14.07	0.52%
Miscellaneous Area Sources, Agriculture Production - Livestock, Horses and Ponies Waste Emissions	10.71	0.40%
Miscellaneous Area Sources, Agriculture Production - Livestock, Goats Waste Emissions	9.48	0.35%
Top 10 Total Emissions	2,660.14	99.14%



Carbon Monoxide (CO)

One source in the Non-Point Source Emissions Area accounted for over 50% of the CO emissions, that source being stationary source fuel combustion (residential wood) (Table 15). This fuel combustion emitted over 10,000 tons per year. Overall, these ten sources emit nearly 20,000 tons of CO per year. The second largest non-point source of CO emissions is from natural sources (biogenic vegetation) at nearly 30% of emissions or nearly 6,000 tons.

Table 15. Carbon monoxide for Nonpoint Sources by the top 10 sources within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Carbon Monoxide 2020 Top 10 Nonpoint Emissions Sources, Summary (tons)		
	Emissions (tons per year)	Percentage
Stationary Source Fuel Combustion, Residential, Wood	10,815.26	53.75%
Natural Sources, Biogenic, Vegetation	5,976.92	29.70%
Waste Disposal, Treatment, and Recovery, Open Burning, All Categories	2,109.58	10.48%
Waste Disposal, Treatment, and Recovery, Open Burning, Residential	371.44	1.85%
Miscellaneous Area Sources, Other Combustion, Forest Wildfires	202.59	1.01%
Mobile Sources, Marine Vessels, Commercial, Diesel	139.71	0.69%
Miscellaneous Area Sources, Other Combustion - as Event, Prescribed Forest Burning	95.64	0.48%
Stationary Source Fuel Combustion, Residential, Natural Gas	88.49	0.44%
Stationary Source Fuel Combustion, Commercial/Institutional, Natural Gas	71.35	0.35%
Stationary Source Fuel Combustion, Industrial, Wood	67.72	0.34%
Top 10 Total Emissions	19,938.72	99.09%



Oxides of Nitrogen (NO_x)

One source in the Non-Point Source Emissions Area accounted for nearly 50% of the NO_x emissions, that source being Mobile Sources, Marine Vessels, Commercial, and Diesel (Table 16). This fuel combustion emitted over 1,000 tons per year. Overall, these ten sources emit nearly 3,000 tons of NO_x per year. The second largest non-point source of NO_x emissions is from natural sources (biogenic vegetation) at just over 20% of emissions or nearly 600 tons.

Table 16. Oxides of Nitrogen emissions for Nonpoint Sources by the top 10 sources within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Nitrogen Oxides 2020 Top 10 Nonpoint Emissions Sources, Summary (tons)		
	Emissions (tons per year)	Percentage
Mobile Sources, Marine Vessels, Commercial, Diesel	1,307.16	47.91%
Natural Sources, Biogenic, Vegetation/Agriculture	574.43	21.05%
Stationary Source Fuel Combustion, Residential, Natural Gas	207.96	7.62%
Mobile Sources, Railroad Equipment, Diesel	162.54	5.96%
Stationary Source Fuel Combustion, Residential, Wood	134.93	4.95%
Stationary Source Fuel Combustion, Residential, Liquified Petroleum Gas (LPG)	105.95	3.88%
Stationary Source Fuel Combustion, Commercial/Institutional, Natural Gas	84.94	3.11%
Waste Disposal, Treatment, and Recovery, Open Burning, All Categories	52.05	1.91%
Waste Disposal, Treatment, and Recovery, Open Burning, Residential	26.22	0.96%
Stationary Source Fuel Combustion, Industrial, Wood	24.83	0.91%
Top 10 Total Emissions	2,681.02	98.25%



Particulate Matter 10 micrometers in diameter or smaller, including filterables and condensibles (PM₁₀-PRI)

One source in the Non-Point Source Emissions Area accounted for nearly 50% of the PM_{10} -PRI emissions, that source being Mobile Sources (all unpaved roads) (Table 17). This source emitted over 6,500 tons per year. Overall, these ten sources emit nearly 14,000 tons of PM_{10} -PRI per year. Secondly, the other two largest non-point source of PM_{10} -PRI emissions is from Mining and Quarrying (19%) and Residential Wood Burning (12%).

Table 17. PM₁₀ emissions for Nonpoint Sources by the top 10 sources within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett. PM10 Primary (Filt + Cond) 2020 Top 10 Nonpoint Emissions Sources, Summary (tons)

· · · · · · · · · · · · · · · · · · ·		
	Emissions (tons per year)	Percentage
Mobile Sources, Unpaved Roads, All Unpaved Roads	6,582.41	46.44%
Industrial Processes, Mining and Quarrying: SIC 10 and SIC 14, All Processes	2,598.33	18.33%
Stationary Source Fuel Combustion, Residential, Wood	1,710.33	12.07%
Miscellaneous Area Sources, Agriculture Production - Crops, Agriculture - Crops	1,350.80	9.53%
Mobile Sources, Paved Roads, All Paved Roads	764.31	5.39%
Industrial Processes, Construction: SIC 15 - 17, Industrial/Commercial/Institutional	373.61	2.64%
Waste Disposal, Treatment, and Recovery, Open Burning, All Categories	265.10	1.87%
Waste Disposal, Treatment, and Recovery, Open Burning, Residential	140.19	0.99%
Miscellaneous Area Sources, Agriculture Production - Livestock, Dust kicked up by Livestock	110.30	0.78%
Industrial Processes, Food and Kindred Products: SIC 20, Commercial Cooking - Charbroiling	75.99	0.54%
Top 10 Total Emissions	13,971.37	98.57%



Particulate Matter 2.5 micrometers in diameter or smaller, including filterables and condensibles (PM_{2.5}-PRI)

One source in the Non-Point Source Emissions Area accounted for nearly 50% of the PM_{2.5}-PRI emissions, that source being Fuel Combustion, Residential, Wood (Table 18). This fuel combustion emitted nearly 2,000 tons per year. Overall, these ten sources emit nearly 4,000 tons of PM_{2.5}-PRI per year. The second largest non-point source of PM_{2.5}-PRI emissions is from All Unpaved Roads at just under 20% of emissions or over 600 tons.

Table 18. PM_{2.5} emissions for Nonpoint Sources by the top 10 sources within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett. PM2.5 Primary (Filt + Cond) 2020 Top 10 Nonpoint Emissions Sources, Summary (tons)

	Emissions (tons per year)	Percentage
Stationary Source Fuel Combustion, Residential, Wood	1,710.33	45.04%
Mobile Sources, Unpaved Roads, All Unpaved Roads	652.21	17.18%
Industrial Processes, Mining and Quarrying: SIC 10 and SIC 14, All Processes	324.79	8.55%
Miscellaneous Area Sources, Agriculture Production - Crops, Agriculture - Crops	270.16	7.11%
Waste Disposal, Treatment, and Recovery, Open Burning, All Categories	240.42	6.33%
Mobile Sources, Paved Roads, All Paved Roads	191.08	5.03%
Waste Disposal, Treatment, and Recovery, Open Burning, Residential	128.38	3.38%
Industrial Processes, Food and Kindred Products: SIC 20, Commercial Cooking - Charbroiling	73.61	1.94%
Stationary Source Fuel Combustion, Industrial, Wood	50.45	1.33%
Industrial Processes, Construction: SIC 15 - 17, Industrial/Commercial/Institutional	37.36	0.98%
Top 10 Total Emissions	3,678.80	96.88%



Sulfur Dioxide (SO₂)

One source in the Non-Point Source Emissions Area accounted for nearly 50% of the SO₂ emissions, that source being Fuel Combustion, Residential, Wood (Table 19). This fuel combustion emitted nearly 60 tons per year. Overall, these ten sources emit over 100 tons of SO₂ per year. Secondly, the other two largest non-point source of SO₂ emissions is from Mobile Sources, Marine Vessels, Commercial, Diesel (22%) and Waste Disposal, Treatment, and Recovery, Open Burning, All Categories (18%).

Table 19. Sulfur Dioxide emissions for Nonpoint Sources by the top 10 sources within the 50mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Sulfur Dioxide 2020 Top 10 Nonpoint Emissions Sources, Summary (tons)		
	Emissions (tons per year)	Percentage
Stationary Source Fuel Combustion, Residential, Wood	57.81	48.53%
Mobile Sources, Marine Vessels, Commercial, Diesel	26.32	22.09%
Waste Disposal, Treatment, and Recovery, Open Burning, All Categories	21.23	17.82%
Waste Disposal, Treatment, and Recovery, Open Burning, Residential	4.37	3.67%
Stationary Source Fuel Combustion, Industrial, Wood	2.82	2.37%
Miscellaneous Area Sources, Other Combustion, Forest Wildfires	1.54	1.29%
Stationary Source Fuel Combustion, Residential, Natural Gas	1.33	1.11%
Stationary Source Fuel Combustion, Commercial/Institutional, Wood	0.89	0.75%
Miscellaneous Area Sources, Other Combustion - as Event, Prescribed Forest Burning	0.79	0.66%
Stationary Source Fuel Combustion, Commercial/Institutional, Natural Gas	0.51	0.43%
Top 10 Total Emissions	117.61	98.73%



Volatile Organic Compounds (VOC)

One source in the Non-Point Source Emissions Area accounted for over 90% of the VOC emissions, that source being Natural Sources, Biogenic, Vegetation (Table 20). This source emitted over 40,000 tons per year. Overall, these ten sources emit nearly 45,000 tons of VOC per year.

Table 20. Volatile Organic Compound emissions for Nonpoint Sources by the top 10 sources within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Volatile Organic Compounds 2020 Top 10 Nonpoint Emissions Sources, Summary (tons)		
	Emissions (tons per year)	Percentage
Natural Sources, Biogenic, Vegetation	40,350.88	91.44%
Stationary Source Fuel Combustion, Residential, Wood	1,616.82	3.66%
Storage and Transport, Petroleum and Petroleum Product Storage, Gasoline Service Stations	292.28	0.66%
Solvent Utilization, Miscellaneous Non-industrial: Consumer and Commercial, All Coatings and Related Products	237.86	0.54%
Solvent Utilization, Miscellaneous Non-industrial: Consumer and Commercial, All Personal Care Products	237.86	0.54%
Solvent Utilization, Miscellaneous Non-industrial: Consumer and Commercial, All Household Products	179.44	0.41%
Solvent Utilization, Miscellaneous Non-industrial: Consumer and Commercial, All Adhesives and Sealants	153.57	0.35%
Waste Disposal, Treatment, and Recovery, Open Burning, All Categories	149.60	0.34%
Solvent Utilization, Miscellaneous Non-industrial: Commercial, Emulsified Asphalt	123.27	0.28%
Solvent Utilization, Surface Coating, Architectural Coatings	117.68	0.27%
Top 10 Total Emissions	43,459.25	98.49%



Greenhouse Gasses (GHG)

Carbon Dioxide (CO₂)

One source in the Non-Point Source Emissions Area accounted for over 80% of the CO_2 emissions, that source being Mobile Sources, Marine Vessels, Commercial, Diesel (Table 21). This source emitted over 65,000 tons per year. Overall, these four sources emit over 80,000 tons of CO_2 per year.

Table 21. Carbon Dioxide emissions for Nonpoint Sources by the top four sources within the 50mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.



Methane (*CH*₄)

One source in the Non-Point Source Emissions Area accounted for nearly 65% of the CH_4 emissions, that source being Forest Wildfires (Table 22). This source emitted nearly 10 tons per year. Overall, these four sources emit over 15 tons of CH_4 per year.

Table 22. Methane emissions for Nonpoint Sources by the top three sources within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.



Nitrous Oxide (N_2O)

Only one source in the Non-Point Source Emissions Area was reported accounting for 100% of the N_2O emissions, that source being Mobile Sources, Railroad Equipment, Diesel (Table 23). This source emitted 0.25 tons per year.

Table 23. Nitrous Oxide emissions for Nonpoint Sources by the top source within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Nitrous Oxide 2020 Top 10 Nonpoint Emissions Sources, Summary (tor		
	Percentage	
Mobile Sources, Railroad Equipment, Diesel	0.25	100.00%
Top 10 Total Emissions	0.25	100.00%

Summary and Recommendations - Nonpoint Sources

Analyzing the Nonpoint source data gave KBIC emissions information from the large sources in the area. KBIC compiled this list of sources of concern in this area.

- Marine vessels for commercial use
- Residential wood burning
- Vegetation
- Unpaved roads
- Open burning of waste
- Fertilizer application
- Mining and quarrying

A portion of a railroad runs through the reservation which may be included as a non-point source in the future. If resources allow, the tribe would also like to include other residential heating sources, such as natural gas or propane, and gas station emissions. KBIC will consider what was learned from this EI for future projects and analyses.

Non-Road Mobile Sources

To identify sources of concern, the KBIC analyzed the top 10 nonpoint emission sources in within 50 miles of the L'Anse Reservation for each pollutant of interest.

Criteria Pollutant Emissions

Ammonia (NH3)

Ammonia emissions from non-road equipment were low when compared to nonpoint source emissions. One source in the Non-Road Emissions Area accounted for nearly 60% of the Ammonia emissions, that source being Recreational Equipment (Table 24). This source only emitted nearly three tons per year. Overall, these eight sources emit nearly 4 tons of Ammonia per year.

Tabl	e 24. A	mmor	nia en	nissi	ons	for	Non	-roa	ad	Sourc	es by t	he top	source	e within t	he 50-mile buffer
area,	emiss	ions ar	re sho	wn i	n to	ons.	Data	is	co	llected	l from	EPA's	5 NEI.	Prepared	by Teal Sackett.
-									-			-	1.		

Ammonia 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)				
	Emissions (tons per year)	Percentage		
Recreational Equipment	2.49	58.66%		
Pleasure Craft	1.16	27.22%		
Logging Equipment	0.18	4.27%		
Construction Equipment	0.16	3.77%		
Lawn and Garden Equipment	0.10	2.35%		
Commercial Equipment	0.07	1.57%		
Industrial Equipment	0.06	1.35%		
Agricultural Equipment	0.03	0.80%		
Grand Total 4 25 100 00%				



Carbon Monoxide (CO)

One non-road equipment types in the Non-Road Emissions Area accounted for over 55% of the emissions, that source being Recreational Equipment (Table 25). Recreational Equipment made up over 12,000 tons of the 22,500 total tons. Second to recreational equipment was Pleasure Craft at over 30%.

Table 25. Carbon Monoxide emissions for Non-road Sources by the top source within the 50mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Carbon Monoxide 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)				
	Emissions (tons per year)	Percentage		
Recreational Equipment	12,676.49	56.26%		
Pleasure Craft	7,056.02	31.31%		
Lawn and Garden Equipment	1,641.88	7.29%		
Commercial Equipment	751.09	3.33%		
Logging Equipment	153.17	0.68%		
Construction Equipment	118.51	0.53%		
Industrial Equipment	114.48	0.51%		
Agricultural Equipment	22.17	0.10%		
Grand Total	22,533.81	100.00%		



Oxides of Nitrogen (NO_x)

One non-road equipment types in the Non-Road Emissions Area accounted for over 50% of the emissions, that source being Pleasure Craft (Table 26). Pleasure Craft made up over 600 tons of the 1,200 total tons. Second to recreational equipment was Pleasure Craft at nearly 35% or 450 tons.

Table 26. Oxides of Nitrogen emissions for Non-road Sources by the top source within the 50mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Nitrogen Oxides 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)				
Emissions (tons per year) Pere				
Pleasure Craft	662.55	50.97%		
Recreational Equipment	453.90	34.92%		
Construction Equipment	61.98	4.77%		
Industrial Equipment	31.61	2.43%		
Commercial Equipment	25.20	1.94%		
Logging Equipment	24.47	1.88%		
Agricultural Equipment	22.27	1.71%		
Lawn and Garden Equipment	18.01	1.39%		
Grand Total	1,299.99	100.00%		



Particulate Matter 10 micrometers in diameter or smaller, including filterables and condensibles (PM₁₀-PRI)

 PM_{10} -PRI emissions from non-road equipment were low when compared to nonpoint source emissions (Table 27). The largest source, Recreational Equipment, emitted only 155 tons in 2020.

Table 27. PM_{10} for Non-road Sources by the top source within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

PM10 Primary (Filt + Cond) 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)					
	Emissions (tons per year)	Percentage			
Recreational Equipment	155.83	80.21%			
Pleasure Craft	19.02	9.79%			
Construction Equipment	5.53	2.85%			
Lawn and Garden Equipment	5.32	2.74%			
Logging Equipment	3.24	1.67%			
Commercial Equipment	2.09	1.08%			
Agricultural Equipment	1.85	0.95%			
Industrial Equipment	1.41	0.72%			
Grand Total	194.29	100.00%			
PM10 Primary (Filt + Cond) 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)					



Particulate Matter 2.5 micrometers in diameter or smaller, including filterables and condensibles (PM_{2.5}-PRI)

 $PM_{2.5}$ -PRI emissions from non-road equipment were low when compared to nonpoint source emissions (Table 28). The largest source, Recreational Equipment, emitted only 143 tons in 2020.

Table 28. PM_{2.5} for Non-road Sources by the top source within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett. PM2.5 Primary (Filt + Cond) 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)

	Emissions (tons per year)	Percentage
Recreational Equipment	143.37	79.86%
Pleasure Craft	17.72	9.87%
Construction Equipment	5.33	2.97%
Lawn and Garden Equipment	4.90	2.73%
Logging Equipment	3.05	1.70%
Commercial Equipment	1.99	1.11%
Agricultural Equipment	1.79	1.00%
Industrial Equipment	1.38	0.77%
Grand Total	179.52	100.00%



Sulfur Dioxide (SO₂)

 SO_2 emissions from non-road equipment were low when compared to nonpoint source emissions (Table 29). The largest source, Recreational Equipment, emitted just over 1 ton of SO_2 in 2020.

Table 29. Sulfur Dioxide for Non-road Sources by the top source within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Sulfur Dioxide 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)						
Emissions (tons per year) Perce						
Recreational Equipment	1.07	54.35%				
Pleasure Craft	0.64	32.47%				
Logging Equipment	0.06	3.14%				
Construction Equipment	0.06	2.95%				
Industrial Equipment	0.05	2.47%				
Lawn and Garden Equipment	0.05	2.30%				
Commercial Equipment	0.03	1.60%				
Agricultural Equipment	0.01	0.71%				
Grand Total	1.97	100.00%				
Sulfur Dioxide 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)						
1.20						
1.00						
0.80						



Pleasure Craft

0.60 0.40 0.20

0.00

Recreational Equipment

One equipment type in the Non-Road Emissions Area accounted for 80% of the total VOC emissions from non-road sources (Table 30). Recreational equipment was the highest source at over 5,000 tons in 2020. Pleasure craft was the next highest source at over 1,000 tons in 2020, or just over 15% of VOC emitted by non-road sources.

Logging Equipment Construction Equipment Industrial Equipment

Lawn and Garden Commercial Equipment Agricultural Equipment

Equipment

Table 30. Volatile Organic Compounds for Non-road Sources by the top source within the 50mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Volatile Organic Compounds 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)					
	Emissions (tons per year)	Percentage			
Recreational Equipment	5,156.75	80.60%			
Pleasure Craft	1,083.20	16.93%			
Lawn and Garden Equipment	96.25	1.50%			
Commercial Equipment	26.21	0.41%			
Logging Equipment	16.56	0.26%			
Construction Equipment	12.11	0.19%			
Industrial Equipment	4.41	0.07%			
Agricultural Equipment	2.21	0.03%			
Grand Total	6,397.70	100.00%			
Volatile Organic Compounds	2020 Non-Road Mobile Emissions by E	quipment Type, Summary (tons)			
6,000.00					
5,000.00					
4,000.00					
3 000 00					
5,000.00					
2,000.00					
1,000.00					
0.00					
Recreational Pleasure Craft Lawn and C Equipment Equipm	Garden Commercial Equipment Logging Equipme lent	nt Construction Industrial Equipment Agricultural Equipment Equipment			

Lead (Pb)

Lead emissions were not reported for any of the non-road sources.

Greenhouse Gasses (GHG)

Carbon Dioxide (CO₂)

One source in the Non-Road Emissions Area accounted for over 50% of the CO_2 emissions, that source being Recreational Equipment (Table 31). This source emitted over 175,000 tons per year. Second to that is Pleasure Craft at nearly 30%, or nearly 95,000 tons. Overall, these eight sources emit nearly 350,000 tons of CO_2 per year.

Table 31. Carbon Dioxide for Non-road Sources by the top source within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett.

Carbon Dioxide 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)					
Emissions (tons per year)					
Recreational Equipment	176,533.22	51.51%			
Pleasure Craft	94,249.29	27.50%			
Logging Equipment	22,023.23	6.43%			
Construction Equipment	19,542.73	5.70%			
Industrial Equipment	12,130.07	3.54%			
Lawn and Garden Equipment	7,587.99	2.21%			
Commercial Equipment	6,471.33	1.89%			
Agricultural Equipment	4,161.46	1.21%			
Grand Total	342,699.32	100.00%			



Methane (CH₄)

One source in the Non-Road Emissions Area accounted for nearly 60% of the CH_4 emissions, that source being Recreational Equipment (Table 32). This source emitted over 110 tons per year. Second to that is Pleasure Craft at nearly 35%, or over 65 tons. Overall, these eight sources emit nearly 200 tons of CH_4 per year.

Table 32. Methane for Non-road Sources by the top source within the 50-mile buffer area, emissions are shown in tons. Data is collected from EPA's NEI. Prepared by Teal Sackett. Methane 2020 Non-Road Mobile Emissions by Equipment Type, Summary (tons)

Emissions (tons per year) Percentag					
Recreational Equipment	114.00	58.54%			
Pleasure Craft	66.46	34.13%			
Lawn and Garden Equipment	6.19	3.18%			
Commercial Equipment	4.61	2.37%			
Industrial Equipment	2.08	1.07%			
Logging Equipment	0.63	0.32%			
Construction Equipment	0.59	0.30%			
Agricultural Equipment	0.19	0.10%			
Grand Total	194.75	100.00%			



Nitrous Oxide (N₂O)

Nitrous Oxide emissions were not reported for any of the non-road sources.

Summary and Recommendations - Non-Road Mobile Sources

Analyzing the 50-mile emissions area data gave the tribe emissions information from large nonroad source equipment types in the area. KBIC compiled this list of non-road source equipment types of concern in this area.

- Recreational Equipment
- Pleasure Craft
- Logging Equipment

There are multiple lakes on and outside reservation, as well as Lake Superior that is used for recreational boating and fishing. Large logging operations take place on and outside the reservation as well. KBIC will consider what was learned from this EI for future projects and analyses.

On-Road Mobile Sources

For the pollutants of interest, the total for the On-Road Emissions area was reviewed for all onroad mobile source emissions. Lead and Greenhouse Gas emissions were not reported for these sources. Although emissions data are reported at the vehicle level for the county, only the total on-road emissions were included in this EI since the aggregation to the vehicle level was not pertinent for the purposes of this EI.

Criteria Pollutant Emissions

Marquette county is shown to have the highest of all emissions as compared to it's other counties for on-road emissions (Table 33). As well as having the highest emissions, it also doubles the other counties in having the highest vehicle miles traveled.

Table 33: Emissions (tons) from On-Road Mobile Sources in the 50-mile buffer area for on-road emissions. Table also includes annual Vehicle Miles Traveled (VMT) for each county for 2020. Data is collected from EPA's NEI. Prepared by Teal Sackett.

State and County								
	со	NH3	NOX	PM10-PRI	PM25-PRI	SO2	VOC	2020 Annual County VMT (mi)
MI, Baraga	559	3	87	5	3	0	35	108,342,330
MI, Dickinson	1,170	6	127	14	5	1	90	202,952,658
MI, Gogebic	812	4	106	9	4	0	58	132,215,548
MI, Houghton	1,598	8	197	17	7	1	122	248,299,082
MI, Iron	677	4	93	6	3	0	50	115,063,475
MI, Keweenaw	215	1	32	3	1	0	13	41,242,424
MI, Marquette	2,847	15	321	34	13	2	209	518,756,489
MI, Ontonagon	502	3	75	4	2	0	32	93,398,786
Grand Total	8,380	44	1,040	92	38	5	609	1.46E+09

Summary and Recommendations - On-Road Mobile Sources

The reservation is surrounded by several highways, including US-41, M-38, M-28, and US-141, as well as several minor paved and unpaved roads. M-38 and US-41 run directly through the reservation.