Appendix M

Air Quality Emissions and Modeling Data

Introduction

This appendix provides detailed emissions inventory files prepared for the Uinta Basin Railway Environmental Impact Statement air quality analysis, information on dispersion modeling, and information on the cumulative air quality impacts analysis.

Cumulative Air Quality Impacts Analysis Details

As discussed in Section 3.15, *Cumulative Impacts*, OEA used information from the *Monument Butte Oil and Gas Development Project Final Environmental Impact Statement* (Monument Butte FEIS) (BLM 2016) to assess the potential cumulative air quality impacts of the Uinta Basin Railway. The Monument Butte analysis drew on the data and results of a comprehensive regional modeling study, the Utah Air Resource Management Strategy Modeling Project (BLM 2014). Because the Monument Butte development proposed nearly twice the number of wells and roughly one and one-half times the amount of the emissions (Table 3.5-11), OEA considers the results of the Monument Butte modeling study to be a conservative representation of the air quality impacts of oil and gas development considered in the Uinta Basin Railway EIS.

Table M-1 through Table M-5 show the predicted impact of the Monument Butte project on criteria pollutant levels. In the tables, the sites in the Uinta Basin study area are modeled locations that are within the cumulative impacts study area. The Class I areas are not within the cumulative impacts study area but are provided for information. The Class II areas are partly within the cumulative impacts study area. The Maximum column shows the total predicted concentration from the Monument Butte study, and the Monument Butte Impact column shows the portion of the Maximum that the Monument Butte project contributes.

Table M-1 presents the estimated nitrogen dioxide (NO_2) impacts. The table shows that the maximum impact of Monument Butte is very small and total NO_2 levels at all sites would be less than the National Ambient Air Quality Standards (NAAQS) and Utah Ambient Air Quality Standards (AAQS). Because of the much lower number of wells, the cumulative impacts for Uinta Basin Railway also would be lower and would be within the NAAQS and Utah Ambient Air Quality Standards (AAQS).

Table M-1. Monument Butte Model Predicted NO_2 Impacts (µg/m³)

	NO_2 1-hour 98th Percentile Daily Maximum[a]		NO_2 Annual Mean[a]	
Modeled Location	**Maximum**	**Monument Butte Impact**	**Maximum**	**Monument Butte Impact**
Uinta Basin Study Area				
Uinta Study Area Site	89.6	0.6	28.9	0.2
Dinosaur AQS Station	10.5	1.6	0.9	0.1
Ouray AQS Station	55.1	2.7	10.9	1.0
Rangely AQS Station	10.4	0.4	1.6	0.0
Redwash AQS Station	43.7	0.7	6.8	0.1
Class 1 Areas				
Arches NP	2.7	0.0	0.5	0.0
Bryce Canyon NP	2.4	0.0	0.2	0.0
Canyonlands NP	3.9	0.0	0.3	0.0
Capitol Reef NP	4.2	0.0	0.3	0.0
Mesa Verde NP	9.7	0.0	0.6	0.0
Class 2 Areas				
Dinosaur NM	10.5	1.6	0.9	0.1
Flaming Gorge National Recreation Area	21.1	0.0	2.8	0.0
Goshute Indian Reservation	0.7	0.0	0.1	0.0
High Uintas Wilderness	2.0	0.0	0.2	0.0
Paiute Indian Reservation	14.0	0.0	1.0	0.0
Skull Valley Indian Reservation	6.8	0.0	0.4	0.0
Uintah and Ouray Indian Reservation	89.6	1.0	28.9	0.2

Notes:

[a] Values less than 0.05 have been rounded to zero.

Source: BLM 2016

µg/m³ = micrograms per cubic meter; NO_2 = nitrogen dioxide; AQS = air quality standard; NM = National Monument; NP = National Park

Table M-2 presents the estimated carbon monoxide (CO) impacts. The table shows that the maximum impact of Monument Butte is very small and total CO levels at all sites would be less than the NAAQS and Utah AAQS. Because of the much lower number of wells, the impacts for the Uinta Basin Railway also would be lower and would be within the NAAQS and Utah AAQS.

Table M-2. Monument Butte Model Predicted CO Impacts (parts per million)

	CO 1-hour Average[a]		CO 8-Hour Average[a]	
Modeled Location	**Maximum**	**Monument Butte Impact**	**Maximum**	**Monument Butte Impact**
Uinta Basin Study Area				
Uinta Study Area Site	1.4	0.0	1.1	0.0
Dinosaur AQS Station	0.5	0.0	0.2	0.0
Ouray AQS Station	0.8	0.0	0.5	0.0
Rangely AQS Station	0.2	0.0	0.2	0.0
Redwash AQS Station	0.4	0.0	0.3	0.0
Class 1 Areas				
Arches NP	0.5	0.0	0.4	0.0
Bryce Canyon NP	0.3	0.0	0.2	0.0
Canyonlands NP	0.2	0.0	0.2	0.0
Capitol Reef NP	0.2	0.0	0.1	0.0
Mesa Verde NP	0.4	0.0	0.2	0.0
Class 2 Areas				
Dinosaur NM	0.5	0.0	0.2	0.0
Flaming Gorge National Recreation Area	0.6	0.0	0.4	0.0
Goshute Indian Reservation	0.2	0.0	0.1	0.0
High Uintas Wilderness	0.3	0.0	0.2	0.0
Paiute Indian Reservation	0.6	0.0	0.4	0.0
Skull Valley Indian Reservation	0.2	0.0	0.2	0.0
Uintah and Ouray Indian Reservation	2.8	0.0	1.1	0.0

Notes:

[a] Values less than 0.05 have been rounded to zero.

Source: BLM 2016

µg/m^3 = micrograms per cubic meter; CO = carbon monoxide; AQS = air quality standard; NM = National Monument; NP = National Park

Table M-3 presents the estimated sulfur dioxide (SO_2) impacts. The table shows that the maximum impact of Monument Butte is very small and total SO_2 levels at all sites would be less than the NAAQS and Utah AAQS. Because of the much lower number of wells, the cumulative impacts for the Uinta Basin Railway also would be lower and would be within the NAAQS and Utah AAQS.

Table M-3. Monument Butte Model Predicted SO_2 Impacts (µg/m3)

Modeled Location	SO_2 1-hour Average 99th Percentile[a]		SO_2 3-Hour Average Maximum[a]	
	Maximum	Monument Butte Impact	Maximum	Monument Butte Impact
Uinta Basin Study Area				
Uinta Study Area Site	7.1	0.0	9.6	0.0
Dinosaur AQS Station	1.4	0.0	1.6	0.0
Ouray AQS Station	0.8	0.0	0.8	0.0
Rangely AQS Station	1.1	0.0	1.3	0.0
Redwash AQS Station	2.0	0.0	2.6	0.0
Class 1 Areas				
Arches NP	0.8	0.0	1.0	0.0
Bryce Canyon NP	0.7	0.0	0.8	0.0
Canyonlands NP	1.8	0.0	3.5	0.0
Capitol Reef NP	1.8	0.0	2.1	0.0
Mesa Verde NP	2.8	0.0	3.2	0.0
Class 2 Areas				
Dinosaur NM	1.4	0.0	1.6	0.0
Flaming Gorge National Recreation Area	11.3	0.0	21.4	0.0
Goshute Indian Reservation	0.5	0.0	0.6	0.0
High Uintas Wilderness	1.5	0.0	2.1	0.0
Paiute Indian Reservation	1.5	0.0	2.2	0.0
Skull Valley Indian Reservation	1.7	0.0	2.0	0.0
Uintah and Ouray Indian Reservation	9.1	0.0	9.7	0.0

Notes:

[a] Values less than 0.05 have been rounded to zero.

Source: BLM 2016

SO_2 = sulfur dioxide; µg/m^3 = micrograms per cubic meter; NO_2 = nitrogen dioxide; AQS = air quality standard; NM = National Monument; NP = National Park

Table M-4 presents the estimated ozone impacts. The table shows that the maximum impact of Monument Butte is very small at most sites. However, total ozone levels exceed the NAAQS at some sites. This is consistent with ozone exceedances measured by the Utah Department of Environmental Quality (DEQ) in winter in the Uinta Basin. Because of the much lower number of wells, the cumulative impacts for the Uinta Basin Railway also would be lower, but existing exceedances of the ozone NAAQS would still occur.

Table M-4. Monument Butte Model Predicted Ozone Impacts (parts per billion)

	Ozone 8-hour Average 99th Percentile Daily Maximum[a]	
Modeled Location	**Maximum**	**Monument Butte Impact**
Uinta Basin Study Area		
Uinta Study Area Site	88.5	0.5
Dinosaur AQS Station	74.6	1.6
Ouray AQS Station	75.5	0.4
Rangely AQS Station	70.5	0.0
Redwash AQS Station	71.6	0.3
Class 1 Areas		
Arches NP	69.6	0.1
Bryce Canyon NP	70.2	0.0
Canyonlands NP	69.9	0.1
Capitol Reef NP	71.1	0.0
Mesa Verde NP	69.3	0.0
Class 2 Areas		
Dinosaur NM	74.6	1.6
Flaming Gorge National Recreation Area	69.9	1.0
Goshute Indian Reservation	69.5	0.0
High Uintas Wilderness	70.0	0.0
Paiute Indian Reservation	70.6	0.0
Skull Valley Indian Reservation	69.4	0.0
Uintah and Ouray Indian Reservation	83.2	0.8

Notes:
[a] Values less than 0.05 have been rounded to zero.
Bolded values indicate levels that equal or exceed the NAAQS and Utah AAQS of 0.070 ppm (70 ppb).
Source: BLM 2016
AQS = air quality standard; NM = National Monument; NP = National Park

Table M-5 presents the estimated PM10 and PM2.5 impacts. The table shows that the maximum impact of Monument Butte is generally small. Total PM10 and annual PM2.5 levels at all sites would be less than the NAAQS and Utah AAQS. Total 24-hour PM2.5 levels would be less than the NAAQS and Utah AAQS at all sites except one. Because of the much lower number of wells, the cumulative impacts for the Uinta Basin Railway also would be lower and would be within the NAAQS and Utah AAQS.

Table M-5. Monument Butte Model Predicted PM10 and PM2.5 Impacts (µg/m³)

Modeled Location	PM10 24-hour Average 99th Percentile[a]		PM2.5 24-hour Average 98th Percentile[a]		PM2.5 Annual Average[a]	
	Max.	Monument Butte Impact	Max.	Monument Butte Impact	Max.	Monument Butte Impact
Uinta Basin Study Area						
Uinta Study Area Site	40.8	5.5	35.5	7.0	11.4	0.1
Dinosaur AQS Station	18.0	1.2	15.1	1.9	3.8	0.3
Ouray AQS Station	30.3	2.1	27.5	2.3	7.4	0.5
Rangely AQS Station	8.4	0.0	6.7	0.1	2.5	0.0
Redwash AQS Station	17.8	1.2	14.3	1.4	4.3	0.1
Class 1 Areas						
Arches NP	8.4	0.0	6.1	0.1	2.8	0.0
Bryce Canyon NP	7.1	0.0	4.7	0.0	2.1	0.0
Canyonlands NP	8.3	0.0	6.5	0.1	2.2	0.0
Capitol Reef NP	8.6	0.0	6.9	0.0	2.2	0.0
Mesa Verde NP	5.8	0.0	4.0	0.1	1.8	0.0
Class 2 Areas						
Dinosaur NM	18.0	1.2	15.1	1.9	3.8	0.3
Flaming Gorge National Recreation Area	16.5	0.2	11.9	0.1	3.2	0.0
Goshute Indian Reservation	8.3	0.0	3.4	0.0	1.4	0.0
High Uintas Wilderness	7.0	0.2	5.8	0.6	2.1	0.0
Paiute Indian Reservation	11.3	0.0	6.4	0.0	2.7	0.0
Skull Valley Indian Reservation	10.0	0.0	7.3	0.0	2.1	0.0
Uintah and Ouray Indian Reservation	37.4	5.0	32.4	3.8	11.4	0.1

Notes:

[a] Values less than 0.05 have been rounded to zero.

Bolded values indicate levels that equal or exceed the 24-hour PM2.5 NAAQS and Utah AAQS of 35 µg/m³.

Source: BLM 2016

µg/m³ = micrograms per cubic meter; PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; AQS = air quality standard; NM = National Monument; NP = National Park

In the Monument Butte FEIS, visibility impacts were calculated at Class I and sensitive Class II areas from the modeled concentrations using the IMPROVE equation (FLAG 2010) to calculate light extinction. Table M-6 shows the predicted visibility impacts. In the table, impacts are expressed in delta-deciviews (DDV), defined as the change in the number of deciviews due to the Monument Butte project. Impacts are compared to the FLAG (2010) Data Analysis Thresholds of 0.5 and 1.0 DDV. Also shown is the 98th percentile incremental impact in DDV. In the Monument Butte modeling, impacts exceeded the applicable thresholds on multiple days. Because of the much lower number of wells estimated for Uinta Basin Railway cumulative impacts, the cumulative impacts for

the Uinta Basin Railway also would be less, which indicates that the number of days on which visibility impacts exceeded the thresholds would be less than shown in Table M-6.

Table M-6. Monument Butte Predicted Visibility Impacts

	Number of Days per Year with DDV Impact Greater than Thresholds		
	No. of Days DDV >.5[a]	**No. of Days DDV >1.0[a]**	**98th Percentile Impact (DDV)[a]**
Class 1 Areas			
Arches NP	9	6	0.662
Bryce Canyon NP	0	0	0.056
Canyonlands NP	7	4	0.464
Capitol Reef NP	4	0	0.357
Mesa Verde NP	0	0	0.099
Class 2 Areas			
Dinosaur NM	124	97	4.574
Flaming Gorge National Recreation Area	94	61	3.264
Goshute Indian Reservation	0	0	0.023
High Uintas Wilderness	51	27	1.748
Paiute Indian Reservation	0	0	0.047
Skull Valley Indian Reservation	0	0	0.051
Uintah and Ouray Indian Reservation	362	340	13.298

Notes:

[a] Values less than 0.5 have been rounded to zero.

Source: BLM 2016

DDV = delta-deciviews; NM = National Monument; NP = National Park

In the Monument Butte FEIS, acidic deposition impacts were calculated at Class I and sensitive Class II areas. Table M-7 shows the predicted deposition impacts for sulfur and nitrogen due to the Monument Butte project. Impacts are compared to the FLAG (2010) Deposition Analysis Threshold (DAT) of 0.005 kilograms per hectare per year (kg/ha-yr) for both nitrogen and sulfur. The DATs are levels below which estimated impacts from a proposed emissions source are considered negligible. Table M-7 shows that the nitrogen DAT was exceeded in some areas but the sulfur DAT was not exceeded in any area. Because of the much lower number of wells estimated for Uinta Basin Railway cumulative impacts compared to Monument Butte, the cumulative acidic deposition impacts for the Uinta Basin Railway would be less than shown in Table M-7.

Table M-7. Monument Butte Predicted Acid Deposition Impacts at Class I and Sensitive Class II Areas

Class I and Sensitive Class II Areas	Nitrogen Deposition (kg/ha-yr)	Sulfur Deposition (kg/ha-yr)
NPS Class I Areas		
Arches National Park	0.0028	0.00002
NPS Class II Areas		
Dinosaur National Monument	0.0279	0.00020
U.S. Forest Service Class II Areas		
Flaming Gorge National Recreation Area	0.0147	0.00008
High Uintas Wilderness Area	0.0150	0.00007
U.S. Fish and Wildlife Service Class II Areas		
Browns Park National Wildlife Refuge	0.0092	0.00006

Notes:
Source: BLM 2016
NPS = National Park Service; kg/ha-yr = kilograms per hectare per year

References

Federal Land Managers' Air Quality Related Values Work Group (FLAG). 2010. Phase I Report—Revised. Natural Resource Report NPS/NRPC/NRR—2010/232. Available: http://nature.nps.gov/air/Pubs/pdf/flag/FLAG_2010.pdf. Accessed: April 20, 2020.

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Emissions Inventory—Direct and Indirect (Construction)

Uinta Project-Level Construction Emissions within PM Nonattainment Area (tons/year)

			Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)
2022Indian	2022 Indian Cany	Total	3.81	9.57	0.31	15.67	15.98	0.30	3.62	3.92	0.03	0.64	4.5E-02	8.2E-03	1.7E-02	1.2E-03	3.0E-03	1.3E-01	3.0E-01	5.7E-03	5.3E-02	3,711	0.18	0.08	3,737	357,446	0
2022Whitm	2022 Whitmore I	Total	7.78	15.65	0.50	25.86	26.36	0.48	7.72	8.20	0.05	1.24	8.4E-02	1.5E-02	2.8E-02	2.2E-03	5.9E-03	2.3E-01	4.8E-01	1.2E-02	8.4E-02	6,281	0.44	0.12	6,326	602,564	0
2022Wells I	2022 Wells Draw	Total	2.23	5.51	0.17	9.25	9.42	0.17	2.22	2.39	0.02	0.36	2.7E-02	4.7E-03	9.7E-03	6.3E-04	1.8E-03	7.4E-02	1.7E-01	3.3E-03	3.1E-02	2,192	0.12	0.05	2,208	211,029	0
2023Indian	2023 Indian Cany	Total	3.65	9.18	0.28	15.88	16.15	0.27	3.83	4.10	0.03	0.62	4.3E-02	7.6E-03	1.5E-02	1.1E-03	2.9E-03	1.2E-01	2.7E-01	5.6E-03	4.8E-02	3,732	0.19	0.08	3,758	359,900	0
2023Whitm	2023 Whitmore I	Total	7.62	15.11	0.45	26.38	26.84	0.43	8.24	8.67	0.05	1.21	8.0E-02	1.4E-02	2.6E-02	2.2E-03	5.7E-03	2.3E-01	4.3E-01	1.2E-02	7.6E-02	6,341	0.45	0.12	6,385	608,916	0
2023Wells I	2023 Wells Draw	Total	2.14	5.28	0.16	9.38	9.54	0.15	2.35	2.50	0.02	0.35	2.5E-02	4.4E-03	8.9E-03	6.0E-04	1.7E-03	7.0E-02	1.5E-01	3.3E-03	2.8E-02	2,205	0.12	0.05	2,221	212,562	0
2024Indian	2024 Indian Cany	Total	1.22	2.99	0.09	5.18	5.26	0.08	1.15	1.23	0.01	0.21	1.4E-02	2.4E-03	4.8E-03	3.8E-04	9.7E-04	3.9E-02	8.1E-02	2.0E-03	1.4E-02	1,275	0.07	0.03	1,283	122,671	0
2024Whitm	2024 Whitmore I	Total	2.62	4.98	0.14	8.50	8.64	0.13	2.42	2.56	0.02	0.42	2.7E-02	4.6E-03	8.3E-03	7.4E-04	2.0E-03	7.5E-02	1.3E-01	4.4E-03	2.3E-02	2,186	0.16	0.04	2,202	209,550	0
2024Wells I	2024 Wells Draw	Total	2.15	5.13	0.14	9.14	9.28	0.14	2.10	2.24	0.02	0.35	2.4E-02	4.2E-03	8.3E-03	6.0E-04	1.7E-03	6.9E-02	1.4E-01	3.4E-03	2.5E-02	2,256	0.13	0.05	2,272	216,992	0
2025Indian	2025 Indian Cany	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025 Whitmore I	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells I	2025 Wells Draw	Total	2.00	4.87	0.12	9.14	9.26	0.12	2.10	2.22	0.02	0.32	2.3E-02	3.9E-03	7.6E-03	5.2E-04	1.6E-03	6.4E-02	1.2E-01	3.3E-03	2.3E-02	2,247	0.14	0.05	2,263	216,549	0
2022Indian	2022 Indian Cany	Surface	1.67	7.99	0.25	13.32	13.58	0.25	1.34	1.59	0.02	0.32	2.9E-02	5.6E-03	1.3E-02	5.6E-04	1.6E-03	8.0E-02	2.5E-01	1.7E-03	4.8E-02	2,992	0.04	0.08	3,013	290,113	0
2022Whitm	2022 Whitmore I	Surface	2.64	12.00	0.38	20.00	20.38	0.37	2.02	2.39	0.03	0.50	4.5E-02	8.5E-03	2.0E-02	8.8E-04	2.5E-03	1.2E-01	3.7E-01	2.8E-03	7.3E-02	4,499	0.07	0.11	4,531	435,671	0
2022Wells I	2022 Wells Draw	Surface	0.98	4.66	0.15	7.77	7.92	0.14	0.78	0.93	0.01	0.19	1.7E-02	3.2E-03	7.8E-03	3.3E-04	9.5E-04	4.7E-02	1.4E-01	1.0E-03	2.8E-02	1,746	0.02	0.04	1,758	169,249	0
2023Indian	2023 Indian Cany	Surface	1.44	7.53	0.22	13.32	13.54	0.21	1.34	1.56	0.02	0.28	2.6E-02	4.9E-03	1.2E-02	4.9E-04	1.5E-03	7.2E-02	2.1E-01	1.5E-03	4.3E-02	2,983	0.04	0.08	3,004	289,814	0
2023Whitm	2023 Whitmore I	Surface	2.28	11.31	0.33	20.00	20.33	0.32	2.02	2.34	0.03	0.44	4.0E-02	7.5E-03	1.8E-02	7.7E-04	2.3E-03	1.1E-01	3.2E-01	2.5E-03	6.4E-02	4,486	0.07	0.11	4,518	435,193	0
2023Wells I	2023 Wells Draw	Surface	0.85	4.39	0.13	7.77	7.90	0.13	0.78	0.91	0.01	0.17	1.5E-02	2.9E-03	7.0E-03	2.9E-04	8.5E-04	4.2E-02	1.3E-01	9.1E-04	2.5E-02	1,741	0.02	0.04	1,753	169,072	0
2024Indian	2024 Indian Cany	Surface	0.41	2.38	0.06	4.45	4.52	0.06	0.45	0.51	0.01	0.08	7.7E-03	1.4E-03	3.5E-03	1.5E-04	4.4E-04	2.1E-02	6.2E-02	4.6E-04	1.3E-02	998	0.01	0.03	1,005	96,728	0
2024Whitm	2024 Whitmore I	Surface	0.65	3.58	0.10	6.69	6.78	0.09	0.67	0.77	0.01	0.13	1.2E-02	2.2E-03	5.3E-03	2.3E-04	6.9E-04	3.3E-02	9.3E-02	7.7E-04	1.9E-02	1,500	0.02	0.04	1,510	145,241	0
2024Wells I	2024 Wells Draw	Surface	0.72	4.15	0.11	7.77	7.88	0.11	0.78	0.89	0.01	0.15	1.4E-02	2.5E-03	6.2E-03	2.6E-04	7.8E-04	3.7E-02	1.1E-01	8.3E-04	2.2E-02	1,742	0.02	0.04	1,754	168,823	0
2025Indian	2025 Indian Cany	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025 Whitmore I	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells I	2025 Wells Draw	Surface	0.61	3.96	0.10	7.77	7.87	0.09	0.78	0.88	0.01	0.13	1.2E-02	2.3E-03	5.5E-03	2.3E-04	7.1E-04	3.3E-02	9.5E-02	7.5E-04	2.0E-02	1,736	0.02	0.04	1,749	168,687	0
2022Indian	2022 Indian Cany	Tunnel	2.14	1.59	0.05	2.35	2.40	0.05	2.28	2.33	0.01	0.32	1.6E-02	2.6E-03	3.2E-03	6.2E-04	1.4E-03	4.5E-02	5.0E-02	4.0E-03	4.8E-03	719	0.14	0.00	724	67,333	0
2022Whitm	2022 Whitmore I	Tunnel	5.14	3.65	0.12	5.86	5.98	0.11	5.70	5.81	0.02	0.74	3.9E-02	6.2E-03	7.7E-03	1.4E-03	3.4E-03	1.1E-01	1.1E-01	9.5E-03	1.1E-02	1,782	0.37	0.01	1,794	166,893	0
2022Wells I	2022 Wells Draw	Tunnel	1.25	0.85	0.03	1.48	1.50	0.02	1.44	1.46	0.00	0.17	9.5E-03	1.5E-03	1.9E-03	3.0E-04	8.2E-04	2.7E-02	2.3E-02	2.3E-03	2.7E-03	446	0.10	0.00	449	41,780	0
2023Indian	2023 Indian Cany	Tunnel	2.22	1.65	0.06	2.55	2.61	0.05	2.49	2.54	0.01	0.33	1.7E-02	2.7E-03	3.4E-03	6.4E-04	1.4E-03	4.7E-02	5.2E-02	4.1E-03	5.0E-03	748	0.15	0.00	753	70,087	0
2023Whitm	2023 Whitmore I	Tunnel	5.34	3.79	0.12	6.38	6.50	0.11	6.22	6.33	0.02	0.77	4.1E-02	6.4E-03	8.0E-03	1.4E-03	3.5E-03	1.2E-01	1.1E-01	9.8E-03	1.2E-02	1,855	0.39	0.01	1,868	173,722	0
2023Wells I	2023 Wells Draw	Tunnel	1.30	0.88	0.03	1.61	1.64	0.02	1.57	1.59	0.00	0.18	9.9E-03	1.5E-03	1.9E-03	3.1E-04	8.5E-04	2.8E-02	2.4E-02	2.4E-03	2.8E-03	464	0.10	0.00	468	43,491	0
2024Indian	2024 Indian Cany	Tunnel	0.82	0.61	0.02	0.72	0.75	0.02	0.70	0.72	0.00	0.12	6.2E-03	1.0E-03	1.2E-03	2.4E-04	5.3E-04	1.7E-02	1.9E-02	1.5E-03	1.8E-03	277	0.06	0.00	279	25,944	0
2024Whitm	2024 Whitmore I	Tunnel	1.96	1.40	0.04	1.81	1.85	0.04	1.75	1.79	0.01	0.28	1.5E-02	2.4E-03	3.0E-03	5.2E-04	1.3E-03	4.2E-02	4.1E-02	3.6E-03	4.3E-03	687	0.14	0.00	691	64,310	0
2024Wells I	2024 Wells Draw	Tunnel	1.43	0.98	0.03	1.37	1.39	0.03	1.32	1.35	0.00	0.20	1.1E-02	1.7E-03	2.1E-03	3.4E-04	9.4E-04	3.1E-02	2.7E-02	2.6E-03	3.1E-03	514	0.11	0.00	518	48,169	0
2025Indian	2025 Indian Cany	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025 Whitmore I	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells I	2025 Wells Draw	Tunnel	1.38	0.91	0.02	1.37	1.39	0.02	1.32	1.34	0.00	0.19	1.1E-02	1.6E-03	2.0E-03	3.0E-04	9.1E-04	3.1E-02	2.3E-02	2.5E-03	2.9E-03	511	0.11	0.00	515	47,862	0
2022Indian	2022 Indian Cany	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2022Whitm	2022 Whitmore I	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2022Wells I	2022 Wells Draw	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2023Indian	2023 Indian Cany	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2023Whitm	2023 Whitmore I	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2023Wells I	2023 Wells Draw	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2024Indian	2024 Indian Cany	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2024Whitm	2024 Whitmore I	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2024Wells I	2024 Wells Draw	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Indian	2025 Indian Cany	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025 Whitmore I	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells I	2025 Wells Draw	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0

Construction_Common
PM NAA

Uinta Project-Level Construction Emissions outside PM Nonattainment Area (tons/year)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy		
		Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)	
2022Indian	2022 Indian Cany	Total	406.00	216.99	7.46	309.03	316.49	7.12	85.45	92.57	0.66	41.43	1.5E+00	2.2E-01	1.5E+00	2.0E-01	5.3E-01	3.2E+00	6.5E+00	2.0E-01	1.2E+00	84,681	5.82	2.64	85,570	6,544,512	1,583,718	
2022Whitm	2022 Whitmore I	Total	434.89	248.85	8.60	340.65	349.25	8.21	102.31	110.53	0.76	44.95	1.7E+00	2.6E-01	1.6E+00	2.1E-01	5.6E-01	3.8E+00	7.6E+00	2.2E-01	1.5E+00	97,537	7.08	2.91	98,532	7,666,066	1,639,225	
2022Wells I	2022 Wells Draw	Total	421.38	170.00	5.64	255.31	260.95	5.37	68.63	74.01	0.54	40.33	1.3E+00	1.8E-01	1.5E+00	2.1E-01	5.7E-01	2.5E+00	4.7E+00	1.6E-01	9.6E-01	69,520	5.08	2.45	70,346	4,961,167	1,785,633	
2023Indian	2023 Indian Cany	Total	381.16	206.25	6.75	314.21	320.96	6.42	90.56	96.99	0.66	38.68	1.4E+00	2.1E-01	1.4E+00	1.9E-01	4.8E-01	3.0E+00	5.9E+00	1.9E-01	1.1E+00	84,509	5.86	2.56	85,376	6,593,783	1,536,041	
2023Whitm	2023 Whitmore I	Total	408.87	236.59	7.75	347.22	354.98	7.39	108.80	116.19	0.76	42.02	1.6E+00	2.4E-01	1.5E+00	2.0E-01	5.1E-01	3.6E+00	6.8E+00	2.2E-01	1.3E+00	97,421	7.16	2.83	98,393	7,728,237	1,589,877	
2023Wells I	2023 Wells Draw	Total	394.40	160.66	5.07	259.24	264.32	4.82	72.52	77.34	0.54	37.38	1.2E+00	1.6E-01	1.4E+00	2.0E-01	5.2E-01	2.4E+00	4.2E+00	1.6E-01	8.7E-01	69,222	5.09	2.37	70,022	4,997,802	1,731,878	
2024Indian	2024 Indian Cany	Total	120.98	66.94	2.08	101.81	103.89	1.98	27.00	28.97	0.22	12.32	4.5E-01	6.7E-02	4.3E-01	5.9E-02	1.5E-01	9.9E-01	1.8E+00	6.5E-02	3.4E-01	28,685	2.05	0.84	28,972	2,263,218	497,457	
2024Whitm	2024 Whitmore I	Total	130.17	76.85	2.38	111.98	114.36	2.26	32.21	34.48	0.26	13.43	5.2E-01	7.9E-02	4.6E-01	6.2E-02	1.6E-01	1.2E+00	2.1E+00	7.5E-02	4.0E-01	33,143	2.52	0.93	33,466	2,658,138	514,893	
2024Wells I	2024 Wells Draw	Total	372.08	154.74	4.63	251.95	256.57	4.39	65.08	69.47	0.54	35.20	1.2E+00	1.6E-01	1.3E+00	1.9E-01	4.8E-01	2.3E+00	3.8E+00	1.6E-01	7.9E-01	70,035	5.30	2.30	70,822	5,130,332	1,678,044	
2025Indian	2025 Indian Cany	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Whitm	2025 Whitmore I	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Wells I	2025 Wells Draw	Total	344.43	143.18	4.03	251.94	255.98	3.82	65.08	68.89	0.53	32.11	1.1E+00	1.4E-01	1.2E+00	1.7E-01	4.3E-01	2.1E+00	3.3E+00	1.5E-01	7.0E-01	68,821	5.34	2.22	69,583	5,037,487	1,623,885	
2022Indian	2022 Indian Cany	Surface	20.84	83.09	2.63	138.15	140.77	2.55	14.01	16.56	0.24	3.80	3.3E-01	6.1E-02	1.4E-01	6.8E-03	1.9E-02	9.0E-01	2.5E+00	2.4E-02	5.0E-01	31,214	0.68	0.78	31,438	3,010,775	0	
2022Whitm	2022 Whitmore I	Surface	21.58	86.00	2.72	142.98	145.70	2.64	14.51	17.14	0.25	3.93	3.4E-01	6.3E-02	1.5E-01	7.0E-03	2.0E-02	9.3E-01	2.6E+00	2.5E-02	5.2E-01	32,307	0.70	0.81	32,539	3,116,147	0	
2022Wells I	2022 Wells Draw	Surface	15.84	63.40	2.01	105.41	107.41	1.94	10.69	12.64	0.18	2.89	2.5E-01	4.7E-02	1.1E-01	5.2E-03	1.4E-02	6.9E-01	1.9E+00	1.8E-02	3.8E-01	23,813	0.51	0.59	23,984	2,297,250	0	
2023Indian	2023 Indian Cany	Surface	18.23	78.31	2.30	138.15	140.44	2.22	14.01	16.24	0.24	3.41	2.9E-01	5.4E-02	1.3E-01	6.0E-03	1.7E-02	8.1E-01	2.2E+00	2.2E-02	4.4E-01	31,113	0.66	0.78	31,336	3,006,921	0	
2023Whitm	2023 Whitmore I	Surface	18.88	81.05	2.38	142.98	145.36	2.30	14.51	16.81	0.24	3.53	3.0E-01	5.6E-02	1.3E-01	6.2E-03	1.8E-02	8.4E-01	2.3E+00	2.3E-02	4.6E-01	32,202	0.69	0.80	32,434	3,112,155	0	
2023Wells I	2023 Wells Draw	Surface	13.85	59.75	1.75	105.41	107.16	1.70	10.69	12.39	0.18	2.60	2.2E-01	4.1E-02	9.7E-02	4.5E-03	1.3E-02	6.2E-01	1.7E+00	1.7E-02	3.4E-01	23,737	0.50	0.59	23,907	2,294,323	0	
2024Indian	2024 Indian Cany	Surface	5.29	24.75	0.66	46.17	46.84	0.64	4.68	5.33	0.08	1.03	8.8E-02	1.6E-02	3.8E-02	1.7E-03	5.3E-03	2.4E-01	6.4E-01	6.9E-03	1.3E-01	10,400	0.22	0.26	10,475	1,003,360	0	
2024Whitm	2024 Whitmore I	Surface	5.48	25.61	0.69	47.79	48.48	0.67	4.85	5.51	0.08	1.06	9.1E-02	1.7E-02	3.9E-02	1.8E-03	5.5E-03	2.5E-01	6.7E-01	7.2E-03	1.4E-01	10,764	0.23	0.27	10,841	1,038,474	0	
2024Wells I	2024 Wells Draw	Surface	12.02	56.49	1.52	105.41	106.93	1.47	10.69	12.16	0.18	2.34	2.0E-01	3.7E-02	8.6E-02	4.0E-03	1.2E-02	5.5E-01	1.5E+00	1.6E-02	3.0E-01	23,739	0.49	0.59	23,908	2,290,470	0	
2025Indian	2025 Indian Cany	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Whitm	2025 Whitmore I	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Wells I	2025 Wells Draw	Surface	10.47	53.86	1.32	105.41	106.73	1.28	10.69	11.97	0.18	2.12	1.8E-01	3.3E-02	7.7E-02	3.5E-03	1.1E-02	5.0E-01	1.3E+00	1.4E-02	2.7E-01	23,662	0.54	0.59	23,832	2,288,163	0	
2022Indian	2022 Indian Cany	Tunnel	69.96	107.29	4.18	59.40	63.58	3.99	56.90	60.88	0.31	11.27	7.2E-01	1.3E-01	2.2E-01	2.1E-02	5.3E-02	2.0E+00	4.0E+00	1.1E-01	6.7E-01	38,765	3.82	0.64	39,033	3,510,262	0	
2022Whitm	2022 Whitmore I	Tunnel	87.06	135.31	5.20	75.43	80.63	4.97	72.21	77.19	0.40	13.73	9.0E-01	1.7E-01	2.8E-01	2.5E-02	6.7E-02	2.5E+00	5.0E+00	1.4E-01	8.6E-01	50,013	5.01	0.83	50,364	4,525,621	0	
2022Wells I	2022 Wells Draw	Tunnel	50.15	76.62	2.89	45.10	47.99	2.77	43.20	45.97	0.23	7.72	5.2E-01	9.6E-02	1.6E-01	1.3E-02	3.9E-02	1.5E+00	2.8E+00	7.9E-02	4.9E-01	29,130	3.07	0.48	29,337	2,637,449	0	
2023Indian	2023 Indian Cany	Tunnel	69.50	104.10	3.84	64.58	68.42	3.65	62.01	65.66	0.32	11.16	6.9E-01	1.3E-01	2.1E-01	2.1E-02	5.2E-02	1.9E+00	3.7E+00	1.1E-01	6.0E-01	39,132	3.93	0.64	39,404	3,563,750	0	
2023Whitm	2023 Whitmore I	Tunnel	86.27	130.86	4.74	82.00	86.74	4.52	78.70	83.22	0.41	13.54	8.7E-01	1.6E-01	2.6E-01	2.5E-02	6.5E-02	2.5E+00	4.5E+00	1.4E-01	7.8E-01	50,455	5.16	0.83	50,811	4,592,159	0	
2023Wells I	2023 Wells Draw	Tunnel	49.72	74.03	2.62	49.03	51.65	2.50	47.08	49.59	0.24	7.60	5.0E-01	9.1E-02	1.5E-01	1.3E-02	3.8E-02	1.4E+00	2.5E+00	8.0E-02	4.5E-01	29,403	3.17	0.48	29,613	2,677,420	0	
2024Indian	2024 Indian Cany	Tunnel	24.39	35.01	1.22	18.37	19.59	1.16	17.45	18.61	0.11	3.89	2.4E-01	4.2E-02	6.7E-02	7.4E-03	1.8E-02	6.6E-01	1.2E+00	4.1E-02	1.9E-01	13,664	1.43	0.22	13,759	1,252,284	0	
2024Whitm	2024 Whitmore I	Tunnel	30.19	43.80	1.49	23.33	24.82	1.42	22.15	23.57	0.14	4.70	2.9E-01	5.3E-02	8.5E-02	8.6E-03	2.2E-02	8.3E-01	1.4E+00	5.0E-02	2.4E-01	17,596	1.88	0.28	17,720	1,611,824	0	
2024Wells I	2024 Wells Draw	Tunnel	52.07	74.04	2.45	41.73	44.18	2.34	39.65	41.99	0.25	7.89	5.1E-01	9.0E-02	1.5E-01	1.4E-02	3.9E-02	1.4E+00	2.3E+00	8.6E-02	4.1E-01	30,712	3.45	0.49	30,931	2,814,309	0	
2025Indian	2025 Indian Cany	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Whitm	2025 Whitmore I	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Wells I	2025 Wells Draw	Tunnel	49.13	67.52	2.09	41.73	43.82	1.99	39.65	41.63	0.24	7.25	4.7E-01	8.2E-02	1.3E-01	1.2E-02	3.7E-02	1.4E+00	2.0E+00	8.2E-02	3.6E-01	30,074	3.52	0.47	30,288	2,724,362	0	
2022Indian	2022 Indian Cany	Employee	315.20	26.60	0.66	111.48	112.14	0.58	14.54	15.13	0.11	26.36	4.5E-01	3.0E-02	1.1E+00	1.7E-01	4.6E-01	3.1E-01	1.2E-02	5.8E-02	7.9E-02	14,702	1.33	1.22	15,099	23,475	1,583,718	5
2022Whitm	2022 Whitmore I	Employee	326.25	27.53	0.68	122.24	122.92	0.60	15.60	16.20	0.11	27.29	4.7E-01	3.1E-02	1.2E+00	1.8E-01	4.7E-01	3.2E-01	1.3E-02	6.1E-02	8.2E-02	15,218	1.38	1.27	15,629	24,297	1,639,225	5
2022Wells I	2022 Wells Draw	Employee	355.39	29.99	0.74	104.81	105.55	0.66	14.74	15.40	0.12	29.72	5.1E-01	3.3E-02	1.3E+00	1.9E-01	5.1E-01	3.5E-01	1.4E-02	6.6E-02	8.9E-02	16,577	1.50	1.38	17,025	26,468	1,785,633	5
2023Indian	2023 Indian Cany	Employee	293.43	23.84	0.62	111.48	112.10	0.55	14.54	15.09	0.11	24.11	4.2E-01	2.8E-02	1.0E+00	1.6E-01	4.1E-01	2.8E-01	1.1E-02	5.4E-02	7.3E-02	14,263	1.26	1.15	14,636	23,112	1,536,041	5
2023Whitm	2023 Whitmore I	Employee	303.71	24.68	0.64	122.24	122.88	0.57	15.60	16.16	0.11	24.95	4.4E-01	2.9E-02	1.1E+00	1.7E-01	4.3E-01	2.9E-01	1.2E-02	5.6E-02	7.5E-02	14,763	1.31	1.19	15,149	23,922	1,589,877	5
2023Wells I	2023 Wells Draw	Employee	330.84	26.88	0.70	104.81	105.51	0.62	14.74	15.36	0.12	27.18	4.8E-01	3.1E-02	1.2E+00	1.8E-01	4.7E-01	3.2E-01	1.3E-02	6.1E-02	8.2E-02	16,082	1.43	1.29	16,502	26,059	1,731,878	5
2024Indian	2024 Indian Cany	Employee	91.30	7.18	0.20	37.26	37.46	0.17	4.86	5.03	0.03	7.40	1.3E-01	8.7E-03	3.2E-01	5.0E-02	1.3E-01	8.7E-02	3.4E-03	1.7E-02	2.2E-02	4,620	0.40	0.36	4,738	7,575	497,457	5
2024Whitm	2024 Whitmore I	Employee	94.50	7.43	0.20	40.86	41.06	0.18	5.21	5.39	0.04	7.66	1.4E-01	9.0E-03	3.4E-01	5.2E-02	1.3E-01	9.0E-02	3.6E-03	1.7E-02	2.3E-02	4,782	0.42	0.37	4,904	7,840	514,893	5
2024Wells I	2024 Wells Draw	Employee	307.99	24.21	0.66	104.81	105.46	0.58	14.74	15.32	0.11	24.97	4.4E-01	2.9E-02	1.1E+00	1.7E-01	4.2E-01	2.9E-01	1.2E-02	5.6E-02	7.6E-02	15,585	1.36	1.22	15,982	25,552	1,678,044	5
2025Indian	2025 Indian Cany	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	5
2025Whitm	2025 Whitmore I	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	5
2025Wells I	2025 Wells Draw	Employee	284.83	21.80	0.62	104.81	105.43	0.55	14.74	15.29	0.11	22.74	4.1E-01	2.7E-02	1.0E+00	1.6E-01	3.8E-01	2.7E-01	1.1E-02	5.1E-02	6.9E-02	15,085	1.28	1.16	15,463	24,963	1,623,885	5

Uinta Project-Level Construction Emissions within Ozone Nonattainment Area (tons/year)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)
2022Indian	2022 Indian Can	Total	245.14	76.41	2.32	172.14	174.46	2.19	34.07	36.26	0.26	22.55	6.0E-01	7.2E-02	8.9E-01	1.3E-01	3.4E-01	1.0E+00	1.8E+00	7.9E-02	3.7E-01	32,814	2.20	1.33	33,250	2,184,842	1,105,592
2022Whitm	2022 Whitmore	Total	279.72	97.13	2.95	213.00	215.95	2.77	64.00	66.78	0.35	27.07	8.3E-01	1.1E-01	9.6E-01	1.4E-01	3.7E-01	1.6E+00	2.4E+00	1.3E-01	4.4E-01	43,124	4.31	1.42	43,640	3,116,249	1,138,716
2022Wells	2022 Wells Draw	Total	202.11	49.87	1.45	111.31	112.76	1.35	31.67	33.02	0.19	18.48	4.8E-01	5.5E-02	7.0E-01	1.0E-01	2.7E-01	8.2E-01	1.0E+00	7.3E-02	2.2E-01	23,208	2.35	0.94	23,540	1,430,360	895,141
2023Indian	2023 Indian Can	Total	229.13	72.27	2.12	173.61	175.73	2.00	35.52	37.52	0.25	20.86	5.7E-01	6.7E-02	8.2E-01	1.2E-01	3.1E-01	9.5E-01	1.6E+00	7.6E-02	3.4E-01	32,663	2.18	1.27	33,082	2,202,169	1,072,309
2023Whitm	2023 Whitmore	Total	264.05	93.47	2.76	217.09	219.85	2.59	68.04	70.63	0.35	25.44	8.0E-01	1.0E-01	8.9E-01	1.3E-01	3.4E-01	1.6E+00	2.2E+00	1.3E-01	4.1E-01	43,321	4.37	1.37	43,823	3,167,311	1,104,436
2023Wells	2023 Wells Draw	Total	189.75	47.49	1.35	113.17	114.52	1.26	33.51	34.77	0.19	17.19	4.6E-01	5.3E-02	6.5E-01	9.7E-02	2.5E-01	7.9E-01	9.5E-01	7.1E-02	2.0E-01	23,191	2.36	0.90	23,510	1,453,288	868,194
2024Indian	2024 Indian Can	Total	71.96	23.22	0.66	57.12	57.78	0.62	10.94	11.56	0.09	6.53	1.8E-01	2.2E-02	2.6E-01	3.7E-02	9.4E-02	3.1E-01	5.0E-01	2.5E-02	1.0E-01	11,006	0.75	0.41	11,142	752,846	347,275
2024Whitm	2024 Whitmore	Total	84.33	30.89	0.89	70.02	70.91	0.83	20.16	20.99	0.12	8.17	2.6E-01	3.5E-02	2.8E-01	4.1E-02	1.0E-01	5.4E-01	7.1E-01	4.5E-02	1.3E-01	14,898	1.55	0.45	15,064	1,106,603	357,679
2024Wells	2024 Wells Draw	Total	179.49	46.31	1.28	109.71	111.00	1.20	29.98	31.18	0.19	16.24	4.5E-01	5.3E-02	6.1E-01	9.1E-02	2.3E-01	8.0E-01	9.1E-01	7.2E-02	1.9E-01	23,650	2.47	0.87	23,963	1,518,005	841,207
2025Indian	2025 Indian Can	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025 Whitmore	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells	2025 Wells Draw	Total	166.63	43.20	1.14	109.71	110.85	1.06	29.98	31.04	0.19	14.85	4.2E-01	4.9E-02	5.6E-01	8.3E-02	2.1E-01	7.6E-01	7.9E-01	6.8E-02	1.7E-01	23,324	2.49	0.84	23,628	1,512,419	814,056
2022Indian	2022 Indian Can	Surface	10.05	46.65	1.48	77.79	79.27	1.44	7.84	9.27	0.13	1.90	1.7E-01	3.3E-02	7.9E-02	3.4E-03	9.6E-03	4.8E-01	1.4E+00	1.0E-02	2.8E-01	17,488	0.25	0.44	17,612	1,694,304	0
2022Whitm	2022 Whitmore	Surface	12.69	49.36	1.56	82.01	83.57	1.51	8.33	9.84	0.14	2.30	2.0E-01	3.7E-02	8.5E-02	4.1E-03	1.1E-02	5.4E-01	1.5E+00	1.5E-02	3.0E-01	18,547	0.42	0.46	18,681	1,787,626	0
2022Wells	2022 Wells Draw	Surface	6.20	22.77	0.72	37.78	38.50	0.70	3.85	4.55	0.07	1.11	9.3E-02	1.7E-02	3.9E-02	2.0E-03	5.5E-03	2.6E-01	7.0E-01	7.7E-03	1.4E-01	8,562	0.22	0.21	8,624	823,690	0
2023Indian	2023 Indian Can	Surface	8.66	43.98	1.29	77.79	79.09	1.25	7.84	9.09	0.13	1.70	1.5E-01	2.9E-02	7.0E-02	3.0E-03	8.7E-03	4.2E-01	1.3E+00	9.5E-03	2.5E-01	17,436	0.24	0.44	17,560	1,692,493	0
2023Whitm	2023 Whitmore	Surface	11.12	46.51	1.36	82.01	83.38	1.32	8.33	9.65	0.14	2.07	1.8E-01	3.3E-02	7.6E-02	3.6E-03	1.0E-02	4.9E-01	1.3E+00	1.4E-02	2.6E-01	18,487	0.42	0.46	18,620	1,785,270	0
2023Wells	2023 Wells Draw	Surface	5.46	21.45	0.63	37.78	38.41	0.61	3.85	4.46	0.06	1.00	8.3E-02	1.5E-02	3.5E-02	1.7E-03	5.0E-03	2.3E-01	6.1E-01	7.1E-03	1.2E-01	8,534	0.22	0.21	8,595	822,529	0
2024Indian	2024 Indian Can	Surface	2.47	13.90	0.37	26.00	26.38	0.36	2.62	2.98	0.04	0.51	4.6E-02	8.6E-03	2.1E-02	8.7E-04	2.6E-03	1.3E-01	3.6E-01	2.9E-03	7.4E-02	5,830	0.08	0.15	5,871	564,864	0
2024Whitm	2024 Whitmore	Surface	3.24	14.70	0.39	27.41	27.81	0.38	2.78	3.17	0.05	0.62	5.3E-02	9.7E-03	2.3E-02	1.1E-03	3.2E-03	1.5E-01	3.8E-01	4.3E-03	7.8E-02	6,179	0.14	0.15	6,224	595,695	0
2024Wells	2024 Wells Draw	Surface	4.79	20.28	0.54	37.78	38.32	0.53	3.85	4.38	0.06	0.90	7.5E-02	1.4E-02	3.1E-02	1.5E-03	4.6E-03	2.1E-01	5.3E-01	6.6E-03	1.1E-01	8,533	0.22	0.21	8,594	821,048	0
2025Indian	2025 Indian Can	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025 Whitmore	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells	2025 Wells Draw	Surface	4.20	19.33	0.47	37.78	38.25	0.46	3.85	4.31	0.06	0.82	6.8E-02	1.2E-02	2.8E-02	1.3E-03	4.3E-03	1.9E-01	4.6E-01	6.1E-03	9.6E-02	8,504	0.23	0.21	8,566	820,123	0
2022Indian	2022 Indian Can	Tunnel	15.05	11.19	0.38	16.52	16.90	0.35	16.08	16.43	0.05	2.25	1.1E-01	1.8E-02	2.3E-02	4.4E-03	9.8E-03	3.2E-01	3.5E-01	2.8E-02	3.4E-02	5,062	1.02	0.03	5,096	474,150	0
2022Whitm	2022 Whitmore	Tunnel	40.39	28.65	0.91	46.07	46.98	0.84	44.84	45.68	0.13	5.81	3.1E-01	4.9E-02	6.1E-02	1.1E-02	2.6E-02	8.7E-01	8.4E-01	7.4E-02	8.8E-02	14,005	2.93	0.08	14,103	1,311,745	0
2022Wells	2022 Wells Draw	Tunnel	17.75	12.07	0.36	20.99	21.35	0.33	20.43	20.76	0.06	2.46	1.4E-01	2.1E-02	2.6E-02	4.2E-03	1.2E-02	3.9E-01	3.3E-01	3.3E-02	3.8E-02	6,336	1.37	0.04	6,381	593,402	0
2023Indian	2023 Indian Can	Tunnel	15.63	11.64	0.40	17.99	18.39	0.36	17.53	17.89	0.05	2.33	1.2E-01	1.9E-02	2.4E-02	4.5E-03	1.0E-02	3.3E-01	3.6E-01	2.9E-02	3.5E-02	5,269	1.06	0.03	5,305	493,542	0
2023Whitm	2023 Whitmore	Tunnel	41.95	29.81	0.95	50.16	51.11	0.87	48.88	49.75	0.13	6.04	3.2E-01	5.0E-02	6.3E-02	1.1E-02	2.7E-02	9.0E-01	8.7E-01	7.7E-02	9.2E-02	14,578	3.04	0.08	14,680	1,365,422	0
2023Wells	2023 Wells Draw	Tunnel	18.44	12.56	0.37	22.85	23.23	0.34	22.27	22.61	0.06	2.56	1.4E-01	2.2E-02	2.7E-02	4.4E-03	1.2E-02	4.0E-01	3.4E-01	3.4E-02	4.0E-02	6,595	1.43	0.04	6,642	617,696	0
2024Indian	2024 Indian Can	Tunnel	5.75	4.31	0.15	5.10	5.25	0.14	4.93	5.07	0.02	0.86	4.4E-02	7.0E-03	8.7E-03	1.7E-03	3.7E-03	1.2E-01	1.4E-01	1.1E-02	1.3E-02	1,951	0.39	0.01	1,964	182,694	0
2024Whitm	2024 Whitmore	Tunnel	15.44	11.03	0.35	14.23	14.58	0.32	13.75	14.07	0.05	2.22	1.2E-01	1.9E-02	2.3E-02	4.1E-03	1.0E-02	3.3E-01	3.2E-01	2.8E-02	3.4E-02	5,397	1.12	0.03	5,434	505,462	0
2024Wells	2024 Wells Draw	Tunnel	20.31	13.90	0.41	19.39	19.80	0.38	18.74	19.12	0.07	2.82	1.5E-01	2.4E-02	3.0E-02	4.8E-03	1.3E-02	4.4E-01	3.8E-01	3.7E-02	4.4E-02	7,304	1.57	0.04	7,356	684,147	0
2025Indian	2025 Indian Can	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025 Whitmore	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells	2025 Wells Draw	Tunnel	19.64	12.94	0.35	19.39	19.75	0.32	18.74	19.07	0.07	2.63	1.5E-01	2.3E-02	2.9E-02	4.2E-03	1.3E-02	4.4E-01	3.2E-01	3.6E-02	4.1E-02	7,258	1.61	0.04	7,311	679,782	0
2022Indian	2022 Indian Can	Employee	220.04	18.57	0.46	77.83	78.29	0.41	10.15	10.56	0.08	18.40	3.2E-01	2.1E-02	7.9E-01	1.2E-01	3.2E-01	2.2E-01	8.6E-03	4.1E-02	5.5E-02	10,264	0.93	0.85	10,541	16,388	1,105,592
2022Whitm	2022 Whitmore	Employee	226.63	19.12	0.47	84.91	85.39	0.42	10.83	11.25	0.08	18.95	3.3E-01	2.1E-02	8.1E-01	1.2E-01	3.3E-01	2.2E-01	8.9E-03	4.2E-02	5.7E-02	10,571	0.96	0.88	10,857	16,879	1,138,716
2022Wells	2022 Wells Draw	Employee	178.16	15.03	0.37	52.54	52.91	0.33	7.39	7.72	0.06	14.90	2.6E-01	1.7E-02	6.4E-01	9.8E-02	2.6E-01	1.7E-01	7.0E-03	3.3E-02	4.5E-02	8,310	0.75	0.69	8,534	13,268	895,141
2023Indian	2023 Indian Can	Employee	204.84	16.65	0.43	77.83	78.26	0.38	10.15	10.54	0.07	16.83	2.9E-01	1.9E-02	7.3E-01	1.1E-01	2.9E-01	2.0E-01	7.8E-03	3.8E-02	5.1E-02	9,957	0.88	0.80	10,217	16,134	1,072,309
2023Whitm	2023 Whitmore	Employee	210.98	17.14	0.45	84.91	85.36	0.40	10.83	11.23	0.08	17.33	3.0E-01	2.0E-02	7.5E-01	1.2E-01	3.0E-01	2.0E-01	8.0E-03	3.9E-02	5.2E-02	10,256	0.91	0.82	10,524	16,618	1,104,436
2023Wells	2023 Wells Draw	Employee	165.85	13.48	0.35	52.54	52.89	0.31	7.39	7.70	0.06	13.62	2.4E-01	1.6E-02	5.9E-01	9.0E-02	2.3E-01	1.6E-01	6.3E-03	3.0E-02	4.1E-02	8,062	0.71	0.65	8,273	13,063	868,194
2024Indian	2024 Indian Can	Employee	63.74	5.01	0.14	26.01	26.15	0.12	3.39	3.51	0.02	5.17	9.2E-02	6.1E-03	2.3E-01	3.5E-02	8.8E-02	6.0E-02	2.4E-03	1.2E-02	1.6E-02	3,225	0.28	0.25	3,308	5,288	347,275
2024Whitm	2024 Whitmore	Employee	65.65	5.16	0.14	28.38	28.52	0.12	3.62	3.75	0.02	5.32	9.5E-02	6.3E-03	2.3E-01	3.6E-02	9.1E-02	6.2E-02	2.5E-03	1.2E-02	1.6E-02	3,322	0.29	0.26	3,407	5,446	357,679
2024Wells	2024 Wells Draw	Employee	154.39	12.14	0.33	52.54	52.87	0.29	7.39	7.68	0.06	12.52	2.2E-01	1.5E-02	5.5E-01	8.4E-02	2.1E-01	1.5E-01	5.8E-03	2.8E-02	3.8E-02	7,813	0.68	0.61	8,012	12,809	841,207
2025Indian	2025 Indian Can	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025 Whitmore	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells	2025 Wells Draw	Employee	142.78	10.93	0.31	52.54	52.85	0.28	7.39	7.66	0.06	11.40	2.1E-01	1.4E-02	5.0E-01	7.8E-02	1.9E-01	1.3E-01	5.4E-03	2.6E-02	3.5E-02	7,562	0.64	0.58	7,751	12,514	814,056

Uinta Project-Level Construction Emissions outside Ozone Nonattainment Area (tons/year)

			Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy		
		Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)	
2022Indian	2022 Indian Can	Total	164.67	150.15	5.45	152.56	158.01	5.22	55.01	60.23	0.43	19.52	9.4E-01	1.6E-01	6.2E-01	7.4E-02	1.9E-01	2.3E+00	5.0E+00	1.2E-01	9.3E-01	55,578	3.81	1.39	56,058	4,717,116	478,126	
2022Whitm	2022 Whitmore	Total	162.96	167.36	6.15	153.52	159.67	5.92	46.03	51.95	0.46	19.12	9.7E-01	1.7E-01	6.7E-01	7.4E-02	2.0E-01	2.4E+00	5.7E+00	1.0E-01	1.1E+00	60,695	3.21	1.61	61,217	5,152,380	500,509	
2022Wells	2022 Wells Draw	Total	221.50	125.65	4.36	153.25	157.62	4.18	39.19	43.37	0.37	22.21	8.2E-01	1.3E-01	8.5E-01	1.1E-01	2.9E-01	1.8E+00	3.9E+00	9.3E-02	7.8E-01	48,504	2.85	1.56	49,014	3,741,836	890,492	
2023Indian	2023 Indian Can	Total	155.69	143.17	4.91	156.48	161.38	4.69	58.88	63.56	0.43	18.43	8.8E-01	1.5E-01	5.7E-01	6.9E-02	1.8E-01	2.2E+00	4.5E+00	1.2E-01	8.3E-01	55,578	3.87	1.37	56,052	4,751,514	463,732	
2023Whitm	2023 Whitmore	Total	152.43	158.23	5.45	156.52	161.97	5.23	48.99	54.22	0.46	17.80	8.9E-01	1.6E-01	6.1E-01	6.9E-02	1.8E-01	2.2E+00	5.1E+00	1.0E-01	9.8E-01	60,441	3.24	1.58	60,956	5,169,842	485,441	
2023Wells	2023 Wells Draw	Total	206.80	118.45	3.88	155.45	159.33	3.71	41.36	45.07	0.37	20.54	7.6E-01	1.2E-01	7.8E-01	1.0E-01	2.7E-01	1.6E+00	3.4E+00	9.0E-02	6.9E-01	48,236	2.85	1.52	48,733	3,757,076	863,684	
2024Indian	2024 Indian Can	Total	50.25	46.71	1.51	49.87	51.38	1.44	17.20	18.64	0.15	6.00	2.9E-01	4.8E-02	1.8E-01	2.2E-02	5.6E-02	7.2E-01	1.4E+00	4.2E-02	2.5E-01	18,954	1.37	0.45	19,113	1,633,044	150,183	
2024Whitm	2024 Whitmore	Total	48.46	50.94	1.64	50.45	52.09	1.57	14.48	16.05	0.16	5.68	2.8E-01	4.9E-02	1.9E-01	2.2E-02	5.6E-02	7.1E-01	1.5E+00	3.4E-02	3.0E-01	20,431	1.14	0.52	20,603	1,761,085	157,214	
2024Wells	2024 Wells Draw	Total	194.74	113.56	3.49	151.37	154.86	3.33	37.20	40.53	0.37	19.30	7.2E-01	1.1E-01	7.2E-01	9.6E-02	2.5E-01	1.6E+00	3.0E+00	9.0E-02	6.2E-01	48,641	2.96	1.48	49,131	3,829,319	836,837	
2025Indian	2025 Indian Can	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Whitm	2025 Whitmore	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Wells	2025 Wells Draw	Total	179.80	104.85	3.02	151.37	154.39	2.88	37.20	40.07	0.36	17.57	6.6E-01	9.8E-02	6.6E-01	8.8E-02	2.2E-01	1.4E+00	2.6E+00	8.4E-02	5.5E-01	47,744	2.99	1.43	48,218	3,741,617	809,828	
2022Indian	2022 Indian Can	Surface	12.47	44.43	1.40	73.68	75.08	1.36	7.52	8.88	0.13	2.22	1.8E-01	3.4E-02	7.7E-02	4.0E-03	1.1E-02	5.1E-01	1.4E+00	1.6E-02	2.7E-01	16,718	0.46	0.41	16,839	1,606,584	0	
2022Whitm	2022 Whitmore	Surface	11.53	48.65	1.54	80.97	82.51	1.49	8.19	9.69	0.14	2.13	1.9E-01	3.5E-02	8.3E-02	3.8E-03	1.1E-02	5.2E-01	1.5E+00	1.3E-02	2.9E-01	18,259	0.34	0.46	18,389	1,764,192	0	
2022Wells	2022 Wells Draw	Surface	10.62	45.29	1.43	75.40	76.84	1.39	7.62	9.02	0.13	1.96	1.7E-01	3.3E-02	7.7E-02	3.5E-03	9.9E-03	4.8E-01	1.4E+00	1.2E-02	2.7E-01	16,997	0.31	0.43	17,118	1,642,809	0	
2023Indian	2023 Indian Can	Surface	11.01	41.86	1.22	73.68	74.90	1.18	7.52	8.70	0.13	2.00	1.6E-01	3.0E-02	6.9E-02	3.5E-03	1.0E-02	4.6E-01	1.2E+00	1.4E-02	2.4E-01	16,660	0.46	0.41	16,781	1,604,242	0	
2023Whitm	2023 Whitmore	Surface	10.04	45.85	1.35	80.97	82.31	1.30	8.19	9.50	0.14	1.91	1.7E-01	3.1E-02	7.4E-02	3.3E-03	9.7E-03	4.6E-01	1.3E+00	1.2E-02	2.6E-01	18,202	0.34	0.46	18,332	1,762,078	0	
2023Wells	2023 Wells Draw	Surface	9.23	42.69	1.25	75.40	76.65	1.21	7.62	8.84	0.13	1.76	1.5E-01	2.9E-02	6.9E-02	3.1E-03	9.0E-03	4.3E-01	1.2E+00	1.1E-02	2.4E-01	16,944	0.30	0.43	17,065	1,640,866	0	
2024Indian	2024 Indian Can	Surface	3.23	13.22	0.35	24.63	24.98	0.34	2.51	2.86	0.04	0.60	5.0E-02	9.1E-03	2.1E-02	1.0E-03	3.1E-03	1.4E-01	3.4E-01	4.5E-03	7.0E-02	5,568	0.15	0.14	5,608	535,224	0	
2024Whitm	2024 Whitmore	Surface	2.90	14.49	0.39	27.06	27.45	0.38	2.74	3.12	0.05	0.57	5.0E-02	9.3E-03	2.2E-02	9.8E-04	3.0E-03	1.4E-01	3.8E-01	3.6E-03	7.7E-02	6,085	0.11	0.15	6,128	588,019	0	
2024Wells	2024 Wells Draw	Surface	7.96	40.37	1.09	75.40	76.49	1.05	7.62	8.68	0.13	1.58	1.4E-01	2.6E-02	6.1E-02	2.7E-03	8.2E-03	3.8E-01	1.1E+00	9.9E-03	2.1E-01	16,947	0.30	0.43	17,068	1,638,244	0	
2025Indian	2025 Indian Can	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Whitm	2025 Whitmore	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Wells	2025 Wells Draw	Surface	6.88	38.49	0.95	75.40	76.35	0.92	7.62	8.54	0.13	1.43	1.2E-01	2.3E-02	5.5E-02	2.4E-03	7.5E-03	3.5E-01	9.2E-01	9.1E-03	1.9E-01	16,894	0.33	0.43	17,015	1,636,726	0	
2022Indian	2022 Indian Can	Tunnel	57.05	97.70	3.85	45.22	49.07	3.69	43.10	46.79	0.27	9.34	6.2E-01	1.2E-01	2.0E-01	1.8E-02	4.4E-02	1.7E+00	3.7E+00	8.8E-02	6.4E-01	34,421	2.94	0.61	34,660	3,103,445	0	
2022Whitm	2022 Whitmore	Tunnel	51.81	110.31	4.40	35.23	39.63	4.24	33.08	37.32	0.29	8.66	6.4E-01	1.3E-01	2.3E-01	1.6E-02	4.4E-02	1.8E+00	4.2E+00	7.3E-02	7.9E-01	37,790	2.45	0.76	38,056	3,380,769	0	
2022Wells	2022 Wells Draw	Tunnel	33.65	65.40	2.56	25.59	28.14	2.46	24.21	26.68	0.18	5.43	3.9E-01	7.6E-02	1.4E-01	9.5E-03	2.8E-02	1.1E+00	2.5E+00	4.9E-02	4.6E-01	23,240	1.79	0.45	23,406	2,085,828	0	
2023Indian	2023 Indian Can	Tunnel	56.09	94.11	3.50	49.14	52.64	3.34	46.97	50.30	0.27	9.15	5.9E-01	1.1E-01	1.9E-01	1.7E-02	4.3E-02	1.7E+00	3.3E+00	8.9E-02	5.7E-01	34,611	3.03	0.61	34,852	3,140,294	0	
2023Whitm	2023 Whitmore	Tunnel	49.66	104.84	3.91	38.22	42.13	3.75	36.04	39.79	0.29	8.27	5.9E-01	1.2E-01	2.1E-01	1.5E-02	4.1E-02	1.7E+00	3.8E+00	7.2E-02	7.0E-01	37,732	2.50	0.76	37,999	3,400,460	0	
2023Wells	2023 Wells Draw	Tunnel	32.58	62.36	2.28	27.78	30.06	2.19	26.38	28.57	0.18	5.22	3.7E-01	7.1E-02	1.3E-01	9.2E-03	2.6E-02	1.1E+00	2.2E+00	4.9E-02	4.1E-01	23,272	1.84	0.45	23,438	2,103,214	0	
2024Indian	2024 Indian Can	Tunnel	19.45	31.32	1.10	13.99	15.09	1.04	13.22	14.26	0.10	3.16	2.0E-01	3.6E-02	6.0E-02	6.0E-03	1.5E-02	5.5E-01	1.0E+00	3.2E-02	1.8E-01	11,991	1.10	0.21	12,074	1,095,534	0	
2024Whitm	2024 Whitmore	Tunnel	16.71	34.18	1.18	10.92	12.10	1.14	10.15	11.29	0.10	2.76	1.9E-01	3.7E-02	6.5E-02	5.0E-03	1.4E-02	5.4E-01	1.1E+00	2.6E-02	2.1E-01	12,886	0.90	0.26	12,978	1,170,672	0	
2024Wells	2024 Wells Draw	Tunnel	33.19	61.12	2.07	23.70	25.77	1.99	22.22	24.21	0.19	5.27	3.6E-01	6.8E-02	1.2E-01	9.2E-03	2.7E-02	1.0E+00	2.0E+00	5.2E-02	3.7E-01	23,921	1.99	0.45	24,092	2,178,332	0	
2025Indian	2025 Indian Can	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Whitm	2025 Whitmore	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	
2025Wells	2025 Wells Draw	Tunnel	30.87	55.49	1.76	23.70	25.46	1.68	22.22	23.91	0.18	4.80	3.3E-01	6.1E-02	1.0E-01	8.0E-03	2.5E-02	9.5E-01	1.7E+00	4.9E-02	3.2E-01	23,327	2.02	0.43	23,492	2,092,442	0	
2022Indian	2022 Indian Can	Employee	95.16	8.03	0.20	33.66	33.86	0.18	4.39	4.57	0.03	7.96	1.4E-01	8.9E-03	3.4E-01	5.2E-02	1.4E-01	9.3E-02	3.7E-03	1.8E-02	2.4E-02	4,439	0.40	0.37	4,559	7,087	478,126	5
2022Whitm	2022 Whitmore	Employee	99.61	8.41	0.21	37.32	37.53	0.18	4.76	4.95	0.03	8.33	1.4E-01	9.3E-03	3.6E-01	5.5E-02	1.4E-01	9.7E-02	3.9E-03	1.8E-02	2.5E-02	4,646	0.42	0.39	4,772	7,419	500,509	5
2022Wells	2022 Wells Draw	Employee	177.23	14.96	0.37	52.27	52.64	0.33	7.35	7.68	0.06	14.82	2.5E-01	1.7E-02	6.3E-01	9.7E-02	2.6E-01	1.7E-01	6.9E-03	3.3E-02	4.5E-02	8,267	0.75	0.69	8,490	13,199	890,492	5
2023Indian	2023 Indian Can	Employee	88.59	7.20	0.19	33.66	33.84	0.17	4.39	4.56	0.03	7.28	1.3E-01	8.4E-03	3.2E-01	4.8E-02	1.2E-01	8.5E-02	3.4E-03	1.6E-02	2.2E-02	4,306	0.38	0.35	4,419	6,978	463,732	5
2023Whitm	2023 Whitmore	Employee	92.73	7.54	0.20	37.32	37.52	0.17	4.76	4.94	0.03	7.62	1.3E-01	8.8E-03	3.3E-01	5.1E-02	1.3E-01	8.9E-02	3.5E-03	1.7E-02	2.3E-02	4,508	0.40	0.36	4,626	7,304	485,441	5
2023Wells	2023 Wells Draw	Employee	164.99	13.41	0.35	52.27	52.62	0.31	7.35	7.66	0.06	13.55	2.4E-01	1.6E-02	5.9E-01	9.0E-02	2.3E-01	1.6E-01	6.3E-03	3.0E-02	4.1E-02	8,020	0.71	0.64	8,230	12,995	863,684	5
2024Indian	2024 Indian Can	Employee	27.56	2.17	0.06	11.25	11.31	0.05	1.47	1.52	0.01	2.23	4.0E-02	2.6E-03	9.8E-02	1.5E-02	3.8E-02	2.6E-02	1.0E-03	5.0E-03	6.8E-03	1,395	0.12	0.11	1,430	2,287	150,183	5
2024Whitm	2024 Whitmore	Employee	28.85	2.27	0.06	12.48	12.54	0.05	1.59	1.65	0.01	2.34	4.2E-02	2.8E-03	1.0E-01	1.6E-02	4.0E-02	2.7E-02	1.1E-03	5.2E-03	7.1E-03	1,460	0.13	0.11	1,497	2,394	157,214	5
2024Wells	2024 Wells Draw	Employee	153.59	12.07	0.33	52.27	52.59	0.29	7.35	7.64	0.06	12.45	2.2E-01	1.5E-02	5.5E-01	8.4E-02	2.1E-01	1.5E-01	5.8E-03	2.8E-02	3.8E-02	7,772	0.68	0.61	7,970	12,743	836,837	5
2025Indian	2025 Indian Can	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	5
2025Whitm	2025 Whitmore	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0	5
2025Wells	2025 Wells Draw	Employee	142.04	10.87	0.31	52.27	52.58	0.27	7.35	7.62	0.06	11.34	2.1E-01	1.4E-02	5.0E-01	7.7E-02	1.9E-01	1.3E-01	5.4E-03	2.6E-02	3.5E-02	7,523	0.64	0.58	7,711	12,449	809,828	5

Uinta Project-Level Total Construction Emissions (tons)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)
Indian Canyon	916.83	511.92	16.97	761.77	778.74	16.17	211.62	227.78	1.61	93.89	3.5E+00	5.2E-01	3.3E+00	4.5E-01	1.2E+00	7.5E+00	1.5E+01	4.6E-01	2.8E+00	206,592	14.17	6.22	208,697	16,241,531	3,617,215
Whitmore Park	991.94	598.02	19.82	860.60	880.42	18.91	261.71	280.62	1.90	103.27	4.0E+00	6.2E-01	3.6E+00	4.7E-01	1.2E+00	9.1E+00	1.8E+01	5.5E-01	3.4E+00	242,910	17.82	6.95	245,304	19,473,470	3,743,994
Wells Draw	1540.82	649.38	19.96	1055.35	1075.31	18.97	280.08	299.05	2.22	146.38	4.8E+00	6.6E-01	5.5E+00	7.7E-01	2.0E+00	9.6E+00	1.7E+01	6.4E-01	3.4E+00	286,499	21.32	9.53	289,737	20,983,918	6,819,440

Uinta Project-Level Construction Emissions (tons/year)

				Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
			Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)
2022Indian	2022	Indian Canyon	Total	409.81	226.56	7.77	324.70	332.47	7.42	89.08	96.49	0.69	42.07	1.5E+00	2.3E-01	1.5E+00	2.0E-01	5.3E-01	3.3E+00	6.8E+00	2.0E-01	1.3E+00	88,392	6.01	2.72	89,308	6,901,958	1,583,718
2022Whitm	2022	Whitmore Par	Total	442.67	264.49	9.09	366.52	375.61	8.69	110.04	118.73	0.81	46.19	1.8E+00	2.8E-01	1.6E+00	2.1E-01	5.6E-01	4.0E+00	8.1E+00	2.4E-01	1.5E+00	103,819	7.52	3.03	104,857	8,268,630	1,639,225
2022Wells D	2022	Wells Draw	Total	423.61	175.51	5.81	264.56	270.37	5.54	70.85	76.39	0.56	40.69	1.3E+00	1.8E-01	1.6E+00	2.1E-01	5.7E-01	2.6E+00	4.9E+00	1.7E-01	1.0E+00	71,712	5.20	2.50	72,554	5,172,195	1,785,633
2023Indian	2023	Indian Canyon	Total	384.81	215.43	7.03	330.08	337.12	6.69	94.39	101.08	0.69	39.29	1.5E+00	2.2E-01	1.4E+00	1.9E-01	4.9E-01	3.2E+00	6.2E+00	2.0E-01	1.2E+00	88,240	6.05	2.64	89,134	6,953,683	1,536,041
2023Whitm	2023	Whitmore Par	Total	416.48	251.70	8.21	373.61	381.82	7.82	117.04	124.86	0.81	43.24	1.7E+00	2.6E-01	1.5E+00	2.0E-01	5.2E-01	3.8E+00	7.3E+00	2.3E-01	1.4E+00	103,762	7.61	2.95	104,779	8,337,152	1,589,877
2023Wells D	2023	Wells Draw	Total	396.55	165.94	5.23	268.63	273.85	4.97	74.87	79.83	0.55	37.72	1.2E+00	1.7E-01	1.4E+00	2.0E-01	5.2E-01	2.4E+00	4.4E+00	1.6E-01	8.9E-01	71,427	5.22	2.41	72,243	5,210,364	1,731,878
2024Indian	2024	Indian Canyon	Total	122.21	69.93	2.17	106.99	109.15	2.06	28.15	30.20	0.23	12.53	4.7E-01	7.0E-02	4.3E-01	5.9E-02	1.5E-01	1.0E+00	1.9E+00	6.7E-02	3.6E-01	29,959	2.12	0.86	30,255	2,385,890	497,457
2024Whitm	2024	Whitmore Par	Total	132.79	81.82	2.52	120.48	123.00	2.40	34.63	37.03	0.28	13.84	5.5E-01	8.3E-02	4.7E-01	6.3E-02	1.6E-01	1.2E+00	2.2E+00	7.9E-02	4.2E-01	35,329	2.69	0.97	35,667	2,867,688	514,893
2024Wells D	2024	Wells Draw	Total	374.23	159.87	4.77	261.08	265.85	4.53	67.18	71.71	0.56	35.55	1.2E+00	1.6E-01	1.3E+00	1.9E-01	4.8E-01	2.4E+00	4.0E+00	1.6E-01	8.1E-01	72,291	5.43	2.35	73,094	5,347,323	1,678,044
2025Indian	2025	Indian Canyon	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025	Whitmore Par	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells D	2025	Wells Draw	Total	346.42	148.05	4.15	261.08	265.24	3.93	67.18	71.11	0.55	32.43	1.1E+00	1.5E-01	1.2E+00	1.7E-01	4.3E-01	2.2E+00	3.4E+00	1.5E-01	7.2E-01	71,068	5.47	2.27	71,846	5,254,036	1,623,885
2022Indian	2022	Indian Canyon	Surface	22.51	91.08	2.88	151.47	154.35	2.79	15.35	18.15	0.26	4.12	3.5E-01	6.7E-02	1.6E-01	7.4E-03	2.1E-02	9.8E-01	2.8E+00	2.6E-02	5.5E-01	34,206	0.71	0.85	34,451	3,300,888	
2022Whitm	2022	Whitmore Par	Surface	24.22	98.00	3.10	162.98	166.08	3.01	16.52	19.53	0.28	4.43	3.8E-01	7.2E-02	1.7E-01	7.9E-03	2.2E-02	1.1E+00	3.0E+00	2.8E-02	5.9E-01	36,806	0.77	0.92	37,070	3,551,818	
2022Wells D	2022	Wells Draw	Surface	16.82	68.06	2.15	113.18	115.33	2.09	11.47	13.56	0.20	3.08	2.7E-01	5.0E-02	1.2E-01	5.5E-03	1.5E-02	7.3E-01	2.1E+00	2.0E-02	4.1E-01	25,559	0.53	0.64	25,743	2,466,499	
2023Indian	2023	Indian Canyon	Surface	19.67	85.84	2.52	151.47	153.99	2.44	15.35	17.79	0.26	3.70	3.2E-01	5.9E-02	1.4E-01	6.5E-03	1.9E-02	8.8E-01	2.4E+00	2.4E-02	4.9E-01	34,096	0.70	0.85	34,341	3,296,735	
2023Whitm	2023	Whitmore Par	Surface	21.16	92.37	2.71	162.98	165.69	2.62	16.52	19.15	0.28	3.98	3.4E-01	6.4E-02	1.5E-01	6.9E-03	2.0E-02	9.5E-01	2.6E+00	2.6E-02	5.2E-01	36,688	0.76	0.92	36,952	3,547,348	
2023Wells D	2023	Wells Draw	Surface	14.69	64.14	1.88	113.18	115.06	1.82	11.47	13.30	0.19	2.76	2.4E-01	4.4E-02	1.0E-01	4.8E-03	1.4E-02	6.6E-01	1.8E+00	1.8E-02	3.6E-01	25,478	0.52	0.64	25,660	2,463,395	
2024Indian	2024	Indian Canyon	Surface	5.70	27.13	0.73	50.63	51.36	0.71	5.13	5.84	0.09	1.11	9.5E-02	1.8E-02	4.1E-02	1.9E-03	5.7E-03	2.6E-01	7.1E-01	7.4E-03	1.4E-01	11,398	0.23	0.28	11,479	1,100,087	
2024Whitm	2024	Whitmore Par	Surface	6.13	29.19	0.78	54.48	55.26	0.76	5.52	6.28	0.09	1.20	1.0E-01	1.9E-02	4.4E-02	2.0E-03	6.2E-03	2.8E-01	7.6E-01	7.9E-03	1.6E-01	12,264	0.25	0.31	12,352	1,183,714	
2024Wells D	2024	Wells Draw	Surface	12.74	60.64	1.63	113.18	114.81	1.58	11.47	13.05	0.19	2.49	2.1E-01	3.9E-02	9.2E-02	4.2E-03	1.3E-02	5.9E-01	1.6E+00	1.6E-02	3.2E-01	25,480	0.51	0.64	25,662	2,459,293	
2025Indian	2025	Indian Canyon	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	
2025Whitm	2025	Whitmore Par	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	
2025Wells D	2025	Wells Draw	Surface	11.09	57.82	1.42	113.18	114.60	1.38	11.47	12.85	0.19	2.25	1.9E-01	3.5E-02	8.3E-02	3.7E-03	1.2E-02	5.3E-01	1.4E+00	1.5E-02	2.9E-01	25,399	0.56	0.64	25,580	2,456,849	
2022Indian	2022	Indian Canyon	Tunnel	72.10	108.88	4.23	61.75	65.98	4.04	59.18	63.22	0.32	11.59	7.3E-01	1.4E-01	2.2E-01	2.2E-02	5.4E-02	2.0E+00	4.0E+00	1.2E-01	6.7E-01	39,484	3.96	0.64	39,757	3,577,595	
2022Whitm	2022	Whitmore Par	Tunnel	92.20	138.96	5.31	81.30	86.61	5.08	77.92	83.00	0.42	14.47	9.4E-01	1.7E-01	2.9E-01	2.6E-02	7.0E-02	2.7E+00	5.1E+00	1.5E-01	8.7E-01	51,795	5.38	0.84	52,159	4,692,515	
2022Wells D	2022	Wells Draw	Tunnel	51.40	77.47	2.91	46.58	49.49	2.79	44.64	47.43	0.24	7.89	5.3E-01	9.7E-02	1.6E-01	1.4E-02	3.9E-02	1.5E+00	2.8E+00	8.1E-02	5.0E-01	29,576	3.17	0.48	29,787	2,679,229	
2023Indian	2023	Indian Canyon	Tunnel	71.72	105.75	3.89	67.13	71.03	3.70	64.50	68.20	0.32	11.49	7.1E-01	1.3E-01	2.1E-01	2.2E-02	5.3E-02	2.0E+00	3.7E+00	1.2E-01	6.1E-01	39,881	4.08	0.64	40,157	3,633,836	
2023Whitm	2023	Whitmore Par	Tunnel	91.61	134.65	4.86	88.39	93.24	4.63	84.92	89.55	0.42	14.31	9.1E-01	1.7E-01	2.7E-01	2.6E-02	6.9E-02	2.6E+00	4.6E+00	1.5E-01	7.9E-01	52,310	5.54	0.84	52,678	4,765,882	
2023Wells D	2023	Wells Draw	Tunnel	51.01	74.91	2.65	50.64	53.29	2.53	48.65	51.18	0.24	7.78	5.1E-01	9.3E-02	1.5E-01	1.4E-02	3.9E-02	1.5E+00	2.5E+00	8.3E-02	4.5E-01	29,867	3.27	0.48	30,081	2,720,910	
2024Indian	2024	Indian Canyon	Tunnel	25.20	35.62	1.24	19.10	20.34	1.18	18.15	19.33	0.11	4.02	2.4E-01	4.3E-02	6.8E-02	7.7E-03	1.8E-02	6.7E-01	1.2E+00	4.3E-02	1.9E-01	13,941	1.49	0.22	14,038	1,278,228	
2024Whitm	2024	Whitmore Par	Tunnel	32.15	45.21	1.54	25.14	26.68	1.46	23.90	25.36	0.15	4.99	3.1E-01	5.5E-02	8.8E-02	9.1E-03	2.4E-02	8.7E-01	1.5E+00	5.4E-02	2.4E-01	18,283	2.02	0.29	18,412	1,676,133	
2024Wells D	2024	Wells Draw	Tunnel	53.50	75.02	2.48	43.10	45.58	2.37	40.97	43.33	0.26	8.09	5.2E-01	9.2E-02	1.5E-01	1.4E-02	4.0E-02	1.5E+00	2.4E+00	8.9E-02	4.1E-01	31,226	3.56	0.49	31,449	2,862,479	
2025Indian	2025	Indian Canyon	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	
2025Whitm	2025	Whitmore Par	Tunnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	
2025Wells D	2025	Wells Draw	Tunnel	50.51	68.43	2.11	43.09	45.21	2.01	40.97	42.98	0.25	7.44	4.8E-01	8.4E-02	1.3E-01	1.2E-02	3.8E-02	1.4E+00	2.0E+00	8.5E-02	3.6E-01	30,585	3.63	0.47	30,803	2,772,224	
2022Indian	2022	Indian Canyon	Employee	315.20	26.60	0.66	111.48	112.14	0.58	14.54	15.13	0.11	26.36	4.5E-01	3.0E-02	1.1E+00	1.7E-01	4.6E-01	3.1E-01	1.2E-02	5.8E-02	7.9E-02	14,702	1.33	1.22	15,099	23,475	1,583,718
2022Whitm	2022	Whitmore Par	Employee	326.25	27.53	0.68	122.24	122.92	0.60	15.60	16.20	0.11	27.29	4.7E-01	3.1E-02	1.2E+00	1.8E-01	4.7E-01	3.2E-01	1.3E-02	6.1E-02	8.2E-02	15,218	1.38	1.27	15,629	24,297	1,639,225
2022Wells D	2022	Wells Draw	Employee	355.39	29.99	0.74	104.81	105.55	0.66	14.74	15.40	0.12	29.72	5.1E-01	3.3E-02	1.3E+00	1.9E-01	5.1E-01	3.5E-01	1.4E-02	6.6E-02	8.9E-02	16,577	1.50	1.38	17,025	26,468	1,785,633
2023Indian	2023	Indian Canyon	Employee	293.43	23.84	0.62	111.48	112.10	0.55	14.54	15.09	0.11	24.11	4.2E-01	2.8E-02	1.0E+00	1.6E-01	4.1E-01	2.8E-01	1.1E-02	5.4E-02	7.3E-02	14,263	1.26	1.15	14,636	23,112	1,536,041
2023Whitm	2023	Whitmore Par	Employee	303.71	24.68	0.64	122.24	122.88	0.57	15.60	16.16	0.11	24.95	4.4E-01	2.9E-02	1.1E+00	1.7E-01	4.3E-01	2.9E-01	1.2E-02	5.6E-02	7.5E-02	14,763	1.31	1.19	15,149	23,922	1,589,877
2023Wells D	2023	Wells Draw	Employee	330.84	26.88	0.70	104.81	105.51	0.62	14.74	15.36	0.12	27.18	4.8E-01	3.1E-02	1.2E+00	1.8E-01	4.7E-01	3.2E-01	1.3E-02	6.1E-02	8.2E-02	16,082	1.43	1.29	16,502	26,059	1,731,878
2024Indian	2024	Indian Canyon	Employee	91.30	7.18	0.20	37.26	37.46	0.17	4.86	5.03	0.03	7.40	1.3E-01	8.7E-03	3.2E-01	5.0E-02	1.3E-01	8.7E-02	3.4E-03	1.7E-02	2.2E-02	4,620	0.40	0.36	4,738	7,575	497,457
2024Whitm	2024	Whitmore Par	Employee	94.50	7.43	0.20	40.86	41.06	0.18	5.21	5.39	0.04	7.66	1.4E-01	9.0E-03	3.4E-01	5.2E-02	1.3E-01	9.0E-02	3.6E-03	1.7E-02	2.3E-02	4,782	0.42	0.37	4,904	7,840	514,893
2024Wells D	2024	Wells Draw	Employee	307.99	24.21	0.66	104.81	105.46	0.58	14.74	15.32	0.11	24.97	4.4E-01	2.9E-02	1.1E+00	1.7E-01	4.2E-01	2.9E-01	1.2E-02	5.6E-02	7.6E-02	15,585	1.36	1.22	15,982	25,552	1,678,044
2025Indian	2025	Indian Canyon	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Whitm	2025	Whitmore Par	Employee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	0.00	0.00	-	0	0
2025Wells D	2025	Wells Draw	Employee	284.83	21.80	0.62	104.81	105.43	0.55	14.74	15.29	0.11	22.74	4.1E-01	2.7E-02	1.0E+00	1.6E-01	3.8E-01	2.7E-01	1.1E-02	5.1E-02	6.9E-02	15,085	1.28	1.16	15,463	24,963	1,623,885

Construction_Common
Project Features

Uinta Schedule

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
							Tunnel Track Days				*Surface Track Days*						
Alternative	**Start Date (2)**	**End Date (4)**	**Tunnel Track Days**	**Surface Track Days**	**Days /Week**	**2021**	**2022**	**2023**	**2024**	**2025**	**2021**	**2022**	**2023**	**2024**	**2025**	Tunnel QAQC	Surface QAQC
Indian Canyon	1/1/2022	5/1/2024	851	567	7		365	365	122			243	243	81		*-1*	*-1*
Whitmore Park	1/1/2022	5/1/2024	851	567	7		365	365	122			243	243	81		*-1*	*-1*
Wells Draw	1/1/2022	12/31/2025	1460	973	7		365	365	365	365		243	243	243	243	*0*	*0*

1/1/2022	12/31/2022
1/1/2023	12/31/2023
1/1/2024	12/31/2024
1/1/2025	12/31/2025

Construction_Common
Project Features

Uinta Project Features

Track length (1)	Miles	Miles per Day
Indian Canyon route	80.5	
Tunneled miles	4.3	0.01
Surface miles	76.2	0.13
Whitmore Park route	87.7	
Tunneled miles	5.7	0.01
Surface miles	82.0	0.14
Wells Draw route	103.3	
Tunneled miles	5.6	0.00
Surface miles	98	0.10

Tunnel Miles Per Year	2022	2023	2024	2025	Miles per Year	2022	2023	2024	2025	QAQC
Indian Cany	1.8	1.8	0.6	-	Indian Canyon	33	33	11	-	*0.1*
Whitmore P	2.4	2.4	0.8	-	Whitmore Park	35	35	12	-	*0.1*
Wells Draw	1.4	1.4	1.4	1.4	Wells Draw	24	24	24	24	*0.0*

Construction Schedule	Value	Note
Indian Canyon and Whitmore Park		
Months (2)	28	
Years (calc'd)	2.33	
Days (calc'd)	852	
Wells Draw		
Months (2)	48	
Years (calc'd)	4.00	
Days (calc'd)	1460	
All Alts (2)		
Tunneling Months per Year	12	Also includes bridges and signal and communication systems activities
Non-tunneling Months per	8	Includes embankments, culverts, retaining walls, roadways, roadway crossings, track, and fencing activities

Ozone NAA *1 2 3 4 5* **PM NAA** *1 2 3 4 5*

Percent of Project Features (3)		Alignment	Surface	Tunnel	Employee
In nonattainment area	Indian Canyon	49%	See surface workbook	See tunnel workbook	70%
	Whitmore Park	47%			69%
	Wells Draw	31%			50%
Out of nonattainment area	Indian Canyon	51%			30%
	Whitmore Park	53%			31%
	Wells Draw	69%			50%

Percent of Project Feat		Alignment	Surface	Tunnel	Employee
In nonattainment area	Indian Canyon	8%	See surface workbook	See tunnel workbook	0%
	Whitmore Park	7%			0%
	Wells Draw	12%			0%
Out of nonattainment area	Indian Canyon	92%			100%
	Whitmore Park	93%			100%
	Wells Draw	88%			100%

Construction Truck Trip Dista	Miles	% of Total
Indian Canyon	74	
Paved	53	71%
Unpaved	22	29%
Whitmore Park	78	
Paved	53	69%
Unpaved	24	31%
Wells Draw	86	
Paved	69	80%
Unpaved	17	20%

Construction_Common
Project Features

Sources

(1) ICF. 2019. GIS. ProjectDescription_20191206.xlsx. G:\Sacramento\LGT-Air&Noise\Air\Uinta Basin Railway EIS 00060.19 (Utah)\01 Project Info\04 Data\2019-12-09 Tunnel Mileage from GIS
(2) Response to OEA IR 3. Venable response PDF. November 25, 2019. G:\Sacramento\LGT-Air&Noise\Air\Uinta Basin Railway EIS 00060.19 (Utah)\01 Project Info\04 Data\2019-12-03 Response to OEA IR 3
(3) ICF. 2020. GIS. 'AirQuality_2020501
(4) Pers. Comm. Debra Rogers, Principal at ICF. Email to David Ernst et al. RE: Uinta construction emissions - extended schedule assumption for conformity. August 6, 2020.

Uinta Project Construction Emissions outside PM Nonattainment Area (tons/year) (calc'd)

			Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
2022Indian	2022 Indian Cany	Earthwork	0	0	0	134	134	0	13	13	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Indian	2022 Indian Cany	Onroad	6	3	0	4	4	0	1	1	0	1	5E-02	8E-03	1E-02	2E-03	4E-03	1E-01	7E-02	1E-02	1E-02	1,252	0	0	1,266	94,982	3
2022Indian	2022 Indian Cany	Offroad	14	80	3	0	3	2	0	2	0	3	3E-01	5E-02	1E-01	5E-03	1E-02	8E-01	2E+00	1E-02	5E-01	29,962	0	1	30,172	2,915,793	4
2022Whitm	2022 Whitmore I	Earthwork	0	0	0	139	139	0	14	14	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Whitm	2022 Whitmore I	Onroad	7	3	0	4	4	0	1	1	0	1	5E-02	8E-03	1E-02	2E-03	4E-03	1E-01	7E-02	1E-02	1E-02	1,298	0	0	1,313	98,511	3
2022Whitm	2022 Whitmore I	Offroad	15	83	3	0	3	3	0	3	0	3	3E-01	6E-02	1E-01	5E-03	2E-02	8E-01	3E+00	1E-02	5E-01	31,008	0	1	31,226	3,017,636	4
2022Wells	2022 Wells Draw	Earthwork	0	0	0	102	102	0	10	10	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Wells	2022 Wells Draw	Onroad	5	2	0	3	3	0	0	1	0	1	4E-02	6E-03	7E-03	1E-03	3E-03	1E-01	5E-02	9E-03	1E-02	942	0	0	952	71,444	3
2022Wells	2022 Wells Draw	Offroad	11	61	2	0	2	2	0	2	0	2	2E-01	4E-02	1E-01	4E-03	1E-02	6E-01	2E+00	9E-03	4E-01	22,872	0	1	23,032	2,225,806	4
2023Indian	2023 Indian Cany	Earthwork	0	0	0	134	134	0	13	13	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Indian	2023 Indian Cany	Onroad	6	3	0	4	4	0	1	1	0	1	5E-02	8E-03	9E-03	2E-03	4E-03	1E-01	6E-02	1E-02	1E-02	1,234	0	0	1,248	93,621	3
2023Indian	2023 Indian Cany	Offroad	12	76	2	0	2	2	0	2	0	3	2E-01	5E-02	1E-01	4E-03	1E-02	7E-01	2E+00	1E-02	4E-01	29,879	0	1	30,088	2,913,300	4
2023Whitm	2023 Whitmore I	Earthwork	0	0	0	139	139	0	14	14	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Whitm	2023 Whitmore I	Onroad	6	3	0	4	4	0	1	1	0	1	5E-02	8E-03	1E-02	2E-03	4E-03	1E-01	6E-02	1E-02	1E-02	1,280	0	0	1,295	97,100	3
2023Whitm	2023 Whitmore I	Offroad	13	78	2	0	2	2	0	2	0	3	3E-01	5E-02	1E-01	5E-03	1E-02	7E-01	2E+00	1E-02	4E-01	30,923	0	1	31,139	3,015,056	4
2023Wells	2023 Wells Draw	Earthwork	0	0	0	102	102	0	10	10	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Wells	2023 Wells Draw	Onroad	5	2	0	3	3	0	0	1	0	1	4E-02	6E-03	7E-03	1E-03	3E-03	1E-01	5E-02	9E-03	1E-02	928	0	0	939	70,421	3
2023Wells	2023 Wells Draw	Offroad	9	58	2	0	2	2	0	2	0	2	2E-01	4E-02	9E-02	3E-03	1E-02	5E-01	2E+00	8E-03	3E-01	22,808	0	1	22,968	2,223,903	4
2024Indian	2024 Indian Cany	Earthwork	0	0	0	45	45	0	4	4	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Indian	2024 Indian Cany	Onroad	2	1	0	1	1	0	0	0	0	0	2E-02	2E-03	3E-03	5E-04	1E-03	4E-02	2E-02	4E-03	4E-03	407	0	0	412	30,869	3
2024Indian	2024 Indian Cany	Offroad	3	24	1	0	1	1	0	1	0	1	7E-02	1E-02	3E-02	1E-03	4E-03	2E-01	6E-01	3E-03	1E-01	9,993	0	0	10,063	972,491	4
2024Whitm	2024 Whitmore I	Earthwork	0	0	0	46	46	0	5	5	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Whitm	2024 Whitmore I	Onroad	2	1	0	1	1	0	0	0	0	0	2E-02	2E-03	3E-03	5E-04	1E-03	5E-02	2E-02	4E-03	4E-03	422	0	0	427	32,016	3
2024Whitm	2024 Whitmore I	Offroad	3	25	1	0	1	1	0	1	0	1	7E-02	1E-02	4E-02	1E-03	4E-03	2E-01	6E-01	3E-03	1E-01	10,342	0	0	10,414	1,006,458	4
2024Wells	2024 Wells Draw	Earthwork	0	0	0	102	102	0	10	10	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Wells	2024 Wells Draw	Onroad	4	2	0	3	3	0	0	1	0	1	3E-02	5E-03	7E-03	1E-03	3E-03	1E-01	4E-02	8E-03	1E-02	916	0	0	927	69,468	3
2024Wells	2024 Wells Draw	Offroad	8	55	1	0	1	1	0	1	0	2	2E-01	3E-02	8E-02	3E-03	9E-03	5E-01	1E+00	7E-03	3E-01	22,823	0	1	22,982	2,221,002	4
2025Indian	2025 Indian Cany	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Indian	2025 Indian Cany	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	3
2025Indian	2025 Indian Cany	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	4
2025Whitm	2025 Whitmore I	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Whitm	2025 Whitmore I	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	3
2025Whitm	2025 Whitmore I	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	4
2025Wells	2025 Wells Draw	Earthwork	0	0	0	102	102	0	10	10	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Wells	2025 Wells Draw	Onroad	4	2	0	3	3	0	0	1	0	1	3E-02	5E-03	6E-03	9E-04	3E-03	1E-01	4E-02	8E-03	9E-03	904	0	0	915	68,578	3
2025Wells	2025 Wells Draw	Offroad	6	52	1	0	1	1	0	1	0	2	1E-01	3E-02	7E-02	3E-03	8E-03	4E-01	1E+00	6E-03	3E-01	22,758	0	1	22,917	2,219,585	4

Uinta Annual Emissions outside PM Nonattainment Area (tons/year) (calc'd)

		Vehicle	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
2022Indian	2022	Indian Cany	20.84	83.09	2.63	138.15	140.77	2.55	14.01	16.56	0.24	3.80	3E-01	6E-02	1E-01	7E-03	2E-02	9E-01	3E+00	2E-02	5E-01	31214	0.68	0.778	31438	3,010,775
2022Whitm	2022	Whitmore I	21.58	86.00	2.72	142.98	145.70	2.64	14.51	17.14	0.25	3.93	3E-01	6E-02	1E-01	7E-03	2E-02	9E-01	3E+00	3E-02	5E-01	32307	0.70	0.806	32539	3,116,147
2022Wells	2022	Wells Draw	15.84	63.40	2.01	105.41	107.41	1.94	10.69	12.64	0.18	2.89	2E-01	5E-02	1E-01	5E-03	1E-02	7E-01	2E+00	2E-02	4E-01	23813	0.51	0.594	23984	2,297,250
2023Indian	2023	Indian Cany	18.23	78.31	2.30	138.15	140.44	2.22	14.01	16.24	0.24	3.41	3E-01	5E-02	1E-01	6E-03	2E-02	8E-01	2E+00	2E-02	4E-01	31113	0.66	0.778	31336	3,006,921
2023Whitm	2023	Whitmore I	18.88	81.05	2.38	142.98	145.36	2.30	14.51	16.81	0.24	3.53	3E-01	6E-02	1E-01	6E-03	2E-02	8E-01	2E+00	2E-02	5E-01	32202	0.69	0.805	32434	3,112,155
2023Wells	2023	Wells Draw	13.85	59.75	1.75	105.41	107.16	1.70	10.69	12.39	0.18	2.60	2E-01	4E-02	1E-01	5E-03	1E-02	6E-01	2E+00	2E-02	3E-01	23737	0.50	0.594	23907	2,294,323
2024Indian	2024	Indian Cany	5.29	24.75	0.66	46.17	46.84	0.64	4.68	5.33	0.08	1.03	9E-02	2E-02	4E-02	2E-03	5E-03	2E-01	6E-01	7E-03	1E-01	10400	0.22	0.260	10475	1,003,360
2024Whitm	2024	Whitmore I	5.48	25.61	0.69	47.79	48.48	0.67	4.85	5.51	0.08	1.06	9E-02	2E-02	4E-02	2E-03	5E-03	3E-01	7E-01	7E-03	1E-01	10764	0.23	0.269	10841	1,038,474
2024Wells	2024	Wells Draw	12.02	56.49	1.52	105.41	106.93	1.47	10.69	12.16	0.18	2.34	2E-01	4E-02	9E-02	4E-03	1E-02	6E-01	1E+00	2E-02	3E-01	23739	0.49	0.593	23908	2,290,470
2025Indian	2025	Indian Cany	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Whitm	2025	Whitmore I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Wells	2025	Wells Draw	10.47	53.86	1.32	105.41	106.73	1.28	10.69	11.97	0.18	2.12	2E-01	3E-02	8E-02	4E-03	1E-02	5E-01	1E+00	1E-02	3E-01	23662	0.54	0.592	23832	2,288,163

Construction_Surface
PM NAA

Uinta Annual Emissions inside PM Nonattainment Area (tons/year) (calc'd)

		Vehicle	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
2022India	2022	Indian Cany	1.67	7.99	0.25	13.32	13.58	0.25	1.34	1.59	0.02	0.32	3E-02	6E-03	1E-02	6E-04	2E-03	8E-02	2E-01	2E-03	5E-02	2992	0.04	0.076	3013	290,113
2022Whit	2022	Whitmore F	2.64	12.00	0.38	20.00	20.38	0.37	2.02	2.39	0.03	0.50	4E-02	8E-03	2E-02	9E-04	3E-03	1E-01	4E-01	3E-03	7E-02	4499	0.07	0.114	4531	435,671
2022Wells	2022	Wells Draw	0.98	4.66	0.15	7.77	7.92	0.14	0.78	0.93	0.01	0.19	2E-02	3E-03	8E-03	3E-04	9E-04	5E-02	1E-01	1E-03	3E-02	1746	0.02	0.044	1758	169,249
2023India	2023	Indian Cany	1.44	7.53	0.22	13.32	13.54	0.21	1.34	1.56	0.02	0.28	3E-02	5E-03	1E-02	5E-04	1E-03	7E-02	2E-01	2E-03	4E-02	2983	0.04	0.076	3004	289,814
2023Whit	2023	Whitmore F	2.28	11.31	0.33	20.00	20.33	0.32	2.02	2.34	0.03	0.44	4E-02	7E-03	2E-02	8E-04	2E-03	1E-01	3E-01	3E-03	6E-02	4486	0.07	0.114	4518	435,193
2023Wells	2023	Wells Draw	0.85	4.39	0.13	7.77	7.90	0.13	0.78	0.91	0.01	0.17	2E-02	3E-03	7E-03	3E-04	9E-04	4E-02	1E-01	9E-04	2E-02	1741	0.02	0.044	1753	169,072
2024India	2024	Indian Cany	0.41	2.38	0.06	4.45	4.52	0.06	0.45	0.51	0.01	0.08	8E-03	1E-03	4E-03	1E-04	4E-04	2E-02	6E-02	5E-04	1E-02	998	0.01	0.025	1005	96,728
2024Whit	2024	Whitmore F	0.65	3.58	0.10	6.69	6.78	0.09	0.67	0.77	0.01	0.13	1E-02	2E-03	5E-03	2E-04	7E-04	3E-02	9E-02	8E-04	2E-02	1500	0.02	0.038	1510	145,241
2024Wells	2024	Wells Draw	0.72	4.15	0.11	7.77	7.88	0.11	0.78	0.89	0.01	0.15	1E-02	3E-03	6E-03	3E-04	8E-04	4E-02	1E-01	8E-04	2E-02	1742	0.02	0.044	1754	168,823
2025India	2025	Indian Cany	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Whit	2025	Whitmore F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Wells	2025	Wells Draw	0.61	3.96	0.10	7.77	7.87	0.09	0.78	0.88	0.01	0.13	1E-02	2E-03	6E-03	2E-04	7E-04	3E-02	9E-02	8E-04	2E-02	1736	0.02	0.044	1749	168,687

Uinta Project Construction Emissions outside Ozone Nonattainment Area (tons/year) (calc'd)

			Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
2022Indian	2022 Indian Cany	Earthwork	0	0	0	71	71	0	7	7	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Indian	2022 Indian Cany	Onroad	5	2	0	3	3	0	0	1	0	1	4E-02	6E-03	8E-03	1E-03	3E-03	1E-01	5E-02	9E-03	1E-02	947	0	0	958	71,882	3
2022Indian	2022 Indian Cany	Offroad	8	42	1	0	1	1	0	1	0	1	1E-01	3E-02	7E-02	3E-03	8E-03	4E-01	1E+00	6E-03	3E-01	15,770	0	0	15,881	1,534,702	4
2022Whitm	2022 Whitmore I	Earthwork	0	0	0	79	79	0	8	8	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Whitm	2022 Whitmore I	Onroad	3	1	0	2	2	0	0	0	0	0	2E-02	4E-03	5E-03	8E-04	2E-03	7E-02	3E-02	6E-03	7E-03	593	0	0	599	44,966	3
2022Whitm	2022 Whitmore I	Offroad	8	47	2	0	2	1	0	1	0	2	2E-01	3E-02	8E-02	3E-03	9E-03	4E-01	1E+00	7E-03	3E-01	17,666	0	0	17,790	1,719,226	4
2022Wells	2022 Wells Draw	Earthwork	0	0	0	74	74	0	7	7	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Wells	2022 Wells Draw	Onroad	3	1	0	2	2	0	0	0	0	0	2E-02	3E-03	4E-03	8E-04	2E-03	6E-02	3E-02	5E-03	6E-03	527	0	0	532	39,949	3
2022Wells	2022 Wells Draw	Offroad	8	44	1	0	1	1	0	1	0	2	2E-01	3E-02	7E-02	3E-03	8E-03	4E-01	1E+00	7E-03	3E-01	16,470	0	0	16,586	1,602,860	4
2023Indian	2023 Indian Cany	Earthwork	0	0	0	71	71	0	7	7	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Indian	2023 Indian Cany	Onroad	5	2	0	3	3	0	0	1	0	1	4E-02	6E-03	7E-03	1E-03	3E-03	1E-01	5E-02	9E-03	1E-02	934	0	0	945	70,852	3
2023Indian	2023 Indian Cany	Offroad	6	40	1	0	1	1	0	1	0	1	1E-01	2E-02	6E-02	2E-03	7E-03	4E-01	1E+00	6E-03	2E-01	15,727	0	0	15,837	1,533,390	4
2023Whitm	2023 Whitmore I	Earthwork	0	0	0	79	79	0	8	8	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Whitm	2023 Whitmore I	Onroad	3	1	0	2	2	0	0	0	0	0	2E-02	4E-03	4E-03	7E-04	2E-03	7E-02	3E-02	5E-03	6E-03	584	0	0	591	44,321	3
2023Whitm	2023 Whitmore I	Offroad	7	45	1	0	1	1	0	1	0	1	1E-01	3E-02	7E-02	3E-03	8E-03	4E-01	1E+00	6E-03	3E-01	17,617	0	0	17,741	1,717,756	4
2023Wells	2023 Wells Draw	Earthwork	0	0	0	74	74	0	7	7	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Wells	2023 Wells Draw	Onroad	3	1	0	2	2	0	0	0	0	0	2E-02	3E-03	4E-03	7E-04	2E-03	6E-02	3E-02	5E-03	6E-03	519	0	0	525	39,377	3
2023Wells	2023 Wells Draw	Offroad	7	42	1	0	1	1	0	1	0	1	1E-01	3E-02	6E-02	2E-03	7E-03	4E-01	1E+00	6E-03	2E-01	16,425	0	0	16,540	1,601,489	4
2024Indian	2024 Indian Cany	Earthwork	0	0	0	24	24	0	2	2	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Indian	2024 Indian Cany	Onroad	1	1	0	1	1	0	0	0	0	0	1E-02	2E-03	2E-03	3E-04	1E-03	3E-02	1E-02	3E-03	3E-03	308	0	0	312	23,362	3
2024Indian	2024 Indian Cany	Offroad	2	13	0	0	0	0	0	0	0	0	4E-02	7E-03	2E-02	7E-04	2E-03	1E-01	3E-01	2E-03	7E-02	5,260	0	0	5,296	511,862	4
2024Whitm	2024 Whitmore I	Earthwork	0	0	0	26	26	0	3	3	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Whitm	2024 Whitmore I	Onroad	1	0	0	1	1	0	0	0	0	0	7E-03	1E-03	1E-03	2E-04	6E-04	2E-02	8E-03	2E-03	2E-03	193	0	0	195	14,614	3
2024Whitm	2024 Whitmore I	Offroad	2	14	0	0	0	0	0	0	0	0	4E-02	8E-03	2E-02	8E-04	2E-03	1E-01	4E-01	2E-03	8E-02	5,892	0	0	5,933	573,405	4
2024Wells	2024 Wells Draw	Earthwork	0	0	0	74	74	0	7	7	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Wells	2024 Wells Draw	Onroad	2	1	0	2	2	0	0	0	0	0	2E-02	3E-03	4E-03	6E-04	2E-03	6E-02	2E-02	5E-03	5E-03	512	0	0	518	38,844	3
2024Wells	2024 Wells Draw	Offroad	6	39	1	0	1	1	0	1	0	1	1E-01	2E-02	6E-02	2E-03	6E-03	3E-01	1E+00	5E-03	2E-01	16,435	0	0	16,550	1,599,401	4
2025Indian	2025 Indian Cany	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Indian	2025 Indian Cany	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	3
2025Indian	2025 Indian Cany	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	4
2025Whitm	2025 Whitmore I	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Whitm	2025 Whitmore I	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	3
2025Whitm	2025 Whitmore I	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	4
2025Wells	2025 Wells Draw	Earthwork	0	0	0	74	74	0	7	7	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Wells	2025 Wells Draw	Onroad	2	1	0	2	2	0	0	0	0	0	2E-02	3E-03	4E-03	5E-04	2E-03	5E-02	2E-02	4E-03	5E-03	505	0	0	512	38,346	3
2025Wells	2025 Wells Draw	Offroad	5	37	1	0	1	1	0	1	0	1	1E-01	2E-02	5E-02	2E-03	6E-03	3E-01	9E-01	5E-03	2E-01	16,389	0	0	16,503	1,598,380	4

Uinta Annual Emissions outside Ozone Nonattainment Area (tons/year) (calc'd)

		Vehicle	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
2022Indian	2022	Indian Cany	12.47	44.43	1.40	73.68	75.08	1.36	7.52	8.88	0.13	2.22	2E-01	3E-02	8E-02	4E-03	1E-02	5E-01	1E+00	2E-02	3E-01	16718	0.46	0.412	16839	1,606,584
2022Whitm	2022	Whitmore I	11.53	48.65	1.54	80.97	82.51	1.49	8.19	9.69	0.14	2.13	2E-01	4E-02	8E-02	4E-03	1E-02	5E-01	1E+00	1E-02	3E-01	18259	0.34	0.458	18389	1,764,192
2022Wells	2022	Wells Draw	10.62	45.29	1.43	75.40	76.84	1.39	7.62	9.02	0.13	1.96	2E-01	3E-02	8E-02	4E-03	1E-02	5E-01	1E+00	1E-02	3E-01	16997	0.31	0.427	17118	1,642,809
2023Indian	2023	Indian Cany	11.01	41.86	1.22	73.68	74.90	1.18	7.52	8.70	0.13	2.00	2E-01	3E-02	7E-02	3E-03	1E-02	5E-01	1E+00	1E-02	2E-01	16660	0.46	0.411	16781	1,604,242
2023Whitm	2023	Whitmore I	10.04	45.85	1.35	80.97	82.31	1.30	8.19	9.50	0.14	1.91	2E-01	3E-02	7E-02	3E-03	1E-02	5E-01	1E+00	1E-02	3E-01	18202	0.34	0.458	18332	1,762,078
2023Wells	2023	Wells Draw	9.23	42.69	1.25	75.40	76.65	1.21	7.62	8.84	0.13	1.76	2E-01	3E-02	7E-02	3E-03	9E-03	4E-01	1E+00	1E-02	2E-01	16944	0.30	0.426	17065	1,640,866
2024Indian	2024	Indian Cany	3.23	13.22	0.35	24.63	24.98	0.34	2.51	2.86	0.04	0.60	5E-02	9E-03	2E-02	1E-03	3E-03	1E-01	3E-01	4E-03	7E-02	5568	0.15	0.137	5608	535,224
2024Whitm	2024	Whitmore I	2.90	14.49	0.39	27.06	27.45	0.38	2.74	3.12	0.05	0.57	5E-02	9E-03	2E-02	1E-03	3E-03	1E-01	4E-01	4E-03	8E-02	6085	0.11	0.153	6128	588,019
2024Wells	2024	Wells Draw	7.96	40.37	1.09	75.40	76.49	1.05	7.62	8.68	0.13	1.58	1E-01	3E-02	6E-02	3E-03	8E-03	4E-01	1E+00	1E-02	2E-01	16947	0.30	0.426	17068	1,638,244
2025Indian	2025	Indian Cany	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Whitm	2025	Whitmore I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Wells	2025	Wells Draw	6.88	38.49	0.95	75.40	76.35	0.92	7.62	8.54	0.13	1.43	1E-01	2E-02	5E-02	2E-03	8E-03	3E-01	9E-01	9E-03	2E-01	16894	0.33	0.426	17015	1,636,726

Construction_Surface
Ozone NAA

Uinta Annual Emissions inside Ozone Nonattainment Area (tons/year) (calc'd)

		Vehicle	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
2022India	2022	Indian Cany	10.05	46.65	1.48	77.79	79.27	1.44	7.84	9.27	0.13	1.90	2E-01	3E-02	8E-02	3E-03	1E-02	5E-01	1E+00	1E-02	3E-01	17488	0.25	0.443	17612	1,694,304
2022Whit	2022	Whitmore F	12.69	49.36	1.56	82.01	83.57	1.51	8.33	9.84	0.14	2.30	2E-01	4E-02	8E-02	4E-03	1E-02	5E-01	2E+00	2E-02	3E-01	18547	0.42	0.461	18681	1,787,626
2022Wells	2022	Wells Draw	6.20	22.77	0.72	37.78	38.50	0.70	3.85	4.55	0.07	1.11	9E-02	2E-02	4E-02	2E-03	5E-03	3E-01	7E-01	8E-03	1E-01	8562	0.22	0.212	8624	823,690
2023India	2023	Indian Cany	8.66	43.98	1.29	77.79	79.09	1.25	7.84	9.09	0.13	1.70	2E-01	3E-02	7E-02	3E-03	9E-03	4E-01	1E+00	9E-03	3E-01	17436	0.24	0.442	17560	1,692,493
2023Whit	2023	Whitmore F	11.12	46.51	1.36	82.01	83.38	1.32	8.33	9.65	0.14	2.07	2E-01	3E-02	8E-02	4E-03	1E-02	5E-01	1E+00	1E-02	3E-01	18487	0.42	0.461	18620	1,785,270
2023Wells	2023	Wells Draw	5.46	21.45	0.63	37.78	38.41	0.61	3.85	4.46	0.06	1.00	8E-02	2E-02	4E-02	2E-03	5E-03	2E-01	6E-01	7E-03	1E-01	8534	0.22	0.211	8595	822,529
2024India	2024	Indian Cany	2.47	13.90	0.37	26.00	26.38	0.36	2.62	2.98	0.04	0.51	5E-02	9E-03	2E-02	9E-04	3E-03	1E-01	4E-01	3E-03	7E-02	5830	0.08	0.148	5871	564,864
2024Whit	2024	Whitmore F	3.24	14.70	0.39	27.41	27.81	0.38	2.78	3.17	0.05	0.62	5E-02	1E-02	2E-02	1E-03	3E-03	1E-01	4E-01	4E-03	8E-02	6179	0.14	0.154	6224	595,695
2024Wells	2024	Wells Draw	4.79	20.28	0.54	37.78	38.32	0.53	3.85	4.38	0.06	0.90	8E-02	1E-02	3E-02	2E-03	5E-03	2E-01	5E-01	7E-03	1E-01	8533	0.22	0.211	8594	821,048
2025India	2025	Indian Cany	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Whit	2025	Whitmore F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Wells	2025	Wells Draw	4.20	19.33	0.47	37.78	38.25	0.46	3.85	4.31	0.06	0.82	7E-02	1E-02	3E-02	1E-03	4E-03	2E-01	5E-01	6E-03	1E-01	8504	0.23	0.211	8566	820,123

Uinta Annual Emissions (tons/year) (calc'd)

	Vehicle	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
		CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
2022Indian C	2022 Indian Canyon	22.51	91.08	2.88	151.47	154.35	2.79	15.35	18.15	0.26	4.12	4E-01	7E-02	2E-01	7E-03	2E-02	1E+00	3E+00	3E-02	5E-01	34206	0.71	0.854	34451	3,300,888
2022Whitmo	2022 Whitmore Park	24.22	98.00	3.10	162.98	166.08	3.01	16.52	19.53	0.28	4.43	4E-01	7E-02	2E-01	8E-03	2E-02	1E+00	3E+00	3E-02	6E-01	36806	0.77	0.919	37070	3,551,818
2022Wells D	2022 Wells Draw	16.82	68.06	2.15	113.18	115.33	2.09	11.47	13.56	0.20	3.08	3E-01	5E-02	1E-01	5E-03	2E-02	7E-01	2E+00	2E-02	4E-01	25559	0.53	0.638	25743	2,466,499
2023Indian C	2023 Indian Canyon	19.67	85.84	2.52	151.47	153.99	2.44	15.35	17.79	0.26	3.70	3E-01	6E-02	1E-01	6E-03	2E-02	9E-01	2E+00	2E-02	5E-01	34096	0.70	0.854	34341	3,296,735
2023Whitmo	2023 Whitmore Park	21.16	92.37	2.71	162.98	165.69	2.62	16.52	19.15	0.28	3.98	3E-01	6E-02	1E-01	7E-03	2E-02	9E-01	3E+00	3E-02	5E-01	36688	0.76	0.918	36952	3,547,348
2023Wells D	2023 Wells Draw	14.69	64.14	1.88	113.18	115.06	1.82	11.47	13.30	0.19	2.76	2E-01	4E-02	1E-01	5E-03	1E-02	7E-01	2E+00	2E-02	4E-01	25478	0.52	0.638	25660	2,463,395
2024Indian C	2024 Indian Canyon	5.70	27.13	0.73	50.63	51.36	0.71	5.13	5.84	0.09	1.11	1E-01	2E-02	4E-02	2E-03	6E-03	3E-01	7E-01	7E-03	1E-01	11398	0.23	0.285	11479	1,100,087
2024Whitmo	2024 Whitmore Park	6.13	29.19	0.78	54.48	55.26	0.76	5.52	6.28	0.09	1.20	1E-01	2E-02	4E-02	2E-03	6E-03	3E-01	8E-01	8E-03	2E-01	12264	0.25	0.307	12352	1,183,714
2024Wells D	2024 Wells Draw	12.74	60.64	1.63	113.18	114.81	1.58	11.47	13.05	0.19	2.49	2E-01	4E-02	9E-02	4E-03	1E-02	6E-01	2E+00	2E-02	3E-01	25480	0.51	0.637	25662	2,459,293
2025Indian C	2025 Indian Canyon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Whitmo	2025 Whitmore Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0.00	0.000	0	-
2025Wells D	2025 Wells Draw	11.09	57.82	1.42	113.18	114.60	1.38	11.47	12.85	0.19	2.25	2E-01	4E-02	8E-02	4E-03	1E-02	5E-01	1E+00	2E-02	3E-01	25399	0.56	0.637	25580	2,456,849

Uinta Project Construction Emissions by Source (tons/year) (calc'd)

			Alternative	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
				CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
2022Indian Canyon	2022	Indian Cany	Earthwork	0	0	0	147	147	0	15	15	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2022Indian Canyon	2022	Indian Cany	Onroad	7	3	0	4	4	0	1	1	0	1	5E-02	8E-03	1E-02	2E-03	4E-03	1E-01	7E-02	1E-02	1E-02	1,302	0	0	1,317	98,806
2022Indian Canyon	2022	Indian Cany	Offroad	16	88	3	0	3	3	0	3	0	3	3E-01	6E-02	1E-01	5E-03	2E-02	8E-01	3E+00	1E-02	5E-01	32,904	0	1	33,134	3,202,083
2022Whitmore Park	2022	Whitmore P	Earthwork	0	0	0	158	158	0	16	16	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2022Whitmore Park	2022	Whitmore P	Onroad	7	3	0	5	5	0	1	1	0	1	6E-02	9E-03	1E-02	2E-03	5E-03	2E-01	8E-02	1E-02	2E-02	1,401	1	0	1,417	106,317
2022Whitmore Park	2022	Whitmore P	Offroad	17	95	3	0	3	3	0	3	0	3	3E-01	6E-02	2E-01	6E-03	2E-02	9E-01	3E+00	1E-02	6E-01	35,405	0	1	35,653	3,445,501
2022Wells Draw	2022	Wells Draw	Earthwork	0	0	0	110	110	0	11	11	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2022Wells Draw	2022	Wells Draw	Onroad	5	2	0	3	3	0	0	1	0	1	4E-02	6E-03	8E-03	1E-03	3E-03	1E-01	5E-02	9E-03	1E-02	973	0	0	984	73,830
2022Wells Draw	2022	Wells Draw	Offroad	12	66	2	0	2	2	0	2	0	2	2E-01	4E-02	1E-01	4E-03	1E-02	6E-01	2E+00	1E-02	4E-01	24,586	0	1	24,759	2,392,669
2023Indian Canyon	2023	Indian Cany	Earthwork	0	0	0	147	147	0	15	15	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2023Indian Canyon	2023	Indian Cany	Onroad	6	3	0	4	4	0	1	1	0	1	5E-02	8E-03	1E-02	2E-03	4E-03	1E-01	6E-02	1E-02	1E-02	1,284	0	0	1,299	97,390
2023Indian Canyon	2023	Indian Cany	Offroad	13	83	2	0	2	2	0	2	0	3	3E-01	5E-02	1E-01	5E-03	1E-02	7E-01	2E+00	1E-02	5E-01	32,813	0	1	33,042	3,199,345
2023Whitmore Park	2023	Whitmore P	Earthwork	0	0	0	158	158	0	16	16	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2023Whitmore Park	2023	Whitmore P	Onroad	7	3	0	5	5	0	1	1	0	1	5E-02	8E-03	1E-02	2E-03	5E-03	2E-01	7E-02	1E-02	2E-02	1,381	1	0	1,397	104,793
2023Whitmore Park	2023	Whitmore P	Offroad	14	89	3	0	3	3	0	3	0	3	3E-01	6E-02	1E-01	5E-03	2E-02	8E-01	3E+00	1E-02	5E-01	35,307	0	1	35,554	3,442,555
2023Wells Draw	2023	Wells Draw	Earthwork	0	0	0	110	110	0	11	11	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2023Wells Draw	2023	Wells Draw	Onroad	5	2	0	3	3	0	0	1	0	1	4E-02	6E-03	7E-03	1E-03	3E-03	1E-01	5E-02	9E-03	1E-02	959	0	0	970	72,772
2023Wells Draw	2023	Wells Draw	Offroad	10	62	2	0	2	2	0	2	0	2	2E-01	4E-02	1E-01	4E-03	1E-02	6E-01	2E+00	9E-03	4E-01	24,518	0	1	24,690	2,390,623
2024Indian Canyon	2024	Indian Cany	Earthwork	0	0	0	49	49	0	5	5	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2024Indian Canyon	2024	Indian Cany	Onroad	2	1	0	1	1	0	0	0	0	0	2E-02	2E-03	3E-03	5E-04	1E-03	5E-02	2E-02	4E-03	4E-03	423	0	0	428	32,112
2024Indian Canyon	2024	Indian Cany	Offroad	4	26	1	0	1	1	0	1	0	1	8E-02	2E-02	4E-02	1E-03	4E-03	2E-01	7E-01	4E-03	1E-01	10,974	0	0	11,051	1,067,976
2024Whitmore Park	2024	Whitmore P	Earthwork	0	0	0	53	53	0	5	5	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2024Whitmore Park	2024	Whitmore P	Onroad	2	1	0	2	2	0	0	0	0	0	2E-02	3E-03	3E-03	5E-04	2E-03	5E-02	2E-02	4E-03	5E-03	455	0	0	461	34,553
2024Whitmore Park	2024	Whitmore P	Offroad	4	28	1	0	1	1	0	1	0	1	9E-02	2E-02	4E-02	2E-03	5E-03	2E-01	7E-01	4E-03	2E-01	11,809	0	0	11,891	1,149,162
2024Wells Draw	2024	Wells Draw	Earthwork	0	0	0	110	110	0	11	11	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2024Wells Draw	2024	Wells Draw	Onroad	4	2	0	3	3	0	0	1	0	1	4E-02	6E-03	7E-03	1E-03	3E-03	1E-01	4E-02	9E-03	1E-02	946	0	0	958	71,787
2024Wells Draw	2024	Wells Draw	Offroad	8	59	2	0	2	2	0	2	0	2	2E-01	3E-02	9E-02	3E-03	1E-02	5E-01	2E+00	8E-03	3E-01	24,534	0	1	24,705	2,387,506
2025Indian Canyon	2025	Indian Cany	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2025Indian Canyon	2025	Indian Cany	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Indian Canyon	2025	Indian Cany	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Whitmore Park	2025	Whitmore P	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2025Whitmore Park	2025	Whitmore P	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Whitmore Park	2025	Whitmore P	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Wells Draw	2025	Wells Draw	Earthwork	0	0	0	110	110	0	11	11	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	
2025Wells Draw	2025	Wells Draw	Onroad	4	2	0	3	3	0	0	1	0	1	3E-02	5E-03	7E-03	9E-04	3E-03	1E-01	4E-02	8E-03	9E-03	934	0	0	946	70,868
2025Wells Draw	2025	Wells Draw	Offroad	7	56	1	0	1	1	0	1	0	2	2E-01	3E-02	8E-02	3E-03	9E-03	4E-01	1E+00	7E-03	3E-01	24,464	0	1	24,635	2,385,982

TRR Project (Colstrip Alternative) Activity Data

Track length (2)	Miles	Miles per Day
Miles	42	0.068

Construction Schedule (1)	Value	Note
Months	20	*Assume 8 month construction period each year, with 31 days each month
Years	2.5	
Days per year	248	
Days total	620	

Ozone NAA

		1	2	3	4
Percent of Project Features (3)			Earthwork	Vehicles	Offroad
In nonattainment area	Indian Canyon		52%	27%	52%
	Whitmore Park		50%	58%	50%
	Wells Draw		33%	46%	33%
Out of nonattainment area	Indian Canyon		48%	73%	48%
	Whitmore Park		50%	42%	50%
	Wells Draw		67%	54%	67%

PM NAA

		1	2	3	4
Percent of Project Featu			Earthwork	Vehicles	Offroad
In nonattainment area	Indian Canyon		9%	4%	9%
	Whitmore Park		12%	7%	12%
	Wells Draw		7%	3%	7%
Out of nonattainment area	Indian Canyon		91%	96%	91%
	Whitmore Park		88%	93%	88%
	Wells Draw		93%	97%	93%

Sources

(1) Tongue River Railroad EIS, Construction Emissions Inventory. May 2014.
(2) Tongue River Railroad EIS, Project Description. https://www.stb.gov/decisions/readingroom.nsf/UNID/E7DE39D1F6FD4A9A85257E2A0049104D/$file/Ch02_Proposed+Action+and+Alternatives.pdf
(3) ICF. 2020. GIS. 'AirQuality_2020501

Uinta Annual Emissions (tons/year) (calc'd)

			Criteria Pollutants								Hazardous Air Pollutants							Greenhouse Gas Emissions				Energy (joules)		
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien‡thylbenzen‹ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum	Total	
2022Indian	2022	Indian Canyon				147.1	147		14.7	15																13
2022Whitr	2022	Whitmore Park				158.3	158		15.8	16																13
2022Wells	2022	Wells Draw				109.9	110		11.0	11																13
2023Indian	2023	Indian Canyon				147.1	147		14.7	15																14
2023Whitr	2023	Whitmore Park				158.3	158		15.8	16																14
2023Wells	2023	Wells Draw				109.9	110		11.0	11																14
2024Indian	2024	Indian Canyon				49.2	49		4.9	5																15
2024Whitr	2024	Whitmore Park				52.9	53		5.3	5																15
2024Wells	2024	Wells Draw				109.9	110		11.0	11																15
2025Indian	2025	Indian Canyon				-	-		-	-																15
2025Whitr	2025	Whitmore Park				-	-		-	-																15
2025Wells	2025	Wells Draw				109.9	110		11.0	11																15

TRR Project (Colstrip Alternative) Emission Rates (tons/mile) (calc'd)

	Criteria Pollutants								Hazardous Air Pollutants							Greenhouse Gas Emissions				Energy (joules)	
Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien‡thylbenzen‹ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum	Total
TRR Project				5	5		0.45	0.45															

TRR Project (Colstrip Alternative) Emission Rates (tons/mile) (calc'd)

Variable	Value	Unit	Notes
PM 10 Emission Factors by Activity (2)			
General Construction	0.13	lb/work-hr	work hr for all non-scraper-related offroad equip
Earthwork	49	lb/scraper-hr	work hr for all scraper-related offroad equip
Activity Rates (1)			
General Construction	81,502	Hours	See Surface_Off tab for equip assumptions
Earthwork	7,500	Hours	See Surface_Off tab for equip assumptions
PM10 Emissions			
Total	4.50	ton/track mile	calculated
PM2.5 Emissions			
PM2.5 to PM10 ratio	0.1	unitless	conversion factor (2)
Total	0.45	ton/track mile	calculated

Sources

(1) Tongue River Railroad EIS, Construction Emissions Inventory. May 2014.
(2) Western Governors' Association. 2006. WRAP Fugitive Dust Handbook. https://www.wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf

Construction_Surface
Surface_On

Uinta Annual Emissions (tons/year) (calc'd)

		Alternative	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
2022Indian Ca	2022	Indian Canyon	6.75	3.12	0.08	4.35	4.43	0.07	0.64	0.72	0.01	1.00	5.22E-02	8.29E-03	1.03E-02	1.87E-03	4.46E-03	1.47E-01	7.25E-02	1.26E-02	1.49E-02	1302	0.49	0.008	1317	98,806	13
2022Whitmor	2022	Whitmore Park	7.27	3.35	0.08	4.68	4.77	0.08	0.69	0.77	0.01	1.08	5.62E-02	8.92E-03	1.11E-02	2.01E-03	4.80E-03	1.58E-01	7.81E-02	1.36E-02	1.61E-02	1401	0.52	0.009	1417	106,317	13
2022Wells Dra	2022	Wells Draw	5.05	2.33	0.06	3.25	3.31	0.05	0.48	0.53	0.01	0.75	3.90E-02	6.19E-03	7.72E-03	1.40E-03	3.33E-03	1.10E-01	5.42E-02	9.45E-03	1.12E-02	973	0.36	0.006	984	73,830	13
2023Indian Ca	2023	Indian Canyon	6.37	2.89	0.07	4.35	4.42	0.06	0.64	0.71	0.01	0.92	5.00E-02	7.84E-03	9.82E-03	1.62E-03	4.31E-03	1.43E-01	6.32E-02	1.21E-02	1.41E-02	1284	0.50	0.008	1299	97,390	14
2023Whitmor	2023	Whitmore Park	6.86	3.11	0.07	4.68	4.76	0.07	0.69	0.76	0.01	0.99	5.38E-02	8.43E-03	1.06E-02	1.74E-03	4.64E-03	1.54E-01	6.80E-02	1.30E-02	1.52E-02	1381	0.54	0.009	1397	104,793	14
2023Wells Dra	2023	Wells Draw	4.76	2.16	0.05	3.25	3.30	0.05	0.48	0.53	0.01	0.69	3.74E-02	5.86E-03	7.34E-03	1.21E-03	3.22E-03	1.07E-01	4.73E-02	9.02E-03	1.05E-02	959	0.37	0.006	970	72,772	14
2024Indian Ca	2024	Indian Canyon	2.01	0.90	0.02	1.45	1.48	0.02	0.21	0.23	0.00	0.29	1.61E-02	2.49E-03	3.13E-03	4.71E-04	1.40E-03	4.66E-02	1.85E-02	3.86E-03	4.46E-03	423	0.17	0.003	428	32,112	15
2024Whitmor	2024	Whitmore Park	2.17	0.97	0.02	1.57	1.59	0.02	0.23	0.25	0.00	0.31	1.73E-02	2.68E-03	3.37E-03	5.07E-04	1.50E-03	5.02E-02	1.99E-02	4.16E-03	4.80E-03	455	0.18	0.003	461	34,553	15
2024Wells Dra	2024	Wells Draw	4.50	2.01	0.04	3.25	3.30	0.04	0.48	0.52	0.01	0.64	3.59E-02	5.57E-03	7.00E-03	1.05E-03	3.12E-03	1.04E-01	4.13E-02	8.64E-03	9.97E-03	946	0.38	0.006	958	71,787	15
2025Indian Ca	2025	Indian Canyon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00	0.000	0	0	15
2025Whitmor	2025	Whitmore Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00	0.000	0	0	15
2025Wells Dra	2025	Wells Draw	4.23	1.88	0.04	3.25	3.29	0.04	0.48	0.52	0.01	0.60	3.45E-02	5.28E-03	6.67E-03	9.10E-04	3.02E-03	1.01E-01	3.65E-02	8.26E-03	9.44E-03	934	0.38	0.006	946	70,868	15
		1 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

TRR Emission Rates (tons/mile)

		Vehicle	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
All	2022	All Vehicles	0.21	0.10	0.00	0.13	0.14	0.00	0.02	0.02	0.00	0.03	1.60E-03	2.54E-04	3.16E-04	5.71E-05	1.36E-04	4.50E-03	2.22E-03	3.87E-04	4.57E-04	40	0.01	0.000	40	3,023	
All	2023	All Vehicles	0.19	0.09	0.00	0.13	0.14	0.00	0.02	0.02	0.00	0.03	1.53E-03	2.40E-04	3.00E-04	4.95E-05	1.32E-04	4.38E-03	1.93E-03	3.69E-04	4.31E-04	39	0.02	0.000	40	2,980	
All	2024	All Vehicles	0.18	0.08	0.00	0.13	0.14	0.00	0.02	0.02	0.00	0.03	1.47E-03	2.28E-04	2.87E-04	4.32E-05	1.28E-04	4.27E-03	1.69E-03	3.54E-04	4.08E-04	39	0.02	0.000	39	2,939	
All	2025	All Vehicles	0.17	0.08	0.00	0.13	0.13	0.00	0.02	0.02	0.00	0.02	1.41E-03	2.16E-04	2.73E-04	3.73E-05	1.24E-04	4.15E-03	1.49E-03	3.38E-04	3.87E-04	38	0.02	0.000	39	2,902	
		1 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

TRR Emission Rates (tons/day)

		Vehicle	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
All	2022	Light Commercial Truck	0.01	0.00	0.00	0.0049	0.00	0.00	0.00	0.00	0.00	0.00	6.82E-05	1.08E-05	1.35E-05	2.42E-06	5.83E-06	1.92E-04	6.77E-05	1.65E-05	1.94E-05	1	0.00	0.000	1	100	
All	2022	Single Unit Short-haul Truck	0.00	0.00	0.00	0.0022	0.00	0.00	0.00	0.00	0.00	0.00	1.57E-05	2.51E-06	3.12E-06	6.07E-07	1.33E-06	4.35E-05	5.87E-05	3.80E-06	4.61E-06	1	0.00	0.000	1	62	
All	2022	Passenger Truck	0.00	0.00	0.00	0.0020	0.00	0.00	0.00	0.00	0.00	0.00	2.44E-05	3.85E-06	4.81E-06	8.41E-07	2.09E-06	6.90E-05	2.40E-05	5.89E-06	6.91E-06	1	0.00	0.000	1	43	
All	2023	Light Commercial Truck	0.01	0.00	0.00	0.0049	0.00	0.00	0.00	0.00	0.00	0.00	6.53E-05	1.02E-05	1.28E-05	2.10E-06	5.63E-06	1.87E-04	5.95E-05	1.58E-05	1.83E-05	1	0.00	0.000	1	98	
All	2023	Single Unit Short-haul Truck	0.00	0.00	0.00	0.0022	0.00	0.00	0.00	0.00	0.00	0.00	1.50E-05	2.38E-06	2.97E-06	5.32E-07	1.28E-06	4.24E-05	5.04E-05	3.64E-06	4.35E-06	1	0.00	0.000	1	62	
All	2023	Passenger Truck	0.00	0.00	0.00	0.0020	0.00	0.00	0.00	0.00	0.00	0.00	2.33E-05	3.64E-06	4.56E-06	7.26E-07	2.01E-06	6.71E-05	2.12E-05	5.62E-06	6.51E-06	1	0.00	0.000	1	42	
All	2024	Light Commercial Truck	0.01	0.00	0.00	0.0049	0.00	0.00	0.00	0.00	0.00	0.00	6.28E-05	9.72E-06	1.22E-05	1.83E-06	5.46E-06	1.82E-04	5.27E-05	1.51E-05	1.74E-05	1	0.00	0.000	1	96	
All	2024	Single Unit Short-haul Truck	0.00	0.00	0.00	0.0022	0.00	0.00	0.00	0.00	0.00	0.00	1.45E-05	2.27E-06	2.84E-06	4.63E-07	1.25E-06	4.15E-05	4.30E-05	3.49E-06	4.12E-06	1	0.00	0.000	1	62	
All	2024	Passenger Truck	0.00	0.00	0.00	0.0020	0.00	0.00	0.00	0.00	0.00	0.00	2.24E-05	3.45E-06	4.34E-06	6.28E-07	1.95E-06	6.53E-05	1.90E-05	5.37E-06	6.16E-06	1	0.00	0.000	1	41	
All	2025	Light Commercial Truck	0.01	0.00	0.00	0.0049	0.00	0.00	0.00	0.00	0.00	0.00	6.03E-05	9.23E-06	1.17E-05	1.59E-06	5.28E-06	1.77E-04	4.71E-05	1.44E-05	1.65E-05	1	0.00	0.000	1	94	
All	2025	Single Unit Short-haul Truck	0.00	0.00	0.00	0.0022	0.00	0.00	0.00	0.00	0.00	0.00	1.40E-05	2.17E-06	2.73E-06	4.03E-07	1.22E-06	4.08E-05	3.68E-05	3.37E-06	3.92E-06	1	0.00	0.000	1	61	
All	2025	Passenger Truck	0.00	0.00	0.00	0.0020	0.00	0.00	0.00	0.00	0.00	0.00	2.14E-05	3.25E-06	4.11E-06	5.31E-07	1.88E-06	6.32E-05	1.72E-05	5.11E-06	5.80E-06	1	0.00	0.000	1	41	
2022Wells Dra	2022	All Vehicles	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	1.08E-04	1.72E-05	2.14E-05	3.87E-06	9.24E-06	3.05E-04	1.50E-04	2.62E-05	3.09E-05	3	0.00	0.000	3	205	
2023Wells Dra	2023	All Vehicles	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	1.04E-04	1.62E-05	2.03E-05	3.36E-06	8.93E-06	2.97E-04	1.31E-04	2.50E-05	2.92E-05	3	0.00	0.000	3	202	
2024Wells Dra	2024	All Vehicles	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	9.97E-05	1.54E-05	1.94E-05	2.92E-06	8.66E-06	2.89E-04	1.15E-04	2.40E-05	2.77E-05	3	0.00	0.000	3	199	
2025Wells Dra	2025	All Vehicles	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	9.57E-05	1.47E-05	1.85E-05	2.53E-06	8.37E-06	2.81E-04	1.01E-04	2.29E-05	2.62E-05	3	0.00	0.000	3	197	
		1 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

TRR Project (Colstrip Alt) Vehicle List (1)

Onroad Vehicles Data (1)				
Vehicle Type	Total Hours per Piece of Equip.	Number of Pieces of Equipment	VMT (onroad veh only)	
			Total	Per Day
4,000 gal. water trucks	3,500	2	210,000	339
Fuel trucks	10,000	2	600,000	968
Mechanics service trucks	2,167	6	1,170,000	1,887
Pickups	2,500	15	562,500	907
Total	18,167	25	2,542,500	4,101

VMT by MOVES Vehicle Type

MOVES Vehicle Type	VMT per day
Light Commercial Truck	2,226
Single Unit Short-haul Truck	968
Passenger Truck	907

Road Paving for Dust (2)

Paved		
Indian Canyon	Whitmore Park	Wells Draw
70.75%	68.78%	79.87%
Unpaved		
Indian Canyon	Whitmore Park	Wells Draw
29.25%	31.22%	20.13%

Construction_Surface
Surface_On

MOVES2014a Emission Factors (3)

TRR Vehicle Type	MOVES Vehicle Type
4,000 gal. water trucks	Light Commercial Truck
Fuel trucks	Single Unit Short-haul Truck
Mechanics service trucks	Light Commercial Truck
Pickups	Passenger Truck

		Vehicle	Criteria Pollutants (g/mile)										Hazardous Air Pollutants (g/mile)									Greenhouse Gas Emissions (g/mile)				Energy (joules)	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Total Energy Consumption (joules)	
2022	Light Com	2022	Light Commercial Truck	3.66	1.35	0.03	0.02	0.05	0.03	0.00	0.03	0.00	0.53	2.78E-02	4.41E-03	5.50E-03	9.87E-04	2.38E-03	7.84E-02	2.76E-02	6.73E-03	7.92E-03	590	0.286	0.004	598	6.49E+06	Diesel Fuel
2022	Single Un	2022	Single Unit Short-haul Truck	1.92	1.67	0.06	0.08	0.14	0.06	0.01	0.07	0.01	0.29	1.47E-02	2.36E-03	2.93E-03	5.69E-04	1.24E-03	4.07E-02	5.50E-02	3.56E-03	4.32E-03	850	0.140	0.005	855	9.35E+06	Diesel Fuel
2022	Passenge	2022	Passenger Truck	2.96	1.36	0.03	0.03	0.05	0.02	0.00	0.03	0.01	0.46	2.44E-02	3.85E-03	4.81E-03	8.41E-04	2.09E-03	6.90E-02	2.40E-02	5.89E-03	6.91E-03	621	0.256	0.004	628	6.82E+06	Diesel Fuel
2023	Light Com	2023	Light Commercial Truck	3.45	1.25	0.03	0.02	0.05	0.02	0.00	0.03	0.00	0.49	2.66E-02	4.17E-03	5.22E-03	8.55E-04	2.29E-03	7.63E-02	2.43E-02	6.42E-03	7.47E-03	579	0.294	0.004	587	6.36E+06	Diesel Fuel
2023	Single Un	2023	Single Unit Short-haul Truck	1.86	1.54	0.05	0.08	0.14	0.05	0.01	0.06	0.01	0.27	1.41E-02	2.23E-03	2.79E-03	4.98E-04	1.20E-03	3.98E-02	4.72E-02	3.41E-03	4.08E-03	845	0.145	0.005	850	9.29E+06	Diesel Fuel
2023	Passenge	2023	Passenger Truck	2.77	1.27	0.02	0.03	0.05	0.02	0.00	0.02	0.01	0.43	2.33E-02	3.64E-03	4.56E-03	7.26E-04	2.01E-03	6.71E-02	2.12E-02	5.62E-03	6.51E-03	611	0.262	0.004	619	6.72E+06	Diesel Fuel
2024	Light Com	2024	Light Commercial Truck	3.25	1.17	0.02	0.02	0.05	0.02	0.00	0.02	0.00	0.46	2.56E-02	3.96E-03	4.99E-03	7.47E-04	2.22E-03	7.43E-02	2.15E-02	6.15E-03	7.09E-03	568	0.299	0.004	577	6.25E+06	Diesel Fuel
2024	Single Un	2024	Single Unit Short-haul Truck	1.81	1.42	0.04	0.08	0.13	0.04	0.01	0.05	0.01	0.25	1.36E-02	2.13E-03	2.66E-03	4.34E-04	1.17E-03	3.89E-02	4.03E-02	3.27E-03	3.86E-03	840	0.150	0.005	845	9.24E+06	Diesel Fuel
2024	Passenge	2024	Passenger Truck	2.58	1.19	0.02	0.03	0.05	0.02	0.00	0.02	0.01	0.39	2.24E-02	3.45E-03	4.34E-03	6.28E-04	1.95E-03	6.53E-02	1.90E-02	5.37E-03	6.16E-03	602	0.267	0.004	610	6.62E+06	Diesel Fuel
2025	Light Com	2025	Light Commercial Truck	3.04	1.09	0.02	0.02	0.05	0.02	0.00	0.02	0.00	0.43	2.46E-02	3.76E-03	4.75E-03	6.48E-04	2.15E-03	7.22E-02	1.92E-02	5.89E-03	6.71E-03	558	0.302	0.004	567	6.14E+06	Diesel Fuel
2025	Single Un	2025	Single Unit Short-haul Truck	1.76	1.32	0.04	0.08	0.12	0.03	0.01	0.05	0.01	0.23	1.32E-02	2.03E-03	2.56E-03	3.78E-04	1.14E-03	3.83E-02	3.45E-02	3.16E-03	3.67E-03	836	0.155	0.005	841	9.19E+06	Diesel Fuel
2025	Passenge	2025	Passenger Truck	2.39	1.12	0.02	0.03	0.04	0.02	0.00	0.02	0.00	0.36	2.14E-02	3.25E-03	4.11E-03	5.31E-04	1.88E-03	6.32E-02	1.72E-02	5.11E-03	5.80E-03	594	0.270	0.004	602	6.53E+06	Diesel Fuel
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	

AP-42 Road Dust Emission Factors (g/mile) (3)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)	
Road Type	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum	Total
Paved				0.81			0.20																		
Unpaved				6.51			0.65																		

Conversions

g to MT	0.000001
g to ton	1.10231E-06

Sources

(1) Tongue River Railroad EIS, Construction Emissions Inventory. May 2014.
(2) ICF. 2020. GIS. 'AirQuality_2020319'
(3) ICF. 2020. Vehicle and Equipment Emission Factors. Excel workbook.

Construction_Surface
Surface_Off

Uinta Annual Emissions (tons/year) (calc'd)

		Vehicle	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)	
2022India	2022	Indian Canyon	15.76	87.96	2.80	0.00	2.80	2.72	0.00	2.72	0.25	3.12	3.0E-01	5.8E-02	1.5E-01	5.5E-03	1.6E-02	8.4E-01	2.7E+00	1.3E-02	5.3E-01	32,904	0	1	33,134	3,202,083	13
2022Whit	2022	Whitmore Park	16.96	94.65	3.02	0.00	3.02	2.93	0.00	2.93	0.27	3.36	3.3E-01	6.3E-02	1.6E-01	5.9E-03	1.7E-02	9.0E-01	2.9E+00	1.4E-02	5.7E-01	35,405	0	1	35,653	3,445,501	13
2022Well	2022	Wells Draw	11.78	65.73	2.09	0.00	2.09	2.03	0.00	2.03	0.19	2.33	2.3E-01	4.4E-02	1.1E-01	4.1E-03	1.2E-02	6.2E-01	2.0E+00	1.0E-02	4.0E-01	24,586	0	1	24,759	2,392,669	13
2023India	2023	Indian Canyon	13.29	82.95	2.45	0.00	2.45	2.38	0.00	2.38	0.25	2.77	2.7E-01	5.1E-02	1.3E-01	4.8E-03	1.4E-02	7.4E-01	2.4E+00	1.2E-02	4.7E-01	32,813	0	1	33,042	3,199,345	14
2023Whit	2023	Whitmore Park	14.30	89.26	2.63	0.00	2.63	2.56	0.00	2.56	0.27	2.98	2.9E-01	5.5E-02	1.4E-01	5.2E-03	1.6E-02	8.0E-01	2.6E+00	1.3E-02	5.1E-01	35,307	0	1	35,554	3,442,555	14
2023Well	2023	Wells Draw	9.93	61.98	1.83	0.00	1.83	1.77	0.00	1.77	0.18	2.07	2.0E-01	3.8E-02	9.7E-02	3.6E-03	1.1E-02	5.5E-01	1.8E+00	8.9E-03	3.5E-01	24,518	0	1	24,690	2,390,623	14
2024India	2024	Indian Canyon	3.69	26.23	0.71	0.00	0.71	0.69	0.00	0.69	0.08	0.82	7.9E-02	1.5E-02	3.8E-02	1.4E-03	4.3E-03	2.2E-01	6.9E-01	3.5E-03	1.4E-01	10,974	0	0	11,051	1,067,976	15
2024Whit	2024	Whitmore Park	3.97	28.22	0.76	0.00	0.76	0.74	0.00	0.74	0.09	0.89	8.5E-02	1.6E-02	4.1E-02	1.5E-03	4.7E-03	2.3E-01	7.4E-01	3.8E-03	1.5E-01	11,809	0	0	11,891	1,149,162	15
2024Well	2024	Wells Draw	8.24	58.64	1.58	0.00	1.58	1.54	0.00	1.54	0.18	1.84	1.8E-01	3.4E-02	8.5E-02	3.2E-03	9.7E-03	4.9E-01	1.5E+00	7.9E-03	3.1E-01	24,534	0	1	24,705	2,387,506	15
2025India	2025	Indian Canyon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	-	-	-	-	16
2025Whit	2025	Whitmore Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	-	-	-	-	16
2025Well	2025	Wells Draw	6.86	55.94	1.38	0.00	1.38	1.34	0.00	1.34	0.18	1.66	1.6E-01	3.0E-02	7.6E-02	2.8E-03	8.8E-03	4.3E-01	1.3E+00	7.0E-03	2.8E-01	24,464	0	1	24,635	2,385,982	16
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

TRR Project (Colstrip Alt) Emission Rates (tons/mile)

	Equipment	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
		CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
2022	All Equipment	0.482	2.691	0.086	-	0.086	0.083	-	0.083	0.008	0.095	0.009254988	0.0017897	0.0044544	0.000167969	0.000492084	0.025557235	0.0832811	0.000411753	0.0163383	1007	7.02E-03	2.59E-02	1013.77139	97,971
2023	All Equipment	0.407	2.538	0.075	-	0.075	0.073	-	0.073	0.008	0.085	0.008199998	0.0015735	0.0039523	0.000147904	0.000440892	0.022616607	0.0726769	0.000364116	0.0144668	1004	6.24E-03	2.59E-02	1010.95976	97,887
2024	All Equipment	0.338	2.401	0.065	-	0.065	0.063	-	0.063	0.007	0.075	0.007266773	0.001385	0.003493	0.000130191	0.000396292	0.019943395	0.0629311	0.000321507	0.0127977	1005	5.50E-03	2.58E-02	1011.56485	97,759
2025	All Equipment	0.281	2.291	0.057	-	0.057	0.055	-	0.055	0.007	0.068	0.006485953	0.0012289	0.0031108	0.000115482	0.000359095	0.017735886	0.0548412	0.00028592	0.0114052	1002	7.25E-03	2.58E-02	1008.70349	97,697
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	

TRR Project (Colstrip Alt) Emission Rates (tons/day)

	Equipment	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
		CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
2022	Off-highway Trucks	0.011	0.103	0.002	-	0.002	0.002	-	0.002	0.000	0.003	0.000264486	4.703E-05	0.0001346	4.63013E-06	1.24604E-05	0.00730969	0.0019906	1.17309E-05	0.00	33	0.000	0.001	33.1258575	3,206
2022	Rubber Tire Loaders	0.004	0.011	0.001	-	0.001	0.001	-	0.001	0.000	0.001	5.24133E-05	1.025E-05	2.475E-05	9.65045E-07	2.80571E-06	0.000145253	0.0005664	2.36365E-06	9.224E-05	5	0.000	0.000	4.82307866	467
2022	Crawler Tractor/Dozers	0.002	0.006	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.35034E-05	4.226E-06	1.152E-05	4.14382E-07	1.18231E-06	6.4673E-05	0.0002601	1.06322E-06	4.138E-05	3	0.000	0.000	2.89277986	280
2022	Crawler Tractor/Dozers	0.002	0.006	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.35034E-05	4.226E-06	1.152E-05	4.14382E-07	1.18231E-06	6.4673E-05	0.0002601	1.06322E-06	4.138E-05	3	0.000	0.000	2.89277986	280
2022	Crawler Tractor/Dozers	0.001	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.49567E-05	2.69E-06	7.331E-06	2.63698E-07	7.52378E-07	4.11555E-05	0.0001655	6.76592E-07	2.634E-05	2	0.000	0.000	1.84085991	178
2022	Graders	0.001	0.003	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.67567E-05	2.917E-06	8.093E-06	2.81683E-07	9.53821E-07	4.49557E-05	0.0002072	7.52023E-07	2.928E-05	3	0.000	0.000	3.2743815	317
2022	Rollers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.67874E-06	8.469E-07	2.346E-06	8.36927E-08	2.15072E-07	1.3053E-05	5.073E-05	2.15028E-07	8.302E-06	0	0.000	0.000	0.37517951	36
2022	Off-highway Trucks	0.001	0.012	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.02766E-05	5.384E-06	1.54E-05	5.30028E-07	1.42639E-06	8.36767E-05	0.0002279	1.34288E-06	5.375E-05	4	0.000	0.000	3.79203895	367
2022	Rollers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.67874E-06	8.469E-07	2.346E-06	8.36927E-08	2.15072E-07	1.3053E-05	5.073E-05	2.15028E-07	8.302E-06	0	0.000	0.000	0.37517951	36
2022	Scrapers	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.00339E-05	1.757E-06	4.889E-06	1.61309E-07	4.92173E-07	2.63099E-05	0.0001153	4.62448E-07	1.758E-05	1	0.000	0.000	1.26429726	113
2022	Excavators	0.002	0.007	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.99318E-05	5.24E-06	1.462E-05	5.08618E-07	1.63067E-06	8.09505E-05	0.0003424	1.34872E-06	5.249E-05	6	0.000	0.000	5.59713567	542
2022	Rubber Tire Loaders	0.004	0.013	0.001	-	0.001	0.001	-	0.001	0.000	0.001	6.06088E-05	1.185E-05	2.863E-05	1.11594E-06	3.24442E-06	0.000167965	0.0006549	2.73324E-06	0.0001067	6	0.000	0.000	5.57723277	540
2022	Generator Sets	0.002	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.65321E-05	8.102E-06	1.629E-05	7.2283E-07	2.11956E-06	0.000102476	0.0002622	1.58763E-06	6.427E-05	1	0.000	0.000	0.73917832	72
2022	Bore/Drill Rigs	0.003	0.010	0.001	-	0.001	0.000	-	0.000	0.000	0.001	5.45909E-05	1.587E-05	1.943E-05	1.20314E-06	4.65442E-06	0.000152134	0.0004877	2.33835E-06	9.524E-05	2	0.000	0.000	2.10485689	204
2023	Off-highway Trucks	0.009	0.100	0.002	-	0.002	0.002	-	0.002	0.000	0.002	0.00023861	4.236E-05	0.0001211	4.16395E-06	1.14155E-05	0.000657799	0.0017772	1.05444E-05	0.0004231	33	0.000	0.001	33.1258667	3,206
2023	Rubber Tire Loaders	0.003	0.010	0.001	-	0.001	0.001	-	0.001	0.000	0.000	4.62248E-05	8.865E-06	2.198E-05	8.40946E-07	2.4629E-06	0.000127701	0.0005006	2.08622E-06	8.13E-05	5	0.000	0.000	4.82312905	467
2023	Crawler Tractor/Dozers	0.001	0.005	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.98984E-05	3.541E-06	9.722E-06	3.46678E-07	1.02988E-06	5.44185E-05	0.0002178	8.98129E-07	3.496E-05	3	0.000	0.000	2.8927889	280
2023	Crawler Tractor/Dozers	0.001	0.005	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.98984E-05	3.541E-06	9.722E-06	3.46678E-07	1.02988E-06	5.44185E-05	0.0002178	8.98129E-07	3.496E-05	3	0.000	0.000	2.8927889	280
2023	Crawler Tractor/Dozers	0.001	0.003	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.26626E-05	2.253E-06	6.187E-06	2.20614E-07	6.55379E-07	3.463E-05	0.0001386	5.71536E-07	2.225E-05	2	0.000	0.000	1.84086567	178
2023	Graders	0.001	0.003	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.32522E-05	2.28E-06	6.266E-06	2.1743E-07	8.21249E-07	3.4939E-05	0.0001646	5.86459E-07	2.297E-05	3	0.000	0.000	3.27437652	317
2023	Rollers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.10588E-06	7.393E-07	2.062E-06	7.2964E-08	1.90439E-07	1.14321E-05	4.291E-05	1.89445E-07	7.285E-06	0	0.000	0.000	0.37494297	36
2023	Off-highway Trucks	0.001	0.011	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.73146E-05	4.849E-06	1.386E-05	4.76663E-07	1.30677E-06	7.53006E-05	0.0002034	1.20706E-06	4.844E-05	4	0.000	0.000	3.79204001	367
2023	Rollers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.10588E-06	7.393E-07	2.062E-06	7.2964E-08	1.90439E-07	1.14321E-05	4.291E-05	1.89445E-07	7.285E-06	0	0.000	0.000	0.37494297	36
2023	Scrapers	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	7.66286E-06	1.313E-06	3.713E-06	1.28881E-07	4.10746E-07	2.08712E-05	8.819E-05	3.57012E-07	1.339E-05	1	0.000	0.000	1.08408543	109
2023	Excavators	0.001	0.006	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.54042E-05	4.417E-06	1.227E-05	4.25946E-07	1.45672E-06	6.80329E-05	0.0002804	1.1342E-06	4.435E-05	6	0.000	0.000	5.59712909	542
2023	Rubber Tire Loaders	0.004	0.012	0.001	-	0.001	0.001	-	0.001	0.000	0.001	5.34526E-05	1.025E-05	2.541E-05	9.72439E-07	2.84801E-06	0.000147669	0.0005789	2.41243E-06	9.402E-05	6	0.000	0.000	5.57729105	540
2023	Generator Sets	0.002	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.38511E-05	7.345E-06	1.562E-05	6.63966E-07	1.90559E-06	9.6929E-05	0.0002368	1.47541E-06	5.99E-05	1	0.000	0.000	0.72910351	71
2023	Bore/Drill Rigs	0.003	0.009	0.000	-	0.000	0.000	-	0.000	0.000	0.001	4.904E-05	1.41E-05	1.782E-05	1.06919E-06	4.1434E-06	0.00013652	0.0004331	2.11606E-06	8.577E-05	2	0.000	0.000	2.1050201	204
2024	Off-highway Trucks	0.007	0.098	0.002	-	0.002	0.002	-	0.002	0.000	0.002	0.000213156	3.777E-05	0.0001078	3.7063E-06	1.03796E-05	0.000585924	0.0015472	9.38361E-06	0.0003775	33	0.000	0.001	33.1259059	3,206
2024	Rubber Tire Loaders	0.003	0.009	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.06054E-05	7.629E-06	1.941E-05	7.2929E-07	2.16204E-06	0.000111727	0.0004407	1.82906E-06	7.134E-05	5	0.000	0.000	4.82316518	467
2024	Crawler Tractor/Dozers	0.001	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.69274E-05	2.983E-06	8.224E-06	2.91236E-07	9.08512E-07	4.59419E-05	0.0001815	7.58242E-07	2.965E-05	3	0.000	0.000	2.89278719	280
2024	Crawler Tractor/Dozers	0.001	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.69274E-05	2.983E-06	8.224E-06	2.91236E-07	9.08512E-07	4.59419E-05	0.0001815	7.58242E-07	2.965E-05	3	0.000	0.000	2.89278719	280
2024	Crawler Tractor/Dozers	0.001	0.003	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.0772E-05	1.898E-06	5.234E-06	1.85332E-07	5.78144E-07	2.92357E-05	0.0001155	4.82517E-07	1.887E-05	2	0.000	0.000	1.84086458	178
2024	Graders	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.08063E-05	1.835E-06	4.987E-06	1.72669E-07	7.29129E-07	2.79423E-05	0.0001326	4.69804E-07	1.857E-05	3	0.000	0.000	3.2743692	317
2024	Rollers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.56339E-06	6.38E-07	1.791E-06	6.28756E-08	1.67498E-07	9.89466E-06	3.564E-05	1.64721E-07	6.32E-06	0	0.000	0.000	0.37494417	36
2024	Off-highway Trucks	0.001	0.011	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.44008E-05	4.324E-06	1.234E-05	4.24274E-07	1.18819E-06	6.70729E-05	0.0001771	1.07418E-06	4.321E-05	4	0.000	0.000	3.79204449	367
2024	Rollers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.56339E-06	6.38E-07	1.791E-06	6.28756E-08	1.67498E-07	9.89466E-06	3.564E-05	1.64721E-07	6.32E-06	0	0.000	0.000	0.37494417	36
2024	Scrapers	0.001	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	6.23029E-06	1.072E-06	2.994E-06	1.03554E-07	3.58071E-07	1.67989E-05	7.078E-05	2.88971E-07	1.086E-05	1	0.000	0.000	1.11468511	99
2024	Excavators	0.001	0.005	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.13116E-05	3.674E-06	1.013E-05	3.51238E-07	1.30023E-06	5.63446E-05	0.0002236	9.38654E-07	3.698E-05	6	0.000	0.000	5.59711384	542
2024	Rubber Tire Loaders	0.003	0.011	0.001	-	0.001	0.001	-	0.001	0.000	0.000	4.69546E-05	8.821E-06	2.244E-05	8.43325E-07	2.5001E-06	0.000129197	0.0005096	2.11505E-06	8.25E-05	6	0.000	0.000	5.57733283	540
2024	Generator Sets	0.001	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.23384E-05	6.893E-06	1.478E-05	6.29537E-07	1.77687E-06	9.07218E-05	0.0002199	1.41377E-06	5.695E-05	1	0.000	0.000	0.73927224	72
2024	Bore/Drill Rigs	0.002	0.008	0.000	-	0.000	0.000	-	0.000	0.000	0.001	4.47077E-05	1.266E-05	1.651E-05	9.65615E-07	3.72118E-06	0.000124368	0.0003919	1.93796E-06	7.826E-05	2	0.000	0.000	2.10514456	204
2025	Off-highway Trucks	0.005	0.095	0.001	-	0.001	0.001	-	0.001	0.000	0.002	0.000191791	3.392E-05	9.661E-05	3.32261E-06	9.50399E-06	0.00052565	0.001352	8.41026E-06	0.0003391	33	-	0.00	33.13	3,206
2025	Rubber Tire Loaders	0.002	0.008	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.55129E-05	6.551E-06	1.702E-05	6.29802E-07	1.90377E-06	9.72789E-05	0.000385	1.60019E-06	6.23E-05	5	0.000	0.000	4.82319693	467
2025	Crawler Tractor/Dozers	0.001	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.46669E-05	2.567E-06	7.07E-06	2.49392E-07	8.20036E-07	3.94789E-05	0.0001539	6.49907E-07	2.56E-05	3	0.000	0.000	2.89278112	280
2025	Crawler Tractor/Dozers	0.001	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.46669E-05	2.567E-06	7.07E-06	2.49392E-07	8.20036E-07	3.94789E-05	0.0001539	6.49907E-07	2.56E-05	3	0.000	0.000	2.89278112	280
2025	Crawler Tractor/Dozers	0.001	0.003	0.000	-	0.000	0.000	-	0.000	0.000	0.000	9.33346E-06	1.633E-06	4.499E-06	1.58704E-07	5.21841E-07	2.51229E-05	9.796E-05	4.13577E-07	1.629E-05	2	0.000	0.000	1.84086071	178
2025	Graders	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	8.90596E-06	1.49E-06	3.99E-06	1.38E-07	6.57871E-07	2.25033E-05	0.0001075	3.78441E-07	1.514E-05	3	0.000	0.000	3.27436284	317
2025	Rollers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.1858E-06	5.678E-07	1.6E-06	5.58907E-08	1.51684E-07	8.82443E-06	3.055E-05	1.47466E-07	5.646E-06	0	0.000	0.000	0.3749448	36
2025	Off-highway Trucks	0.001	0.011	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.1955E-05	3.883E-06	1.106E-05	3.80351E-07	1.08796E-06	6.0173E-05	0.0001548	9.62754E-07	3.882E-05	4	0.000	0.000	3.79204601	367
2025	Rollers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.1858E-06	5.678E-07	1.6E-06	5.58907E-08	1.51684E-07	8.82443E-06	3.055E-05	1.47466E-07	5.646E-06	0	0.000	0.000	0.3749448	36
2025	Scrapers	0.000	0.001	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.63819E-06	8.12E-07	2.225E-06	7.77347E-08	2.81614E-07	1.24765E-05	5.384E-05	2.10984E-07	8.092E-06	1	0.000	0.000	0.92065925	95
2025	Excavators	0.001	0.005	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.85283E-05	3.169E-06	8.681E-06	3.00362E-07	1.19375E-06	4.83999E-05	0.0001871	8.06952E-07	3.198E-05	6	0.000	0.000	5.59710984	542
2025	Rubber Tire Loaders	0.003	0.010	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.10658E-05	7.575E-06	1.968E-05	7.2828E-07	2.20145E-06	0.00011249	0.0004452	1.8504E-06	7.204E-05	6	0.000	0.000	5.57736954	540
2025	Generator Sets	0.001	0.004	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.05532E-05	6.404E-06	1.411E-05	5.90446E-07	1.6407E-06	8.57125E-05	0.0002025	1.33984E-06	5.383E-05	1	0.000	0.000	0.73930965	72
2025	Bore/Drill Rigs	0.002	0.008	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.13819E-05	1.154E-05	1.551E-05	8.86084E-07	3.38943E-06	0.00011505	0.0003602	1.80066E-06	7.247E-05	2	0.000	0.000	2.10524118	204
2022	All Equipment	0.033	0.182	0.006	-	0.006	0.006	-	0.006	0.001	0.006	0.000626951	0.0001212	0.0003017	1.13786E-05	3.33347E-05	0.001731297	0.0056416	2.7893E-05	0.0011068	68	4.76E-04	1.75E-03	68.6748361	6,637
2023	All Equipment	0.028	0.172	0.005	-	0.005	0.005	-	0.005	0.001	0.006	0.000555484	0.0001066	0.0002677	1.00193E-05	2.98669E-05	0.001532093	0.0049233	2.46659E-05	0.00098	68	4.22E-04	1.75E-03	68.4843709	6,631
2024	All Equipment	0.023	0.163	0.004	-	0.004	0.004	-	0.004	0.001	0.005	0.000492265	9.382E-05	0.0002366	8.81936E-06	2.68456E-05	0.001351004	0.0042631	2.17795E-05	0.0008669	68	3.73E-04	1.75E-03	68.5253607	6,622
2025	All Equipment	0.019	0.155	0.004	-	0.004	0.004	-	0.004	0.001	0.005	0.000439371	8.325E-05	0.0002107	7.82294E-06	2.43258E-05	0.001201463	0.003715	1.93688E-05	0.0007726	68	4.91E-04	1.75E-03	68.3315269	6,618
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

TRR Project (Colstrip Alt) Equipment List (1)

0

Offroad Equipment Data (1)							
Construction Equipment	HP	Total Hours per Piece of Equip.		Number of Pieces of Equi	horsepower-hour from all equip/day	SCC Code	SCC levels 1-4 Concat
		Total	Per Day				
CAT 777 (100-ton haul trucks)	1000	5429	9	7	61,290	2270002051	Off-highway Vehicle Diesel-Construction and Mining Equipment-Off-highway Trucks
CAT 992 Front-end loader	1000	5500	9	1	8,871	2270002060	ent-Rubber Tire Loaders
CAT D10 dozer	600	5500	9	1	5,323	2270002069	-Crawler Tractor/Dozers
CAT D9 dozer	600	5500	9	1	5,323	2270002069	-Crawler Tractor/Dozers
CAT D8 dozers	300	3500	6	2	3,387	2270002069	-Crawler Tractor/Dozers
CAT 14G motor graders	300	4167	7	3	6,048	2270002048	ning Equipment-Graders
CAT 825 compactor	300	5500	9	1	2,661	2270002015	lining Equipment-Rollers
CAT 10,000 gal. water wagons	300	4833	8	3	7,016	2270002051	nent-Off-highway Trucks
Smooth drum roller	300	5500	9	1	2,661	2270002015	lining Equipment-Rollers
CAT 637 scrapers	600	2500	4	3	7,258	2270002018	ning Equipment-Scrapers
CAT 345 excavators	600	10600	17	1	10,258	2270002036	g Equipment-Excavators
CAT 966 front-end loaders	600	5300	9	2	10,258	2270002060	ent-Rubber Tire Loaders
Generator sets	100	2667	4	3	1,290	2270006005	uipment-Generator Sets
Rock drills	300	2667	4	3	3,871	2270002033	uipment-Bore/Drill Rigs

Offroad Equipment Data (1)	
	Hours/day-all equip pieces
General Construction	131.5
Scraper	12.1

MOVES2014a Emission Factors (2)

TRR Equipment Type	MOVES Equipment Type
CAT 777 (100-ton haul trucks)	Off-highway Trucks
CAT 992 Front-end loader	Rubber Tire Loaders
CAT D10 dozer	Crawler Tractor/Dozers
CAT D9 dozer	Crawler Tractor/Dozers
CAT D8 dozers	Crawler Tractor/Dozers
CAT 14G motor graders	Graders
CAT 825 compactor	Rollers
CAT 10,000 gal. water wagons	Off-highway Trucks
Smooth drum roller	Rollers
CAT 637 scrapers	Scrapers
CAT 345 excavators	Excavators
CAT 966 front-end loaders	Rubber Tire Loaders
Generator sets	Generator Sets
Rock drills	Bore/Drill Rigs

		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	Equipment	Criteria Pollutants (g/hp-hr)										Hazardous Air Pollutants (g/hp-hr)									Greenhouse Gas Emissions (g/hp-hr)				Energy	
		CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	BSFC (grams)	Diesel (gllaons)
2022	Off-highway Trucks	0.16	1.53	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.04	4E-03	7E-04	2E-03	7E-05	2E-04	1E-02	3E-02	2E-04	7E-03	537	0.003	0.014	540	168.283	0.05
2022	Rubber Tire Loaders	0.36	1.16	0.06	0.00	0.06	0.06	0.00	0.06	0.00	0.06	5E-03	1E-03	3E-03	1E-04	3E-04	1E-02	6E-02	2E-04	9E-03	540	0.005	0.014	544	169.288	0.05
2022	Crawler Tractor/Dozers	0.28	0.95	0.05	0.00	0.05	0.04	0.00	0.04	0.00	0.04	4E-03	7E-04	2E-03	7E-05	2E-04	1E-02	4E-02	2E-04	7E-03	540	0.004	0.014	543	169.221	0.05
2022	Crawler Tractor/Dozers	0.28	0.95	0.05	0.00	0.05	0.04	0.00	0.04	0.00	0.04	4E-03	7E-04	2E-03	7E-05	2E-04	1E-02	4E-02	2E-04	7E-03	540	0.004	0.014	543	169.221	0.05
2022	Crawler Tractor/Dozers	0.28	0.95	0.05	0.00	0.05	0.04	0.00	0.04	0.00	0.04	4E-03	7E-04	2E-03	7E-05	2E-04	1E-02	4E-02	2E-04	7E-03	540	0.004	0.014	543	169.221	0.05
2022	Graders	0.16	0.49	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	3E-03	4E-04	1E-03	4E-05	1E-04	7E-03	3E-02	1E-04	4E-03	538	0.002	0.014	541	168.557	0.05
2022	Rollers	0.11	0.33	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	8E-04	3E-05	7E-05	4E-03	2E-02	7E-05	3E-03	140	0.002	0.004	141	43.894	0.01
2022	Off-highway Trucks	0.16	1.53	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.04	4E-03	7E-04	2E-03	7E-05	2E-04	1E-02	3E-02	2E-04	7E-03	537	0.003	0.014	540	168.283	0.05
2022	Rollers	0.11	0.33	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	8E-04	3E-05	7E-05	4E-03	2E-02	7E-05	3E-03	140	0.002	0.004	141	43.894	0.01
2022	Scrapers	0.11	0.24	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1E-03	2E-04	6E-04	2E-05	6E-05	3E-03	1E-02	6E-05	2E-03	173	0.001	0.004	174	50.273	0.02
2022	Excavators	0.16	0.59	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	3E-03	5E-04	1E-03	4E-05	1E-04	7E-03	3E-02	1E-04	5E-03	542	0.003	0.014	546	169.886	0.05
2022	Rubber Tire Loaders	0.36	1.16	0.06	0.00	0.06	0.06	0.00	0.06	0.00	0.06	5E-03	1E-03	3E-03	1E-04	3E-04	1E-02	6E-02	2E-04	9E-03	540	0.005	0.014	544	169.288	0.05
2022	Generator Sets	1.19	3.10	0.19	0.00	0.19	0.18	0.00	0.18	0.00	0.27	3E-02	6E-03	1E-02	5E-04	1E-03	7E-02	2E-01	1E-03	5E-02	568	0.017	0.015	573	178.457	0.06
2022	Bore/Drill Rigs	0.66	2.31	0.12	0.00	0.12	0.11	0.00	0.11	0.00	0.15	1E-02	4E-03	5E-03	3E-04	1E-03	4E-02	1E-01	5E-04	2E-02	540	0.006	0.014	544	169.389	0.05
2023	Off-highway Trucks	0.13	1.48	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.04	4E-03	6E-04	2E-03	6E-05	2E-04	1E-02	3E-02	2E-04	6E-03	537	0.003	0.014	540	168.283	0.05
2023	Rubber Tire Loaders	0.31	1.06	0.05	0.00	0.05	0.05	0.00	0.05	0.00	0.05	5E-03	9E-04	2E-03	9E-05	3E-04	1E-02	5E-02	2E-04	8E-03	540	0.004	0.014	544	169.288	0.05
2023	Crawler Tractor/Dozers	0.23	0.84	0.04	0.00	0.04	0.04	0.00	0.04	0.00	0.03	3E-03	6E-04	2E-03	6E-05	2E-04	9E-03	4E-02	2E-04	6E-03	540	0.003	0.014	543	169.221	0.05
2023	Crawler Tractor/Dozers	0.23	0.84	0.04	0.00	0.04	0.04	0.00	0.04	0.00	0.03	3E-03	6E-04	2E-03	6E-05	2E-04	9E-03	4E-02	2E-04	6E-03	540	0.003	0.014	543	169.221	0.05
2023	Crawler Tractor/Dozers	0.23	0.84	0.04	0.00	0.04	0.04	0.00	0.04	0.00	0.03	3E-03	6E-04	2E-03	6E-05	2E-04	9E-03	4E-02	2E-04	6E-03	540	0.003	0.014	543	169.221	0.05
2023	Graders	0.12	0.39	0.03	0.00	0.03	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	9E-04	3E-05	1E-04	5E-03	2E-02	9E-05	3E-03	538	0.002	0.014	541	168.557	0.05
2023	Rollers	0.09	0.30	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.01	1E-03	3E-04	7E-04	2E-05	6E-05	4E-03	1E-02	6E-05	2E-03	140	0.001	0.004	141	43.866	0.01
2023	Off-highway Trucks	0.13	1.48	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.04	4E-03	6E-04	2E-03	6E-05	2E-04	1E-02	3E-02	2E-04	6E-03	537	0.003	0.014	540	168.283	0.05
2023	Rollers	0.09	0.30	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.01	1E-03	3E-04	7E-04	2E-05	6E-05	4E-03	1E-02	6E-05	2E-03	140	0.001	0.004	141	43.866	0.01
2023	Scrapers	0.08	0.19	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1E-03	2E-04	5E-04	2E-05	5E-05	3E-03	1E-02	4E-05	2E-03	148	0.001	0.004	149	48.213	0.01
2023	Excavators	0.13	0.52	0.03	0.00	0.03	0.02	0.00	0.02	0.00	0.02	2E-03	4E-04	1E-03	4E-05	1E-04	6E-03	2E-02	1E-04	4E-03	542	0.002	0.014	546	169.886	0.05
2023	Rubber Tire Loaders	0.31	1.06	0.05	0.00	0.05	0.05	0.00	0.05	0.00	0.05	5E-03	9E-04	2E-03	9E-05	3E-04	1E-02	5E-02	2E-04	8E-03	540	0.004	0.014	544	169.288	0.05
2023	Generator Sets	1.09	2.92	0.17	0.00	0.17	0.17	0.00	0.17	0.00	0.25	2E-02	5E-03	1E-02	5E-04	1E-03	7E-02	2E-01	1E-03	4E-02	561	0.017	0.014	565	176.012	0.05
2023	Bore/Drill Rigs	0.59	2.10	0.10	0.00	0.10	0.10	0.00	0.10	0.00	0.14	1E-02	3E-03	4E-03	3E-04	1E-03	3E-02	1E-01	5E-04	2E-02	540	0.005	0.014	544	169.389	0.05
2024	Off-highway Trucks	0.10	1.44	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.03	3E-03	6E-04	2E-03	5E-05	2E-04	9E-03	2E-02	1E-04	6E-03	537	0.003	0.014	540	168.283	0.05
2024	Rubber Tire Loaders	0.27	0.95	0.05	0.00	0.05	0.05	0.00	0.05	0.00	0.04	4E-03	8E-04	2E-03	7E-05	2E-04	1E-02	5E-02	2E-04	7E-03	540	0.004	0.014	544	169.288	0.05
2024	Crawler Tractor/Dozers	0.19	0.75	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	3E-03	5E-04	1E-03	5E-05	2E-04	8E-03	3E-02	1E-04	5E-03	540	0.003	0.014	543	169.221	0.05
2024	Crawler Tractor/Dozers	0.19	0.75	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	3E-03	5E-04	1E-03	5E-05	2E-04	8E-03	3E-02	1E-04	5E-03	540	0.003	0.014	543	169.221	0.05
2024	Crawler Tractor/Dozers	0.19	0.75	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	3E-03	5E-04	1E-03	5E-05	2E-04	8E-03	3E-02	1E-04	5E-03	540	0.003	0.014	543	169.221	0.05
2024	Graders	0.10	0.32	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	7E-04	3E-05	1E-04	4E-03	2E-02	7E-05	3E-03	538	0.001	0.014	541	168.557	0.05
2024	Rollers	0.08	0.27	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1E-03	2E-04	6E-04	2E-05	6E-05	3E-03	1E-02	6E-05	2E-03	140	0.001	0.004	141	43.866	0.01
2024	Off-highway Trucks	0.10	1.44	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.03	3E-03	6E-04	2E-03	5E-05	2E-04	9E-03	2E-02	1E-04	6E-03	537	0.003	0.014	540	168.283	0.05
2024	Rollers	0.08	0.27	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1E-03	2E-04	6E-04	2E-05	6E-05	3E-03	1E-02	6E-05	2E-03	140	0.001	0.004	141	43.866	0.01
2024	Scrapers	0.06	0.15	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	8E-04	1E-04	4E-04	1E-05	4E-05	2E-03	9E-03	4E-05	1E-03	153	0.001	0.004	154	43.944	0.01
2024	Excavators	0.10	0.45	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	9E-04	3E-05	1E-04	5E-03	2E-02	8E-05	3E-03	542	0.002	0.014	546	169.886	0.05
2024	Rubber Tire Loaders	0.27	0.95	0.05	0.00	0.05	0.05	0.00	0.05	0.00	0.04	4E-03	8E-04	2E-03	7E-05	2E-04	1E-02	5E-02	2E-04	7E-03	540	0.004	0.014	544	169.288	0.05
2024	Generator Sets	1.03	2.83	0.16	0.00	0.16	0.15	0.00	0.15	0.00	0.24	2E-02	5E-03	1E-02	4E-04	1E-03	6E-02	2E-01	1E-03	4E-02	569	0.016	0.015	573	178.457	0.06
2024	Bore/Drill Rigs	0.54	1.94	0.09	0.00	0.09	0.09	0.00	0.09	0.00	0.12	1E-02	3E-03	4E-03	2E-04	9E-04	3E-02	9E-02	5E-04	2E-02	540	0.005	0.014	544	169.389	0.05
2025	Off-highway Trucks	0.08	1.41	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.03	3E-03	5E-04	1E-03	5E-05	1E-04	8E-03	2E-02	1E-04	5E-03	537	0.002	0.014	540	168.283	0.05
2025	Rubber Tire Loaders	0.24	0.86	0.04	0.00	0.04	0.04	0.00	0.04	0.00	0.04	4E-03	7E-04	2E-03	6E-05	2E-04	1E-02	4E-02	2E-04	6E-03	540	0.003	0.014	544	169.288	0.05
2025	Crawler Tractor/Dozers	0.15	0.68	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	2E-03	4E-04	1E-03	4E-05	1E-04	7E-03	3E-02	1E-04	4E-03	540	0.002	0.014	543	169.221	0.05
2025	Crawler Tractor/Dozers	0.15	0.68	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	2E-03	4E-04	1E-03	4E-05	1E-04	7E-03	3E-02	1E-04	4E-03	540	0.002	0.014	543	169.221	0.05
2025	Crawler Tractor/Dozers	0.15	0.68	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	2E-03	4E-04	1E-03	4E-05	1E-04	7E-03	3E-02	1E-04	4E-03	540	0.002	0.014	543	169.221	0.05
2025	Graders	0.08	0.27	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	1E-03	2E-04	6E-04	2E-05	1E-04	3E-03	2E-02	6E-05	2E-03	538	0.001	0.014	541	168.557	0.05
2025	Rollers	0.06	0.25	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1E-03	2E-04	5E-04	2E-05	5E-05	3E-03	1E-02	5E-05	2E-03	140	0.001	0.004	141	43.866	0.01
2025	Off-highway Trucks	0.08	1.41	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.03	3E-03	5E-04	1E-03	5E-05	1E-04	8E-03	2E-02	1E-04	5E-03	537	0.002	0.014	540	168.283	0.05
2025	Rollers	0.06	0.25	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1E-03	2E-04	5E-04	2E-05	5E-05	3E-03	1E-02	5E-05	2E-03	140	0.001	0.004	141	43.866	0.01
2025	Scrapers	0.05	0.12	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	6E-04	1E-04	3E-04	1E-05	4E-05	2E-03	7E-03	3E-05	1E-03	126	0.001	0.003	127	42.071	0.01
2025	Excavators	0.08	0.40	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	8E-04	3E-05	1E-04	4E-03	2E-02	7E-05	3E-03	542	0.001	0.014	546	169.886	0.05
2025	Rubber Tire Loaders	0.24	0.86	0.04	0.00	0.04	0.04	0.00	0.04	0.00	0.04	4E-03	7E-04	2E-03	6E-05	2E-04	1E-02	4E-02	2E-04	6E-03	540	0.003	0.014	544	169.288	0.05
2025	Generator Sets	0.97	2.72	0.15	0.00	0.15	0.14	0.00	0.14	0.00	0.23	2E-02	5E-03	1E-02	4E-04	1E-03	6E-02	1E-01	9E-04	4E-02	569	0.016	0.015	573	178.457	0.06
2025	Bore/Drill Rigs	0.49	1.82	0.09	0.00	0.09	0.08	0.00	0.08	0.00	0.11	1E-02	3E-03	4E-03	2E-04	8E-04	3E-02	8E-02	4E-04	2E-02	540	0.005	0.014	544	169.389	0.05

Sources

(1) Tongue River Railroad EIS, Construction Emissions Inventory. May 2014.
(2) ICF. 2020. Vehicle and Equipment Emission Factors. Excel workbook.

Construction_Tunnels
PM NAA

Uinta Project Construction Emissions outside PM Nonattainment Area (tons/year) (calc'd)

				Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)	
2022Indian	2022 Indian Canv	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Indian	2022 Indian Canv	Onroad	53	39	1	58	60	1	57	58	0	8	4E-01	6E-02	8E-02	2E-02	3E-02	1E+00	1E+00	1E-01	1E-01	17,859	4	0	17,980	1,672,730	3
2022Indian	2022 Indian Canv	Offroad	17	68	3	0	3	3	0	3	0	3	3E-01	7E-02	1E-01	6E-03	2E-02	9E-01	3E+00	1E-02	5E-01	20,893	0	1	21,041	1,836,329	4
2022Indian	2022 Indian Canv	Locomotive	0	0	0	0	0	0	0	0	0	0	6E-05	7E-06	7E-05	3E-06	3E-08	9E-05	3E-03	7E-06	2E-06	12	0	0	12	1,203	5
2022Whitm	2022 Whitmore	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Whitm	2022 Whitmore	Onroad	65	46	1	74	75	1	72	73	0	9	5E-01	8E-02	1E-01	2E-02	4E-02	1E+00	1E+00	1E-01	1E-01	22,488	5	0	22,645	2,106,265	3
2022Whitm	2022 Whitmore	Offroad	22	89	4	0	4	4	0	4	0	4	4E-01	9E-02	2E-01	8E-03	2E-02	1E+00	4E+00	2E-02	7E-01	27,509	0	1	27,703	2,417,773	4
2022Whitm	2022 Whitmore	Locomotive	0	0	0	0	0	0	0	0	0	0	8E-05	9E-06	9E-05	4E-06	4E-08	1E-04	3E-03	9E-06	2E-06	16	0	0	16	1,583	5
2022Wells	2022 Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Wells	2022 Wells Draw	Onroad	37	25	1	44	45	1	43	44	0	5	3E-01	4E-02	6E-02	9E-03	2E-02	8E-01	7E-01	7E-02	8E-02	13,360	3	0	13,456	1,251,305	3
2022Wells	2022 Wells Draw	Offroad	13	51	2	0	2	2	0	2	0	3	2E-01	5E-02	1E-01	5E-03	1E-02	7E-01	2E+00	1E-02	4E-01	15,761	0	0	15,872	1,385,237	4
2022Wells	2022 Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907	5
2023Indian	2023 Indian Canv	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Indian	2023 Indian Canv	Onroad	55	41	1	63	65	1	62	63	0	8	4E-01	7E-02	8E-02	2E-02	4E-02	1E+00	1E+00	1E-01	1E-01	18,590	4	0	18,715	1,741,143	3
2023Indian	2023 Indian Canv	Offroad	14	63	2	0	2	2	0	2	0	3	3E-01	6E-02	1E-01	5E-03	2E-02	8E-01	2E+00	1E-02	5E-01	20,530	0	1	20,676	1,821,404	4
2023Indian	2023 Indian Canv	Locomotive	0	0	0	0	0	0	0	0	0	0	6E-05	7E-06	7E-05	3E-06	3E-08	9E-05	3E-03	7E-06	2E-06	12	0	0	12	1,203	5
2023Whitm	2023 Whitmore	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Whitm	2023 Whitmore	Onroad	67	48	2	81	82	1	78	80	0	10	5E-01	8E-02	1E-01	2E-02	4E-02	1E+00	1E+00	1E-01	1E-01	23,408	5	0	23,571	2,192,454	3
2023Whitm	2023 Whitmore	Offroad	19	83	3	0	3	3	0	3	0	4	4E-01	8E-02	2E-01	7E-03	2E-02	1E+00	3E+00	2E-02	6E-01	27,031	0	1	27,223	2,398,122	4
2023Whitm	2023 Whitmore	Locomotive	0	0	0	0	0	0	0	0	0	0	8E-05	9E-06	9E-05	4E-06	4E-08	1E-04	3E-03	9E-06	2E-06	16	0	0	16	1,583	5
2023Wells	2023 Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Wells	2023 Wells Draw	Onroad	39	26	1	48	49	1	47	48	0	5	3E-01	5E-02	6E-02	9E-03	3E-02	9E-01	7E-01	7E-02	8E-02	13,907	3	0	14,006	1,302,535	3
2023Wells	2023 Wells Draw	Offroad	11	47	2	0	2	2	0	2	0	2	2E-01	4E-02	9E-02	4E-03	1E-02	6E-01	2E+00	9E-03	4E-01	15,487	0	0	15,597	1,373,978	4
2023Wells	2023 Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907	5
2024Indian	2024 Indian Canv	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Indian	2024 Indian Canv	Onroad	20	15	1	18	19	0	17	18	0	3	2E-01	2E-02	3E-02	6E-03	1E-02	4E-01	5E-01	4E-02	5E-02	6,881	1	0	6,927	644,517	3
2024Indian	2024 Indian Canv	Offroad	4	20	1	0	1	1	0	1	0	1	8E-02	2E-02	4E-02	2E-03	5E-03	2E-01	7E-01	4E-03	1E-01	6,779	0	0	6,828	607,364	4
2024Indian	2024 Indian Canv	Locomotive	0	0	0	0	0	0	0	0	0	0	2E-05	2E-06	2E-05	1E-06	1E-08	3E-05	8E-04	2E-06	6E-07	4	0	0	4	402	5
2024Whitm	2024 Whitmore	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Whitm	2024 Whitmore	Onroad	25	18	1	23	23	1	22	23	0	4	2E-01	3E-02	4E-02	7E-03	2E-02	5E-01	5E-01	5E-02	5E-02	8,665	2	0	8,725	811,618	3
2024Whitm	2024 Whitmore	Offroad	5	26	1	0	1	1	0	1	0	1	1E-01	2E-02	5E-02	2E-03	6E-03	3E-01	9E-01	5E-03	2E-01	8,925	0	0	8,989	799,677	4
2024Whitm	2024 Whitmore	Locomotive	0	0	0	0	0	0	0	0	0	0	3E-05	3E-06	3E-05	1E-06	1E-08	4E-05	1E-03	3E-06	7E-07	5	0	0	5	529	5
2024Wells	2024 Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Wells	2024 Wells Draw	Onroad	43	29	1	41	42	1	40	40	0	6	3E-01	5E-02	6E-02	1E-02	3E-02	9E-01	8E-01	8E-02	9E-02	15,403	3	0	15,513	1,442,660	3
2024Wells	2024 Wells Draw	Offroad	9	45	2	0	2	2	0	2	0	2	2E-01	4E-02	8E-02	3E-03	1E-02	5E-01	2E+00	8E-03	3E-01	15,299	0	0	15,409	1,370,742	4
2024Wells	2024 Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907	5
2025Indian	2025 Indian Canv	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Indian	2025 Indian Canv	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	3
2025Indian	2025 Indian Canv	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	4
2025Indian	2025 Indian Canv	Locomotive	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	5
2025Whitm	2025 Whitmore	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Whitm	2025 Whitmore	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	3
2025Whitm	2025 Whitmore	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	4
2025Whitm	2025 Whitmore	Locomotive	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	5
2025Wells	2025 Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Wells	2025 Wells Draw	Onroad	41	27	1	41	42	1	40	40	0	6	3E-01	5E-02	6E-02	9E-03	3E-02	9E-01	7E-01	8E-02	9E-02	15,305	3	0	15,416	1,433,455	3
2025Wells	2025 Wells Draw	Offroad	8	40	1	0	1	1	0	1	0	2	2E-01	3E-02	7E-02	3E-03	9E-03	4E-01	1E+00	7E-03	3E-01	14,760	0	0	14,863	1,289,999	4
2025Wells	2025 Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907	5

Construction_Tunnels
PM NAA

Uinta Annual Emissions outside PM Nonattainment Area (tons/year) (calc'd)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
2022India	2022	Indian Can	69.96	107.29	4.18	59.40	63.58	3.99	56.90	60.88	0.31	11.27	7.17E-01	1.33E-01	2.19E-01	2.14E-02	5.28E-02	2.00E+00	3.99E+00	1.12E-01	6.66E-01	38,765	4	1	39,033	3,510,262
2022Whit	2022	Whitmore I	87.06	135.31	5.20	75.43	80.63	4.97	72.21	77.19	0.40	13.73	9.05E-01	1.68E-01	2.80E-01	2.50E-02	6.66E-02	2.54E+00	4.97E+00	1.38E-01	8.62E-01	50,013	5	1	50,364	4,525,621
2022Wells	2022	Wells Draw	50.15	76.62	2.89	45.10	47.99	2.77	43.20	45.97	0.23	7.72	5.20E-01	9.60E-02	1.60E-01	1.35E-02	3.85E-02	1.47E+00	2.77E+00	7.89E-02	4.93E-01	29,130	3	0	29,337	2,637,449
2023India	2023	Indian Can	69.50	104.10	3.84	64.58	68.42	3.65	62.01	65.66	0.32	11.16	6.94E-01	1.27E-01	2.07E-01	2.13E-02	5.19E-02	1.94E+00	3.65E+00	1.14E-01	6.04E-01	39,132	4	1	39,404	3,563,750
2023Whit	2023	Whitmore I	86.27	130.86	4.74	82.00	86.74	4.52	78.70	83.22	0.41	13.54	8.72E-01	1.59E-01	2.64E-01	2.47E-02	6.52E-02	2.46E+00	4.52E+00	1.40E-01	7.80E-01	50,455	5	1	50,811	4,592,159
2023Wells	2023	Wells Draw	49.72	74.03	2.62	49.03	51.65	2.50	47.08	49.59	0.24	7.60	5.01E-01	9.10E-02	1.51E-01	1.32E-02	3.77E-02	1.43E+00	2.50E+00	8.03E-02	4.46E-01	29,403	3	0	29,613	2,677,420
2024India	2024	Indian Can	24.39	35.01	1.22	18.37	19.59	1.16	17.45	18.61	0.11	3.89	2.35E-01	4.22E-02	6.73E-02	7.43E-03	1.80E-02	6.57E-01	1.16E+00	4.12E-02	1.87E-01	13,664	1	0	13,759	1,252,284
2024Whit	2024	Whitmore I	30.19	43.80	1.49	23.33	24.82	1.42	22.15	23.57	0.14	4.70	2.95E-01	5.28E-02	8.52E-02	8.57E-03	2.25E-02	8.30E-01	1.42E+00	5.03E-02	2.40E-01	17,596	2	0	17,720	1,611,824
2024Wells	2024	Wells Draw	52.07	74.04	2.45	41.73	44.18	2.34	39.65	41.99	0.25	7.89	5.07E-01	9.01E-02	1.46E-01	1.37E-02	3.90E-02	1.44E+00	2.34E+00	8.65E-02	4.11E-01	30,712	3	0	30,931	2,814,309
2025India	2025	Indian Can	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Whit	2025	Whitmore I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Wells	2025	Wells Draw	49.13	67.52	2.09	41.73	43.82	1.99	39.65	41.63	0.24	7.25	4.70E-01	8.25E-02	1.31E-01	1.19E-02	3.68E-02	1.35E+00	1.99E+00	8.25E-02	3.62E-01	30,074	4	0	30,288	2,724,362

Uinta Annual Emissions inside PM Nonattainment Area (tons/year) (calc'd)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
2022India	2022	Indian Can	2.14	1.59	0.05	2.35	2.40	0.05	2.28	2.33	0.01	0.32	1.63E-02	2.61E-03	3.25E-03	6.19E-04	1.39E-03	4.55E-02	4.97E-02	3.96E-03	4.77E-03	719	0	0	724	67,333
2022Whit	2022	Whitmore I	5.14	3.65	0.12	5.86	5.98	0.11	5.70	5.81	0.02	0.74	3.91E-02	6.18E-03	7.72E-03	1.35E-03	3.35E-03	1.11E-01	1.07E-01	9.46E-03	1.12E-02	1,782	0	0	1,794	166,893
2022Wells	2022	Wells Draw	1.25	0.85	0.03	1.48	1.50	0.02	1.44	1.46	0.00	0.17	9.51E-03	1.48E-03	1.86E-03	2.97E-04	8.21E-04	2.73E-02	2.30E-02	2.29E-03	2.68E-03	446	0	0	449	41,780
2023India	2023	Indian Can	2.22	1.65	0.06	2.55	2.61	0.05	2.49	2.54	0.01	0.33	1.70E-02	2.71E-03	3.37E-03	6.43E-04	1.44E-03	4.72E-02	5.17E-02	4.11E-03	4.95E-03	748	0	0	753	70,087
2023Whit	2023	Whitmore I	5.34	3.79	0.12	6.38	6.50	0.11	6.22	6.33	0.02	0.77	4.07E-02	6.42E-03	8.02E-03	1.40E-03	3.48E-03	1.15E-01	1.11E-01	9.83E-03	1.17E-02	1,855	0	0	1,868	173,722
2023Wells	2023	Wells Draw	1.30	0.88	0.03	1.61	1.64	0.02	1.57	1.59	0.00	0.18	9.87E-03	1.54E-03	1.93E-03	3.09E-04	8.53E-04	2.84E-02	2.40E-02	2.38E-03	2.79E-03	464	0	0	468	43,491
2024India	2024	Indian Can	0.82	0.61	0.02	0.72	0.75	0.02	0.70	0.72	0.00	0.12	6.24E-03	9.99E-04	1.24E-03	2.37E-04	5.29E-04	1.74E-02	1.92E-02	1.51E-03	1.82E-03	277	0	0	279	25,944
2024Whit	2024	Whitmore I	1.96	1.40	0.04	1.81	1.85	0.04	1.75	1.79	0.01	0.28	1.50E-02	2.36E-03	2.95E-03	5.17E-04	1.28E-03	4.24E-02	4.12E-02	3.62E-03	4.30E-03	687	0	0	691	64,310
2024Wells	2024	Wells Draw	1.43	0.98	0.03	1.37	1.39	0.03	1.32	1.35	0.00	0.20	1.09E-02	1.70E-03	2.13E-03	3.40E-04	9.39E-04	3.13E-02	2.66E-02	2.62E-03	3.07E-03	514	0	0	518	48,169
2025India	2025	Indian Can	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Whit	2025	Whitmore I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Wells	2025	Wells Draw	1.38	0.91	0.02	1.37	1.39	0.02	1.32	1.34	0.00	0.19	1.05E-02	1.62E-03	2.04E-03	2.96E-04	9.15E-04	3.06E-02	2.28E-02	2.52E-03	2.92E-03	511	0	0	515	47,862

Construction_Tunnels
Ozone NAA

Uinta Project Construction Emissions outside Ozone Nonattainment Area (tons/year) (calc'd)

				Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)	
2022India	2022 Indian Can	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022India	2022 Indian Can	Onroad	40	30	1	44	45	1	43	44	0	6	3E-01	5E-02	6E-02	1E-02	3E-02	9E-01	9E-01	7E-02	9E-02	13,516	3	0	13,607	1,265,913	3
2022India	2022 Indian Can	Offroad	17	68	3	0	3	3	0	3	0	3	3E-01	7E-02	1E-01	6E-03	2E-02	9E-01	3E+00	1E-02	5E-01	20,893	0	1	21,041	1,836,329	4
2022India	2022 Indian Can	Locomotive	0	0	0	0	0	0	0	0	0	0	6E-05	7E-06	7E-05	3E-06	3E-08	9E-05	3E-03	7E-06	2E-06	12	0	0	12	1,203	5
2022Whitı	2022 Whitmore	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Whitı	2022 Whitmore	Onroad	30	21	1	34	34	1	33	33	0	4	2E-01	4E-02	4E-02	8E-03	2E-02	6E-01	6E-01	5E-02	6E-02	10,265	2	0	10,336	961,413	3
2022Whitı	2022 Whitmore	Offroad	22	89	4	0	4	4	0	4	0	4	4E-01	9E-02	2E-01	8E-03	2E-02	1E+00	4E+00	2E-02	7E-01	27,509	0	1	27,703	2,417,773	4
2022Whitı	2022 Whitmore	Locomotive	0	0	0	0	0	0	0	0	0	0	8E-05	9E-06	9E-05	4E-06	4E-08	1E-04	3E-03	9E-06	2E-06	16	0	0	16	1,583	5
2022Wells	2022 Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2022Wells	2022 Wells Draw	Onroad	21	14	0	25	25	0	24	24	0	3	2E-01	2E-02	3E-02	5E-03	1E-02	5E-01	4E-01	4E-02	4E-02	7,470	2	0	7,524	699,684	3
2022Wells	2022 Wells Draw	Offroad	13	51	2	0	2	2	0	2	0	3	2E-01	5E-02	1E-01	5E-03	1E-02	7E-01	2E+00	1E-02	4E-01	15,761	0	0	15,872	1,385,237	4
2022Wells	2022 Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907	5
2023India	2023 Indian Can	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023India	2023 Indian Can	Onroad	42	31	1	48	49	1	47	48	0	6	3E-01	5E-02	6E-02	1E-02	3E-02	9E-01	1E+00	8E-02	9E-02	14,069	3	0	14,163	1,317,688	3
2023India	2023 Indian Can	Offroad	14	63	2	0	2	2	0	2	0	3	3E-01	6E-02	1E-01	5E-03	2E-02	8E-01	2E+00	1E-02	5E-01	20,530	0	1	20,676	1,821,404	4
2023India	2023 Indian Can	Locomotive	0	0	0	0	0	0	0	0	0	0	6E-05	7E-06	7E-05	3E-06	3E-08	9E-05	3E-03	7E-06	2E-06	12	0	0	12	1,203	5
2023Whitı	2023 Whitmore	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Whitı	2023 Whitmore	Onroad	31	22	1	37	37	1	36	36	0	4	2E-01	4E-02	5E-02	8E-03	2E-02	7E-01	6E-01	6E-02	7E-02	10,685	2	0	10,759	1,000,754	3
2023Whitı	2023 Whitmore	Offroad	19	83	3	0	3	3	0	3	0	4	4E-01	8E-02	2E-01	7E-03	2E-02	1E+00	3E+00	2E-02	6E-01	27,031	0	1	27,223	2,398,122	4
2023Whitı	2023 Whitmore	Locomotive	0	0	0	0	0	0	0	0	0	0	8E-05	9E-06	9E-05	4E-06	4E-08	1E-04	3E-03	9E-06	2E-06	16	0	0	16	1,583	5
2023Wells	2023 Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2023Wells	2023 Wells Draw	Onroad	22	15	0	27	27	0	26	27	0	3	2E-01	3E-02	3E-02	5E-03	1E-02	5E-01	4E-01	4E-02	5E-02	7,776	2	0	7,832	728,329	3
2023Wells	2023 Wells Draw	Offroad	11	47	2	0	2	2	0	2	0	2	2E-01	4E-02	9E-02	4E-03	1E-02	6E-01	2E+00	9E-03	4E-01	15,487	0	0	15,597	1,373,978	4
2023Wells	2023 Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907	5
2024India	2024 Indian Can	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024India	2024 Indian Can	Onroad	15	11	0	14	14	0	13	14	0	2	1E-01	2E-02	2E-02	4E-03	1E-02	3E-01	4E-01	3E-02	3E-02	5,208	1	0	5,243	487,767	3
2024India	2024 Indian Can	Offroad	4	20	1	0	1	1	0	1	0	1	8E-02	2E-02	4E-02	2E-03	5E-03	2E-01	7E-01	4E-03	1E-01	6,779	0	0	6,828	607,364	4
2024India	2024 Indian Can	Locomotive	0	0	0	0	0	0	0	0	0	0	2E-05	2E-06	2E-05	1E-06	1E-08	3E-05	8E-04	2E-06	6E-07	4	0	0	4	402	5
2024Whitı	2024 Whitmore	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Whitı	2024 Whitmore	Onroad	11	8	0	10	11	0	10	10	0	2	9E-02	1E-02	2E-02	3E-03	7E-03	2E-01	2E-01	2E-02	2E-02	3,955	1	0	3,983	370,466	3
2024Whitı	2024 Whitmore	Offroad	5	26	1	0	1	1	0	1	0	1	1E-01	2E-02	5E-02	2E-03	6E-03	3E-01	9E-01	5E-03	2E-01	8,925	0	0	8,989	799,677	4
2024Whitı	2024 Whitmore	Locomotive	0	0	0	0	0	0	0	0	0	0	3E-05	3E-06	3E-05	1E-06	1E-08	4E-05	1E-03	3E-06	7E-07	5	0	0	5	529	5
2024Wells	2024 Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2024Wells	2024 Wells Draw	Onroad	24	16	0	23	23	0	22	23	0	3	2E-01	3E-02	4E-02	6E-03	2E-02	5E-01	4E-01	4E-02	5E-02	8,613	2	0	8,674	806,682	3
2024Wells	2024 Wells Draw	Offroad	9	45	2	0	2	2	0	2	0	2	2E-01	4E-02	8E-02	3E-03	1E-02	5E-01	2E+00	8E-03	3E-01	15,299	0	0	15,409	1,370,742	4
2024Wells	2024 Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907	5
2025India	2025 Indian Can	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025India	2025 Indian Can	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	3
2025India	2025 Indian Can	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	4
2025India	2025 Indian Can	Locomotive	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	5
2025Whitı	2025 Whitmore	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Whitı	2025 Whitmore	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	3
2025Whitı	2025 Whitmore	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	4
2025Whitı	2025 Whitmore	Locomotive	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	5
2025Wells	2025 Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0	2
2025Wells	2025 Wells Draw	Onroad	23	15	0	23	23	0	22	22	0	3	2E-01	3E-02	3E-02	5E-03	2E-02	5E-01	4E-01	4E-02	5E-02	8,558	2	0	8,620	801,535	3
2025Wells	2025 Wells Draw	Offroad	8	40	1	0	1	1	0	1	0	2	2E-01	3E-02	7E-02	3E-03	9E-03	4E-01	1E+00	7E-03	3E-01	14,760	0	0	14,863	1,289,999	4
2025Wells	2025 Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907	5

Construction_Tunnels
Ozone NAA

Uinta Annual Emissions outside Ozone Nonattainment Area (tons/year) (calc'd)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
2022India	2022	Indian Cany	57.05	97.70	3.85	45.22	49.07	3.69	43.10	46.79	0.27	9.34	6.19E-01	1.17E-01	2.00E-01	1.77E-02	4.45E-02	1.72E+00	3.69E+00	8.82E-02	6.37E-01	34,421	3	1	34,660	3,103,445
2022Whit	2022	Whitmore I	51.81	110.31	4.40	35.23	39.63	4.24	33.08	37.32	0.29	8.66	6.36E-01	1.26E-01	2.27E-01	1.58E-02	4.36E-02	1.78E+00	4.24E+00	7.26E-02	7.85E-01	37,790	2	1	38,056	3,380,769
2022Wells	2022	Wells Draw	33.65	65.40	2.56	25.59	28.14	2.46	24.21	26.68	0.18	5.43	3.94E-01	7.64E-02	1.36E-01	9.55E-03	2.77E-02	1.11E+00	2.46E+00	4.87E-02	4.58E-01	23,240	2	0	23,406	2,085,828
2023India	2023	Indian Cany	56.09	94.11	3.50	49.14	52.64	3.34	46.97	50.30	0.27	9.15	5.91E-01	1.10E-01	1.87E-01	1.74E-02	4.32E-02	1.65E+00	3.34E+00	8.94E-02	5.74E-01	34,611	3	1	34,852	3,140,294
2023Whit	2023	Whitmore I	49.66	104.84	3.91	38.22	42.13	3.75	36.04	39.79	0.29	8.27	5.93E-01	1.15E-01	2.09E-01	1.51E-02	4.14E-02	1.67E+00	3.75E+00	7.25E-02	7.00E-01	37,732	3	1	37,999	3,400,460
2023Wells	2023	Wells Draw	32.58	62.36	2.28	27.78	30.06	2.19	26.38	28.57	0.18	5.22	3.71E-01	7.06E-02	1.26E-01	9.16E-03	2.65E-02	1.05E+00	2.19E+00	4.89E-02	4.09E-01	23,272	2	0	23,438	2,103,214
2024India	2024	Indian Cany	19.45	31.32	1.10	13.99	15.09	1.04	13.22	14.26	0.10	3.16	1.98E-01	3.62E-02	5.97E-02	6.00E-03	1.48E-02	5.52E-01	1.04E+00	3.20E-02	1.76E-01	11,991	1	0	12,074	1,095,534
2024Whit	2024	Whitmore I	16.71	34.18	1.18	10.92	12.10	1.14	10.15	11.29	0.10	2.76	1.92E-01	3.65E-02	6.49E-02	5.02E-03	1.37E-02	5.40E-01	1.14E+00	2.55E-02	2.11E-01	12,886	1	0	12,978	1,170,672
2024Wells	2024	Wells Draw	33.19	61.12	2.07	23.70	25.77	1.99	22.22	24.21	0.19	5.27	3.63E-01	6.77E-02	1.18E-01	9.19E-03	2.66E-02	1.03E+00	1.99E+00	5.19E-02	3.71E-01	23,921	2	0	24,092	2,178,332
2025India	2025	Indian Cany	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Whit	2025	Whitmore I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Wells	2025	Wells Draw	30.87	55.49	1.76	23.70	25.46	1.68	22.22	23.91	0.18	4.80	3.32E-01	6.11E-02	1.04E-01	7.97E-03	2.47E-02	9.46E-01	1.68E+00	4.92E-02	3.23E-01	23,327	2	0	23,492	2,092,442

Uinta Annual Emissions inside Ozone Nonattainment Area (tons/year) (calc'd)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
2022India	2022	Indian Cany	15.05	11.19	0.38	16.52	16.90	0.35	16.08	16.43	0.05	2.25	1.15E-01	1.84E-02	2.29E-02	4.36E-03	9.75E-03	3.20E-01	3.50E-01	2.79E-02	3.36E-02	5,062	1	0	5,096	474,150
2022Whit	2022	Whitmore I	40.39	28.65	0.91	46.07	46.98	0.84	44.84	45.68	0.13	5.81	3.08E-01	4.86E-02	6.07E-02	1.06E-02	2.63E-02	8.71E-01	8.39E-01	7.44E-02	8.83E-02	14,005	3	0	14,103	1,311,745
2022Wells	2022	Wells Draw	17.75	12.07	0.36	20.99	21.35	0.33	20.43	20.76	0.06	2.46	1.35E-01	2.11E-02	2.64E-02	4.22E-03	1.17E-02	3.88E-01	3.27E-01	3.25E-02	3.81E-02	6,336	1	0	6,381	593,402
2023India	2023	Indian Cany	15.63	11.64	0.40	17.99	18.39	0.36	17.53	17.89	0.05	2.33	1.19E-01	1.91E-02	2.38E-02	4.53E-03	1.01E-02	3.33E-01	3.64E-01	2.90E-02	3.49E-02	5,269	1	0	5,305	493,542
2023Whit	2023	Whitmore I	41.95	29.81	0.95	50.16	51.11	0.87	48.88	49.75	0.13	6.04	3.20E-01	5.05E-02	6.30E-02	1.10E-02	2.74E-02	9.05E-01	8.73E-01	7.72E-02	9.17E-02	14,578	3	0	14,680	1,365,422
2023Wells	2023	Wells Draw	18.44	12.56	0.37	22.85	23.23	0.34	22.27	22.61	0.06	2.56	1.40E-01	2.19E-02	2.74E-02	4.38E-03	1.21E-02	4.03E-01	3.41E-01	3.38E-02	3.96E-02	6,595	1	0	6,642	617,696
2024India	2024	Indian Cany	5.75	4.31	0.15	5.10	5.25	0.14	4.93	5.07	0.02	0.86	4.39E-02	7.03E-03	8.74E-03	1.67E-03	3.73E-03	1.22E-01	1.35E-01	1.07E-02	1.28E-02	1,951	0	0	1,964	182,694
2024Whit	2024	Whitmore I	15.44	11.03	0.35	14.23	14.58	0.32	13.75	14.07	0.05	2.22	1.18E-01	1.86E-02	2.32E-02	4.06E-03	1.01E-02	3.33E-01	3.24E-01	2.84E-02	3.38E-02	5,397	1	0	5,434	505,462
2024Wells	2024	Wells Draw	20.31	13.90	0.41	19.39	19.80	0.38	18.74	19.12	0.07	2.82	1.54E-01	2.41E-02	3.02E-02	4.83E-03	1.33E-02	4.44E-01	3.78E-01	3.72E-02	4.36E-02	7,304	2	0	7,356	684,147
2025India	2025	Indian Cany	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Whit	2025	Whitmore I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Wells	2025	Wells Draw	19.64	12.94	0.35	19.39	19.75	0.32	18.74	19.07	0.07	2.63	1.49E-01	2.30E-02	2.90E-02	4.20E-03	1.30E-02	4.35E-01	3.24E-01	3.58E-02	4.15E-02	7,258	2	0	7,311	679,782

Construction_Tunnels
Tunnel_Sum

Uinta Annual Emissions (tons/year) (calc'd)

		Alternative	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
2022Indian	2022	Indian Canyon	72.10	108.88	4.23	61.75	65.98	4.04	59.18	63.22	0.32	11.59	7.34E-01	1.36E-01	2.22E-01	2.21E-02	5.42E-02	2.04E+00	4.04E+00	1.16E-01	6.71E-01	39,484	4	1	39,757	3,577,595
2022Whitm	2022	Whitmore Park	92.20	138.96	5.31	81.30	86.61	5.08	77.92	83.00	0.42	14.47	9.44E-01	1.74E-01	2.88E-01	2.64E-02	6.99E-02	2.65E+00	5.08E+00	1.47E-01	8.74E-01	51,795	5	1	52,159	4,692,515
2022Wells	2022	Wells Draw	51.40	77.47	2.91	46.58	49.49	2.79	44.64	47.43	0.24	7.89	5.29E-01	9.75E-02	1.62E-01	1.38E-02	3.93E-02	1.50E+00	2.79E+00	8.12E-02	4.96E-01	29,576	3	0	29,787	2,679,229
2023Indian	2023	Indian Canyon	71.72	105.75	3.89	67.13	71.03	3.70	64.50	68.20	0.32	11.49	7.11E-01	1.30E-01	2.11E-01	2.19E-02	5.34E-02	1.99E+00	3.70E+00	1.18E-01	6.09E-01	39,881	4	1	40,157	3,633,836
2023Whitm	2023	Whitmore Park	91.61	134.65	4.86	88.39	93.24	4.63	84.92	89.55	0.42	14.31	9.13E-01	1.66E-01	2.72E-01	2.61E-02	6.87E-02	2.58E+00	4.63E+00	1.50E-01	7.92E-01	52,310	6	1	52,678	4,765,882
2023Wells	2023	Wells Draw	51.01	74.91	2.65	50.64	53.29	2.53	48.65	51.18	0.24	7.78	5.11E-01	9.25E-02	1.53E-01	1.35E-02	3.86E-02	1.46E+00	2.53E+00	8.27E-02	4.49E-01	29,867	3	0	30,081	2,720,910
2024Indian	2024	Indian Canyon	25.20	35.62	1.24	19.10	20.34	1.18	18.15	19.33	0.11	4.02	2.42E-01	4.32E-02	6.85E-02	7.67E-03	1.85E-02	6.74E-01	1.18E+00	4.27E-02	1.89E-01	13,941	1	0	14,038	1,278,228
2024Whitm	2024	Whitmore Park	32.15	45.21	1.54	25.14	26.68	1.46	23.90	25.36	0.15	4.99	3.10E-01	5.51E-02	8.81E-02	9.08E-03	2.38E-02	8.73E-01	1.46E+00	5.40E-02	2.45E-01	18,283	2	0	18,412	1,676,133
2024Wells	2024	Wells Draw	53.50	75.02	2.48	43.10	45.58	2.37	40.97	43.33	0.26	8.09	5.18E-01	9.18E-02	1.48E-01	1.40E-02	3.99E-02	1.47E+00	2.37E+00	8.91E-02	4.14E-01	31,226	4	0	31,449	2,862,479
2025Indian	2025	Indian Canyon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Whitm	2025	Whitmore Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0
2025Wells	2025	Wells Draw	50.51	68.43	2.11	43.09	45.21	2.01	40.97	42.98	0.25	7.44	4.81E-01	8.41E-02	1.33E-01	1.22E-02	3.77E-02	1.38E+00	2.01E+00	8.50E-02	3.65E-01	30,585	4	0	30,803	2,772,224

Uinta Project Construction Emissions (tons/year) (calc'd)

			Alternative	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
				CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
2022Indian Canyon	2022	Indian Canyon	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2022Indian Canyon	2022	Indian Canyon	Onroad	55	41	1	61	62	1	59	60	0	8	4E-01	7E-02	8E-02	2E-02	4E-02	1E+00	1E+00	1E-01	1E-01	18,578	4	0	18,703	1,740,063
2022Indian Canyon	2022	Indian Canyon	Offroad	17	68	3	0	3	3	0	3	0	3	3E-01	7E-02	1E-01	6E-03	2E-02	9E-01	3E+00	1E-02	5E-01	20,893	0	1	21,041	1,836,329
2022Indian Canyon	2022	Indian Canyon	Locomotive	0	0	0	0	0	0	0	0	0	0	6E-05	7E-06	7E-05	3E-06	3E-08	9E-05	3E-03	7E-06	2E-06	12	0	0	12	1,203
2022Whitmore Par	2022	Whitmore Park	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2022Whitmore Par	2022	Whitmore Park	Onroad	70	50	2	80	81	1	78	79	0	10	5E-01	8E-02	1E-01	2E-02	5E-02	2E+00	1E+00	1E-01	2E-01	24,270	5	0	24,439	2,273,158
2022Whitmore Par	2022	Whitmore Park	Offroad	22	89	4	0	4	4	0	4	0	4	4E-01	9E-02	2E-01	8E-03	2E-02	1E+00	4E+00	2E-02	7E-01	27,509	0	1	27,703	2,417,773
2022Whitmore Par	2022	Whitmore Park	Locomotive	0	0	0	0	0	0	0	0	0	0	8E-05	9E-06	9E-05	4E-06	4E-08	1E-04	3E-03	9E-06	2E-06	16	0	0	16	1,583
2022Wells Draw	2022	Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2022Wells Draw	2022	Wells Draw	Onroad	39	26	1	46	47	1	45	45	0	5	3E-01	5E-02	6E-02	9E-03	3E-02	8E-01	7E-01	7E-02	8E-02	13,806	3	0	13,905	1,293,085
2022Wells Draw	2022	Wells Draw	Offroad	13	51	2	0	2	2	0	2	0	3	2E-01	5E-02	1E-01	5E-03	1E-02	7E-01	2E+00	1E-02	4E-01	15,761	0	0	15,872	1,385,237
2022Wells Draw	2022	Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907
2023Indian Canyon	2023	Indian Canyon	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2023Indian Canyon	2023	Indian Canyon	Onroad	57	43	1	66	67	1	64	66	0	9	4E-01	7E-02	9E-02	2E-02	4E-02	1E+00	1E+00	1E-01	1E-01	19,338	4	0	19,468	1,811,230
2023Indian Canyon	2023	Indian Canyon	Offroad	14	63	2	0	2	2	0	2	0	3	3E-01	6E-02	1E-01	5E-03	2E-02	8E-01	2E+00	1E-02	5E-01	20,530	0	1	20,676	1,821,404
2023Indian Canyon	2023	Indian Canyon	Locomotive	0	0	0	0	0	0	0	0	0	0	6E-05	7E-06	7E-05	3E-06	3E-08	9E-05	3E-03	7E-06	2E-06	12	0	0	12	1,203
2023Whitmore Par	2023	Whitmore Park	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2023Whitmore Par	2023	Whitmore Park	Onroad	73	52	2	87	89	2	85	86	0	10	6E-01	9E-02	1E-01	2E-02	5E-02	2E+00	2E+00	1E-01	2E-01	25,263	5	0	25,439	2,366,176
2023Whitmore Par	2023	Whitmore Park	Offroad	19	83	3	0	3	3	0	3	0	4	4E-01	8E-02	2E-01	7E-03	2E-02	1E+00	3E+00	2E-02	6E-01	27,031	0	1	27,223	2,398,122
2023Whitmore Par	2023	Whitmore Park	Locomotive	0	0	0	0	0	0	0	0	0	0	8E-05	9E-06	9E-05	4E-06	4E-08	1E-04	3E-03	9E-06	2E-06	16	0	0	16	1,583
2023Wells Draw	2023	Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2023Wells Draw	2023	Wells Draw	Onroad	40	27	1	50	51	1	49	49	0	6	3E-01	5E-02	6E-02	1E-02	3E-02	9E-01	7E-01	7E-02	9E-02	14,371	3	0	14,474	1,346,025
2023Wells Draw	2023	Wells Draw	Offroad	11	47	2	0	2	2	0	2	0	2	2E-01	4E-02	9E-02	4E-03	1E-02	6E-01	2E+00	9E-03	4E-01	15,487	0	0	15,597	1,373,978
2023Wells Draw	2023	Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907
2024Indian Canyon	2024	Indian Canyon	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2024Indian Canyon	2024	Indian Canyon	Onroad	21	16	1	19	19	0	18	19	0	3	2E-01	3E-02	3E-02	6E-03	1E-02	4E-01	5E-01	4E-02	5E-02	7,158	1	0	7,206	670,461
2024Indian Canyon	2024	Indian Canyon	Offroad	4	20	1	0	1	1	0	1	0	1	8E-02	2E-02	4E-02	2E-03	5E-03	2E-01	7E-01	4E-03	1E-01	6,779	0	0	6,828	607,364
2024Indian Canyon	2024	Indian Canyon	Locomotive	0	0	0	0	0	0	0	0	0	0	2E-05	2E-06	2E-05	1E-06	1E-08	3E-05	8E-04	2E-06	6E-07	4	0	0	4	402
2024Whitmore Par	2024	Whitmore Park	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2024Whitmore Par	2024	Whitmore Park	Onroad	27	19	1	25	25	1	24	24	0	4	2E-01	3E-02	4E-02	7E-03	2E-02	6E-01	6E-01	5E-02	6E-02	9,352	2	0	9,417	875,928
2024Whitmore Par	2024	Whitmore Park	Offroad	5	26	1	0	1	1	0	1	0	1	1E-01	2E-02	5E-02	2E-03	6E-03	3E-01	9E-01	5E-03	2E-01	8,925	0	0	8,989	799,677
2024Whitmore Par	2024	Whitmore Park	Locomotive	0	0	0	0	0	0	0	0	0	0	3E-05	3E-06	3E-05	1E-06	1E-08	4E-05	1E-03	3E-06	7E-07	5	0	0	5	529
2024Wells Draw	2024	Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2024Wells Draw	2024	Wells Draw	Onroad	44	30	1	42	43	1	41	42	0	6	3E-01	5E-02	7E-02	1E-02	3E-02	1E+00	8E-01	8E-02	1E-01	15,917	3	0	16,030	1,490,829
2024Wells Draw	2024	Wells Draw	Offroad	9	45	2	0	2	2	0	2	0	2	2E-01	4E-02	8E-02	3E-03	1E-02	5E-01	2E+00	8E-03	3E-01	15,299	0	0	15,409	1,370,742
2024Wells Draw	2024	Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907
2025Indian Canyon	2025	Indian Canyon	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Indian Canyon	2025	Indian Canyon	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Indian Canyon	2025	Indian Canyon	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Indian Canyon	2025	Indian Canyon	Locomotive	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Whitmore Par	2025	Whitmore Park	Earthwork	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Whitmore Par	2025	Whitmore Park	Onroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Whitmore Par	2025	Whitmore Park	Offroad	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Whitmore Par	2025	Whitmore Park	Locomotive	0	0	0	0	0	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Wells Draw	2025	Wells Draw	Earthwork	0	0	0	1	1	0	0	0	0	0	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0	0	0	0	0
2025Wells Draw	2025	Wells Draw	Onroad	43	28	1	42	43	1	41	42	0	6	3E-01	5E-02	6E-02	9E-03	3E-02	9E-01	7E-01	8E-02	9E-02	15,816	4	0	15,931	1,481,317
2025Wells Draw	2025	Wells Draw	Offroad	8	40	1	0	1	1	0	1	0	2	2E-01	3E-02	7E-02	3E-03	9E-03	4E-01	1E+00	7E-03	3E-01	14,760	0	0	14,863	1,289,999
2025Wells Draw	2025	Wells Draw	Locomotive	0	0	0	0	0	0	0	0	0	0	4E-05	5E-06	5E-05	2E-06	2E-08	7E-05	2E-03	5E-06	1E-06	9	0	0	9	907

Uinta Annual Emissions (tons/year) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy			
	Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum E	Total Energy Consumption (joules)	BSFC (grams)	Diesel Fuel (gallons
2022Indian	2022 Indian Canyon				1.1	1.1	-	0.2	0.2																			
2022Whitm	2022 Whitmore Park				1.5	1.5	-	0.2	0.2																			
2022Wells	2022 Wells Draw				0.8	0.8	-	0.1	0.1																			
2023Indian	2023 Indian Canyon				1.1	1.1	-	0.2	0.2																			
2023Whitm	2023 Whitmore Park				1.5	1.5	-	0.2	0.2																			
2023Wells	2023 Wells Draw				0.8	0.8	-	0.1	0.1																			
2024Indian	2024 Indian Canyon				0.4	0.4	-	0.1	0.1																			
2024Whitm	2024 Whitmore Park				0.5	0.5	-	0.1	0.1																			
2024Wells	2024 Wells Draw				0.8	0.8	-	0.1	0.1																			
2025Indian	2025 Indian Canyon				-	-	-	-	-																			
2025Whitm	2025 Whitmore Park				-	-	-	-	-																			
2025Wells	2025 Wells Draw				0.8	0.8	-	0.1	0.1																			
		8																										

HSR PB (Tunnel 4) Emission Rates (tons/mile) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy			
Activity	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum E	Total Energy Consumption (joules)	BSFC (grams)	Diesel Fuel (gallons
All				0.6010	0.6010	0.0000	0.0879	0.0879																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

HSR PB (Tunnel 4) Emission Rates (tons/day) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy			
Activity	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum E	Total Energy Consumption (joules)	BSFC (grams)	Diesel Fuel (gallons
Grading				0.0003	0.0003		0.00003	0.00003																			
Cut/Fill				0.0020	0.0020		0.00030	0.00030																			
Total	0	0	0	0.0022	0.0022	0.00	0.00033	0.00033	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HSR PB (Tunnel 4) Activity List (1)

Volume of Spoils (CY)	1,159,854
Volume of Spoils (CY/day)	19,080
Days of Spoils	61
Mass of Spoils (ton/day)	24,120
Gradings (ac/day)	0.50

PM Emission Factors (1)

	Uncontrolled	Controlled
PM10 G (lb/acre)	1.06E+00	5.30E-01
PM2.5 G (lb/acre)	1.15E-01	5.73E-02
PM10 C/F (lb/ton)	1.64E-04	8.19E-05
PM2.5 C/F (lb/ton)	2.48E-05	1.24E-05

Controls

Watering	50% grading	WARP Handbook, Table 3-7, 3.2-hour watering interval

Conversions

ton per cy conversion	1.2641662	CalEEMod
lb per ton conversion	0.0005	

Sources

(1) HSR PB, Construction Emissions Inventory and Construction Data. December 2018. SR14Revised Fugitive Dust.xlsx.

Construction_Tunnels
Tunnel_Loco

Uinta Annual Emissions (tons/year) (calc'd)

			Criteria Pollutants									
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
=B7&C7	2022	Indian Canyon	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B8&C8	2022	Whitmore Park	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B9&C9	2022	Wells Draw	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B10&C10	2023	Indian Canyon	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B11&C11	2023	Whitmore Park	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B12&C12	2023	Wells Draw	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B13&C13	2024	Indian Canyon	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B14&C14	2024	Whitmore Park	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B15&C15	2024	Wells Draw	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B16&C16	2025	Indian Canyon	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B17&C17	2025	Whitmore Park	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I
=B18&C18	2025	Wells Draw	=INDEX('G:\Sacramento\LGT-A	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I

HSR PB (Tunnel 4) Emission Rates (tons/mile) (calc'd)

	Locomotives	Criteria Pollutants									
		CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
2022		=D33/HSR_Miles_per_Day	=E33/HSR_Miles_per_	=F33/HSR_Miles_per_Da	=G33/HSR_Miles_per_D	=H33/HSR_Miles_per_	=I33/HSR_Miles_per_D	=J33/HSR_Miles_per_D	=K33/HSR_Miles_per_	=L33/HSR_Miles_per_	=M33/HSR_Miles_per_Da
2023		=D34/HSR_Miles_per_Day	=E34/HSR_Miles_per_	=F34/HSR_Miles_per_Da	=G34/HSR_Miles_per_D	=H34/HSR_Miles_per_	=I34/HSR_Miles_per_D	=J34/HSR_Miles_per_D	=K34/HSR_Miles_per_	=L34/HSR_Miles_per_	=M34/HSR_Miles_per_Da
2024		=D35/HSR_Miles_per_Day	=E35/HSR_Miles_per_	=F35/HSR_Miles_per_Da	=G35/HSR_Miles_per_D	=H35/HSR_Miles_per_	=I35/HSR_Miles_per_D	=J35/HSR_Miles_per_D	=K35/HSR_Miles_per_	=L35/HSR_Miles_per_	=M35/HSR_Miles_per_Da
2025		=D36/HSR_Miles_per_Day	=E36/HSR_Miles_per_	=F36/HSR_Miles_per_Da	=G36/HSR_Miles_per_D	=H36/HSR_Miles_per_	=I36/HSR_Miles_per_D	=J36/HSR_Miles_per_D	=K36/HSR_Miles_per_	=L36/HSR_Miles_per_	=M36/HSR_Miles_per_Da
1	*=B28+1*	*=C28+1*	*=D28+1*	*=E28+1*	*=F28+1*	*=G28+1*	*=H28+1*	*=I28+1*	*=J28+1*	*=K28+1*	*=L28+1*

HSR PB (Tunnel 4) Emission Rates (tons/day) (calc'd)

	Criteria Pollutants									
Year	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
2022	=D52*g_to_ton*$M$41	=E52*g_to_ton*$M$4	=F52*g_to_ton*$M$41	=G52*g_to_ton*$M$41	=H52*g_to_ton*$M$4	=I52*g_to_ton*$M$4	=J52*g_to_ton*$M$4	=K52*g_to_ton*$M$4	=L52*g_to_ton*$M$4	=M52*g_to_ton*$M$41
2023	=D53*g_to_ton*$M$41	=E53*g_to_ton*$M$4	=F53*g_to_ton*$M$41	=G53*g_to_ton*$M$41	=H53*g_to_ton*$M$4	=I53*g_to_ton*$M$4	=J53*g_to_ton*$M$4	=K53*g_to_ton*$M$4	=L53*g_to_ton*$M$4	=M53*g_to_ton*$M$41
2024	=D54*g_to_ton*$M$41	=E54*g_to_ton*$M$4	=F54*g_to_ton*$M$41	=G54*g_to_ton*$M$41	=H54*g_to_ton*$M$4	=I54*g_to_ton*$M$4	=J54*g_to_ton*$M$4	=K54*g_to_ton*$M$4	=L54*g_to_ton*$M$4	=M54*g_to_ton*$M$41
2025	=D55*g_to_ton*$M$41	=E55*g_to_ton*$M$4	=F55*g_to_ton*$M$41	=G55*g_to_ton*$M$41	=H55*g_to_ton*$M$4	=I55*g_to_ton*$M$4	=J55*g_to_ton*$M$4	=K55*g_to_ton*$M$4	=L55*g_to_ton*$M$4	=M55*g_to_ton*$M$41
1	*=C37+1*	*=D37+1*	*=E37+1*	*=F37+1*	*=G37+1*	*=H37+1*	*=I37+1*	*=J37+1*	*=K37+1*	*=L37+1*

HSR PB (Tunnel 4) Activity List (1)

Code	Lookup	Year	Days	Loco	Engine Tier	#/day	hrs/day	HP	LF	Fuel	Fuel (gal/day)
=Track_Activity!A25	=Track_Activity!B25	=Track_Activity!C25	=Track_Activity!D25	=Track_Activity!E25	n/a	=Track_Activity!G25	=Track_Activity!H25	=Track_Activity!I25	=Track_Activity!J25	=Track_Activity!K25	=Track_Activity!L25

Locomotive Tier 2 Emission Factors (4, unless otherwise noted)

			g/bhp-hr	*g/gal*	*g/gal*	*g/gal*	*g/gal*	*g/gal*	*g/gal*	*g/gal*	*g/gal*	*g/gal*
			Criteria Pollutants									
		Rail Grinding Train	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Various efs as denotd in above row	2022		1.28	89	2	0	=F48+G48	=F48*0.97	0	=I48+J48	0.093888	=3.2*1.053
	2023		=$D$48	84	1.9	0	=F49+G49	=F49*0.97	0	=I49+J49	=$L$48	=3*1.053
	2024		=$D$48	79	1.7	0	=F50+G50	=F50*0.97	0	=I50+J50	=$L$48	=2.8*1.053
	2025		=$D$48	74	1.6	0	=F51+G51	=F51*0.97	0	=I51+J51	=$L$48	=2.6*1.053
Efs adjusted to g/gal	2022		=D48/$C$62	=E48	=F48	=G48	=H48	=I48	=J48	=K48	=L48	=M48
	2023		=D49/$C$62	=E49	=F49	=G49	=H49	=I49	=J49	=K49	=L49	=M49
	2024		=D50/$C$62	=E50	=F50	=G50	=H50	=I50	=J50	=K50	=L50	=M50
	2025		=D51/$C$62	=E51	=F51	=G51	=H51	=I51	=J51	=K51	=L51	=M51

Conversions

ton per cy conversion (2)	=1.2641662
lb per ton conversion	=1/2000
Fuel oil no. 6 and residual oil heating value (MMBtu/10^3 gal) (7))	150
Large line-haul (bhp-hr/gal) (4)	20.8
gram to pounds	453.592
grams to tons	0.00000110231
grams to MT	0.000001
Btu to MMBtu	0.000001
1 gal to BTU (8)	128488

Construction_Tunnels
Tunnel_Loco

Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	8
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	8
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	8
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	9
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	9
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	9
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	10
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	10
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	10
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	10
=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\I	=INDEX('G:\Sacrament	=INDEX('G:\Sacramento\	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrament	=INDEX('G:\Sacrame	10

Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
=N33/HSR_Miles_per_	=O33/HSR_Miles_per_Da	=P33/HSR_Miles_per_	=Q33/HSR_Miles_per_Da	=R33/HSR_Miles_per_Da	=S33/HSR_Miles_per_	=T33/HSR_Miles_per_	=U33/HSR_Miles_per_Da	=V33/HSR_Miles_per_	=W33/HSR_Miles_per_D	=X33/HSR_Miles_per_	=Y33/HSR_Miles_per_	=Z33/HSR_Miles_per_	=AA33/HSR_Miles_p
=N34/HSR_Miles_per_	=O34/HSR_Miles_per_Da	=P34/HSR_Miles_per_	=Q34/HSR_Miles_per_Da	=R34/HSR_Miles_per_Da	=S34/HSR_Miles_per_	=T34/HSR_Miles_per_	=U34/HSR_Miles_per_Da	=V34/HSR_Miles_per_	=W34/HSR_Miles_per_D	=X34/HSR_Miles_per_	=Y34/HSR_Miles_per_	=Z34/HSR_Miles_per_	=AA34/HSR_Miles_p
=N35/HSR_Miles_per_	=O35/HSR_Miles_per_Da	=P35/HSR_Miles_per_	=Q35/HSR_Miles_per_Da	=R35/HSR_Miles_per_Da	=S35/HSR_Miles_per_	=T35/HSR_Miles_per_	=U35/HSR_Miles_per_Da	=V35/HSR_Miles_per_	=W35/HSR_Miles_per_D	=X35/HSR_Miles_per_	=Y35/HSR_Miles_per_	=Z35/HSR_Miles_per_	=AA35/HSR_Miles_p
=N36/HSR_Miles_per_	=O36/HSR_Miles_per_Da	=P36/HSR_Miles_per_	=Q36/HSR_Miles_per_Da	=R36/HSR_Miles_per_Da	=S36/HSR_Miles_per_	=T36/HSR_Miles_per_	=U36/HSR_Miles_per_Da	=V36/HSR_Miles_per_	=W36/HSR_Miles_per_D	=X36/HSR_Miles_per_	=Y36/HSR_Miles_per_	=Z36/HSR_Miles_per_	=AA36/HSR_Miles_p
=M28+1	*=N28+1*	*=O28+1*	*=P28+1*	*=Q28+1*	*=R28+1*	*=S28+1*	*=T28+1*	*=U28+1*	*=V28+1*	*=W28+1*	*=X28+1*	*=Y28+1*	*=Z28+1*	

Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Naphthalene (6)	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
=N52*g_to_ton*$M$4	=O52*g_to_ton*$M$41	=P52*g_to_ton*$M$4	=Q52*g_to_ton*$M$41	=R52*g_to_ton*$M$41	=S52*g_to_ton*$M$4	=T52*g_to_ton*$M$4	=U52*g_to_ton*$M$41	=V52*g_to_ton*$M$4	=W52*g_to_MT*$M$41	=X52*g_to_MT*$M$4	=Y52*g_to_MT*$M$4	=Z52*g_to_MT*$M$4	=$M$41
=N53*g_to_ton*$M$4	=O53*g_to_ton*$M$41	=P53*g_to_ton*$M$4	=Q53*g_to_ton*$M$41	=R53*g_to_ton*$M$41	=S53*g_to_ton*$M$4	=T53*g_to_ton*$M$4	=U53*g_to_ton*$M$41	=V53*g_to_ton*$M$4	=W53*g_to_MT*$M$41	=X53*g_to_MT*$M$4	=Y53*g_to_MT*$M$4	=Z53*g_to_MT*$M$4	=$M$41
=N54*g_to_ton*$M$4	=O54*g_to_ton*$M$41	=P54*g_to_ton*$M$4	=Q54*g_to_ton*$M$41	=R54*g_to_ton*$M$41	=S54*g_to_ton*$M$4	=T54*g_to_ton*$M$4	=U54*g_to_ton*$M$41	=V54*g_to_ton*$M$4	=W54*g_to_MT*$M$41	=X54*g_to_MT*$M$4	=Y54*g_to_MT*$M$4	=Z54*g_to_MT*$M$4	=$M$41
=N55*g_to_ton*$M$4	=O55*g_to_ton*$M$41	=P55*g_to_ton*$M$4	=Q55*g_to_ton*$M$41	=R55*g_to_ton*$M$41	=S55*g_to_ton*$M$4	=T55*g_to_ton*$M$4	=U55*g_to_ton*$M$41	=V55*g_to_ton*$M$4	=W55*g_to_MT*$M$41	=X55*g_to_MT*$M$4	=Y55*g_to_MT*$M$4	=Z55*g_to_MT*$M$4	=$M$41
=M37+1	*=N37+1*	*=O37+1*	*=P37+1*	*=Q37+1*	*=R37+1*	*=S37+1*	*=T37+1*	*=U37+1*	*=V37+1*	*=W37+1*	*=X37+1*	*=Y37+1*	*=Z37+1*

Notes
=Track_Activity!M25

lb/MMBtu	*lb/MMBtu*	*lb/MMBtu*	*lb/MMBtu*	*lb/10^3 gal*	*lb/MMBtu*	*g/gal*	*lb/MMBtu*	*lb/10^3 gal*	*g/gal*	*g/gal*	*g/gal*	*g/gal*
Hazardous Air Pollutants									Greenhouse Gas Emissions			
Acetaldehyde (6)	Acrolein (6)	Benzene (6)	1,3-Butadiene (6)	Ethylbenzene (7)	Formaldehyde (6)	DPM	Naphthalene (6)	POM (6)	CO2	CH4 (3)	N2O (3)	CO2e (5)
0.000767	0.0000925	0.000933	0.0000391	0.0000636	0.00118	=F48	0.0000848	0.0033	10208	0.8	0.26	10299.3
=N$48	=O$48	=P$48	=Q$48	=R$48	=S$48	=F49	=U$48	=V$48	=$W$48	=$X$48	=$Y$48	=$Z$48
=N$48	=O$48	=P$48	=Q$48	=R$48	=S$48	=F50	=U$48	=V$48	=$W$48	=$X$48	=$Y$48	=$Z$48
=N$48	=O$48	=P$48	=Q$48	=R$48	=S$48	=F51	=U$48	=V$48	=$W$48	=$X$48	=$Y$48	=$Z$48
=N48*$C$66*$C$67*C	=O48*$C$66*$C$67*$C$63	=P48*$C$66*$C$67*C	=Q48*$C$66*$C$67*$C$63	=R48/$C$61*$C$66*$C$67*	=S48*$C$66*$C$67*C	=T48	=U48*$C$66*$C$67*$C$63	=V48/$C$61*$C$66*C	=W48	=X48	=Y48	=Z48
=N49*$C$66*$C$67*C	=O49*$C$66*$C$67*$C$63	=P49*$C$66*$C$67*C	=Q49*$C$66*$C$67*$C$63	=R49/$C$61*$C$66*$C$67*	=S49*$C$66*$C$67*C	=T49	=U49*$C$66*$C$67*$C$63	=V49/$C$61*$C$66*C	=W49	=X49	=Y49	=Z49
=N50*$C$66*$C$67*C	=O50*$C$66*$C$67*$C$63	=P50*$C$66*$C$67*C	=Q50*$C$66*$C$67*$C$63	=R50/$C$61*$C$66*$C$67*	=S50*$C$66*$C$67*C	=T50	=U50*$C$66*$C$67*$C$63	=V50/$C$61*$C$66*C	=W50	=X50	=Y50	=Z50
=N51*$C$66*$C$67*C	=O51*$C$66*$C$67*$C$63	=P51*$C$66*$C$67*C	=Q51*$C$66*$C$67*$C$63	=R51/$C$61*$C$66*$C$67*	=S51*$C$66*$C$67*C	=T51	=U51*$C$66*$C$67*$C$63	=V51/$C$61*$C$66*C	=W51	=X51	=Y51	=Z51

Sources

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(5) ICCP. 2014. AR5 Synthesis Report. https://ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf
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Construction_Tunnels
Tunnel_On

Uinta Annual Emissions (tons/year)

		Vehicle	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
2022India	2022	Indian Canyon	55	41	1	61	62	1	59	60	0	8	4.22E-01	6.75E-02	8.39E-02	1.60E-02	3.58E-02	1.18E+00	1.28E+00	1.02E-01	1.23E-01	18,578	4	0	18,703	1,740,063	8
2022Whit	2022	Whitmore Park	70	50	2	80	81	1	78	79	0	10	5.33E-01	8.42E-02	1.05E-01	1.84E-02	4.56E-02	1.51E+00	1.45E+00	1.29E-01	1.53E-01	24,270	5	0	24,439	2,273,158	8
2022Wells	2022	Wells Draw	39	26	1	46	47	1	45	45	0	5	2.94E-01	4.59E-02	5.76E-02	9.19E-03	2.54E-02	8.46E-01	7.13E-01	7.09E-02	8.30E-02	13,806	3	0	13,905	1,293,085	8
2023India	2023	Indian Canyon	57	43	1	66	67	1	64	66	0	9	4.38E-01	7.01E-02	8.72E-02	1.66E-02	3.72E-02	1.22E+00	1.34E+00	1.06E-01	1.28E-01	19,338	4	0	19,468	1,811,230	9
2023Whit	2023	Whitmore Park	73	52	2	87	89	2	85	86	0	10	5.54E-01	8.75E-02	1.09E-01	1.91E-02	4.74E-02	1.57E+00	1.51E+00	1.34E-01	1.59E-01	25,263	5	0	25,439	2,366,176	9
2023Wells	2023	Wells Draw	40	27	1	50	51	1	49	49	0	6	3.06E-01	4.77E-02	5.98E-02	9.55E-03	2.64E-02	8.79E-01	7.43E-01	7.36E-02	8.62E-02	14,371	3	0	14,474	1,346,025	9
2024India	2024	Indian Canyon	21	16	1	19	19	0	18	19	0	3	1.61E-01	2.58E-02	3.21E-02	6.12E-03	1.37E-02	4.49E-01	4.96E-01	3.91E-02	4.71E-02	7,158	1	0	7,206	670,461	10
2024Whit	2024	Whitmore Park	27	19	1	25	25	1	24	24	0	4	2.04E-01	3.22E-02	4.02E-02	7.04E-03	1.74E-02	5.77E-01	5.61E-01	4.93E-02	5.85E-02	9,352	2	0	9,417	875,928	10
2024Wells	2024	Wells Draw	44	30	1	42	43	1	41	42	0	6	3.37E-01	5.25E-02	6.59E-02	1.05E-02	2.91E-02	9.67E-01	8.23E-01	8.11E-02	9.50E-02	15,917	3	0	16,030	1,490,829	10
2025India	2025	Indian Canyon	0	0	0	0	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-	-	-	-	0	10
2025Whit	2025	Whitmore Park	0	0	0	0	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-	-	-	-	0	10
2025Wells	2025	Wells Draw	43	28	1	42	43	1	41	42	0	6	3.25E-01	5.01E-02	6.31E-02	9.16E-03	2.83E-02	9.48E-01	7.06E-01	7.80E-02	9.03E-02	15,816	4	0	15,931	1,481,317	10

HSR PB (Tunnel 4) Emission Rates for Uinta Alternatives (tons/mile)

		All Vehicles	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
2022India	2022	Indian Canyon	29.96	22.27	0.76	32.89	33.65	0.70	32.01	32.71	0.09	4.48	2.29E-01	3.66E-02	4.55E-02	8.68E-03	1.94E-02	6.38E-01	6.96E-01	5.55E-02	6.68E-02	10077	2.03	0.058	10145	943,843	
2022Whit	2022	Whitmore Park	28.84	20.45	0.65	32.89	33.54	0.60	32.01	32.61	0.09	4.15	2.20E-01	3.47E-02	4.33E-02	7.58E-03	1.88E-02	6.22E-01	5.99E-01	5.31E-02	6.30E-02	9999	2.09	0.058	10068	936,482	
2022Wells	2022	Wells Draw	27.81	18.91	0.56	32.89	33.45	0.51	32.01	32.52	0.09	3.86	2.12E-01	3.30E-02	4.14E-02	6.61E-03	1.83E-02	6.08E-01	5.13E-01	5.10E-02	5.97E-02	9927	2.15	0.058	9998	929,798	
2023India	2023	Indian Canyon	31.11	23.17	0.79	35.81	36.60	0.73	34.90	35.62	0.10	4.65	2.38E-01	3.80E-02	4.73E-02	9.02E-03	2.02E-02	6.62E-01	7.25E-01	5.77E-02	6.94E-02	10489	2.10	0.060	10560	982,445	
2023Whit	2023	Whitmore Park	29.95	21.28	0.68	35.81	36.49	0.62	34.90	35.52	0.10	4.31	2.28E-01	3.60E-02	4.50E-02	7.88E-03	1.95E-02	6.46E-01	6.23E-01	5.51E-02	6.55E-02	10408	2.17	0.060	10480	974,803	
2023Wells	2023	Wells Draw	28.89	19.68	0.58	35.81	36.39	0.53	34.90	35.43	0.10	4.01	2.20E-01	3.43E-02	4.30E-02	6.87E-03	1.90E-02	6.32E-01	5.34E-01	5.29E-02	6.20E-02	10334	2.24	0.060	10408	967,865	
2024India	2024	Indian Canyon	34.26	25.65	0.87	30.39	31.26	0.80	29.37	30.17	0.11	5.12	2.62E-01	4.19E-02	5.21E-02	9.94E-03	2.22E-02	7.29E-01	8.04E-01	6.35E-02	7.64E-02	11617	2.31	0.067	11694	1,088,032	
2024Whit	2024	Whitmore Park	32.99	23.56	0.75	30.39	31.14	0.69	29.37	30.06	0.11	4.75	2.51E-01	3.97E-02	4.96E-02	8.68E-03	2.15E-02	7.11E-01	6.91E-01	6.07E-02	7.21E-02	11527	2.39	0.067	11607	1,079,621	
2024Wells	2024	Wells Draw	31.83	21.78	0.64	30.39	31.03	0.59	29.37	29.96	0.11	4.42	2.42E-01	3.78E-02	4.74E-02	7.57E-03	2.09E-02	6.96E-01	5.92E-01	5.83E-02	6.83E-02	11445	2.46	0.067	11527	1,071,986	
2025India	2025	Indian Canyon	26.88	17.61	0.48	32.89	33.37	0.44	32.01	32.45	0.09	3.61	2.04E-01	3.15E-02	3.97E-02	5.75E-03	1.78E-02	5.96E-01	4.40E-01	4.91E-02	5.68E-02	9863	2.21	0.058	9936	923,804	
2025Whit	2025	Whitmore Park	27.92	18.32	0.50	35.81	36.31	0.46	34.90	35.35	0.09	3.75	2.12E-01	3.27E-02	4.12E-02	5.98E-03	1.85E-02	6.19E-01	4.58E-01	5.09E-02	5.90E-02	10267	2.29	0.060	10343	961,645	
2025Wells	2025	Wells Draw	30.77	20.28	0.55	30.39	30.94	0.51	29.37	29.88	0.10	4.13	2.34E-01	3.60E-02	4.54E-02	6.59E-03	2.04E-02	6.82E-01	5.08E-01	5.61E-02	6.50E-02	11372	2.52	0.067	11455	1,065,147	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

HSR Emission Rates (tons/day)

		Vehicle	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
2022India	2022	All Vehicles	0.11	0.08	0.00	0.12	0.13	0.00	0.12	0.12	0.00	0.02	8.54E-04	1.37E-04	1.70E-04	3.24E-05	7.24E-05	2.38E-03	2.60E-03	2.07E-04	2.49E-04	38	0.01	0.000	38	3,520	
2023India	2023	All Vehicles	0.11	0.08	0.00	0.12	0.13	0.00	0.12	0.12	0.00	0.02	8.19E-04	1.29E-04	1.62E-04	2.83E-05	7.01E-05	2.32E-03	2.23E-03	1.98E-04	2.35E-04	37	0.01	0.000	38	3,493	
2024India	2024	All Vehicles	0.10	0.07	0.00	0.12	0.12	0.00	0.12	0.12	0.00	0.01	7.89E-04	1.23E-04	1.54E-04	2.47E-05	6.82E-05	2.27E-03	1.91E-03	1.90E-04	2.23E-04	37	0.01	0.000	37	3,468	
2025India	2025	All Vehicles	0.10	0.07	0.00	0.12	0.12	0.00	0.12	0.12	0.00	0.01	7.62E-04	1.18E-04	1.48E-04	2.15E-05	6.64E-05	2.22E-03	1.64E-03	1.83E-04	2.12E-04	37	0.01	0.000	37	3,445	
2022Whit	2022	All Vehicles	0.12	0.09	0.00	0.13	0.14	0.00	0.13	0.13	0.00	0.02	8.86E-04	1.42E-04	1.76E-04	3.36E-05	7.52E-05	2.47E-03	2.70E-03	2.15E-04	2.59E-04	39	0.01	0.000	39	3,664	
2023Whit	2023	All Vehicles	0.11	0.08	0.00	0.13	0.14	0.00	0.13	0.13	0.00	0.02	8.51E-04	1.34E-04	1.68E-04	2.94E-05	7.28E-05	2.41E-03	2.32E-03	2.06E-04	2.44E-04	39	0.01	0.000	39	3,636	
2024Whit	2024	All Vehicles	0.11	0.07	0.00	0.13	0.14	0.00	0.13	0.13	0.00	0.01	8.19E-04	1.28E-04	1.60E-04	2.56E-05	7.08E-05	2.36E-03	1.99E-03	1.97E-04	2.31E-04	39	0.01	0.000	39	3,610	
2025Whit	2025	All Vehicles	0.10	0.07	0.00	0.13	0.14	0.00	0.13	0.13	0.00	0.01	7.92E-04	1.22E-04	1.54E-04	2.23E-05	6.89E-05	2.31E-03	1.71E-03	1.90E-04	2.20E-04	38	0.01	0.000	39	3,586	
2022Wells	2022	All Vehicles	0.13	0.10	0.00	0.11	0.12	0.00	0.11	0.11	0.00	0.02	9.76E-04	1.56E-04	1.94E-04	3.71E-05	8.28E-05	2.72E-03	3.00E-03	2.37E-04	2.85E-04	43	0.01	0.000	44	4,058	
2023Wells	2023	All Vehicles	0.12	0.09	0.00	0.11	0.12	0.00	0.11	0.11	0.00	0.02	9.37E-04	1.48E-04	1.85E-04	3.24E-05	8.02E-05	2.65E-03	2.58E-03	2.26E-04	2.69E-04	43	0.01	0.000	43	4,026	
2024Wells	2024	All Vehicles	0.12	0.08	0.00	0.11	0.12	0.00	0.11	0.11	0.00	0.02	9.02E-04	1.41E-04	1.77E-04	2.82E-05	7.79E-05	2.59E-03	2.21E-03	2.17E-04	2.55E-04	43	0.01	0.000	43	3,998	
2025Wells	2025	All Vehicles	0.11	0.08	0.00	0.11	0.12	0.00	0.11	0.11	0.00	0.02	8.72E-04	1.34E-04	1.69E-04	2.46E-05	7.59E-05	2.54E-03	1.89E-03	2.09E-04	2.42E-04	42	0.01	0.000	43	3,972	
Indian Car	2022	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.19E-04	3.47E-05	4.33E-05	7.76E-06	1.87E-05	6.16E-04	2.17E-04	5.29E-05	6.23E-05	4.21	0.00	0.000	4.27	394	
Indian Car	2022	Single Unit Short-haul Truck	0.08	0.07	0.00	0.11	0.11	0.00	0.11	0.11	0.00	0.01	6.35E-04	1.02E-04	1.27E-04	2.46E-05	5.37E-05	1.76E-03	2.38E-03	1.54E-04	1.87E-04	33.37	0.01	0.000	33.57	3,126	
Indian Car	2023	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.09E-04	3.28E-05	4.11E-05	6.72E-06	1.80E-05	6.00E-04	1.91E-04	5.05E-05	5.87E-05	4.13	0.00	0.000	4.19	387	
Indian Car	2023	Single Unit Short-haul Truck	0.08	0.07	0.00	0.11	0.11	0.00	0.11	0.11	0.00	0.01	6.10E-04	9.66E-05	1.21E-04	2.16E-05	5.21E-05	1.72E-03	2.04E-03	1.48E-04	1.76E-04	33.16	0.01	0.000	33.36	3,106	
Indian Car	2024	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.01E-04	3.12E-05	3.92E-05	5.87E-06	1.75E-05	5.84E-04	1.69E-04	4.84E-05	5.57E-05	4.05	0.00	0.000	4.12	380	
Indian Car	2024	Single Unit Short-haul Truck	0.08	0.06	0.00	0.11	0.11	0.00	0.11	0.11	0.00	0.01	5.88E-04	9.19E-05	1.15E-04	1.88E-05	5.07E-05	1.68E-03	1.74E-03	1.42E-04	1.67E-04	32.97	0.01	0.000	33.17	3,088	
Indian Car	2025	Light Commercial Truck	0.02	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	1.93E-04	2.96E-05	3.74E-05	5.10E-06	1.69E-05	5.68E-04	1.51E-04	4.63E-05	5.28E-05	3.98	0.00	0.000	4.05	373	
Indian Car	2025	Single Unit Short-haul Truck	0.08	0.06	0.00	0.11	0.11	0.00	0.11	0.11	0.00	0.01	5.69E-04	8.79E-05	1.11E-04	1.64E-05	4.95E-05	1.66E-03	1.49E-03	1.37E-04	1.59E-04	32.80	0.01	0.000	33.01	3,072	
Whitmore	2022	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.24E-04	3.56E-05	4.44E-05	7.96E-06	1.92E-05	6.32E-04	2.22E-04	5.43E-05	6.39E-05	4.32	0.00	0.000	4.38	404	
Whitmore	2022	Single Unit Short-haul Truck	0.09	0.08	0.00	0.12	0.12	0.00	0.12	0.12	0.00	0.01	6.62E-04	1.06E-04	1.32E-04	2.57E-05	5.60E-05	1.84E-03	2.48E-03	1.61E-04	1.95E-04	34.80	0.01	0.000	35.00	3,260	
Whitmore	2023	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.15E-04	3.36E-05	4.21E-05	6.90E-06	1.85E-05	6.15E-04	1.96E-04	5.18E-05	6.02E-05	4.24	0.00	0.000	4.30	397	
Whitmore	2023	Single Unit Short-haul Truck	0.08	0.07	0.00	0.12	0.12	0.00	0.12	0.12	0.00	0.01	6.36E-04	1.01E-04	1.26E-04	2.25E-05	5.43E-05	1.79E-03	2.13E-03	1.54E-04	1.84E-04	34.58	0.01	0.000	34.79	3,239	
Whitmore	2024	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.07E-04	3.20E-05	4.02E-05	6.02E-06	1.79E-05	6.00E-04	1.73E-04	4.96E-05	5.72E-05	4.16	0.00	0.000	4.22	390	
Whitmore	2024	Single Unit Short-haul Truck	0.08	0.06	0.00	0.12	0.12	0.00	0.12	0.12	0.00	0.01	6.13E-04	9.59E-05	1.20E-04	1.96E-05	5.28E-05	1.76E-03	1.82E-03	1.48E-04	1.74E-04	34.38	0.01	0.000	34.59	3,220	
Whitmore	2025	Light Commercial Truck	0.02	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	1.98E-04	3.04E-05	3.83E-05	5.23E-06	1.73E-05	5.83E-04	1.55E-04	4.75E-05	5.42E-05	4.09	0.00	0.000	4.15	383	
Whitmore	2025	Single Unit Short-haul Truck	0.08	0.06	0.00	0.12	0.12	0.00	0.12	0.12	0.00	0.01	5.93E-04	9.17E-05	1.15E-04	1.71E-05	5.16E-05	1.73E-03	1.55E-03	1.43E-04	1.66E-04	34.21	0.01	0.000	34.42	3,204	
Wells Dra	2022	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.40E-04	3.80E-05	4.74E-05	8.51E-06	2.05E-05	6.76E-04	2.38E-04	5.80E-05	6.83E-05	4.61	0.00	0.000	4.68	432	
Wells Dra	2022	Single Unit Short-haul Truck	0.10	0.08	0.00	0.10	0.11	0.00	0.10	0.10	0.00	0.01	7.36E-04	1.18E-04	1.47E-04	2.85E-05	6.23E-05	2.04E-03	2.76E-03	1.79E-04	2.17E-04	38.71	0.01	0.000	38.93	3,626	
Wells Dra	2023	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.30E-04	3.59E-05	4.50E-05	7.37E-06	1.98E-05	6.58E-04	2.09E-04	5.54E-05	6.44E-05	4.53	0.00	0.000	4.59	424	
Wells Dra	2023	Single Unit Short-haul Truck	0.09	0.08	0.00	0.10	0.10	0.00	0.10	0.10	0.00	0.01	7.07E-04	1.12E-04	1.40E-04	2.50E-05	6.04E-05	2.00E-03	2.37E-03	1.71E-04	2.05E-04	38.46	0.01	0.000	38.69	3,602	
Wells Dra	2024	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.21E-04	3.42E-05	4.30E-05	6.44E-06	1.92E-05	6.41E-04	1.85E-04	5.31E-05	6.11E-05	4.45	0.00	0.000	4.51	416	
Wells Dra	2024	Single Unit Short-haul Truck	0.09	0.07	0.00	0.10	0.10	0.00	0.10	0.10	0.00	0.01	6.82E-04	1.07E-04	1.34E-04	2.18E-05	5.88E-05	1.95E-03	2.02E-03	1.64E-04	1.94E-04	38.24	0.01	0.000	38.48	3,582	
Wells Dra	2025	Light Commercial Truck	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	2.12E-04	3.24E-05	4.10E-05	5.59E-06	1.85E-05	6.23E-04	1.66E-04	5.08E-05	5.79E-05	4.37	0.00	0.000	4.44	409	
Wells Dra	2025	Single Unit Short-haul Truck	0.09	0.07	0.00	0.10	0.10	0.00	0.10	0.10	0.00	0.01	6.60E-04	1.02E-04	1.28E-04	1.90E-05	5.74E-05	1.92E-03	1.73E-03	1.59E-04	1.84E-04	38.04	0.01	0.000	38.29	3,563	

HSR PB (Tunnel 4) Equipment List (1)

Subphase	Code	Vehicle	Trip/Day	RT Mi/Trip	Fuel	Fuel (gal/day)	Vehicle	Notes	Days	MOVES Vehicle
								Activity Rate (trips) Scaled Across Tunnel		
Tunnel 4 fi	RoadOffOn 75	Dump Truck (tunnel spoils)		125	20 Diesel	387	T7	Construction Period Activity Rate (trips) Scaled Across Tunnel	386	Single Unit Short-haul Truck
	RoadOffOn 76	Dump Truck (portal spoils)		402	20 Diesel	577	T7	Construction Period Activity Rate (trips) Scaled Across Tunnel	386	Single Unit Short-haul Truck
	RoadOffOn 77	Concrete Truck		20	20 Diesel	44	T6	Construction Period Activity Rate (trips) Scaled Across Tunnel	386	Light Commercial Truck
	RoadOffOn 78	Concrete Truck		35	20 Diesel	106	T6	Construction Period Activity Rate (trips) Scaled Across Tunnel	386	Light Commercial Truck
	RoadOffOn 79	Concrete Cross Passages		1	20 Diesel	2	T6	Construction Period	386	Light Commercial Truck
Track	Code	Vehicle	Trip/Day	RT Mi/Trip	Fuel	Fuel (gal/day)	Vehicle	Notes	Days	MOVES Vehicle
								Activity Rate (trips) Scaled Across Tunnel		
	TrackMark	Trucks-0150		0.018	40 Diesel	44	T6	Construction Period Activity Rate (trips) Scaled Across Tunnel	122	Light Commercial Truck
	NonBallast	Trucks-0200		0.152	40 Diesel	31	T6	Construction Period Activity Rate (trips) Scaled Across Tunnel	122	Light Commercial Truck
	NonBallast	Pump Truck		0.087	40 Diesel	18	T6	Construction Period Activity Rate (trips) Scaled Across Tunnel	122	Light Commercial Truck
	NonBallast	Concrete Truck		2.123	20 Diesel	215	T6	Construction Period	122	Light Commercial Truck
Subphase	Code	Vehicle	Trucks	RT Mi/ Truck	Fuel	Fuel (gal/day/veh)	Vehicle Onsite	Notes	Days	MOVES Vehicle
								Activity Rate (RT mi/truck) Scaled Across Tunnel		
Tunnel 4	RoadOn24	Tractor loader tunnel spoils		2	14 Diesel	6	T6	Construction Period Activity Rate (RT mi/truck) Scaled Across Tunnel	386	Light Commercial Truck
	RoadOn25	Tractor loader portal spoils		4	29 Diesel	12	T6	Construction Period	386	Light Commercial Truck

Onsite Light Commercial RT Mi/Day	49

Vehicle	**Trip/Day**
Light Commercial Truck	58
Single Unit Short-haul Truck	527

MOVES2014a Vehicle Types (2)

PB Vehicle Type	MOVES Vehicle Type
Trucks-0150	Light Commercial Truck
Trucks-0200	Light Commercial Truck
Pump Truck	Light Commercial Truck
Concrete Truck	Light Commercial Truck
Tractor loader tunnel spoils	Light Commercial Truck
Tractor loader portal spoils	Light Commercial Truck
Dump Truck (tunnel spoils)	Single Unit Short-haul Truck
Dump Truck (portal spoils)	Single Unit Short-haul Truck
Concrete Truck	Light Commercial Truck
Concrete Truck	Light Commercial Truck
Concrete Cross Passages	Light Commercial Truck

		Vehicle	Criteria Pollutants (g/mile)										Hazardous Air Pollutants (g/mile)									Greenhouse Gas Emissions (g/mile)				Energy (joules)	
	Year		CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Total Energy Consumption (joules)	
2022Light	2022	Light Commercial Truck	3.66	1.35	0.03	0.02	0.05	0.03	0.00	0.03	0.00	0.53	2.78E-02	4.41E-03	5.50E-03	9.87E-04	2.38E-03	7.84E-02	2.76E-02	6.73E-03	7.92E-03	590	0.29	0.004	598	8E+06	Diesel Fuel
2022Singl	2022	Single Unit Short-haul Truck	1.92	1.67	0.06	0.08	0.14	0.06	0.01	0.07	0.01	0.29	1.47E-02	2.36E-03	2.93E-03	5.69E-04	1.24E-03	4.07E-02	5.50E-02	3.56E-03	4.32E-03	850	0.14	0.005	855	1E+07	Diesel Fuel
2023Light	2023	Light Commercial Truck	3.45	1.25	0.03	0.02	0.05	0.02	0.00	0.03	0.00	0.49	2.66E-02	4.17E-03	5.22E-03	8.55E-04	2.29E-03	7.63E-02	2.43E-02	6.42E-03	7.47E-03	579	0.29	0.004	587	8E+06	Diesel Fuel
2023Singl	2023	Single Unit Short-haul Truck	1.86	1.54	0.05	0.08	0.14	0.05	0.01	0.06	0.01	0.27	1.41E-02	2.23E-03	2.79E-03	4.98E-04	1.20E-03	3.98E-02	4.72E-02	3.41E-03	4.08E-03	845	0.15	0.005	850	1E+07	Diesel Fuel
2024Light	2024	Light Commercial Truck	3.25	1.17	0.02	0.02	0.05	0.02	0.00	0.02	0.00	0.46	2.56E-02	3.96E-03	4.99E-03	7.47E-04	2.22E-03	7.43E-02	2.15E-02	6.15E-03	7.09E-03	568	0.30	0.004	577	8E+06	Diesel Fuel
2024Singl	2024	Single Unit Short-haul Truck	1.81	1.42	0.04	0.08	0.13	0.04	0.01	0.05	0.01	0.25	1.36E-02	2.13E-03	2.66E-03	4.34E-04	1.17E-03	3.89E-02	4.03E-02	3.27E-03	3.86E-03	840	0.15	0.005	845	1E+07	Diesel Fuel
2025Light	2025	Light Commercial Truck	3.04	1.09	0.02	0.02	0.05	0.02	0.00	0.02	0.00	0.43	2.46E-02	3.76E-03	4.75E-03	6.48E-04	2.15E-03	7.22E-02	1.92E-02	5.89E-03	6.71E-03	558	0.30	0.004	567	8E+06	Diesel Fuel
2025Singl	2025	Single Unit Short-haul Truck	1.76	1.32	0.04	0.08	0.12	0.03	0.01	0.05	0.01	0.23	1.32E-02	2.03E-03	2.56E-03	3.78E-04	1.14E-03	3.83E-02	3.45E-02	3.16E-03	3.67E-03	836	0.15	0.005	841	1E+07	Diesel Fuel
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

AP-42 Road Dust Emission Factors (g/mile) (2)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
Road Type	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum Energy Cons	Total Energy Consumpti	BSFC (grams/el Fuel (gallons
Paved				0.81			0.20																			
Unpaved				6.51			0.65																			

Sources

(1) HSR PB, Construction Emissions Inventory and Construction Data. December 2018.
(2) ICF. 2020. Vehicle and Equipment Emission Factors. Excel workbook.

Uinta Annual Emissions (tons/year) (calc'd)

		Vehicle	Criteria Pollutants										Hazardous Air Pollutants										Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)	
2022Indian	2022	Indian Canyon	16.86	67.71	2.83	0.00	2.83	2.75	0.00	2.75	0.15	3.33	3.1E-01	6.8E-02	1.4E-01	6.1E-03	1.8E-02	8.7E-01	2.8E+00	1.4E-02	5.5E-01	20,893	0	1	21,041	1,836,329	8
2022Whit	2022	Whitmore Park	22.20	89.15	3.73	0.00	3.73	3.62	0.00	3.62	0.19	4.39	4.1E-01	9.0E-02	1.8E-01	8.0E-03	2.4E-02	1.1E+00	3.6E+00	1.8E-02	7.2E-01	27,509	0	1	27,703	2,417,773	8
2022Wells	2022	Wells Draw	12.72	51.08	2.14	0.00	2.14	2.08	0.00	2.08	0.11	2.52	2.4E-01	5.2E-02	1.0E-01	4.6E-03	1.4E-02	6.5E-01	2.1E+00	1.0E-02	4.1E-01	15,761	0	0	15,872	1,385,237	8
2023Indi	2023	Indian Canyon	14.37	62.92	2.44	0.00	2.44	2.36	0.00	2.36	0.14	2.92	2.7E-01	5.9E-02	1.2E-01	5.3E-03	1.6E-02	7.7E-01	2.4E+00	1.2E-02	4.8E-01	20,530	0	1	20,676	1,821,404	9
2023Whit	2023	Whitmore Park	18.91	82.84	3.21	0.00	3.21	3.11	0.00	3.11	0.19	3.84	3.6E-01	7.8E-02	1.6E-01	7.0E-03	2.1E-02	1.0E+00	3.1E+00	1.6E-02	6.3E-01	27,031	0	1	27,223	2,398,122	9
2023Wells	2023	Wells Draw	10.84	47.46	1.84	0.00	1.84	1.78	0.00	1.78	0.11	2.20	2.1E-01	4.5E-02	9.3E-02	4.0E-03	1.2E-02	5.8E-01	1.8E+00	9.1E-03	3.6E-01	15,487	0	0	15,597	1,373,978	9
2024Indi	2024	Indian Canyon	4.09	19.78	0.70	0.00	0.70	0.68	0.00	0.68	0.05	0.86	8.0E-02	1.7E-02	3.6E-02	1.5E-03	4.8E-03	2.2E-01	6.8E-01	3.6E-03	1.4E-01	6,779	0	0	6,828	607,364	10
2024Whit	2024	Whitmore Park	5.39	26.05	0.93	0.00	0.93	0.90	0.00	0.90	0.06	1.13	1.1E-01	2.3E-02	4.8E-02	2.0E-03	6.3E-03	3.0E-01	9.0E-01	4.7E-03	1.9E-01	8,925	0	0	8,989	799,677	10
2024Wells	2024	Wells Draw	9.24	44.65	1.59	0.00	1.59	1.54	0.00	1.54	0.11	1.94	1.8E-01	3.9E-02	8.2E-02	3.5E-03	1.1E-02	5.1E-01	1.5E+00	8.0E-03	3.2E-01	15,299	0	0	15,409	1,370,742	10
2025Indi	2025	Indian Canyon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	-	-	-	0	10
2025Whit	2025	Whitmore Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	-	-	-	0	10
2025Wells	2025	Wells Draw	7.72	40.16	1.35	0.00	1.35	1.30	0.00	1.30	0.10	1.69	1.6E-01	3.4E-02	7.0E-02	3.0E-03	9.4E-03	4.3E-01	1.3E+00	6.9E-03	2.7E-01	14,760	0	0	14,863	1,289,999	10

HSR PB (Tunnel 4) Emission Rates (tons/mile)

		All Vehicles	Criteria Pollutants										Hazardous Air Pollutants										Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)	
	2022	All Equipment	9.15	36.73	1.54	0.00	1.54	1.49	0.00	1.49	0.08	1.81	1.7E-01	3.7E-02	7.5E-02	3.3E-03	1.0E-02	4.7E-01	1.5E+00	7.4E-03	3.0E-01	11333	0.12	0.290	11413	996,060	
	2023	All Equipment	7.79	34.13	1.32	0.00	1.32	1.28	0.00	1.28	0.08	1.58	1.5E-01	3.2E-02	6.7E-02	2.9E-03	8.8E-03	4.2E-01	1.3E+00	6.5E-03	2.6E-01	11136	0.11	0.288	11215	987,964	
	2024	All Equipment	6.64	32.11	1.14	0.00	1.14	1.11	0.00	1.11	0.08	1.40	1.3E-01	2.8E-02	5.9E-02	2.5E-03	7.8E-03	3.6E-01	1.1E+00	5.8E-03	2.3E-01	11001	0.10	0.287	11080	985,637	
	2025	All Equipment	5.55	28.87	0.97	0.00	0.97	0.94	0.00	0.94	0.07	1.22	1.1E-01	2.4E-02	5.0E-02	2.2E-03	6.7E-03	3.1E-01	9.4E-01	5.0E-03	2.0E-01	10613	0.09	0.270	10687	927,579	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	

HSR PB Emission Rates (tons/day)

		Equipment	Criteria Pollutants										Hazardous Air Pollutants										Greenhouse Gas Emissions				Energy	
			CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)	
	2022	Bore/Drill Rigs	0.008	0.029	0.001	-	0.001	0.001	-	0.001	0.000	0.002	0.000160187	4.65567E-05	5.70197E-05	3.53041E-06	1.36576E-05	0.000446409	0.001431062	6.86146E-06	0.00	7	0.000	0.000	6.80822404	598	
	2022	Rubber Tire Loaders	0.002	0.007	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.16932E-05	6.19748E-06	1.49687E-05	5.83542E-07	1.69655E-06	8.78313E-05	0.000342463	1.42925E-06	5.57766E-05	3	0.000	0.000	3.214787997	282	
	2022	Off-highway Trucks	0.005	0.044	0.001	-	0.001	0.001	-	0.001	0.000	0.001	0.000113192	2.01281E-05	5.75915E-05	1.98155E-06	5.33266E-06	0.000312832	0.00085191	5.02048E-06	0.000200961	16	0.000	0.000	15.62726852	1,372	
	2022	Other Construction Eq	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	1.10413E-05	2.66201E-06	4.56855E-06	2.22034E-07	7.67804E-07	3.0632E-05	0.000121519	4.90127E-07	1.93302E-05	1	0.000	0.000	0.848970972	75	
	2022	Air Compressors	0.013	0.043	0.002	-	0.002	0.002	-	0.002	0.000	0.002	0.000213549	3.96053E-05	0.000101766	3.92582E-06	9.67103E-06	0.000592228	0.001954951	9.57826E-06	0.000374028	13	0.000	0.000	13.01288789	1,120	
	2022	Tractors/Loaders/Bac	0.002	0.003	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.2727E-05	8.40444E-06	1.31761E-05	6.86394E-07	2.32659E-06	9.1658E-05	0.000302738	1.40449E-06	5.74158E-05	1	0.000	0.000	0.823409308	72	
	2022	Rough Terrain Forklift	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	9.29454E-06	1.70909E-06	4.59011E-06	1.69506E-07	4.25399E-07	2.60088E-05	0.000135393	4.19785E-07	1.64609E-05	1	0.000	0.000	0.813936883	71	
	2022	Generator Sets	0.003	0.007	0.000	-	0.000	0.000	-	0.000	0.000	0.001	5.83181E-05	1.29332E-05	2.60113E-05	1.15389E-06	3.38357E-06	0.000163587	0.000418518	2.53442E-06	0.000102591	1	0.000	0.000	1.300711985	114	
	2022	Graders	0.000	0.000	0.000	-	0.000	0.000	-	0.000	0.000	0.000	4.03247E-07	7.02046E-08	1.94761E-07	6.77866E-09	2.29535E-08	1.08185E-06	4.98718E-06	1.80973E-08	7.04505E-07	0	0.000	0.000	0.086859215	8	
	2022	Rollers	0.000	0.000	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.19867E-07	5.78978E-08	1.60358E-07	5.72174E-09	1.47036E-08	8.92379E-07	3.46788E-06	1.47006E-08	5.67604E-07	0	0.000	0.000	0.028273728	2	
	2023	Bore/Drill Rigs	0.007	0.026	0.001	-	0.001	0.001	-	0.001	0.000	0.002	0.000143899	4.13713E-05	5.22855E-05	3.13735E-06	1.21581E-05	0.000400594	0.001270787	6.20921E-06	0.000251681	7	0.000	0.000	6.808751957	598	
	2023	Rubber Tire Loaders	0.002	0.006	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.79511E-05	5.36032E-06	1.32891E-05	5.08501E-07	1.48926E-06	7.72181E-05	0.000302705	1.26149E-06	4.9163E-05	3	0.000	0.000	3.214821589	282	
	2023	Off-highway Trucks	0.004	0.043	0.001	-	0.001	0.001	-	0.001	0.000	0.001	0.000102118	1.81296E-05	5.18086E-05	1.78204E-06	4.88547E-06	0.000281517	0.000760596	4.51267E-06	0.00018109	16	0.000	0.000	15.62727288	1,372	
	2023	Other Construction Eq	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	9.76256E-06	2.30269E-06	4.23589E-06	1.94083E-07	6.67047E-07	2.78507E-05	0.000107486	4.34927E-07	1.72345E-05	1	0.000	0.000	0.831083472	73	
	2023	Air Compressors	0.010	0.038	0.002	-	0.002	0.002	-	0.002	0.000	0.002	0.000174935	3.22532E-05	8.6788E-05	3.23332E-06	8.02481E-06	0.000501294	0.001557397	7.93042E-06	0.000309763	12	0.000	0.000	12.31017489	1,093	
	2023	Tractors/Loaders/Bac	0.002	0.003	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.99026E-05	7.52194E-06	1.22321E-05	6.21669E-07	2.06874E-06	8.37572E-05	0.000280288	1.28635E-06	5.24869E-05	1	0.000	0.000	0.823486965	72	
	2023	Rough Terrain Forklift	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	7.97851E-06	1.4607E-06	3.95364E-06	1.44563E-07	3.67739E-07	2.22911E-05	0.000116578	3.62189E-07	1.41393E-05	1	0.000	0.000	0.813945787	71	
	2023	Generator Sets	0.002	0.007	0.000	-	0.000	0.000	-	0.000	0.000	0.001	5.40382E-05	1.17245E-05	2.49293E-05	1.05992E-06	3.04199E-06	0.000154733	0.00037794	2.35527E-06	9.56144E-05	1	0.000	0.000	1.282983608	113	
	2023	Graders	0.000	0.000	0.000	-	0.000	0.000	-	0.000	0.000	0.000	3.18913E-07	5.48577E-08	1.5079E-07	5.23241E-09	1.97632E-08	8.40801E-07	3.96185E-06	1.41131E-08	5.52817E-07	0	0.000	0.000	0.086859083	8	
	2023	Rollers	0.000	0.000	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.80703E-07	5.054E-08	1.40988E-07	4.98826E-09	1.30195E-08	7.81566E-07	2.93346E-06	1.29516E-08	4.98076E-07	0	0.000	0.000	0.028255902	2	
	2024	Bore/Drill Rigs	0.007	0.024	0.001	-	0.001	0.001	-	0.001	0.000	0.002	0.000131187	3.71515E-05	4.84568E-05	2.83342E-06	1.09191E-05	0.000364935	0.001149924	5.6866E-06	0.000229646	7	0.000	0.000	6.80915453	598	
	2024	Rubber Tire Loaders	0.002	0.006	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.45532E-05	4.61281E-06	1.17364E-05	4.40986E-07	1.30734E-06	6.75587E-05	0.000266467	1.10599E-06	4.314E-05	3	0.000	0.000	3.214845672	282	
	2024	Off-highway Trucks	0.003	0.042	0.001	-	0.001	0.001	-	0.001	0.000	0.001	9.12243E-05	1.61656E-05	4.61185E-05	1.58618E-06	4.44215E-06	0.000250757	0.000662145	4.01589E-06	0.000161542	16	0.000	0.000	15.62729138	1,372	
	2024	Other Construction Eq	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	8.70623E-06	2.02158E-06	3.66533E-06	1.71314E-07	5.93045E-07	2.40439E-05	9.64514E-05	3.89394E-07	1.52237E-05	1	0.000	0.000	0.849016146	75	
	2024	Air Compressors	0.008	0.035	0.001	-	0.001	0.001	-	0.001	0.000	0.001	0.000145246	2.65849E-05	7.23521E-05	2.6606E-06	6.85661E-06	0.000414645	0.001251552	6.64965E-06	0.000257371	12	0.000	0.000	11.76852904	1,081	
	2024	Tractors/Loaders/Bac	0.002	0.003	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.58459E-05	6.45283E-06	1.06503E-05	5.34898E-07	1.77285E-06	7.23805E-05	0.000250162	1.115E-06	4.53993E-05	1	0.000	0.000	0.823568412	72	
	2024	Rough Terrain Forklift	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	6.77611E-06	1.23588E-06	3.35784E-06	1.22134E-07	3.15747E-07	1.88962E-05	9.80058E-05	3.08946E-07	1.2004E-05	1	0.000	0.000	0.813952121	71	
	2024	Generator Sets	0.002	0.006	0.000	-	0.000	0.000	-	0.000	0.000	0.001	5.16234E-05	1.10038E-05	2.35932E-05	1.00496E-06	2.83651E-06	0.000144824	0.000351058	2.25687E-06	9.09059E-05	1	0.000	0.000	1.300877243	114	
	2024	Graders	0.000	0.000	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.60053E-07	4.4155E-08	1.20021E-07	4.15524E-09	1.75464E-08	6.72427E-07	3.1914E-06	1.13058E-08	4.46816E-07	0	0.000	0.000	0.086858889	8	
	2024	Rollers	0.000	0.000	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.43615E-07	4.36168E-08	1.22442E-07	4.29855E-09	1.14512E-08	6.76459E-07	2.43677E-06	1.12613E-08	4.3204E-07	0	0.000	0.000	0.028255992	2	
	2025	Bore/Drill Rigs	0.006	0.023	0.001	-	0.001	0.001	-	0.001	0.000	0.001	0.000121428	3.38573E-05	4.55176E-05	2.60066E-06	9.94567E-06	0.000337594	0.001056876	5.2837E-06	0.000212663	7	0.000	0.000	6.809467055	598	
	2025	Rubber Tire Loaders	0.001	0.005	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.14739E-05	3.96111E-06	1.02901E-05	3.80828E-07	1.15117E-06	5.88224E-05	0.000232827	9.67599E-07	3.76725E-05	3	0.000	0.000	3.214866834	282	
	2025	Off-highway Trucks	0.002	0.041	0.001	-	0.001	0.001	-	0.001	0.000	0.001	8.20806E-05	1.45181E-05	4.13478E-05	1.42197E-06	4.06741E-06	0.000224962	0.000578603	3.59933E-06	0.00014514	16	0.000	0.000	15.62729761	1,372	
	2025	Other Construction Eq	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	7.78905E-06	1.77136E-06	3.30589E-06	1.51491E-07	5.25163E-07	2.1453E-05	8.66698E-05	3.49349E-07	1.36045E-05	1	0.000	0.000	0.849032866	75	
	2025	Air Compressors	0.006	0.027	0.001	-	0.001	0.001	-	0.001	0.000	0.001	0.00010717	1.99755E-05	5.22301E-05	1.99303E-06	4.93682E-06	0.000298801	0.000895141	4.96365E-06	0.000189138	10	0.000	0.000	10.30316494	865	
	2025	Tractors/Loaders/Bac	0.001	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.30741E-05	5.67288E-06	9.61721E-06	4.74282E-07	1.552E-06	6.46165E-05	0.000229601	9.97957E-07	4.05495E-05	1	0.000	0.000	0.823630322	72	
	2025	Rough Terrain Forklift	0.000	0.002	0.000	-	0.000	0.000	-	0.000	0.000	0.000	5.68914E-06	1.03336E-06	2.81701E-06	1.0193E-07	2.69047E-07	1.58251E-05	8.12766E-05	2.60214E-07	1.00717E-05	1	0.000	0.000	0.813956621	71	
	2025	Generator Sets	0.002	0.006	0.000	-	0.000	0.000	-	0.000	0.000	0.001	4.87735E-05	1.02233E-05	2.25281E-05	9.42559E-07	2.61913E-06	0.000136827	0.000323276	2.13886E-06	8.59348E-05	1	0.000	0.000	1.300943082	114	
	2025	Graders	0.000	0.000	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.1432E-07	3.58505E-08	9.60092E-08	3.32095E-09	1.58316E-08	5.41538E-07	2.58632E-06	9.10711E-09	3.64338E-07	0	0.000	0.000	0.08685872	8	
	2025	Rollers	0.000	0.000	0.000	-	0.000	0.000	-	0.000	0.000	0.000	2.178E-07	3.88185E-08	1.09414E-07	3.82103E-09	1.037E-08	6.03291E-07	2.08868E-06	1.00817E-08	3.8597E-07	0	0.000	0.000	0.02825604	2	
	2022	All Equipment	0.034	0.137	0.006	-	0.006	0.006	-	0.006	0.000	0.007	0.000630726	0.000138324	0.000280047	1.22656E-05	3.72988E-05	0.00175316	0.005567009	2.77711E-05	0.001107292	42	4.57E-04	1.08E-03	42.56533053	3715	
	2023	All Equipment	0.029	0.127	0.005	-	0.005	0.005	-	0.005	0.000	0.006	0.000551185	0.00012023	0.000249814	1.06917E-05	3.27359E-05	0.001550877	0.004780673	2.43796E-05	0.000972223	42	4.13E-04	1.07E-03	41.82763613	3685	
	2024	All Equipment	0.025	0.120	0.004	-	0.004	0.004	-	0.004	0.000	0.005	0.000485666	0.000105317	0.000220173	9.36295E-06	2.90724E-05	0.001359389	0.004131395	2.15509E-05	0.00085611	41	3.71E-04	1.07E-03	41.32234942	3676	
	2025	All Equipment	0.021	0.108	0.004	-	0.004	0.003	-	0.003	0.000	0.005	0.00041791	9.10875E-05	0.000187859	8.07329E-06	2.50926E-05	0.001160046	0.003488945	1.85798E-05	0.000735524	40	3.25E-04	1.01E-03	39.85747409	3459	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	

Construction_Tunnels
Tunnel_Off

HSR PB (Tunnel 4) Equipment List (1)

Subphase	Code	Equip	#/day	hrs/day	Equip Load	CMOD	HP Bin	HP	kW	LF	Fuel	Fuel (gal/day/	Notes	MOVES Name	HP-HR/day
Tunnel 4 from Portal 7 (MINED TWIN TUNNEL	RoadOff88	Underground drill rig	2	2	4	Bore/Drill Rigs	250	227.9734	170	0.5025	Diesel	0.190196326	Activity Rate (	Bore/Drill Rigs	911.8936
	RoadOff89	Underground loader	2	8	16	Rubber Tired Loaders	250	335.255	250	0.3618	Diesel	0.803956089	Activity Rate (	Rubber Tire Lo	5364.08
	RoadOff90	Underground truck	10	8	80	Off-Highway Trucks	250	321.8448	240	0.3819	Diesel	4.067525831	Activity Rate (	Off-highway T	25747.584
	RoadOff91	Wet mix sprayed concrete	2	3	6	Other Construction Equipm	25	22.529136	16.8	0.4154	Diesel	0.026203351	Activity Rate (	Other Constru	135.174816
	RoadOff92	Ready-mixed concrete tru	6	8	48	Off-Highway Trucks	175	10.05765	7.5	0.3819	Diesel	0.076453258	Activity Rate (	Off-highway T	482.7672
	RoadOff93	Air Compressor	2	24	48	Air Compressors	500	439.85456	328	0.48	Diesel	5.905282155	Activity Rate (	Air Compresso	21113.01888
	RoadOff94	Backhoe loader	2	4	8	Tractors/Loaders/Backhoes	120	125	0	0.3685	Diesel	0.15490955	Activity Rate (	Tractors/Load	1000
	RoadOff95	Platform Truck	2	4	8	Aerial Lifts	120	160.9224	120	0.3082	Diesel	0.165178387	Activity Rate (	Other Constru	1287.3792
	RoadOff96	Forklift	2	4	8	Rough Terrain Forklifts	175	160.9224	120	0.402	Diesel	0.215185585	Activity Rate (	Rough Terrain	1287.3792
	RoadOff97	Generator	2	24	48	Generator Sets	50	42.91264	32	0.74	Diesel	0.763839511	Activity Rate (	Generator Set	2059.80672
	RoadOff98	Surface Top Hammer Drill	3	17.311475	51.93443	Bore/Drill Rigs	175	201.153	150	0.5025	Diesel	1.02603485	Activity Rate (	Bore/Drill Rigs	10446.76564
	Code	Equip	#/day	hrs/day	Equip Load	CMOD	HP Bin	HP		LF	Fuel	Fuel (gal/day/	Notes		
	TrackMark	Tractors/Loaders/Backhoe	10	0.0143108	0.143108	Tractors/Loaders/Backhoes	120	97		0.3685	Diesel	1.20324981	Activity Rate (	Tractors/Load	13.88148473
	NonBallast	Tractors/Loaders/Backhoe	6	0.1732779	1.039667	Tractors/Loaders/Backhoes	120	97		0.3685	Diesel	0.721949886	Activity Rate S	Tractors/Load	100.8477358
	NonBallast	Graders-0140	6	0.1732779	1.039667	Graders	120	140		0.4087	Diesel	1.134173572	Activity Rate S	Graders	145.5534331
	NonBallast	Rollers-0175	6	0.1732779	1.039667	Rollers	175	175		0.3752	Diesel	1.311665852	Activity Rate (	Rollers	181.9417914

Unique Equipment	HP-HR/day
Bore/Drill Rigs	11,359
Rubber Tire Loaders	5,364
Off-highway Trucks	26,230
Other Construction Equipment	1,423
Air Compressors	21,113
Tractors/Loaders/Backhoes	1,115
Rough Terrain Forklifts	1,287
Generator Sets	2,060
Graders	146
Rollers	182

MOVES2014a Emission Factors (2)

PB Equipment CMOD Type	MOVES Equipment Type	Unique Equipment
Bore/Drill Rigs	Bore/Drill Rigs	*Bore/Drill Rigs*
Rubber Tired Loaders	Rubber Tire Loaders	*Rubber Tire Loaders*
Off-Highway Trucks	Off-highway Trucks	*Off-highway Trucks*
Other Construction Equipment	Other Construction Eq	*Other Construction Equipment*
Off-Highway Trucks	Off-highway Trucks	*Air Compressors*
Air Compressors	Air Compressors	*Tractors/Loaders/Backhoes*
Tractors/Loaders/Backhoes	Tractors/Loaders/Bac	*Rough Terrain Forklifts*
Aerial Lifts	Other Construction Eq	*Generator Sets*
Rough Terrain Forklifts	Rough Terrain Forklift	*Graders*
Generator Sets	Generator Sets	*Rollers*
Bore/Drill Rigs	Bore/Drill Rigs	
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	
Graders	Graders	
Rollers	Rollers	

Construction_Tunnels
Tunnel_Off

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	Equipment	Criteria Pollutants (g/hp-hr)										Hazardous Air Pollutants (g/hp-hr)									Greenhouse Gas Emissions (g/hp-hr)				Energy	
		CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	BSFC (grams)	Diesel (gllaons)
2022	Bore/Drill Rigs	0.66	2.31	0.12	0.00	0.12	0.11	0.00	0.11	0.00	0.15	1E-02	4E-03	5E-03	3E-04	1E-03	4E-02	1E-01	5E-04	2E-02	540	0.006	0.014	544	169.3892775	0.05 Diesel
2022	Rubber Tire Loaders	0.36	1.16	0.06	0.00	0.06	0.06	0.00	0.06	0.00	0.06	5E-03	1E-03	3E-03	1E-04	3E-04	1E-02	6E-02	2E-04	9E-03	540	0.005	0.014	544	169.2883237	0.05 Diesel
2022	Off-highway Trucks	0.16	1.53	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.04	4E-03	7E-04	2E-03	7E-05	2E-04	1E-02	3E-02	2E-04	7E-03	537	0.003	0.014	540	168.2826357	0.05 Diesel
2022	Other Construction Eq	0.56	1.39	0.08	0.00	0.08	0.08	0.00	0.08	0.00	0.08	7E-03	2E-03	3E-03	1E-04	5E-04	2E-02	8E-02	3E-04	1E-02	538	0.005	0.014	541	168.5949097	0.05 Diesel
2022	Air Compressors	0.55	1.83	0.09	0.00	0.09	0.08	0.00	0.08	0.00	0.09	9E-03	2E-03	4E-03	2E-04	4E-04	3E-02	8E-02	4E-04	2E-02	555	0.008	0.014	559	170.6990329	0.05 Diesel
2022	Tractors/Loaders/Bac	1.60	2.34	0.25	0.00	0.25	0.25	0.00	0.25	0.00	0.30	3E-02	7E-03	1E-02	6E-04	2E-03	7E-02	2E-01	1E-03	5E-02	665	0.014	0.017	670	208.7848383	0.06 Diesel
2022	Rough Terrain Forklift	0.57	1.51	0.10	0.00	0.10	0.10	0.00	0.10	0.00	0.07	7E-03	1E-03	3E-03	1E-04	3E-04	2E-02	1E-01	3E-04	1E-02	570	0.006	0.015	574	178.5861906	0.06 Diesel
2022	Generator Sets	1.19	3.10	0.19	0.00	0.19	0.18	0.00	0.18	0.00	0.27	3E-02	6E-03	1E-02	5E-04	1E-03	7E-02	2E-01	1E-03	5E-02	568	0.017	0.015	573	178.4571431	0.06 Diesel
2022	Graders	0.16	0.49	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.03	3E-03	4E-04	1E-03	4E-05	1E-04	7E-03	3E-02	1E-04	4E-03	538	0.002	0.014	541	168.5573666	0.05 Diesel
2022	Rollers	0.11	0.33	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	8E-04	3E-05	7E-05	4E-03	2E-02	7E-05	3E-03	140	0.002	0.004	141	43.89396977	0.01 Diesel
2023	Bore/Drill Rigs	0.59	2.10	0.10	0.00	0.10	0.10	0.00	0.10	0.00	0.14	1E-02	3E-03	4E-03	3E-04	1E-03	3E-02	1E-01	5E-04	2E-02	540	0.005	0.014	544	169.3892382	0.05 Diesel
2023	Rubber Tire Loaders	0.31	1.06	0.05	0.00	0.05	0.05	0.00	0.05	0.00	0.05	5E-03	9E-04	2E-03	9E-05	3E-04	1E-02	5E-02	2E-04	8E-03	540	0.004	0.014	544	169.2883223	0.05 Diesel
2023	Off-highway Trucks	0.13	1.48	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.04	4E-03	6E-04	2E-03	6E-05	2E-04	1E-02	3E-02	2E-04	6E-03	537	0.003	0.014	540	168.2826032	0.05 Diesel
2023	Other Construction Eq	0.49	1.25	0.07	0.00	0.07	0.07	0.00	0.07	0.00	0.07	6E-03	1E-03	3E-03	1E-04	4E-04	2E-02	7E-02	3E-04	1E-02	526	0.005	0.014	530	165.0380609	0.05 Diesel
2023	Air Compressors	0.44	1.65	0.07	0.00	0.07	0.07	0.00	0.07	0.00	0.08	8E-03	1E-03	4E-03	1E-04	3E-04	2E-02	7E-02	3E-04	1E-02	525	0.007	0.014	529	166.5761349	0.05 Diesel
2023	Tractors/Loaders/Bac	1.47	2.22	0.24	0.00	0.24	0.23	0.00	0.23	0.00	0.27	2E-02	6E-03	1E-02	5E-04	2E-03	7E-02	2E-01	1E-03	4E-02	665	0.014	0.017	670	208.7848866	0.06 Diesel
2023	Rough Terrain Forklift	0.49	1.37	0.08	0.00	0.08	0.08	0.00	0.08	0.00	0.06	6E-03	1E-03	3E-03	1E-04	3E-04	2E-02	8E-02	3E-04	1E-02	570	0.005	0.015	574	178.5861623	0.06 Diesel
2023	Generator Sets	1.09	2.92	0.17	0.00	0.17	0.17	0.00	0.17	0.00	0.25	2E-02	5E-03	1E-02	5E-04	1E-03	7E-02	2E-01	1E-03	4E-02	561	0.017	0.014	565	176.0124424	0.05 Diesel
2023	Graders	0.12	0.39	0.03	0.00	0.03	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	9E-04	3E-05	1E-04	5E-03	2E-02	9E-05	3E-03	538	0.002	0.014	541	168.5574725	0.05 Diesel
2023	Rollers	0.09	0.30	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.01	1E-03	3E-04	7E-04	2E-05	6E-05	4E-03	1E-02	6E-05	2E-03	140	0.001	0.004	141	43.86601784	0.01 Diesel
2024	Bore/Drill Rigs	0.54	1.94	0.09	0.00	0.09	0.09	0.00	0.09	0.00	0.12	1E-02	3E-03	4E-03	2E-04	9E-04	3E-02	9E-02	5E-04	2E-02	540	0.005	0.014	544	169.3892653	0.05 Diesel
2024	Rubber Tire Loaders	0.27	0.95	0.05	0.00	0.05	0.05	0.00	0.05	0.00	0.04	4E-03	8E-04	2E-03	7E-05	2E-04	1E-02	5E-02	2E-04	7E-03	540	0.004	0.014	544	169.2883709	0.05 Diesel
2024	Off-highway Trucks	0.10	1.44	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.03	3E-03	6E-04	2E-03	5E-05	2E-04	9E-03	2E-02	1E-04	6E-03	537	0.003	0.014	540	168.2826461	0.05 Diesel
2024	Other Construction Eq	0.44	1.13	0.06	0.00	0.06	0.06	0.00	0.06	0.00	0.06	6E-03	1E-03	2E-03	1E-04	4E-04	2E-02	6E-02	2E-04	1E-02	538	0.004	0.014	541	168.5949244	0.05 Diesel
2024	Air Compressors	0.35	1.52	0.06	0.00	0.06	0.05	0.00	0.05	0.00	0.06	6E-03	1E-03	3E-03	1E-04	3E-04	2E-02	5E-02	3E-04	1E-02	502	0.006	0.014	506	164.7754833	0.05 Diesel
2024	Tractors/Loaders/Bac	1.30	2.05	0.21	0.00	0.21	0.20	0.00	0.20	0.00	0.24	2E-02	5E-03	9E-03	4E-04	1E-03	6E-02	2E-01	9E-04	4E-02	665	0.012	0.017	670	208.7848988	0.06 Diesel
2024	Rough Terrain Forklift	0.41	1.25	0.07	0.00	0.07	0.07	0.00	0.07	0.00	0.05	5E-03	9E-04	2E-03	9E-05	2E-04	1E-02	7E-02	2E-04	8E-03	570	0.005	0.015	574	178.5861912	0.06 Diesel
2024	Generator Sets	1.03	2.83	0.16	0.00	0.16	0.15	0.00	0.15	0.00	0.24	2E-02	5E-03	1E-02	4E-04	1E-03	6E-02	2E-01	1E-03	4E-02	569	0.016	0.015	573	178.4570823	0.06 Diesel
2024	Graders	0.10	0.32	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	2E-03	3E-04	7E-04	3E-05	1E-04	4E-03	2E-02	7E-05	3E-03	538	0.001	0.014	541	168.5574047	0.05 Diesel
2024	Rollers	0.08	0.27	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1E-03	2E-04	6E-04	2E-05	6E-05	3E-03	1E-02	6E-05	2E-03	140	0.001	0.004	141	43.8660154	0.01 Diesel
2025	Bore/Drill Rigs	0.49	1.82	0.09	0.00	0.09	0.08	0.00	0.08	0.00	0.11	1E-02	3E-03	4E-03	2E-04	8E-04	3E-02	8E-02	4E-04	2E-02	540	0.005	0.014	544	169.3892548	0.05 Diesel
2025	Rubber Tire Loaders	0.24	0.86	0.04	0.00	0.04	0.04	0.00	0.04	0.00	0.04	4E-03	7E-04	2E-03	6E-05	2E-04	1E-02	4E-02	2E-04	6E-03	540	0.003	0.014	544	169.2883431	0.05 Diesel
2025	Off-highway Trucks	0.08	1.41	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.03	3E-03	5E-04	1E-03	5E-05	1E-04	8E-03	2E-02	1E-04	5E-03	537	0.002	0.014	540	168.282614	0.05 Diesel
2025	Other Construction Eq	0.39	1.03	0.06	0.00	0.06	0.06	0.00	0.06	0.00	0.06	5E-03	1E-03	2E-03	1E-04	3E-04	1E-02	6E-02	2E-04	9E-03	538	0.004	0.014	541	168.5949119	0.05 Diesel
2025	Air Compressors	0.26	1.17	0.04	0.00	0.04	0.04	0.00	0.04	0.00	0.05	5E-03	9E-04	2E-03	9E-05	2E-04	1E-02	4E-02	2E-04	8E-03	440	0.005	0.011	443	131.7765925	0.04 Diesel
2025	Tractors/Loaders/Bac	1.18	1.94	0.19	0.00	0.19	0.19	0.00	0.19	0.00	0.21	2E-02	5E-03	8E-03	4E-04	1E-03	5E-02	2E-01	8E-04	3E-02	665	0.011	0.017	670	208.7848685	0.06 Diesel
2025	Rough Terrain Forklift	0.34	1.13	0.06	0.00	0.06	0.06	0.00	0.06	0.00	0.04	4E-03	7E-04	2E-03	7E-05	2E-04	1E-02	6E-02	2E-04	7E-03	570	0.004	0.015	574	178.58624	0.06 Diesel
2025	Generator Sets	0.97	2.72	0.15	0.00	0.15	0.14	0.00	0.14	0.00	0.23	2E-02	5E-03	1E-02	4E-04	1E-03	6E-02	1E-01	9E-04	4E-02	569	0.016	0.015	573	178.4571141	0.06 Diesel
2025	Graders	0.08	0.27	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	1E-03	2E-04	6E-04	2E-05	1E-04	3E-03	2E-02	6E-05	2E-03	538	0.001	0.014	541	168.5574045	0.05 Diesel
2025	Rollers	0.06	0.25	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1E-03	2E-04	5E-04	2E-05	5E-05	3E-03	1E-02	5E-05	2E-03	140	0.001	0.004	141	43.8660097	0.01 Diesel

Sources

(1) HSR PB, Construction Emissions Inventory and Construction Data. December 2018.
(2) ICF. 2020. Vehicle and Equipment Emission Factors. Excel workbook.

HSR PB (Tunnel 4) Project Information

Tunnel Miles/Day	0.004

Tunnel length (1)	
Tunnel 4 from Portal 7 (mined twin) (mi)	0.455
Portals	1

Tunnel Construction Schedule (1)	Value
Portal (days)	264
Tunnel (days)	122
Total (days)	386

Ozone NAA

Percent of Project Features (2)		1 Earthwork	2 Vehicles	3 Offroad	4 Locomotives	5
In nonattainment area	Indian Canyon	0%	27%	0%	0%	
	Whitmore Park	0%	58%	0%	0%	
	Wells Draw	0%	46%	0%	0%	
Out of nonattainment area	Indian Canyon	100%	73%	100%	100%	
	Whitmore Park	100%	42%	100%	100%	
	Wells Draw	100%	54%	100%	100%	

PM NAA

Percent of Project Features (2)		1 Earthwork	2 Vehicles	3 Offroad	4 Locomotives	5
In nonattainment area	Indian Canyon	0%	4%	0%	0%	
	Whitmore Park	0%	7%	0%	0%	
	Wells Draw	0%	3%	0%	0%	
Out of nonattainment area	Indian Canyon	100%	96%	100%	100%	
	Whitmore Park	100%	93%	100%	100%	
	Wells Draw	100%	97%	100%	100%	

Sources

(1) HSR PB, Construction Emissions Inventory and Construction Data. December 2018.
(2) ICF. 2020. GIS. 'AirQuality_2020501

Tunnels (1)

Subphase Tunnel 4 from Portal 7 (MINED TWIN TUNNELS)

Schedule

Phase	Code	Start Date	End Date	Working Days	Days/Wee	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roadway Offsite Onroad 75	RoadOffOn75	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offsite Onroad 76	RoadOffOn76	11/1/2023	10/30/2024	264	5					43	221			
Roadway Offsite Onroad 77	RoadOffOn77	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offsite Onroad 78	RoadOffOn78	3/3/2025	7/4/2025	89	5							89		
Roadway Offsite Onroad 79	RoadOffOn79	11/30/2024	3/2/2025	67	5						22	45		
Roadway Onroad 24	RoadOn24	10/31/2024	3/2/2025	122	7						61	61		
Roadway Onroad 25	RoadOn25	11/1/2023	10/30/2024	264	5					43	221			
Roadway Offroad 88	RoadOff88	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 89	RoadOff89	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 90	RoadOff90	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 91	RoadOff91	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 92	RoadOff92	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 93	RoadOff93	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 94	RoadOff94	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 95	RoadOff95	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 96	RoadOff96	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 97	RoadOff97	10/31/2024	3/2/2025	122	7						61	61		
Roadway Offroad 98	RoadOff98	11/1/2023	10/30/2024	264	5					43	221			

	Original Working Days	Activity Rate Scalar Normalized Across Tunnel Construction period
RoadOffOn75	122	100%
RoadOffOn76	264	216%
RoadOffOn77	122	100%
RoadOffOn78	89	73%
RoadOffOn79	67	55%
RoadOn24	122	100%
RoadOn25	264	216%
RoadOff88	122	100%
RoadOff89	122	100%
RoadOff90	122	100%
RoadOff91	122	100%
RoadOff92	122	100%
RoadOff93	122	100%
RoadOff94	122	100%
RoadOff95	122	100%
RoadOff96	122	100%
RoadOff97	122	100%
RoadOff98	264	216%

Loco - none identified

Construction_Tunnels
Tunnel_Activity

Offsite Onroad

Subphase	Code	Vehicle	Trip/Day	RT Mi/Trip	Fuel	Fuel (gal/d	Vehicle	Notes
Tunnel 4 fi	RoadOffOn75	Dump Truck (tunnel spoi	125	20	Diesel	387	T7	Original
	RoadOffOn76	Dump Truck (portal spoil	186	20	Diesel	577	T7	Original
	RoadOffOn77	Concrete Truck	20	20	Diesel	44	T6	Original
	RoadOffOn78	Concrete Truck	48	20	Diesel	106	T6	Original
	RoadOffOn79	Concrete Cross Passages	1	20	Diesel	2	T6	Original
Tunnel 4 fi	RoadOffOn75	Dump Truck (tunnel spoi	125.0	20	Diesel	387	T7	Activity Rate (trips) Scaled Across Tunnel Construction Period
	RoadOffOn76	Dump Truck (portal spoil	402.5	20	Diesel	577	T7	Activity Rate (trips) Scaled Across Tunnel Construction Period
	RoadOffOn77	Concrete Truck	20.0	20	Diesel	44	T6	Activity Rate (trips) Scaled Across Tunnel Construction Period
	RoadOffOn78	Concrete Truck	35.0	20	Diesel	106	T6	Activity Rate (trips) Scaled Across Tunnel Construction Period
	RoadOffOn79	Concrete Cross Passages	0.5	20	Diesel	2	T6	Activity Rate (trips) Scaled Across Tunnel Construction Period

Onsite Onroad

Subphase	Code	Vehicle	Trucks	RT Mi/ Truck	Fuel	Fuel (gal/d	Vehicle	Notes
Tunnel 4 fi	RoadOn24	Tractor loader tunnel spc	2	13.5	Diesel	5.775144	T6Onsite	Original
	RoadOn25	Tractor loader portal spc	4	13.5	Diesel	11.55029	T6Onsite	Original
Tunnel 4 fi	RoadOn24	Tractor loader tunnel spc	2	13.5	Diesel	5.775144	T6Onsite	Activity Rate (RT mi/truck) Scaled Across Tunnel Construction Period
	RoadOn25	Tractor loader portal spc	4	29.2	Diesel	11.55029	T6Onsite	Activity Rate (RT mi/truck) Scaled Across Tunnel Construction Period

Offroad

Subphase	Code	Equip	#/day	hrs/day	Equip Load	CMOD	HP Bin	HP	kW	LF	Fuel	Fuel (gal/d	Notes
Tunnel 4 fi	RoadOff88	Underground drill rig	2	2	4	Bore/Drill	250	228	170	0.50	Diesel	0.2	Original
	RoadOff89	Underground loader	2	8	16	Rubber Tir	250	335	250	0.36	Diesel	0.8	Original
	RoadOff90	Underground truck	10	8	80	Off-Highw	250	322	240	0.38	Diesel	4.1	Original
	RoadOff91	Wet mix sprayed concret	2	3	6	Other Con	25	23	16.8	0.42	Diesel	0.0	Original
	RoadOff92	Ready-mixed concrete tr	6	8	48	Off-Highw	175	10	7.5	0.38	Diesel	0.1	Original
	RoadOff93	Air Compressor	2	24	48	Air Compr	500	440	328	0.48	Diesel	5.9	Original
	RoadOff94	Backhoe loader	2	4	8	Tractors/L	120	125		0.37	Diesel	0.2	Original
	RoadOff95	Platform Truck	2	4	8	Aerial Lifts	120	161	120	0.31	Diesel	0.2	Original
	RoadOff96	Forklift	2	4	8	Rough Ter	175	161	120	0.40	Diesel	0.2	Original
	RoadOff97	Generator	2	24	48	Generator	50	43	32	0.74	Diesel	0.8	Original
	RoadOff98	Surface Top Hammer Dri	3	8	24	Bore/Drill	175	201	150	0.50	Diesel	1.0	Original
Tunnel 4 fi	RoadOff88	Underground drill rig	2	2.0	4.0	Bore/Drill	250	228	170	0.50	Diesel	0.2	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff89	Underground loader	2	8.0	16.0	Rubber Tir	250	335	250	0.36	Diesel	0.8	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff90	Underground truck	10	8.0	80.0	Off-Highw	250	322	240	0.38	Diesel	4.1	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff91	Wet mix sprayed concret	2	3.0	6.0	Other Con	25	23	16.8	0.42	Diesel	0.0	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff92	Ready-mixed concrete tr	6	8.0	48.0	Off-Highw	175	10	7.5	0.38	Diesel	0.1	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff93	Air Compressor	2	24.0	48.0	Air Compr	500	440	328	0.48	Diesel	5.9	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff94	Backhoe loader	2	4.0	8.0	Tractors/L	120	125		0.37	Diesel	0.2	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff95	Platform Truck	2	4.0	8.0	Aerial Lifts	120	161	120	0.31	Diesel	0.2	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff96	Forklift	2	4.0	8.0	Rough Ter	175	161	120	0.40	Diesel	0.2	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff97	Generator	2	24.0	48.0	Generator	50	43	32	0.74	Diesel	0.8	Activity Rate (hours) Scaled Across Tunnel Construction Period
	RoadOff98	Surface Top Hammer Dri	3	17.3	51.9	Bore/Drill	175	201	150	0.50	Diesel	1.0	Activity Rate (hours) Scaled Across Tunnel Construction Period

Source

(1) HSR PB. SR14Revised Construction_Tunnels_T4Loco.xlsx

Construction_Tunnels
Track_Activity

Track (1)

Schedule

Phase	Code	Start Date	End Date	Working Days	Days/Week	2019	2020	2021	2022	2023	2024	2025	2026	2027
Track marking	TrackMark	2/14/2027	4/15/2027	44	5									44
Rail grinding	RailGrind	8/22/2027	10/22/2027	44	5									44
Non-ballasted track	Nonballast	11/1/2026	11/29/2027	285	5								44	241

Assumptions: Removed all phases related to ballast or ballasted track, which would not be required in the tunnels. These included ballast, ballast first level, transport ballast, ties, track, first level, 2nd level.

		Original	Track Activit	Activity Rate Scalar Normalized Across Tunnel Construction Period (activity/day)
	Total Track length (miles	91.7	91.7	91.7
	Non-ballasted track leng	49.1	0.455	
NonBallast	Non-ballasted track cons	285	2.6	2.2%
TrackMark	Track marking construct	44	0.2	0.2%
RailGrind	Rail grinding time (day)	44	0.2	0.2%
	Total Days	393		

Loco

Code	Lookup	Year	Days	Loco	Engine Tier	#/day	hrs/day	HP	LF	Fuel	Fuel (gal/d	Notes
RailGrind	RailGrind:2027	2027	44	Rail Grinding Train	2	1	8	2450	0.3	Diesel	1360	Original
RailGrind	RailGrind:2027	2027	0.2	Rail Grinding Train	2	1	8	2450	0.3	Diesel	1360	Adjusted for Tunnel Length
RailGrind	RailGrind:2027	2027	122	Rail Grinding Train	2	1	0.014	2450	0.3	Diesel	2.43	Activity Rate (hours) Scaled Across Tunnel Construction Period

Offsite Onroad

Code	Vehicle	Days	Trip/Day	RT Mi/Trip	Fuel	Fuel (gal/day)	Vehicle	Notes
TrackMark	Trucks-0150	44	10	40	Diesel	44	T6	Original
NonBallast	Trucks-0200	241	7	40	Diesel	31	T6	Original
NonBallast	Pump Truck	241	4	40	Diesel	18	T6	Original
NonBallast	Concrete Truck	241	98	20	Diesel	215	T6	Original
TrackMark	Trucks-0150	0.2	10	40	Diesel	44	T6	Adjusted for Tunnel Length
NonBallast	Trucks-0200	2.6	7	40	Diesel	31	T6	Adjusted for Tunnel Length
NonBallast	Pump Truck	2.6	4	40	Diesel	18	T6	Adjusted for Tunnel Length
NonBallast	Concrete Truck	2.6	98	20	Diesel	215	T6	Adjusted for Tunnel Length
TrackMark	Trucks-0150	122.0	0.02	40	Diesel	44	T6	Activity Rate (trips) Scaled Across Tunnel Construction Period
NonBallast	Trucks-0200	122.0	0.15	40	Diesel	31	T6	Activity Rate (trips) Scaled Across Tunnel Construction Period
NonBallast	Pump Truck	122.0	0.09	40	Diesel	18	T6	Activity Rate (trips) Scaled Across Tunnel Construction Period
NonBallast	Concrete Truck	122.0	2.12	20	Diesel	215	T6	Activity Rate (trips) Scaled Across Tunnel Construction Period

Onsite Onroad - none identified

Construction_Tunnels
Track_Activity

Offroad

Code	Days	Equip	#/day	hrs/day	Equip Load	CMOD	HP Bin	HP	LF	Fuel	Fuel (gal/d	Notes
TrackMark	44	Tractors/Loader	10	8	80	Tractors/Load	120	97	0.3685	Diesel	1.20325	Original
NonBallast	241	Tractors/Loader	6	8	48	Tractors/Load	120	97	0.3685	Diesel	0.72195	Original
NonBallast	241	Graders-0140	6	8	48	Graders	120	140	0.4087	Diesel	1.134174	Original
NonBallast	241	Rollers-0175	6	8	48	Rollers	175	175	0.3752	Diesel	1.311666	Original
TrackMark	0.2	Tractors/Loader	10	8	80	Tractors/Load	120	97	0.3685	Diesel	1.20325	Adjusted for Tunnel Length
NonBallast	2.6	Tractors/Loader	6	8	48	Tractors/Load	120	97	0.3685	Diesel	0.72195	Adjusted for Tunnel Length
NonBallast	2.6	Graders-0140	6	8	48	Graders	120	140	0.4087	Diesel	1.134174	Adjusted for Tunnel Length
NonBallast	2.6	Rollers-0175	6	8	48	Rollers	175	175	0.3752	Diesel	1.311666	Adjusted for Tunnel Length
TrackMark	122.0	Tractors/Loader	10	0.014	0.143	Tractors/Load	120	97	0.3685	Diesel	1.20325	Activity Rate (hours) Scaled Across Tunnel Construction Period
NonBallast	122.0	Tractors/Loader	6	0.173	1.040	Tractors/Load	120	97	0.3685	Diesel	0.72195	Activity Rate Scaled Across Tunnel Construction Period
NonBallast	122.0	Graders-0140	6	0.173	1.040	Graders	120	140	0.4087	Diesel	1.134174	Activity Rate Scaled Across Tunnel Construction Period
NonBallast	122.0	Rollers-0175	6	0.173	1.040	Rollers	175	175	0.3752	Diesel	1.311666	Activity Rate (hours) Scaled Across Tunnel Construction Period

Source

(1) SR14Revised Construction_Track_T4Loco.xlsx

Construction_Employee
Employee_Sum

Uinta Project Construction Emissions (tons/year) (calc'd)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)
2022Indian Canyon	2022	Indian Canyon	315.20	26.60	0.66	111.48	112.14	0.58	14.54	15.13	0.11	26.36	4.53E-01	2.95E-02	1.13E+00	1.73E-01	4.56E-01	3.08E-01	1.23E-02	5.85E-02	7.91E-02	14,702	1.33	1.22	15,099	23,475	1,583,718
2022Whitmore Pa	2022	Whitmore Park	326.25	27.53	0.68	122.24	122.92	0.60	15.60	16.20	0.11	27.29	4.69E-01	3.06E-02	1.17E+00	1.79E-01	4.72E-01	3.19E-01	1.27E-02	6.05E-02	8.19E-02	15,218	1.38	1.27	15,629	24,297	1,639,225
2022Wells Draw	2022	Wells Draw	355.39	29.99	0.74	104.81	105.55	0.66	14.74	15.40	0.12	29.72	5.11E-01	3.33E-02	1.27E+00	1.95E-01	5.14E-01	3.48E-01	1.39E-02	6.59E-02	8.92E-02	16,577	1.50	1.38	17,025	26,468	1,785,633
2023Indian Canyon	2023	Indian Canyon	293.43	23.84	0.62	111.48	112.10	0.55	14.54	15.09	0.11	24.11	4.22E-01	2.77E-02	1.04E+00	1.60E-01	4.14E-01	2.82E-01	1.12E-02	5.38E-02	7.27E-02	14,263	1.26	1.15	14,636	23,112	1,536,041
2023Whitmore Pa	2023	Whitmore Park	303.71	24.68	0.64	122.24	122.88	0.57	15.60	16.16	0.11	24.95	4.36E-01	2.87E-02	1.08E+00	1.66E-01	4.28E-01	2.92E-01	1.16E-02	5.57E-02	7.53E-02	14,763	1.31	1.19	15,149	23,922	1,589,877
2023Wells Draw	2023	Wells Draw	330.84	26.88	0.70	104.81	105.51	0.62	14.74	15.36	0.12	27.18	4.75E-01	3.13E-02	1.18E+00	1.81E-01	4.66E-01	3.18E-01	1.26E-02	6.06E-02	8.20E-02	16,082	1.43	1.29	16,502	26,059	1,731,878
2024Indian Canyon	2024	Indian Canyon	91.30	7.18	0.20	37.26	37.46	0.17	4.86	5.03	0.03	7.40	1.31E-01	8.72E-03	3.24E-01	4.98E-02	1.26E-01	8.65E-02	3.43E-03	1.66E-02	2.24E-02	4,620	0.40	0.36	4,738	7,575	497,457
2024Whitmore Pa	2024	Whitmore Park	94.50	7.43	0.20	40.86	41.06	0.18	5.21	5.39	0.04	7.66	1.36E-01	9.03E-03	3.35E-01	5.16E-02	1.30E-01	8.96E-02	3.55E-03	1.72E-02	2.32E-02	4,782	0.42	0.37	4,904	7,840	514,893
2024Wells Draw	2024	Wells Draw	307.99	24.21	0.66	104.81	105.46	0.58	14.74	15.32	0.11	24.97	4.43E-01	2.94E-02	1.09E+00	1.68E-01	4.25E-01	2.92E-01	1.16E-02	5.60E-02	7.57E-02	15,585	1.36	1.22	15,982	25,552	1,678,044
2025Indian Canyon	2025	Indian Canyon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00	0.00	0	0	0
2025Whitmore Pa	2025	Whitmore Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00	0.00	0	0	0
2025Wells Draw	2025	Wells Draw	284.83	21.80	0.62	104.81	105.43	0.55	14.74	15.29	0.11	22.74	4.12E-01	2.75E-02	1.01E+00	1.55E-01	3.84E-01	2.66E-01	1.08E-02	5.13E-02	6.93E-02	15,085	1.28	1.16	15,463	24,963	1,623,885

Uinta Project Construction Emissions (tons/day) (calc'd)

		Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
	Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)
2022	Indian Canyon	0.86	0.07	0.00	0.31	0.31	0.00	0.04	0.04	0.00	0.07	1.24E-03	8.09E-05	3.09E-03	4.73E-04	1.25E-03	8.45E-04	3.37E-05	1.60E-04	2.17E-04	40	0.00	0.00	41	64	4339
2022	Whitmore Park	0.89	0.08	0.00	0.33	0.34	0.00	0.04	0.04	0.00	0.07	1.28E-03	8.37E-05	3.20E-03	4.89E-04	1.29E-03	8.74E-04	3.49E-05	1.66E-04	2.24E-04	42	0.00	0.00	43	67	4491
2022	Wells Draw	0.97	0.08	0.00	0.29	0.29	0.00	0.04	0.04	0.00	0.08	1.40E-03	9.12E-05	3.49E-03	5.33E-04	1.41E-03	9.52E-04	3.80E-05	1.81E-04	2.44E-04	45	0.00	0.00	47	73	4892
2023	Indian Canyon	0.80	0.07	0.00	0.31	0.31	0.00	0.04	0.04	0.00	0.07	1.15E-03	7.60E-05	2.86E-03	4.39E-04	1.13E-03	7.72E-04	3.06E-05	1.47E-04	1.99E-04	39	0.00	0.00	40	63	4208
2023	Whitmore Park	0.83	0.07	0.00	0.33	0.34	0.00	0.04	0.04	0.00	0.07	1.20E-03	7.86E-05	2.96E-03	4.54E-04	1.17E-03	7.99E-04	3.17E-05	1.53E-04	2.06E-04	40	0.00	0.00	42	66	4356
2023	Wells Draw	0.91	0.07	0.00	0.29	0.29	0.00	0.04	0.04	0.00	0.07	1.30E-03	8.56E-05	3.23E-03	4.95E-04	1.28E-03	8.70E-04	3.45E-05	1.66E-04	2.25E-04	44	0.00	0.00	45	71	4745
2024	Indian Canyon	0.75	0.06	0.00	0.31	0.31	0.00	0.04	0.04	0.00	0.06	1.08E-03	7.15E-05	2.66E-03	4.08E-04	1.03E-03	7.09E-04	2.81E-05	1.36E-04	1.84E-04	38	0.00	0.00	39	62	4078
2024	Whitmore Park	0.77	0.06	0.00	0.33	0.34	0.00	0.04	0.04	0.00	0.06	1.12E-03	7.40E-05	2.75E-03	4.23E-04	1.07E-03	7.34E-04	2.91E-05	1.41E-04	1.90E-04	39	0.00	0.00	40	64	4220
2024	Wells Draw	0.84	0.07	0.00	0.29	0.29	0.00	0.04	0.04	0.00	0.07	1.21E-03	8.06E-05	2.99E-03	4.60E-04	1.16E-03	8.00E-04	3.17E-05	1.53E-04	2.07E-04	43	0.00	0.00	44	70	4597
2025	Indian Canyon	0.69	0.05	0.00	0.31	0.31	0.00	0.04	0.04	0.00	0.06	1.00E-03	6.68E-05	2.44E-03	3.77E-04	9.32E-04	6.46E-04	2.62E-05	1.25E-04	1.68E-04	37	0.00	0.00	38	61	3946
2025	Whitmore Park	0.72	0.05	0.00	0.33	0.34	0.00	0.04	0.04	0.00	0.06	1.04E-03	6.91E-05	2.53E-03	3.90E-04	9.65E-04	6.69E-04	2.71E-05	1.29E-04	1.74E-04	38	0.00	0.00	39	63	4084
2025	Wells Draw	0.78	0.06	0.00	0.29	0.29	0.00	0.04	0.04	0.00	0.06	1.13E-03	7.53E-05	2.76E-03	4.25E-04	1.05E-03	7.29E-04	2.95E-05	1.41E-04	1.90E-04	41	0.00	0.00	42	68	4449

MOVES2014 Employee Vehicle Emission Factors (g/mile)

	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)	
Employee Vehicle (LDA-LDT-LDT2)	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Total Energy Consumption	Diesel	Gasoline
2022	7.51	0.63	0.02	0.02	0.04	0.01	0.00	0.02	0.00	0.63	1.08E-02	7.03E-04	2.69E-02	4.11E-03	1.09E-02	7.34E-03	2.93E-04	1.39E-03	1.89E-03	386	0.03	0.03	396	5,368,223	89,331.96	5,278,891
2023	6.99	0.57	0.01	0.02	0.04	0.01	0.00	0.02	0.00	0.57	1.00E-02	6.60E-04	2.49E-02	3.81E-03	9.85E-03	6.71E-03	2.66E-04	1.28E-03	1.73E-03	374	0.03	0.03	384	5,207,925	87,952	5,119,973
2024	6.51	0.51	0.01	0.02	0.04	0.01	0.00	0.02	0.00	0.53	9.37E-03	6.22E-04	2.31E-02	3.55E-03	8.98E-03	6.17E-03	2.45E-04	1.18E-03	1.60E-03	363	0.03	0.03	372	5,047,066	86,241	4,960,825
2025	6.02	0.46	0.01	0.02	0.04	0.01	0.00	0.01	0.00	0.48	8.71E-03	5.81E-04	2.12E-02	3.28E-03	8.10E-03	5.62E-03	2.27E-04	1.08E-03	1.46E-03	351	0.03	0.03	360	4,884,965	84,253	4,800,712
2026	5.58	0.42	0.01	0.02	0.03	0.01	0.00	0.01	0.00	0.44	8.15E-03	5.45E-04	1.96E-02	3.04E-03	7.36E-03	5.16E-03	2.13E-04	9.99E-04	1.35E-03	341	0.03	0.03	349	4,735,952	82,258	4,653,695
2027	5.19	0.38	0.01	0.02	0.03	0.01	0.00	0.01	0.00	0.41	7.70E-03	5.13E-04	1.83E-02	2.83E-03	6.77E-03	4.80E-03	1.99E-04	9.29E-04	1.25E-03	331	0.03	0.03	339	4,600,236	80,283	4,519,953
2045	2.80	0.21	0.01	0.02	0.03	0.01	0.00	0.01	0.00	0.22	4.76E-03	3.03E-04	1.01E-02	1.57E-03	3.59E-03	2.85E-03	1.33E-04	5.28E-04	7.07E-04	272	0.02	0.02	279	3,781,731	66,656	3,715,075
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

AP-42 Road Dust Emission Factors (g/mile) (3)

	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)	
Road Type	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum	Total
Paved				0.81			0.20																		
Unpaved				6.51			0.65																		

Uinta Project Information

Employee Commute	
Average Employees (1)	1,000
One-way trips per Employee per D	2
Total Trips per Day (calc'd)	2,000
Average One-way Trip Distance (2)	
Indian Canyon	52
Paved	35
Unpaved	17
Whitmore Park	54
Paved	35
Unpaved	19
Wells Draw	59
Paved	45
Unpaved	14
Average VMT per Day (calc'd)	
Indian Canyon	104,352
Paved	70,969
Unpaved	33,383
Whitmore Park	108,010
Paved	70,471
Unpaved	37,539
Wells Draw	117,657
Paved	89,126
Unpaved	28,530

Conversions

Conversions	
gram to ton	0.000001
gram to MT	0.000001

Sources

(1) Response to OEA IR 3. Venable response PDF. November 25, 2019. G:\Sacramento\LGT-Air&Noise\Air\Uinta Basin Railway EIS 00060.19 (Utah)\01 Project Info\04 Data\2019-12-03 Response to OEA IR 3
(2) ICF GIS. 2020. 'Air Quality 20200319'
(3) ICF. 2020. Vehicle and Equipment Emission Factors. Excel workbook.

Emissions Inventory—Direct and Indirect (Operations)

Project

Uinta Project-Level Operation Emissions Within Nonattainment Area (tons/year) (calc'd)

			Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	soline (gallons)
LowIndian C	Low	Indian Canyon	Total	69.72	170.01	3.63	2.42	6.05	3.53	0.20	3.73	0.21	6.69	1.1E-01	1.2E-02	1.6E-01	9.8E-03	1.1E-02	1.5E-01	3.6E+00	1.1E-02	2.6E-03	20,258	1.7	0.6	20,461	1,947,589	50,272
LowWhitmo	Low	Whitmore Park	Total	72.19	176.14	3.77	2.74	6.51	3.66	0.23	3.89	0.21	6.93	1.1E-01	1.3E-02	1.6E-01	1.0E-02	1.2E-02	1.5E-01	3.8E+00	1.2E-02	2.8E-03	21,037	1.7	0.6	21,247	2,022,589	51,778
LowWells D	Low	Wells Draw	Total	57.92	128.40	2.76	2.00	4.76	2.68	0.18	2.86	0.16	5.73	9.0E-02	9.8E-03	1.3E-01	8.7E-03	1.1E-02	1.2E-01	2.7E+00	9.1E-03	2.2E-03	16,218	1.4	0.5	16,385	1,550,930	51,293
HighIndian (	High	Indian Canyon	Total	189.45	478.96	10.32	6.02	16.34	10.01	0.68	10.69	0.60	18.36	3.1E-01	3.5E-02	4.1E-01	2.4E-02	2.3E-02	4.4E-01	1.0E+01	3.3E-02	1.0E-02	59,303	4.7	1.6	59,863	5,727,587	100,544
HighWhitmo	High	Whitmore Park	Total	196.10	496.00	10.69	6.66	17.34	10.37	0.74	11.11	0.62	19.01	3.2E-01	3.7E-02	4.3E-01	2.5E-02	2.4E-02	4.6E-01	1.1E+01	3.5E-02	1.0E-02	61,459	4.9	1.7	62,039	5,936,098	103,557
HighWells D	High	Wells Draw	Total	155.34	362.55	7.85	4.70	12.55	7.62	0.57	8.19	0.49	15.57	2.5E-01	2.9E-02	3.4E-01	2.0E-02	2.0E-02	3.6E-01	7.8E+00	2.7E-02	8.3E-03	47,973	3.8	1.3	48,430	4,622,840	94,695
LowIndian C	Low	Indian Canyon	Loco	62.30	173.15	3.74	0.00	3.74	3.63	0.00	3.63	0.22	6.16	1.0E-01	1.3E-02	1.3E-01	5.3E-03	5.8E-05	1.6E-01	3.7E+00	1.2E-02	3.0E-03	21,669	1.7	0.6	21,863	2,122,734	0
LowWhitmo	Low	Whitmore Park	Loco	64.50	179.27	3.88	0.00	3.88	3.76	0.00	3.76	0.23	6.38	1.1E-01	1.3E-02	1.3E-01	5.5E-03	6.0E-05	1.7E-01	3.9E+00	1.2E-02	3.1E-03	22,434	1.8	0.6	22,635	2,197,712	0
LowWells D	Low	Wells Draw	Loco	50.63	131.21	2.85	0.00	2.85	2.77	0.00	2.77	0.18	5.21	8.5E-02	1.0E-02	1.0E-01	4.3E-03	4.7E-05	1.3E-01	2.9E+00	9.4E-03	2.4E-03	17,609	1.4	0.4	17,767	1,725,068	0
HighIndian (	High	Indian Canyon	Loco	173.21	481.43	10.41	0.00	10.41	10.10	0.00	10.10	0.61	17.13	2.9E-01	3.5E-02	3.5E-01	1.5E-02	1.6E-04	4.5E-01	1.0E+01	3.2E-02	8.3E-03	60,247	4.7	1.5	60,786	5,901,960	0
HighWhitmo	High	Whitmore Park	Loco	179.33	498.43	10.78	0.00	10.78	10.45	0.00	10.45	0.63	17.73	3.0E-01	3.6E-02	3.7E-01	1.5E-02	1.7E-04	4.6E-01	1.1E+01	3.3E-02	8.6E-03	62,375	4.9	1.6	62,933	6,110,424	0
HighWells D	High	Wells Draw	Loco	140.76	364.80	7.93	0.00	7.93	7.69	0.00	7.69	0.50	14.47	2.4E-01	2.9E-02	2.9E-01	1.2E-02	1.3E-04	3.6E-01	7.9E+00	2.6E-02	6.8E-03	48,961	3.8	1.2	49,399	4,796,307	0
LowIndian C	Low	Indian Canyon	Employee	8.82	0.68	0.02	3.60	3.62	0.02	0.48	0.50	0.00	0.70	1.3E-02	8.5E-04	3.1E-02	4.8E-03	1.2E-02	8.2E-03	3.3E-04	1.6E-03	2.1E-03	467	0.0	0.0	479	773	50,272
LowWhitmo	Low	Whitmore Park	Employee	9.08	0.70	0.02	3.92	3.94	0.02	0.51	0.53	0.00	0.72	1.3E-02	8.8E-04	3.2E-02	4.9E-03	1.2E-02	8.5E-03	3.4E-04	1.6E-03	2.2E-03	481	0.0	0.0	493	796	51,778
LowWells D	Low	Wells Draw	Employee	8.60	0.64	0.02	3.18	3.20	0.02	0.46	0.47	0.00	0.68	1.3E-02	8.4E-04	3.0E-02	4.7E-03	1.1E-02	8.0E-03	3.3E-04	1.5E-03	2.1E-03	477	0.0	0.0	488	794	51,293
HighIndian (	High	Indian Canyon	Employee	17.64	1.35	0.04	7.20	7.23	0.03	0.96	0.99	0.01	1.41	2.6E-02	1.7E-03	6.2E-02	9.6E-03	2.4E-02	1.6E-02	6.7E-04	3.2E-03	4.3E-03	934	0.1	0.1	957	1,546	100,544
HighWhitmo	High	Whitmore Park	Employee	18.16	1.39	0.04	7.84	7.88	0.03	1.02	1.05	0.01	1.45	2.6E-02	1.8E-03	6.4E-02	9.9E-03	2.4E-02	1.7E-02	6.9E-04	3.3E-03	4.4E-03	962	0.1	0.1	986	1,592	103,557
HighWells D	High	Wells Draw	Employee	15.89	1.19	0.04	5.87	5.91	0.03	0.84	0.87	0.01	1.25	2.3E-02	1.6E-03	5.6E-02	8.7E-03	2.1E-02	1.5E-02	6.1E-04	2.8E-03	3.8E-03	880	0.1	0.1	902	1,466	94,695
LowIndian C	Low	Indian Canyon	Diverted Trucks	-1.39	-3.82	-0.13	-1.18	-1.31	-0.12	-0.27	-0.39	-0.02	-0.17	-0.01	0.00	0.00	0.00	0.00	-0.02	-0.12	0.00	0.00	-1,878	-0.06	0.00	-1,880	-175,918	0
LowWhitmo	Low	Whitmore Park	Diverted Trucks	-1.39	-3.82	-0.13	-1.18	-1.31	-0.12	-0.27	-0.39	-0.02	-0.17	-0.01	0.00	0.00	0.00	0.00	-0.02	-0.12	0.00	0.00	-1,878	-0.06	0.00	-1,880	-175,918	0
LowWells D	Low	Wells Draw	Diverted Trucks	-1.31	-3.45	-0.11	-1.18	-1.29	-0.10	-0.27	-0.38	-0.02	-0.16	-0.01	0.00	0.00	0.00	0.00	-0.02	-0.10	0.00	0.00	-1,868	-0.06	0.00	-1,870	-174,933	0
HighIndian (	High	Indian Canyon	Diverted Trucks	-1.39	-3.82	-0.13	-1.18	-1.31	-0.12	-0.27	-0.39	-0.02	-0.17	-0.01	0.00	0.00	0.00	0.00	-0.02	-0.12	0.00	0.00	-1,878	-0.06	0.00	-1,880	-175,918	0
HighWhitmo	High	Whitmore Park	Diverted Trucks	-1.39	-3.82	-0.13	-1.18	-1.31	-0.12	-0.27	-0.39	-0.02	-0.17	-0.01	0.00	0.00	0.00	0.00	-0.02	-0.12	0.00	0.00	-1,878	-0.06	0.00	-1,880	-175,918	0
HighWells D	High	Wells Draw	Diverted Trucks	-1.31	-3.45	-0.11	-1.18	-1.29	-0.10	-0.27	-0.38	-0.02	-0.16	-0.01	0.00	0.00	0.00	0.00	-0.02	-0.10	0.00	0.00	-1,868	-0.06	0.00	-1,870	-174,933	0

Uinta Project-Level Operation Emissions Outside Nonattainment Area (tons/year) (calc'd)

			Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy		
		Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	soline (gallons)	
LowIndian C	Low	Indian Canyon	Total	65.94	173.04	3.68	-0.10	3.57	3.57	-0.18	3.39	0.20	6.40	1.0E-01	1.1E-02	1.4E-01	7.0E-03	4.2E-03	1.4E-01	3.7E+00	9.7E-03	4.1E-04	19,849	1.7	0.6	20,050	1,936,339	21,741	
LowWhitmo	Low	Whitmore Park	Total	75.15	198.15	4.22	0.06	4.28	4.10	-0.16	3.94	0.23	7.30	1.2E-01	1.3E-02	1.6E-01	7.9E-03	4.5E-03	1.6E-01	4.2E+00	1.1E-02	8.9E-04	22,999	1.9	0.7	23,229	2,244,080	22,759	
LowWells D	Low	Wells Draw	Total	118.19	284.70	6.14	1.51	7.65	5.96	0.07	6.03	0.37	11.92	1.9E-01	2.2E-02	2.6E-01	1.4E-02	1.0E-02	2.7E-01	6.1E+00	2.0E-02	4.2E-03	36,619	3.0	1.0	36,974	3,552,907	51,027	
HighIndian (	High	Indian Canyon	Total	183.85	490.47	10.54	1.45	12.00	10.23	0.03	10.26	0.61	17.98	3.0E-01	3.5E-02	3.9E-01	1.9E-02	9.5E-03	4.4E-01	1.1E+01	3.2E-02	6.8E-03	59,738	4.8	1.6	60,299	5,824,558	43,482	
HighWhitmo	High	Whitmore Park	Total	209.32	560.29	12.05	1.79	13.84	11.70	0.06	11.76	0.70	20.49	3.4E-01	4.0E-02	4.4E-01	2.1E-02	1.0E-02	5.0E-01	1.2E+01	3.6E-02	8.1E-03	68,491	5.5	1.8	69,131	6,680,175	45,517	
HighWells D	High	Wells Draw	Total	323.90	799.60	17.34	4.18	21.52	16.82	0.45	17.28	1.08	32.90	5.3E-01	6.3E-02	6.9E-01	3.5E-02	2.0E-02	7.9E-01	1.7E+01	5.8E-02	1.5E-02	106,053	8.4	2.8	107,036	10,316,246	94,203	
LowIndian C	Low	Indian Canyon	Loco	64.09	178.13	3.85	0.00	3.85	3.74	0.00	3.74	0.23	6.34	1.1E-01	1.3E-02	1.3E-01	5.5E-03	5.9E-05	1.7E-01	3.9E+00	1.2E-02	3.1E-03	22,292	1.7	0.6	22,491	2,183,766	0	*2*
LowWhitmo	Low	Whitmore Park	Loco	73.12	203.23	4.39	0.00	4.39	4.26	0.00	4.26	0.26	7.23	1.2E-01	1.5E-02	1.5E-01	6.3E-03	6.8E-05	1.9E-01	4.4E+00	1.4E-02	3.5E-03	25,433	2.0	0.6	25,661	2,491,491	0	*2*
LowWells D	Low	Wells Draw	Loco	111.48	288.91	6.28	0.00	6.28	6.09	0.00	6.09	0.39	11.46	1.9E-01	2.3E-02	2.3E-01	9.5E-03	1.0E-04	2.9E-01	6.3E+00	2.1E-02	5.4E-03	38,775	3.0	1.0	39,122	3,798,490	0	*2*
HighIndian (	High	Indian Canyon	Loco	178.19	495.27	10.71	0.00	10.71	10.39	0.00	10.39	0.63	17.62	3.0E-01	3.6E-02	3.6E-01	1.5E-02	1.7E-04	4.6E-01	1.1E+01	3.3E-02	8.6E-03	61,979	4.9	1.6	62,534	6,071,650	0	*2*
HighWhitmo	High	Whitmore Park	Loco	203.30	565.06	12.22	0.00	12.22	11.85	0.00	11.85	0.72	20.10	3.4E-01	4.1E-02	4.2E-01	1.7E-02	1.9E-04	5.3E-01	1.2E+01	3.8E-02	9.8E-03	70,713	5.5	1.8	71,346	6,927,236	0	*2*
HighWells D	High	Wells Draw	Loco	309.95	803.28	17.46	0.00	17.46	16.94	0.00	16.94	1.09	31.87	5.2E-01	6.3E-02	6.3E-01	2.7E-02	2.9E-04	8.0E-01	1.7E+01	5.8E-02	1.5E-02	107,808	8.4	2.7	108,773	10,561,161	0	*2*
LowIndian C	Low	Indian Canyon	Employee	3.81	0.29	0.01	1.56	1.56	0.01	0.21	0.21	0.00	0.30	5.5E-03	3.7E-04	1.3E-02	2.1E-03	5.1E-03	3.6E-03	1.4E-04	6.9E-04	9.3E-04	202	0.0	0.0	207	334	21,741	*3*
LowWhitmo	Low	Whitmore Park	Employee	3.99	0.31	0.01	1.72	1.73	0.01	0.22	0.23	0.00	0.32	5.8E-03	3.9E-04	1.4E-02	2.2E-03	5.4E-03	3.7E-03	1.5E-04	7.2E-04	9.7E-04	211	0.0	0.0	217	350	22,759	*3*
LowWells D	Low	Wells Draw	Employee	8.56	0.64	0.02	3.16	3.18	0.02	0.45	0.47	0.00	0.68	1.3E-02	8.4E-04	3.0E-02	4.7E-03	1.1E-02	7.9E-03	3.3E-04	1.5E-03	2.1E-03	474	0.0	0.0	486	790	51,027	*3*
HighIndian (	High	Indian Canyon	Employee	7.63	0.58	0.02	3.11	3.13	0.01	0.41	0.43	0.00	0.61	1.1E-02	7.4E-04	2.7E-02	4.2E-03	1.0E-02	7.1E-03	2.9E-04	1.4E-03	1.9E-03	404	0.0	0.0	414	668	43,482	*3*
HighWhitmo	High	Whitmore Park	Employee	7.98	0.61	0.02	3.44	3.46	0.02	0.45	0.46	0.00	0.64	1.2E-02	7.7E-04	2.8E-02	4.3E-03	1.1E-02	7.5E-03	3.0E-04	1.4E-03	1.9E-03	423	0.0	0.0	433	700	45,517	*3*
HighWells D	High	Wells Draw	Employee	15.80	1.18	0.04	5.84	5.88	0.03	0.84	0.87	0.01	1.25	2.3E-02	1.5E-03	5.6E-02	8.6E-03	2.1E-02	1.5E-02	6.0E-04	2.8E-03	3.8E-03	875	0.1	0.1	897	1,458	94,203	*3*
LowIndian C	Low	Indian Canyon	Diverted Trucks	-1.96	-5.38	-0.18	-1.66	-1.84	-0.17	-0.39	-0.56	-0.02	-0.25	-0.01	0.00	0.00	0.00	0.00	-0.03	-0.17	0.00	0.00	-2,645	-0.08	0.00	-2,648	-247,761	0	*4*
LowWhitmo	Low	Whitmore Park	Diverted Trucks	-1.96	-5.38	-0.18	-1.66	-1.84	-0.17	-0.39	-0.56	-0.02	-0.25	-0.01	0.00	0.00	0.00	0.00	-0.03	-0.17	0.00	0.00	-2,645	-0.08	0.00	-2,648	-247,761	0	*4*
LowWells D	Low	Wells Draw	Diverted Trucks	-1.85	-4.86	-0.16	-1.66	-1.82	-0.15	-0.39	-0.53	-0.02	-0.22	-0.01	0.00	0.00	0.00	0.00	-0.03	-0.15	0.00	0.00	-2,630	-0.09	0.00	-2,634	-246,373	0	*4*
HighIndian (	High	Indian Canyon	Diverted Trucks	-1.96	-5.38	-0.18	-1.66	-1.84	-0.17	-0.39	-0.56	-0.02	-0.25	-0.01	0.00	0.00	0.00	0.00	-0.03	-0.17	0.00	0.00	-2,645	-0.08	0.00	-2,648	-247,761	0	*4*
HighWhitmo	High	Whitmore Park	Diverted Trucks	-1.96	-5.38	-0.18	-1.66	-1.84	-0.17	-0.39	-0.56	-0.02	-0.25	-0.01	0.00	0.00	0.00	0.00	-0.03	-0.17	0.00	0.00	-2,645	-0.08	0.00	-2,648	-247,761	0	*4*
HighWells D	High	Wells Draw	Diverted Trucks	-1.85	-4.86	-0.16	-1.66	-1.82	-0.15	-0.39	-0.53	-0.02	-0.22	-0.01	0.00	0.00	0.00	0.00	-0.03	-0.15	0.00	0.00	-2,630	-0.09	0.00	-2,634	-246,373	0	*4*

Uinta Project-Level Operation Total Emissions (tons/year) (calc'd)

			Criteria Pollutants										Hazardous Air Pollutants										Greenhouse Gas Emissions				Energy	
		Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyd	Acrolein	Benzene	,3-Butadien	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	soline (gallons)
LowIndian C	Low	Indian Canyon	Total	135.66	343.05	7.31	2.32	9.63	7.10	0.02	7.13	0.41	13.08	2.1E-01	2.4E-02	3.0E-01	1.7E-02	1.5E-02	2.9E-01	7.3E+00	2.1E-02	3.0E-03	40,106	3.4	1.2	40,511	3,883,928	72,013
LowWhitmo	Low	Whitmore Park	Total	147.33	374.30	7.98	2.80	10.79	7.76	0.07	7.83	0.45	14.23	2.3E-01	2.6E-02	3.2E-01	1.8E-02	1.6E-02	3.1E-01	8.0E+00	2.3E-02	3.7E-03	44,036	3.7	1.3	44,476	4,266,669	74,537
LowWells D	Low	Wells Draw	Total	176.11	413.10	8.90	3.51	12.41	8.64	0.25	8.89	0.54	17.65	2.8E-01	3.1E-02	3.9E-01	2.2E-02	2.1E-02	3.8E-01	8.9E+00	2.9E-02	6.3E-03	52,837	4.4	1.5	53,359	5,103,837	102,320
HighIndian (	High	Indian Canyon	Total	373.31	969.43	20.86	7.47	28.33	20.24	0.71	20.95	1.21	36.34	6.1E-01	7.0E-02	8.0E-01	4.3E-02	3.3E-02	8.8E-01	2.1E+01	6.5E-02	1.7E-02	119,041	9.5	3.2	120,162	11,552,146	144,026
HighWhitmo	High	Whitmore Park	Total	405.42	1056.29	22.74	8.44	31.18	22.07	0.80	22.87	1.32	39.50	6.6E-01	7.7E-02	8.7E-01	4.6E-02	3.4E-02	9.6E-01	2.3E+01	7.1E-02	1.9E-02	129,950	10.4	3.5	131,169	12,616,273	149,074
HighWells D	High	Wells Draw	Total	479.24	1162.15	25.19	8.88	34.07	24.44	1.02	25.46	1.56	48.47	7.8E-01	9.1E-02	1.0E+00	5.5E-02	4.1E-02	1.1E+00	2.5E+01	8.5E-02	2.4E-02	154,026	12.3	4.1	155,466	14,939,087	188,899
LowIndian C	Low	Indian Canyon	Loco	126.39	351.29	7.60	0.00	7.60	7.37	0.00	7.37	0.45	12.50	2.1E-01	2.6E-02	2.6E-01	1.1E-02	1.2E-04	3.3E-01	7.6E+00	2.3E-02	6.1E-03	43,961	3.4	1.1	44,354	4,306,500	
LowWhitmo	Low	Whitmore Park	Loco	137.62	382.50	8.27	0.00	8.27	8.02	0.00	8.02	0.49	13.61	2.3E-01	2.8E-02	2.8E-01	1.2E-02	1.3E-04	3.6E-01	8.3E+00	2.6E-02	6.6E-03	47,867	3.8	1.2	48,296	4,689,202	
LowWells D	Low	Wells Draw	Loco	162.10	420.12	9.13	0.00	9.13	8.86	0.00	8.86	0.57	16.67	2.7E-01	3.3E-02	3.3E-01	1.4E-02	1.5E-04	4.2E-01	9.1E+00	3.0E-02	7.8E-03	56,384	4.4	1.4	56,889	5,523,558	
HighIndian (	High	Indian Canyon	Loco	351.40	976.70	21.12	0.00	21.12	20.48	0.00	20.48	1.24	34.75	5.9E-01	7.1E-02	7.2E-01	3.0E-02	3.3E-04	9.1E-01	2.1E+01	6.5E-02	1.7E-02	122,227	9.6	3.1	123,320	11,973,611	
HighWhitmo	High	Whitmore Park	Loco	382.63	1063.49	22.99	0.00	22.99	22.30	0.00	22.30	1.35	37.83	6.4E-01	7.7E-02	7.8E-01	3.3E-02	3.6E-04	9.9E-01	2.3E+01	7.1E-02	1.8E-02	133,088	10.4	3.4	134,279	13,037,660	
HighWells D	High	Wells Draw	Loco	450.71	1168.08	25.39	0.00	25.39	24.63	0.00	24.63	1.59	46.35	7.6E-01	9.1E-02	9.2E-01	3.9E-02	4.2E-04	1.2E+00	2.5E+01	8.4E-02	2.2E-02	156,769	12.3	4.0	158,171	15,357,468	
LowIndian C	Low	Indian Canyon	Employee	12.63	0.97	0.03	5.15	5.18	0.02	0.69	0.71	0.00	1.01	1.8E-02	1.2E-03	4.5E-02	6.9E-03	1.7E-02	1.2E-02	4.8E-04	2.3E-03	3.1E-03	669	0.1	0.1	686	1,107	72,013
LowWhitmo	Low	Whitmore Park	Employee	13.07	1.00	0.03	5.64	5.67	0.03	0.73	0.76	0.01	1.04	1.9E-02	1.3E-03	4.6E-02	7.1E-03	1.8E-02	1.2E-02	4.9E-04	2.4E-03	3.2E-03	692	0.1	0.1	710	1,146	74,537
LowWells D	Low	Wells Draw	Employee	17.16	1.29	0.04	6.35	6.38	0.03	0.91	0.95	0.01	1.35	2.5E-02	1.7E-03	6.0E-02	9.3E-03	2.3E-02	1.6E-02	6.6E-04	3.1E-03	4.1E-03	951	0.1	0.1	974	1,584	102,320
HighIndian (	High	Indian Canyon	Employee	25.26	1.93	0.05	10.31	10.36	0.05	1.37	1.42	0.01	2.02	3.7E-02	2.4E-03	8.9E-02	1.4E-02	3.4E-02	2.4E-02	9.5E-04	4.6E-03	6.1E-03	1,338	0.1	0.1	1,371	2,214	144,026
HighWhitmo	High	Whitmore Park	Employee	26.15	2.00	0.06	11.28	11.34	0.05	1.47	1.52	0.01	2.09	3.8E-02	2.5E-03	9.2E-02	1.4E-02	3.5E-02	2.4E-02	9.9E-04	4.7E-03	6.4E-03	1,385	0.1	0.1	1,419	2,292	149,074
HighWells D	High	Wells Draw	Employee	31.69	2.37	0.07	11.72	11.79	0.06	1.68	1.74	0.01	2.50	4.6E-02	3.1E-03	1.1E-01	1.7E-02	4.2E-02	2.9E-02	1.2E-03	5.7E-03	7.7E-03	1,755	0.1	0.1	1,799	2,925	188,899
LowIndian C	Low	Indian Canyon	Diverted Trucks	-3.36	-9.21	-0.31	-2.84	-3.15	-0.29	-0.66	-0.95	-0.04	-0.42	-0.02	0.00	0.00	0.00	0.00	-0.05	-0.29	0.00	-0.01	-4,524	-0.14	-0.01	-4,529	-423,679	
LowWhitmo	Low	Whitmore Park	Diverted Trucks	-3.36	-9.21	-0.31	-2.84	-3.15	-0.29	-0.66	-0.95	-0.04	-0.42	-0.02	0.00	0.00	0.00	0.00	-0.05	-0.29	0.00	-0.01	-4,524	-0.14	-0.01	-4,529	-423,679	
LowWells D	Low	Wells Draw	Diverted Trucks	-3.16	-8.30	-0.27	-2.84	-3.11	-0.25	-0.66	-0.91	-0.04	-0.38	-0.02	0.00	0.00	0.00	0.00	-0.05	-0.25	0.00	-0.01	-4,498	-0.15	-0.01	-4,504	-421,306	
HighIndian (	High	Indian Canyon	Diverted Trucks	-3.36	-9.21	-0.31	-2.84	-3.15	-0.29	-0.66	-0.95	-0.04	-0.42	-0.02	0.00	0.00	0.00	0.00	-0.05	-0.29	0.00	-0.01	-4,524	-0.14	-0.01	-4,529	-423,679	
HighWhitmo	High	Whitmore Park	Diverted Trucks	-3.36	-9.21	-0.31	-2.84	-3.15	-0.29	-0.66	-0.95	-0.04	-0.42	-0.02	0.00	0.00	0.00	0.00	-0.05	-0.29	0.00	-0.01	-4,524	-0.14	-0.01	-4,529	-423,679	
HighWells D	High	Wells Draw	Diverted Trucks	-3.16	-8.30	-0.27	-2.84	-3.11	-0.25	-0.66	-0.91	-0.04	-0.38	-0.02	0.00	0.00	0.00	0.00	-0.05	-0.25	0.00	-0.01	-4,498	-0.15	-0.01	-4,504	-421,306	

Uinta Project Information

		1	2	3	4
Percent of Project Features (3)			Locomotive	Employee	Diverted Trucks
In nonattainment area	Indian Canyon		49%	70%	42%
	Whitmore Park		47%	69%	42%
	Wells Draw		31%	50%	42%
Out of nonattainment area	Indian Canyon		51%	30%	58%
	Whitmore Park		53%	31%	58%
	Wells Draw		69%	50%	58%

Variable	Value
Op Days/Yr (assumed)	365
Op Yrs/Proj (assumed)	30
Indian Canyon Op Yr (2)	2025
Whitmore Park Op Yr (2)	2025
Wells Draw Op Yr (2)	2026
Low Production (bbl/day) (3)	130,000
High Production (bbl/day) (3)	350,000

Energy Conversions

Variable	Value	Source
Gasoline Btu to gallon	8.31E-06	https://www.eia.gov/energyexplained/units-and-calculators/
Diesel Btu to gallon	7.28E-06	https://www.eia.gov/energyexplained/units-and-calculators/
joule to MMBtu	9.48E-10	
joule to Btu	9.48E-04	
Btu to MMBtu	1.00E-06	
Diesel density (kg/L)	0.85	
Liter to gallon	0.26	
kg to g	0.001	
Gram diesel fuel to gallon	0.00031079	

Sources

(1) ICF. 2020. GIS. 'AirQuality_2020319'
(2) Uinta Basin Rail Project Information Report. DATE.
(3) UBR_ProjectAttributesTable.xlsx as of 2/11/20. rows 87-88

Locomotive Emissions (US tons/year and MT/year for GHGs) (calc'd)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
Scenario	Alt		CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
LowIndian C	Low	Indian Canyon	126	351	7.5954	—	8	7	—	7	0	12	2.12E-01	2.56E-02	2.58E-01	1.08E-02	1.17E-04	3.26E-01	8	2.35E-02	6.09E-03	43,961	3.4	1.1	44,354	4,306,500	2025
LowWhitmo	Low	Whitmore Park	138	383	8.2703	—	8	8	—	8	0	14	2.31E-01	2.79E-02	2.81E-01	1.18E-02	1.28E-04	3.55E-01	8	2.55E-02	6.63E-03	47867	3.8	1.2	48296	4,689,202	2025
LowWells D	Low	Wells Draw	162	420	9.1330	—	9	9	—	9	1	17	2.72E-01	3.28E-02	3.31E-01	1.39E-02	1.50E-04	4.19E-01	9	3.01E-02	7.81E-03	56384	4.4	1.4	56889	5,523,558	2026
HighIndian	High	Indian Canyon	351	977	21.1178	—	21	20	—	20	1	35	5.90E-01	7.12E-02	7.18E-01	3.01E-02	3.26E-04	9.08E-01	21	6.52E-02	1.69E-02	122227	9.6	3.1	123320	11,973,611	2025
HighWhitm	High	Whitmore Park	383	1063	22.9945	—	23	22	—	22	1	38	6.42E-01	7.75E-02	7.81E-01	3.27E-02	3.55E-04	9.88E-01	23	7.10E-02	1.84E-02	133088	10.4	3.4	134279	13,037,660	2025
HighWells D	High	Wells Draw	451	1168	25.3930	—	25	25	—	25	2	46	7.57E-01	9.13E-02	9.21E-01	3.86E-02	4.18E-04	1.16E+00	25	8.37E-02	2.17E-02	156769	12.3	4.0	158171	15,357,468	2026

Conversions

Conversions	
kilogram to gram	1,000
Fuel oil no. 6 and residual oil	
heating value (MMBtu/10^3 gal)	150.00000
pound to ton	0.0005
gram to pounds	453.59
gram to ton	0.0000011
gram to MT	0.0000010
MMBtu to Btu	0.000001
1 gal to BTU (12)	128488
CH4 GWP (5)	28
N2O GWP (5)	265

This is Btu to Mmbtu but based on unit of below, works in this instance

Diesel Fuel and Large line Haul Train Emission Factors

Distillate Fuel Oil No. 2 (4) g/gal	EF
CH4	0.8
N2O	0.26
Diesel Fuel (6) lb/ gallon	**EF**
Acetaldehyde	0.044702
Acrolein	0.0053910
Benzene	0.0543763
1,3-Butadiene	0.0022788
Ethylbenzene (8)	0.0000247
Formaldehyde	0.0687717
DPM (10)	1.6000000
Napthalene (8)	0.0049422
POM (8)	0.0012822
Additional Locomotive Emission Factors (10)	
Large Line-Haul and Passsenger	
conversion from bhp-hr/gal	20.8
SOx	0.094
density of diesel fuel	3200
fraction of fuel sulfur converted to SO2	0.978
SO2/S molecular weight	2
sulfur content of fuel (ppm)	0.000015
CO2	10,208
CO2/C molecular weight	3.67
carbon content of fuel (ppm)	0.87

EPA Locomotive Emission Factors by Year for Large Line-haul (g/gal) (10)	CO	Nox	PM10 Ex	PM 10 D	PM10 T	PM2.5 Ex	PM 2.5 D	PM10 T	Sox	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene (8)	Formaldehyde	DPM (10)	Napthalene (8)	POM (8)	CO2	CH4	N2O	CO2e
2025	26.62	74.00	1.60	0.00	1.60	1.55	0.00	1.55	0.09	2.63	4.47E-02	5.39E-03	5.44E-02	2.28E-03	2.47E-05	6.88E-02	1.60	4.94E-03	1.28E-03	10,208.00	0.80	0.26	10,299.30
2026	26.62	69.00	1.50	0.00	1.50	1.46	0.00	1.46	0.09	2.74	4.47E-02	5.39E-03	5.44E-02	2.28E-03	2.47E-05	6.88E-02	1.50	4.94E-03	1.28E-03	10,208.00	0.80	0.26	10,299.30

Uinta Locomotive Information

Diesel Fuel Usage (2)		Notes
Gallons per car cycle	55	A car cycle is a full cycle of a loaded and unloaded train trip (i.e., round-trip distance)
Gallons per car mile	0.34	Assumes Indian Canyon route to provide the most conservative gallons per mile

LowIndian Canyon
LowWhitmore Park
LowWells Draw
HighIndian Canyon
HighWhitmore Park
HighWells Draw

Scenario Features (2)	Low	High
Loaded oil trains per year	672	1,809
Loaded frac sand trains per year	0	110
Total trains per year (calc'd)	672	1,919
Oil tank cars per train	110	110
Manifest cars per train	7	3
Total cars per train	117	113
Cars per year (calc'd)	78,300	217,702

	Alt	Diesel fuel per year (gallons) (calc'd)
Low	Indian Canyon	4,306,500
Low	Whitmore Park	4,689,202
Low	Wells Draw	5,523,558
High	Indian Canyon	11,973,611
High	Whitmore Park	13,037,660
High	Wells Draw	15,357,468

Sources

(1) Uinta Basin Rail Project Information Report. DATE.
(2) Uinta Basin Rail project. train consist summary based on IR#2 response.xlsx. November 2019.
(3) David's Kickoff Email. 2019-09-06 - UBRY - STB Response Table DAE. G:\Sacramento\LGT-Air&Noise\Air\Uinta Basin Railway EIS 00060.19 (Utah)\01 Project Info\04 Data\2019-11-07 David's Kickoff Email
(4) EPA. 2018. https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
(5) ICCP. 2014. AR5 Synthesis Report. https://ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf
(6) EPA. 1996. AP-42. Vol. I, 3.3. https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s03.pdf
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(10) EPA. 2009. Emission Factors for Locomotives. https://nepis.epa.gov/Exe/ZyPDF.cgi/P100500B.PDF?Dockey=P100500B.PDF
(11) EPA. 2017. Rail HAP Speciation. Excel Workbook. Last modified 4/13/18. ftp://newftp.epa.gov/Air/nei/2014/doc/2014v2_supportingdata/rail_cmv/
(12) AFDC. 2014. https://afdc.energy.gov/fuels/fuel_comparison_chart.pdf

Operations_Diverted Trucks
Diverted Trucks

Uinta Project Operation Emissions (tons/year) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy
	Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)
Low	Indian Canyon	-3	-9	-0.31	-3	-3	-0.29	-0.7	-0.95	-0.04	-0.4	-1.99E-02	-3.28E-03	-4.03E-03	-9.17E-04	-1.65E-03	-5.32E-02	-2.89E-01	-4.87E-03	-6.15E-03	-4,524	-0.143	-0.006	-4,529	-423,679
Low	Whitmore Park	-3	-9	-0.31	-3	-3	-0.29	-0.7	-0.95	-0.04	-0.4	-1.99E-02	-3.28E-03	-4.03E-03	-9.17E-04	-1.65E-03	-5.32E-02	-2.89E-01	-4.87E-03	-6.15E-03	-4,524	-0.143	-0.006	-4,529	-423,679
Low	Wells Draw	-3	-8	-0.27	-3	-3	-0.25	-0.7	-0.91	-0.04	-0.4	-1.84E-02	-3.00E-03	-3.71E-03	-7.86E-04	-1.55E-03	-5.03E-02	-2.52E-01	-4.50E-03	-5.61E-03	-4,498	-0.146	-0.006	-4,504	-421,306
High	Indian Canyon	-3	-9	-0.31	-3	-3	-0.29	-0.7	-0.95	-0.04	-0.4	-1.99E-02	-3.28E-03	-4.03E-03	-9.17E-04	-1.65E-03	-5.32E-02	-2.89E-01	-4.87E-03	-6.15E-03	-4,524	-0.143	-0.006	-4,529	-423,679
High	Whitmore Park	-3	-9	-0.31	-3	-3	-0.29	-0.7	-0.95	-0.04	-0.4	-1.99E-02	-3.28E-03	-4.03E-03	-9.17E-04	-1.65E-03	-5.32E-02	-2.89E-01	-4.87E-03	-6.15E-03	-4,524	-0.143	-0.006	-4,529	-423,679
High	Wells Draw	-3	-8	-0.27	-3	-3	-0.25	-0.7	-0.91	-0.04	-0.4	-1.84E-02	-3.00E-03	-3.71E-03	-7.86E-04	-1.55E-03	-5.03E-02	-2.52E-01	-4.50E-03	-5.61E-03	-4,498	-0.146	-0.006	-4,504	-421,306

Uinta Project Emission Benefits (tons/day) (calc'd)

			Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	
LowIndian C	Low	Indian Canyon	-0.0092	-0.0252	-0.0009	-0.0078	-0.0086	-0.0008	-0.0018	-0.0026	-0.0001	-0.0012	-5.4E-05	-9.0E-06	-1.1E-05	-2.5E-06	-4.5E-06	-1.5E-04	-7.9E-04	-1.3E-05	-1.7E-05	-12.39	0.00	0.00	-12.41	-1161	*2025*
LowWhitmo	Low	Whitmore Park	-0.0092	-0.0252	-0.0009	-0.0078	-0.0086	-0.0008	-0.0018	-0.0026	-0.0001	-0.0012	-5.4E-05	-9.0E-06	-1.1E-05	-2.5E-06	-4.5E-06	-1.5E-04	-7.9E-04	-1.3E-05	-1.7E-05	-12.39	0.00	0.00	-12.41	-1161	*2025*
LowWells D	Low	Wells Draw	-0.0087	-0.0227	-0.0008	-0.0078	-0.0085	-0.0007	-0.0018	-0.0025	-0.0001	-0.0010	-5.1E-05	-8.2E-06	-1.0E-05	-2.2E-06	-4.2E-06	-1.4E-04	-6.9E-04	-1.2E-05	-1.5E-05	-12.32	0.00	0.00	-12.34	-1154	*2026*
HighIndian	High	Indian Canyon	-0.0092	-0.0252	-0.0009	-0.0078	-0.0086	-0.0008	-0.0018	-0.0026	-0.0001	-0.0012	-5.4E-05	-9.0E-06	-1.1E-05	-2.5E-06	-4.5E-06	-1.5E-04	-7.9E-04	-1.3E-05	-1.7E-05	-12.39	0.00	0.00	-12.41	-1161	*2025*
HighWhitm	High	Whitmore Park	-0.0092	-0.0252	-0.0009	-0.0078	-0.0086	-0.0008	-0.0018	-0.0026	-0.0001	-0.0012	-5.4E-05	-9.0E-06	-1.1E-05	-2.5E-06	-4.5E-06	-1.5E-04	-7.9E-04	-1.3E-05	-1.7E-05	-12.39	0.00	0.00	-12.41	-1161	*2025*
HighWells I	High	Wells Draw	-0.0087	-0.0227	-0.0008	-0.0078	-0.0085	-0.0007	-0.0018	-0.0025	-0.0001	-0.0010	-5.1E-05	-8.2E-06	-1.0E-05	-2.2E-06	-4.2E-06	-1.4E-04	-6.9E-04	-1.2E-05	-1.5E-05	-12.32	0.00	0.00	-12.34	-1154	*2026*

MOVES2014 Haul Truck Emission Factors (g/mile) (3)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)
	Employee Vehicle	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Total
2022	2022Diesel FuelCo	1.32	4.09	0.15	0.12	0.27	0.14	0.02	0.15	0.01	0.19	8.12E-03	1.38E-03	1.69E-03	4.50E-04	6.56E-04	2.07E-02	1.37E-01	2.01E-03	2.63E-03	1644	0.05	0.00	1646	2.23E+07
2023	2023Diesel FuelCo	1.24	3.68	0.13	0.12	0.25	0.12	0.02	0.14	0.01	0.17	7.51E-03	1.27E-03	1.55E-03	3.95E-04	6.12E-04	1.95E-02	1.22E-01	1.85E-03	2.40E-03	1632	0.05	0.00	1634	2.22E+07
2024	2024Diesel FuelCo	1.16	3.31	0.12	0.12	0.24	0.11	0.02	0.12	0.01	0.15	6.94E-03	1.16E-03	1.42E-03	3.43E-04	5.70E-04	1.83E-02	1.07E-01	1.70E-03	2.18E-03	1622	0.05	0.00	1623	2.20E+07
2025	2025Diesel FuelCo	1.09	2.98	0.10	0.12	0.22	0.09	0.02	0.11	0.01	0.14	6.42E-03	1.06E-03	1.30E-03	2.96E-04	5.33E-04	1.72E-02	9.35E-02	1.57E-03	1.99E-03	1612	0.05	0.00	1614	2.19E+07
2026	2026Diesel FuelCo	1.02	2.68	0.09	0.12	0.21	0.08	0.02	0.10	0.01	0.12	5.96E-03	9.70E-04	1.20E-03	2.54E-04	4.99E-04	1.62E-02	8.16E-02	1.45E-03	1.81E-03	1603	0.05	0.00	1605	2.18E+07
2027	2027Diesel FuelCo	0.96	2.42	0.08	0.12	0.20	0.07	0.02	0.09	0.01	0.11	5.55E-03	8.90E-04	1.11E-03	2.16E-04	4.69E-04	1.54E-02	7.08E-02	1.35E-03	1.65E-03	1594	0.05	0.00	1596	2.16E+07
2045	2045Diesel FuelCo	0.72	1.31	0.03	0.12	0.15	0.02	0.02	0.04	0.01	0.05	3.73E-03	5.38E-04	6.94E-04	4.30E-05	3.39E-04	1.17E-02	2.50E-02	8.78E-04	9.55E-04	1549	0.06	0.00	1551	2.10E+07

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 26

AP-42 Road Dust Emission Factors (g/mile) (3)

	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)	
Road Type	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum	Total
Paved				0.81			0.20																		
Unpaved				5.88			0.59																		

Uinta Activity Data

	Variable	Value	Source
	Truck Oil Haul Capacity	209	(1)
	Volume Diverted from P	10,000	(4) Assumes all trips would be diverted.
	Volume Diverted from P	10,000	(4) Assumes all trips would be diverted.
	Low Haul Trips/Day	(48)	calculated
	High Haul Trips/Day	(48)	calculated
	Roundtrip Trip distance	160.7	(2), = [distance from oil field to Price River Terminal] - [distance from oil field to closest project terminal]
	Paved	161.1	
	Unpaved	-0.4	Distance is negative due to difference in distances, not gross distances.
Low	Low VMT/Day	(7,690)	calculated
	Paved	(7,709)	calculated
	Unpaved	20	calculated
High	High VMT/Day	(7,690)	calculated
	Paved	(7,709)	calculated
	Unpaved	20	calculated

Conversion

Variable	Value
g to ton	1.10E-06
g to MT	1.00E-06

Sources

(1) Butte Monument FEIS. Appendix A-1. https://eplanning.blm.gov/epl-front-office/projects/nepa/62904/75396/83267/FEIS_3_Appendix_A_-_Appendix_K.pdf
(2) ICF. 2020. GIS. 'AirQuality_20200319'
(3) ICF. 2020. Vehicle and Equipment Emission Factors. Excel workbook.
(4) Bauer, David. 2020. Senior Vice President, Environmental Regulatory Compliance. April 29. Email regarding existing oil production in the basin trucked to Price River Terminal.

Uinta Project Operation Emissions (tons/year) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
	Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	Indian Canyon	13	1	0.03	5	5	0.02	1	0.71	0.00	1	1.83E-02	1.22E-03	4.46E-02	6.88E-03	1.70E-02	1.18E-02	4.77E-04	2.28E-03	3.07E-03	669	0.057	0.051	686	1107	72013
Low	Whitmore Park	13	1	0.03	6	6	0.03	1	0.76	0.01	1	1.89E-02	1.26E-03	4.62E-02	7.12E-03	1.76E-02	1.22E-02	4.94E-04	2.36E-03	3.18E-03	692	0.059	0.053	710	1146	74537
Low	Wells Draw	17	1	0.04	6	6	0.03	1	0.95	0.01	1	2.51E-02	1.68E-03	6.05E-02	9.35E-03	2.27E-02	1.59E-02	6.55E-04	3.07E-03	4.15E-03	951	0.079	0.073	974	1584	102320
High	Indian Canyon	25	2	0.05	10	10	0.05	1	1.42	0.01	2	3.66E-02	2.44E-03	8.92E-02	1.38E-02	3.40E-02	2.36E-02	9.55E-04	4.55E-03	6.14E-03	1,338	0.114	0.103	1,371	2214	144026
High	Whitmore Park	26	2	0.06	11	11	0.05	1	1.52	0.01	2	3.78E-02	2.52E-03	9.23E-02	1.42E-02	3.52E-02	2.44E-02	9.88E-04	4.71E-03	6.36E-03	1,385	0.118	0.107	1,419	2292	149074
High	Wells Draw	32	2	0.07	12	12	0.06	2	1.74	0.01	3	4.63E-02	3.09E-03	1.12E-01	1.73E-02	4.18E-02	2.93E-02	1.21E-03	5.68E-03	7.65E-03	1,755	0.146	0.134	1,799	2925	188899

Uinta Project Construction Emissions (tons/day) (calc'd)

			Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
		Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
2025	*LowIndian Canyon*	Low	Indian Canyon	0.03	0.00	0.00	0.014	0.01	0.00	0.002	0.00	0.00	0.00	5.01E-05	3.34E-06	1.22E-04	1.89E-05	4.66E-05	3.23E-05	1.31E-06	6.23E-06	8.41E-06	1.83	0.000	0.000	2	3.03	197.30
2025	*LowWhitmore Park*	Low	Whitmore Park	0.04	0.00	0.00	0.015	0.02	0.00	0.002	0.00	0.00	0.00	5.18E-05	3.46E-06	1.26E-04	1.95E-05	4.82E-05	3.35E-05	1.35E-06	6.45E-06	8.71E-06	1.90	0.000	0.000	2	3.14	204.21
2026	*LowWells Draw*	Low	Wells Draw	0.05	0.00	0.00	0.017	0.02	0.00	0.002	0.00	0.00	0.00	6.87E-05	4.59E-06	1.66E-04	2.56E-05	6.21E-05	4.35E-05	1.79E-06	8.42E-06	1.14E-05	2.60	0.000	0.000	3	4.34	280.33
2025	*HighIndian Canyon*	High	Indian Canyon	0.07	0.01	0.00	0.028	0.03	0.00	0.004	0.00	0.00	0.01	1.00E-04	6.68E-06	2.44E-04	3.77E-05	9.32E-05	6.46E-05	2.62E-06	1.25E-05	1.68E-05	3.67	0.000	0.000	4	6.07	394.59
2025	*HighWhitmore Park*	High	Whitmore Park	0.07	0.01	0.00	0.031	0.03	0.00	0.004	0.00	0.00	0.01	1.04E-04	6.91E-06	2.53E-04	3.90E-05	9.65E-05	6.69E-05	2.71E-06	1.29E-05	1.74E-05	3.79	0.000	0.000	4	6.28	408.42
2026	*HighWells Draw*	High	Wells Draw	0.09	0.01	0.00	0.032	0.03	0.00	0.005	0.00	0.00	0.01	1.27E-04	8.48E-06	3.06E-04	4.73E-05	1.15E-04	8.03E-05	3.31E-06	1.55E-05	2.10E-05	4.81	0.000	0.000	5	8.01	517.53

MOVES2014 Employee Vehicle Emission Factors (g/mile) (3)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)		
Employee Vehicle Year	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Total Energy Consumption	Diesel	Gasoline
2022	2022Gas/DieselCar/Truck	7.51	0.63	0.02	0.02	0.04	0.01	0.00	0.02	0.00	0.63	1.08E-02	7.03E-04	2.69E-02	4.11E-03	1.09E-02	7.34E-03	2.93E-04	1.39E-03	1.89E-03	386	0.03	0.03	396	5.37E+06	8.93E+04	5.28E+06
2023	2023Gas/DieselCar/Truck	6.99	0.57	0.01	0.02	0.04	0.01	0.00	0.02	0.00	0.57	1.00E-02	6.60E-04	2.49E-02	3.81E-03	9.85E-03	6.71E-03	2.66E-04	1.28E-03	1.73E-03	374	0.03	0.03	384	5.21E+06	8.80E+04	5.12E+06
2024	2024Gas/DieselCar/Truck	6.51	0.51	0.01	0.02	0.04	0.01	0.00	0.02	0.00	0.53	9.37E-03	6.22E-04	2.31E-02	3.55E-03	8.98E-03	6.17E-03	2.45E-04	1.18E-03	1.60E-03	363	0.03	0.03	372	5.05E+06	8.62E+04	4.96E+06
2025	2025Gas/DieselCar/Truck	6.02	0.46	0.01	0.02	0.04	0.01	0.00	0.01	0.00	0.48	8.71E-03	5.81E-04	2.12E-02	3.28E-03	8.10E-03	5.62E-03	2.27E-04	1.08E-03	1.46E-03	351	0.03	0.03	360	4.88E+06	8.43E+04	4.80E+06
2026	2026Gas/DieselCar/Truck	5.58	0.42	0.01	0.02	0.03	0.01	0.00	0.01	0.00	0.44	8.15E-03	5.45E-04	1.96E-02	3.04E-03	7.36E-03	5.16E-03	2.13E-04	9.99E-04	1.35E-03	341	0.03	0.03	349	4.74E+06	8.23E+04	4.65E+06
2027	2027Gas/DieselCar/Truck	5.19	0.38	0.01	0.02	0.03	0.01	0.00	0.01	0.00	0.41	7.70E-03	5.13E-04	1.83E-02	2.83E-03	6.77E-03	4.80E-03	1.99E-04	9.29E-04	1.25E-03	331	0.03	0.03	339	4.60E+06	8.03E+04	4.52E+06
2045	2045Gas/DieselCar/Truck	2.80	0.21	0.01	0.02	0.03	0.01	0.00	0.01	0.00	0.22	4.76E-03	3.03E-04	1.01E-02	1.57E-03	3.59E-03	2.85E-03	1.33E-04	5.28E-04	7.07E-04	272	0.02	0.02	279	3.78E+06	6.67E+04	3.72E+06
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*

AP-42 Road Dust Emission Factors (g/mile) (3)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)		
Road Type	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Total Energy Consumption	Diesel	Gasoline
Paved				0.81			0.20																			
Unpaved				5.88			0.59																			

Uinta Project Information

Scenario	Alternative	Average Employees/Day (1) Employees	Trips	One-way trips per Employee per Day (assumed)
Low	Indian Canyon	50	100	2
Low	Whitmore Park	50	100	
Low	Wells Draw	65	130	
High	Indian Canyon	100	200	
High	Whitmore Park	100	200	
High	Wells Draw	120	240	

Average One-way Trip Distance (2)	
Indian Canyon	52
Paved	35
Unpaved	17
Whitmore Park	54
Paved	35
Unpaved	19
Wells Draw	59
Paved	45
Unpaved	14

			Average VMT per Day (calc'd)
LowIndian Canyon	Low	Indian Canyon	5,218
LowPaved	Low	Paved	3,548
LowUnpaved	Low	Unpaved	1,669
LowWhitmore Park	Low	Whitmore Park	5,400
LowPaved	Low	Paved	3,524
LowUnpaved	Low	Unpaved	1,877
LowWells Draw	Low	Wells Draw	7,648
LowPaved	Low	Paved	5,793
LowUnpaved	Low	Unpaved	1,854
HighIndian Canyon	High	Indian Canyon	10,435
HighPaved	High	Paved	7,097
HighUnpaved	High	Unpaved	3,338
HighWhitmore Park	High	Whitmore Park	10,801
HighPaved	High	Paved	7,047
HighUnpaved	High	Unpaved	3,754
HighWells Draw	High	Wells Draw	14,119
HighPaved	High	Paved	10,695
HighUnpaved	High	Unpaved	3,424

Conversions

Conversions	
gram to ton	0.000001
gram to MT	0.000001

Sources

(1) Response to OEA IR 3. Venable response PDF. November 25, 2019. G:\Sacramento\LGT-Air&Noise\Air\Uinta Basin Railway EIS 00060.19 (Utah)\01 Project Info\04 Data\2019-12-03 Response to OEA IR 3
(2) ICF. 2020. GIS. 'AirQuality_20200319'
(3) ICF. 2020. Vehicle and Equipment Emission Factors. Excel Workbook.

Emissions Inventory—Direct and Indirect (Operations)

Downline

Downline Emissions
Summary

Basic rail segment descriptors to insert as first columns into each table to the right				*Table 1. Estimated Downline Emissions of Criteria Pollutants: Increase in Trains per Day*						*Table 2. Estimated Downline Emissions of Hazardous Air Pollutants: Increase in Trains per Day*									*Table 3. Estimated Annual Average Downline Emissions Compared to County-Level Emissions*													
				Locomotive Criteria Pollutant Emissions (tons/year)						Locomotive Hazardous Air Pollutant Emissions (tons/year)									Project Locomotive						Segment Counties' Emission Levels						% of Segment Counties' Level					
Rail Segment Description	**Rail Mini Segment**	**Segment Length (miles)**	**Max Increase in Trains per Day**	**CO**	**Nox**	**PM10**	**PM2.5**	**SO2**	**VOCs**	**Acetaldehyde**	**Acrolein**	**Benzene**	**1,3-Butadiene**	**Ethylbenzene**	**Formaldehyde**	**DPM**	**Napthalene**	**POM**	**CO**	**Nox**	**PM10**	**PM2.5**	**SO2**	**VOCs**	**CO**	**Nox**	**PM10**	**PM2.5**	**SO2**	**VOCs**	**CO**	**Nox**	**PM10**	**PM2.5**	**SO2**	**VOCs**
Denver East/North	DE-01	3.2	8.4	11.04	30.69	0.66	0.64	0.04	1.09	0.02	0.00	0.02	0.00	0.00	0.03	0.66	0.00	0.00	11.04	30.69	0.66	0.64	0.04	1.09	60,756	18,029	11,084	2,833	3,314	17,127	0.02%	0.17%	0.01%	0.02%	0.00%	0.01%
Denver Eastbound	EB-01	1.4	1.1	0.65	1.82	0.04	0.04	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.65	1.82	0.04	0.04	0.00	0.06	139,862	33,519	23,693	5,351	3,880	31,482	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%
Denver Eastbound	EB-02	0.7	1.1	0.30	0.83	0.02	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.30	0.83	0.02	0.02	0.00	0.03	79,106	15,490	12,609	2,518	566	14,355	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%
Denver Eastbound	EB-03	8.6	1.1	3.91	10.86	0.23	0.23	0.01	0.39	0.01	0.00	0.01	0.00	0.00	0.01	0.23	0.00	0.00	3.91	10.86	0.23	0.23	0.01	0.39	139,862	33,519	23,693	5,351	3,880	31,482	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%
Denver Eastbound	EB-04	18.5	1.1	8.46	23.53	0.51	0.49	0.03	0.84	0.01	0.00	0.02	0.00	0.00	0.02	0.51	0.00	0.00	8.46	23.53	0.51	0.49	0.03	0.84	135,579	28,868	23,577	5,522	3,485	33,566	0.01%	0.08%	0.00%	0.01%	0.00%	0.00%
Denver Eastbound	EB-05	1.1	1.1	0.50	1.39	0.03	0.03	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.50	1.39	0.03	0.03	0.00	0.05	60,756	18,029	11,084	2,833	3,314	17,127	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%
Denver Eastbound	EB-06	28.8	1.1	13.13	36.49	0.79	0.77	0.05	1.30	0.02	0.00	0.03	0.00	0.00	0.03	0.79	0.00	0.00	13.13	36.49	0.79	0.77	0.05	1.30	142,694	30,747	27,186	6,159	3,491	42,249	0.01%	0.12%	0.00%	0.01%	0.00%	0.00%
Kyune to Denver	KD-01	11.1	9.5	43.78	121.68	2.63	2.55	0.15	4.33	0.07	0.01	0.09	0.00	0.00	0.11	2.63	0.01	0.00	43.78	121.68	2.63	2.55	0.15	4.33	67,474	20,569	19,971	3,788	10,595	51,793	0.06%	0.59%	0.01%	0.07%	0.00%	0.01%
Kyune to Denver	KD-02	3.3	9.5	12.96	36.03	0.78	0.76	0.05	1.28	0.02	0.00	0.03	0.00	0.00	0.03	0.78	0.00	0.00	12.96	36.03	0.78	0.76	0.05	1.28	57,190	14,739	16,059	3,017	268	32,240	0.02%	0.24%	0.00%	0.03%	0.02%	0.00%
Kyune to Denver	KD-03	171.2	9.5	675.34	1877.08	40.59	39.37	2.38	66.78	1.13	0.14	1.38	0.06	0.00	1.74	40.59	0.13	0.03	675.34	1,877.08	40.59	39.37	2.38	66.78	122,486	41,960	29,327	6,701	6,875	123,903	0.55%	4.47%	0.14%	0.59%	0.03%	0.05%
Kyune to Denver	KD-04	3.1	9.5	12.35	34.32	0.74	0.72	0.04	1.22	0.02	0.00	0.03	0.00	0.00	0.03	0.74	0.00	0.00	12.35	34.32	0.74	0.72	0.04	1.22	36,994	5,328	5,780	1,744	121	39,808	0.03%	0.64%	0.01%	0.04%	0.04%	0.00%
Kyune to Denver	KD-05	0.6	9.5	2.42	6.74	0.15	0.14	0.01	0.24	0.00	0.00	0.00	0.00	0.00	0.01	0.15	0.00	0.00	2.42	6.74	0.15	0.14	0.01	0.24	36,994	5,328	5,780	1,744	121	39,808	0.01%	0.13%	0.00%	0.01%	0.01%	0.00%
Kyune to Denver	KD-06	265.8	9.5	1048.35	2913.84	63.00	61.11	3.70	103.66	1.76	0.21	2.14	0.09	0.00	2.71	63.00	0.19	0.05	1,048.35	2,913.84	63.00	61.11	3.70	103.66	195,118	50,967	30,287	7,970	4,613	172,518	0.54%	5.72%	0.21%	0.77%	0.08%	0.06%
Kyune to Denver	KD-07	2.1	9.5	8.48	23.56	0.51	0.49	0.03	0.84	0.01	0.00	0.02	0.00	0.00	0.02	0.51	0.00	0.00	8.48	23.56	0.51	0.49	0.03	0.84	60,756	18,029	11,084	2,833	3,314	17,127	0.01%	0.13%	0.00%	0.02%	0.00%	0.00%
Denver Northbound	NB-01	43.9	7.3	132.95	369.53	7.99	7.75	0.47	13.15	0.22	0.03	0.27	0.01	0.00	0.34	7.99	0.02	0.01	132.95	369.53	7.99	7.75	0.47	13.15	127,631	48,721	34,588	8,411	3,761	114,627	0.10%	0.76%	0.02%	0.09%	0.01%	0.01%
Denver Northbound	NB-02	15.7	7.3	47.73	132.66	2.87	2.78	0.17	4.72	0.08	0.01	0.10	0.00	0.00	0.12	2.87	0.01	0.00	47.73	132.66	2.87	2.78	0.17	4.72	66,875	30,692	23,504	5,578	446	97,500	0.07%	0.43%	0.01%	0.05%	0.04%	0.00%
Denver Northbound	NB-03	0.5	7.3	1.49	4.15	0.09	0.09	0.01	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	1.49	4.15	0.09	0.09	0.01	0.15	66,875	30,692	23,504	5,578	446	97,500	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%
Denver Northbound	NB-04	9.1	7.3	27.56	76.61	1.66	1.61	0.10	2.73	0.05	0.01	0.06	0.00	0.00	0.07	1.66	0.01	0.00	27.56	76.61	1.66	1.61	0.10	2.73	66,875	30,692	23,504	5,578	446	97,500	0.04%	0.25%	0.01%	0.03%	0.02%	0.00%
Denver Southbound	SB-01	4.1	1.1	1.89	5.25	0.11	0.11	0.01	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	1.89	5.25	0.11	0.11	0.01	0.19	139,862	33,519	23,693	5,351	3,880	31,482	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%
Denver Southbound	SB-02	8.2	1.1	3.75	10.42	0.23	0.22	0.01	0.37	0.01	0.00	0.01	0.00	0.00	0.01	0.23	0.00	0.00	3.75	10.42	0.23	0.22	0.01	0.37	153,929	26,329	25,103	5,207	736	30,794	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%
Denver Southbound	SB-03	42.2	1.1	19.28	53.58	1.16	1.12	0.07	1.91	0.03	0.00	0.04	0.00	0.00	0.05	1.16	0.00	0.00	19.28	53.58	1.16	1.12	0.07	1.91	111,737	17,544	18,222	3,919	319	30,321	0.02%	0.31%	0.01%	0.03%	0.02%	0.01%
Subtotal - Denver Eastbound	EB-01 to EB-06	59.0	1.1	27.0	74.9	1.6	1.6	0.1	2.7	0.0	0.0	0.1	0.0	0.0	0.1	1.6	0.0	0.0	26.95	74.92	1.62	1.57	0.10	2.67	221,800	46,237	39,795	8,677	4,056	56,604	0.01%	0.16%	0.00%	0.02%	0.00%	0.00%
Subotal - Kyune to Denver	KD-01 to KD-07	457.4	9.5	1803.68	5013.24	108.39	105.14	6.36	178.34	3.03	0.37	3.68	0.15	0.00	4.66	108.39	0.33	0.09	1,803.68	5,013.24	108.39	105.14	6.36	178.34	290,895	93,430	57,746	13,698	21,694	276,167	0.62%	5.37%	0.19%	0.77%	0.03%	0.06%
Subtotal - Denver Northbound	NB-01 to NB-04	69.2	7.3	209.73	582.95	12.60	12.23	0.74	20.74	0.35	0.04	0.43	0.02	0.00	0.54	12.60	0.04	0.01	209.73	582.95	12.60	12.23	0.74	20.74	127,631	48,721	34,588	8,411	3,761	114,627	0.16%	1.20%	0.04%	0.15%	0.02%	0.02%
Subtotal - Denver Southbound	SB-01 to SB-03	54.6	1.1	24.9	69.3	1.5	1.5	0.1	2.5	0.0	0.0	0.1	0.0	0.0	0.1	1.5	0.0	0.0	24.92	69.25	1.50	1.45	0.09	2.46	251,599	51,063	41,915	9,269	4,199	61,803	0.01%	0.14%	0.00%	0.02%	0.00%	0.00%

Downline Emissions
Rail Segments

												STB thresholds																				tons/yr																						MT/yr			
Scenario	Segment	Mini Segment ID	Miles	State	County	Attainment Status	Existing Trains/Day	Project Trains/Day (Low)	Total Trains/Day (Low)	% Increase in Trains	Exceeds Trains/Day Thresh	Exceeds +% Train Threshold?	CO		Nox		PM10 Ex	PM 10 D	PM10 T		PM2.5 Ex	PM 2.5 D	PM10 T		Sox		VOC		Acetaldeh	Acrolein		Benzene		1,3-Butad		Ethylbenz		Formaldeh		DPM (10)		Napthaler		POM (8)		CO2		CH4		N2O		CO2e	
High-2025	Denver East/North	DE-01	3.2	Colorado	Adams	NonAttainment	25	8.4	33.4	34%	TRUE	FALSE	11.0	30.7	0.7	-	0.7	0.6	-	0.6	0.0	1.1	2E-02	2E-03	2E-02	9E-04	1E-05	3E-02	7E-01	2E-03	5E-04	3,841	0.3	0.1	3,875																										
High-2025	Eastbound - Denver	EB-01	0.1	Colorado	Adams	NonAttainment	10	1.1	11.1	11%	FALSE	FALSE	0.0	0.1	0.0	-	0.0	0.0	-	0.0	0.0	0.0	7E-05	8E-06	8E-05	3E-06	4E-08	1E-04	2E-03	7E-06	2E-06	14	0.0	0.0	14																										
High-2025	Eastbound - Denver	EB-01	1.3	Colorado	Denver	NonAttainment	10	1.1	11.1	11%	FALSE	FALSE	0.6	1.7	0.0	-	0.0	0.0	-	0.0	0.0	0.1	1E-03	1E-04	1E-03	5E-05	6E-07	2E-03	4E-02	1E-04	3E-05	214	0.0	0.0	216																										
High-2025	Eastbound - Denver	EB-02	0.7	Colorado	Denver	NonAttainment	3	1.1	4.1	37%	FALSE	FALSE	0.3	0.8	0.0	-	0.0	0.0	-	0.0	0.0	0.0	5E-04	6E-05	6E-04	3E-05	3E-07	8E-04	2E-02	6E-05	1E-05	103	0.0	0.0	104																										
High-2025	Eastbound - Denver	EB-03	3.2	Colorado	Adams	NonAttainment	149	1.1	150.1	1%	FALSE	FALSE	1.5	4.1	0.1	-	0.1	0.1	-	0.1	0.0	0.1	2E-03	3E-04	3E-03	1E-04	1E-06	4E-03	9E-02	3E-04	7E-05	516	0.0	0.0	520																										
High-2025	Eastbound - Denver	EB-03	5.3	Colorado	Denver	NonAttainment	149	1.1	150.1	1%	FALSE	FALSE	2.4	6.7	0.1	-	0.1	0.1	-	0.1	0.0	0.2	4E-03	5E-04	5E-03	2E-04	2E-06	6E-03	1E-01	5E-04	1E-04	844	0.1	0.0	851																										
High-2025	Eastbound - Denver	EB-04	18.0	Colorado	Adams	NonAttainment	3	1.1	4.1	37%	FALSE	FALSE	8.2	22.8	0.5	-	0.5	0.5	-	0.5	0.0	0.8	1E-02	2E-03	2E-02	7E-04	8E-06	2E-02	5E-01	2E-03	4E-04	2,854	0.2	0.1	2,880																										
High-2025	Eastbound - Denver	EB-04	0.6	Colorado	Arapahoe	NonAttainment	3	1.1	4.1	37%	FALSE	FALSE	0.3	0.7	0.0	-	0.0	0.0	-	0.0	0.0	0.0	4E-04	5E-05	5E-04	2E-05	2E-07	7E-04	2E-02	5E-05	1E-05	90	0.0	0.0	91																										
High-2025	Eastbound - Denver	EB-05	1.1	Colorado	Adams	NonAttainment	4	1.1	5.1	28%	FALSE	FALSE	0.5	1.4	0.0	-	0.0	0.0	-	0.0	0.0	0.0	8E-04	1E-04	1E-03	4E-05	5E-07	1E-03	3E-02	9E-05	2E-05	174	0.0	0.0	175																										
High-2025	Eastbound - Denver	EB-06	3.4	Colorado	Adams	NonAttainment	3	1.1	4.1	37%	FALSE	FALSE	1.5	4.3	0.1	-	0.1	0.1	-	0.1	0.0	0.2	3E-03	3E-04	3E-03	1E-04	1E-06	4E-03	9E-02	3E-04	7E-05	535	0.0	0.0	539																										
High-2025	Eastbound - Denver	EB-06	25.4	Colorado	Arapahoe	NonAttainment	3	1.1	4.1	37%	FALSE	FALSE	11.6	32.2	0.7	-	0.7	0.7	-	0.7	0.0	1.1	2E-02	2E-03	2E-02	1E-03	1E-05	3E-02	7E-01	2E-03	6E-04	4,032	0.3	0.1	4,068																										
High-2025	Eastbound - Denver	EB-06	0.0	Colorado	Elbert	Attainment	3	1.1	4.1	37%	FALSE	FALSE	0.0	0.0	0.0	-	0.0	0.0	-	0.0	0.0	0.0	1E-06	2E-07	2E-06	7E-08	8E-10	2E-06	5E-05	2E-07	4E-08	0	0.0	0.0	0																										
High-2025	Kyune - Denver	KD-01	1.2	Utah	Utah	NonAttainment	8	9.5	17.5	119%	TRUE	TRUE	4.8	13.5	0.3	-	0.3	0.3	-	0.3	0.0	0.5	8E-03	1E-03	1E-02	4E-04	4E-06	1E-02	3E-01	9E-04	2E-04	1,686	0.1	0.0	1,701																										
High-2025	Kyune - Denver	KD-01	9.9	Utah	Carbon	Attainment	8	9.5	17.5	119%	TRUE	TRUE	38.9	108.2	2.3	-	2.3	2.3	-	2.3	0.1	3.8	7E-02	8E-03	8E-02	3E-03	4E-05	1E-01	2E+00	7E-03	2E-03	13,541	1.1	0.3	13,662																										
High-2025	Kyune - Denver	KD-02	3.3	Utah	Carbon	Attainment	12	9.5	21.5	79%	TRUE	FALSE	13.0	36.0	0.8	-	0.8	0.8	-	0.8	0.0	1.3	2E-02	3E-03	3E-02	1E-03	1E-05	3E-02	8E-01	2E-03	6E-04	4,509	0.4	0.1	4,549																										
High-2025	Kyune - Denver	KD-03	30.9	Colorado	Mesa	Attainment	8	9.5	17.5	119%	TRUE	TRUE	121.7	338.4	7.3	-	7.3	7.1	-	7.1	0.4	12.0	2E-01	2E-02	2E-01	1E-02	1E-04	3E-01	7E+00	2E-02	6E-03	42,344	3.3	1.1	42,723																										
High-2025	Kyune - Denver	KD-03	20.5	Utah	Carbon	Attainment	8	9.5	17.5	119%	TRUE	TRUE	80.9	224.8	4.9	-	4.9	4.7	-	4.7	0.3	8.0	1E-01	2E-02	2E-01	7E-03	8E-05	2E-01	5E+00	2E-02	4E-03	28,136	2.2	0.7	28,387																										
High-2025	Kyune - Denver	KD-03	57.6	Utah	Emery	Attainment	8	9.5	17.5	119%	TRUE	TRUE	227.3	631.8	13.7	-	13.7	13.3	-	13.3	0.8	22.5	4E-01	5E-02	5E-01	2E-02	2E-04	6E-01	1E+01	4E-02	1E-02	79,066	6.2	2.0	79,773																										
High-2025	Kyune - Denver	KD-03	62.2	Utah	Grand-UT	Attainment	8	9.5	17.5	119%	TRUE	TRUE	245.4	682.1	14.7	-	14.7	14.3	-	14.3	0.9	24.3	4E-01	5E-02	5E-01	2E-02	2E-04	6E-01	1E+01	5E-02	1E-02	85,357	6.7	2.2	86,120																										
High-2025	Kyune - Denver	KD-04	3.1	Colorado	Mesa	Attainment	8	9.5	17.5	119%	TRUE	TRUE	12.3	34.3	0.7	-	0.7	0.7	-	0.7	0.0	1.2	2E-02	3E-03	3E-02	1E-03	1E-05	3E-02	7E-01	2E-03	6E-04	4,295	0.3	0.1	4,333																										
High-2025	Kyune - Denver	KD-05	0.6	Colorado	Mesa	Attainment	8	9.5	17.5	119%	TRUE	TRUE	2.4	6.7	0.1	-	0.1	0.1	-	0.1	0.0	0.2	4E-03	5E-04	5E-03	2E-04	2E-06	6E-03	1E-01	5E-04	1E-04	843	0.1	0.0	851																										
High-2025	Kyune - Denver	KD-06	8.7	Colorado	Boulder	NonAttainment	11	9.5	20.5	86%	TRUE	TRUE	34.4	95.6	2.1	-	2.1	2.0	-	2.0	0.1	3.4	6E-02	7E-03	7E-02	3E-03	3E-05	9E-02	2E+00	6E-03	2E-03	11,959	0.9	0.3	12,066																										
High-2025	Kyune - Denver	KD-06	11.2	Colorado	Jefferson	NonAttainment	11	9.5	20.5	86%	TRUE	TRUE	44.3	123.0	2.7	-	2.7	2.6	-	2.6	0.2	4.4	7E-02	9E-03	9E-02	4E-03	4E-05	1E-01	3E+00	8E-03	2E-03	15,397	1.2	0.4	15,535																										
High-2025	Kyune - Denver	KD-06	0.4	Colorado	Adams	NonAttainment	11	9.5	20.5	86%	TRUE	TRUE	1.4	3.9	0.1	-	0.1	0.1	-	0.1	0.0	0.1	2E-03	3E-04	3E-03	1E-04	1E-06	4E-03	8E-02	3E-04	7E-05	490	0.0	0.0	495																										
High-2025	Kyune - Denver	KD-06	9.6	Colorado	Jefferson	NonAttainment	11	9.5	20.5	86%	TRUE	TRUE	38.0	105.6	2.3	-	2.3	2.2	-	2.2	0.1	3.8	6E-02	8E-03	8E-02	3E-03	4E-05	1E-01	2E+00	7E-03	2E-03	13,211	1.0	0.3	13,329																										
High-2025	Kyune - Denver	KD-06	51.4	Colorado	Eagle	Attainment	11	9.5	20.5	86%	TRUE	FALSE	202.6	563.1	12.2	-	12.2	11.8	-	11.8	0.7	20.0	3E-01	4E-02	4E-01	2E-02	2E-04	5E-01	1E+01	4E-02	1E-02	70,470	5.5	1.8	71,100																										
High-2025	Kyune - Denver	KD-06	65.0	Colorado	Garfield	Attainment	11	9.5	20.5	86%	TRUE	FALSE	256.4	712.6	15.4	-	15.4	14.9	-	14.9	0.9	25.3	4E-01	5E-02	5E-01	2E-02	2E-04	7E-01	2E+01	5E-02	1E-02	89,171	7.0	2.3	89,969																										
High-2025	Kyune - Denver	KD-06	16.9	Colorado	Gilpin	Attainment	11	9.5	20.5	86%	TRUE	FALSE	66.6	185.2	4.0	-	4.0	3.9	-	3.9	0.2	6.6	1E-01	1E-02	1E-01	6E-03	6E-05	2E-01	4E+00	1E-02	3E-03	23,182	1.8	0.6	23,389																										
High-2025	Kyune - Denver	KD-06	65.7	Colorado	Grand-CO	Attainment	11	9.5	20.5	86%	TRUE	FALSE	259.0	719.7	15.6	-	15.6	15.1	-	15.1	0.9	25.6	4E-01	5E-02	5E-01	2E-02	2E-04	7E-01	2E+01	5E-02	1E-02	90,071	7.1	2.3	90,877																										
High-2025	Kyune - Denver	KD-06	37.0	Colorado	Mesa	Attainment	11	9.5	20.5	86%	TRUE	FALSE	145.7	405.1	8.8	-	8.8	8.5	-	8.5	0.5	14.4	2E-01	3E-02	3E-01	1E-02	1E-04	4E-01	9E+00	3E-02	7E-03	50,694	4.0	1.3	51,148																										
High-2025	Kyune - Denver	KD-07	2.1	Colorado	Adams	NonAttainment	143	9.5	152.5	7%	TRUE	FALSE	8.5	23.6	0.5	-	0.5	0.5	-	0.5	0.0	0.8	1E-02	2E-03	2E-02	7E-04	8E-06	2E-02	5E-01	2E-03	4E-04	2,948	0.2	0.1	2,974																										
High-2025	Northbound	NB-01	16.1	Colorado	Adams	NonAttainment	10	7.3	17.3	73%	TRUE	TRUE	48.7	135.3	2.9	-	2.9	2.8	-	2.8	0.2	4.8	8E-02	1E-02	1E-01	4E-03	5E-05	1E-01	3E+00	9E-03	2E-03	16,936	1.3	0.4	17,088																										
High-2025	Northbound	NB-01	0.2	Colorado	Denver	NonAttainment	10	7.3	17.3	73%	TRUE	TRUE	0.5	1.4	0.0	-	0.0	0.0	-	0.0	0.0	0.1	9E-04	1E-04	1E-03	4E-05	5E-07	1E-03	3E-02	1E-04	2E-05	179	0.0	0.0	180																										
High-2025	Northbound	NB-01	27.6	Colorado	Weld	NonAttainment	10	7.3	17.3	73%	TRUE	TRUE	83.7	232.8	5.0	-	5.0	4.9	-	4.9	0.3	8.3	1E-01	2E-02	2E-01	7E-03	8E-05	2E-01	5E+00	2E-02	4E-03	29,129	2.3	0.7	29,390																										
High-2025	Northbound	NB-02	15.7	Colorado	Weld	NonAttainment	14	7.3	21.3	52%	TRUE	TRUE	47.7	132.7	2.9	-	2.9	2.8	-	2.8	0.2	4.7	8E-02	1E-02	1E-01	4E-03	4E-05	1E-01	3E+00	9E-03	2E-03	16,602	1.3	0.4	16,750																										
High-2025	Northbound	NB-03	0.5	Colorado	Weld	NonAttainment	12	7.3	19.3	61%	TRUE	TRUE	1.5	4.1	0.1	-	0.1	0.1	-	0.1	0.0	0.1	3E-03	3E-04	3E-03	1E-04	1E-06	4E-03	9E-02	3E-04	7E-05	519	0.0	0.0	524																										
High-2025	Northbound	NB-04	9.1	Colorado	Weld	NonAttainment	14	7.3	21.3	52%	TRUE	TRUE	27.6	76.6	1.7	-	1.7	1.6	-	1.6	0.1	2.7	5E-02	6E-03	6E-02	2E-03	3E-05	7E-02	2E+00	5E-03	1E-03	9,587	0.8	0.2	9,673																										
High-2025	Southbound	SB-01	1.1	Colorado	Adams	NonAttainment	0	1.1	1.1	100%	FALSE	TRUE	0.5	1.4	0.0	-	0.0	0.0	-	0.0	0.0	0.1	9E-04	1E-04	1E-03	4E-05	5E-07	1E-03	3E-02	9E-05	2E-05	177	0.0	0.0	179																										
High-2025	Southbound	SB-01	3.0	Colorado	Denver	NonAttainment	0	1.1	1.1	100%	FALSE	TRUE	1.4	3.8	0.1	-	0.1	0.1	-	0.1	0.0	0.1	2E-03	3E-04	3E-03	1E-04	1E-06	4E-03	8E-02	3E-04	7E-05	480	0.0	0.0	484																										
High-2025	Southbound	SB-02	2.0	Colorado	Arapahoe	NonAttainment	38	1.1	39.1	3%	FALSE	FALSE	0.9	2.5	0.1	-	0.1	0.1	-	0.1	0.0	0.1	2E-03	2E-04	2E-03	8E-05	8E-07	2E-03	5E-02	2E-04	4E-05	312	0.0	0.0	315																										
High-2025	Southbound	SB-02	6.3	Colorado	Denver	NonAttainment	38	1.1	39.1	3%	FALSE	FALSE	2.9	7.9	0.2	-	0.2	0.2	-	0.2	0.0	0.3	5E-03	6E-04	6E-03	2E-04	3E-06	7E-03	2E-01	5E-04	1E-04	993	0.1	0.0	1,002																										
High-2025	Southbound	SB-03	5.3	Colorado	Arapahoe	NonAttainment	20	1.1	21.1	6%	FALSE	FALSE	2.4	6.8	0.1	-	0.1	0.1	-	0.1	0.0	0.2	4E-03	5E-04	5E-03	2E-04	2E-06	6E-03	1E-01	5E-04	1E-04	846	0.1	0.0	854																										
High-2025	Southbound	SB-03	36.9	Colorado	Douglas	NonAttainment	20	1.1	21.1	6%	FALSE	FALSE	16.8	46.8	1.0	-	1.0	1.0	-	1.0	0.1	1.7	3E-02	3E-03	3E-02	1E-03	2E-05	4E-02	1E+00	3E-03	8E-04	5,859	0.5	0.1	5,912																										

Downline Emissions
Counties by Segment

Rail Mini Segment	*Red = nonattainment* Includes a Nonattainment Area?	In mini segment? Utah	Boulder	Adams	Jefferson	Denver	Arapahoe	Weld	Douglas	Carbon	Emery	Grand-CO	Grand-UT	Mesa	Eagle	Garfield	Gilpin	Elbert
DE-01	Yes			X														
EB-01	Yes			X		X												
EB-02	Yes					X												
EB-03	Yes			X		X												
EB-04	Yes			X			X											
EB-05	Yes			X														
EB-06	Yes			X			X											X
KD-01	Yes	X								X								
KD-02	Yes	X																
KD-03	Yes	X									X	X		X				
KD-04	No													X				
KD-05	No													X				
KD-06	Yes		X	X									X	X	X	X	X	
KD-07	Yes			X														
NB-01	Yes			X				X										
NB-02	Yes							X										
NB-03	Yes							X										
NB-04	Yes							X										
SB-01	Yes			X		X												
SB-02	Yes					X	X											
SB-03	Yes						X		X									
EB-01 to EB-06				X		X	X											X
KD-01 to KD-07		X	X	X						X	X	X	X	X	X	X	X	
NB-01 to NB-04				X				X										
SB-01 to SB-03				X		X	X		X									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Downline Emissions
Counties by Segment

	County CO emissions																	
Rail Mini Segment	**Utah**	**Boulder**	**Adams**	**Jefferson**	**Denver**	**Arapahoe**	**Weld**	**Douglas**	**Carbon**	**Emery**	**Grand-CO**	**Grand-UT**	**Mesa**	**Eagle**	**Garfield**	**Gilpin**	**Elbert**	**Total**
DE-01			60756															60,756
EB-01			60756		79106													139,862
EB-02					79106													79,106
EB-03			60756		79106													139,862
EB-04			60756			74823												135,579
EB-05			60756															60,756
EB-06			60756			74823											7115	142,694
KD-01	57190								10284									67,474
KD-02	57190																	57,190
KD-03	57190									19094	9209		36994					122,486
KD-04													36994					36,994
KD-05													36994					36,994
KD-06		39396	60756									15631	36994	15429	24881	2030		195,118
KD-07			60756															60,756
NB-01			60756				66875											127,631
NB-02							66875											66,875
NB-03							66875											66,875
NB-04							66875											66,875
SB-01			60756		79106													139,862
SB-02					79106	74823												153,929
SB-03						74823		36914										111,737
EB-01 to EB-06			60756		79106	74823											7115	221,800
KD-01 to KD-07	57190	39396	60756						10284	19094	9209	15631	36994	15429	24881	2030		290,895
NB-01 to NB-04			60756				66875											127,631
SB-01 to SB-03			60756		79106	74823		36914										251,599
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	**37**

Downline Emissions
Counties by Segment

County NOx emissions

Rail Mini Segment	Utah	Boulder	Adams	Jefferson	Denver	Arapahoe	Weld	Douglas	Carbon	Emery	Grand-CO	Grand-UT	Mesa	Eagle	Garfield	Gilpin	Elbert	Total
DE-01			18029															18,029
EB-01			18029		15490													33,519
EB-02					15490													15,490
EB-03			18029		15490													33,519
EB-04			18029			10839												28,868
EB-05			18029															18,029
EB-06			18029			10839											1879	30,747
KD-01	14739								5830									20,569
KD-02	14739																	14,739
KD-03	14739									20586	1308		5328					41,960
KD-04													5328					5,328
KD-05													5328					5,328
KD-06		8714	18029									2592	5328	2979	12942	383		50,967
KD-07			18029															18,029
NB-01			18029				30692											48,721
NB-02							30692											30,692
NB-03							30692											30,692
NB-04							30692											30,692
SB-01			18029		15490													33,519
SB-02					15490	10839												26,329
SB-03						10839		6705										17,544
EB-01 to EB-06			18029		15490	10839											1879	46,237
KD-01 to KD-07	14739	8714	18029						5830	20586	1308	2592	5328	2979	12942	383		93,430
NB-01 to NB-04			18029				30692											48,721
SB-01 to SB-03			18029		15490	10839		6705										51,063
	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

County PM10 emissions

Rail Mini Segment	Utah	Boulder	Adams	Jefferson	Denver	Arapahoe	Weld	Douglas	Carbon	Emery	Grand-CO	Grand-UT	Mesa	Eagle	Garfield	Gilpin	Elbert	Total
DE-01			11084															11,084
EB-01			11084		12609													23,693
EB-02					12609													12,609
EB-03			11084		12609													23,693
EB-04			11084			12494												23,577
EB-05			11084															11,084
EB-06			11084			12494											3608	27,186
KD-01	16059								3912									19,971
KD-02	16059																	16,059
KD-03	16059									5394	2094		5780					29,327
KD-04													5780					5,780
KD-05													5780					5,780
KD-06		5953	11084									1645	5780	1963	3365	497		30,287
KD-07			11084															11,084
NB-01			11084				23504											34,588
NB-02							23504											23,504
NB-03							23504											23,504
NB-04							23504											23,504
SB-01			11084		12609													23,693
SB-02					12609	12494												25,103
SB-03						12494		5728										18,222
EB-01 to EB-06			11084		12609	12494											3608	39,795
KD-01 to KD-07	16059	5953	11084						3912	5394	2094	1645	5780	1963	3365	497		57,746
NB-01 to NB-04			11084				23504											34,588
SB-01 to SB-03			11084		12609	12494		5728										41,915
	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73

Downline Emissions
Counties by Segment

County PM2.5 emissions

Rail Mini Segment	Utah	Boulder	Adams	Jefferson	Denver	Arapahoe	Weld	Douglas	Carbon	Emery	Grand-CO	Grand-UT	Mesa	Eagle	Garfield	Gilpin	Elbert	Total
DE-01			2833															2,833
EB-01			2833		2518													5,351
EB-02					2518													2,518
EB-03			2833		2518													5,351
EB-04			2833			2690												5,522
EB-05			2833															2,833
EB-06			2833			2690											637	6,159
KD-01	3017								771									3,788
KD-02	3017																	3,017
KD-03	3017									1328	612		1744					6,701
KD-04													1744					1,744
KD-05													1744					1,744
KD-06		1349	2833									301	1744	511	1137	95		7,970
KD-07			2833															2,833
NB-01			2833				5578											8,411
NB-02							5578											5,578
NB-03							5578											5,578
NB-04							5578											5,578
SB-01			2833		2518													5,351
SB-02					2518	2690												5,207
SB-03						2690		1229										3,919
EB-01 to EB-06			2833		2518	2690											637	8,677
KD-01 to KD-07	3017	1349	2833						771	1328	612	301	1744	511	1137	95		13,698
NB-01 to NB-04			2833				5578											8,411
SB-01 to SB-03			2833		2518	2690		1229										9,269
	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91

County SO2 emissions

Rail Mini Segment	Utah	Boulder	Adams	Jefferson	Denver	Arapahoe	Weld	Douglas	Carbon	Emery	Grand-CO	Grand-UT	Mesa	Eagle	Garfield	Gilpin	Elbert	Total
DE-01			3314															3,314
EB-01			3314		566													3,880
EB-02					566													566
EB-03			3314		566													3,880
EB-04			3314			171												3,485
EB-05			3314															3,314
EB-06			3314			171											5	3,491
KD-01	268								10327									10,595
KD-02	268																	268
KD-03	268									6425	61		121					6,875
KD-04													121					121
KD-05													121					121
KD-06		990	3314									22	121	48	114	3		4,613
KD-07			3314															3,314
NB-01			3314				446											3,761
NB-02							446											446
NB-03							446											446
NB-04							446											446
SB-01			3314		566													3,880
SB-02					566	171												736
SB-03						171		148										319
EB-01 to EB-06			3314		566	171											5	4,056
KD-01 to KD-07	268	990	3314						10327	6425	61	22	121	48	114	3		21,694
NB-01 to NB-04			3314				446											3,761
SB-01 to SB-03			3314		566	171		148										4,199
	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109

Downline Emissions
Counties by Segment

	County VOC emissions																	
Rail Mini Segment	**Utah**	**Boulder**	**Adams**	**Jefferson**	**Denver**	**Arapahoe**	**Weld**	**Douglas**	**Carbon**	**Emery**	**Grand-CO**	**Grand-UT**	**Mesa**	**Eagle**	**Garfield**	**Gilpin**	**Elbert**	**Total**
DE-01			17127															17,127
EB-01			17127		14355													31,482
EB-02					14355													14,355
EB-03			17127		14355													31,482
EB-04			17127			16439												33,566
EB-05			17127															17,127
EB-06			17127			16439											8683	42,249
KD-01	32240								19553									51,793
KD-02	32240																	32,240
KD-03	32240									37152	14704		39808					123,903
KD-04													39808					39,808
KD-05													39808					39,808
KD-06		13057	17127									45883	39808	14845	38874	2924		172,518
KD-07			17127															17,127
NB-01			17127				97500											114,627
NB-02							97500											97,500
NB-03							97500											97,500
NB-04							97500											97,500
SB-01			17127		14355													31,482
SB-02					14355	16439												30,794
SB-03						16439		13881										30,321
EB-01 to EB-06			17127		14355	16439											8683	56,604
KD-01 to KD-07	32240	13057	17127						19553	37152	14704	45883	39808	14845	38874	2924		276,167
NB-01 to NB-04			17127				97500											114,627
SB-01 to SB-03			17127		14355	16439		13881										61,803
	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127

Downline Emissions
County_Status

State	County	GIS' Attainment Stat	Elliott's QAQC of St	NA Severity Lookup	8-Hour Ozone (2008)	8-Hour Ozone (2015)	Severity Carbon Mono	PM10 (1987)	PM2.5 (2006)	Sulfur Dioxide (1971
Utah	Utah	NonAttainment	NonAttainment	Serious	N/A	Marginal	Maintenance	Maintenance	Serious	N/A
Colorado	Boulder	NonAttainment	NonAttainment	Serious	Serious	Marginal	Maintenance	Maintenance	N/A	N/A
Colorado	Adams	NonAttainment	NonAttainment	Serious	Serious	Marginal	Maintenance	Maintenance	N/A	N/A
Colorado	Jefferson	NonAttainment	NonAttainment	Serious	Serious	Marginal	Maintenance	Maintenance	N/A	N/A
Colorado	Denver	NonAttainment	NonAttainment	Serious	Serious	Marginal	Maintenance	Maintenance	N/A	N/A
Colorado	Arapahoe	NonAttainment	NonAttainment	Serious	Serious	Marginal	Maintenance	Maintenance	N/A	N/A
Colorado	Weld	NonAttainment	NonAttainment	Serious	Serious	Marginal	Maintenance	N/A	N/A	N/A
Colorado	Douglas	NonAttainment	NonAttainment	Serious	Serious	Marginal	Maintenance	Maintenance	N/A	N/A
Colorado	Grand-CO	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A
Utah	Carbon	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A
Utah	Emery	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A
Utah	Grand-UT	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A
Colorado	Mesa	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A
Colorado	Eagle	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A
Colorado	Garfield	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A
Colorado	Gilpin	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A
Colorado	Elbert	Attainment	Attainment		N/A	N/A	N/A	N/A	N/A	N/A

Source: U.S. EPA. Green Book. Last update: April 23, 2020. https://www3.epa.gov/airquality/greenbook/ancl.html#UT

General Conf	VOC	Nox	CO	SO2	NO2	PM10	PM2.5
Serious	50	50	100	100	100	70	70

Downline Emissions
County_Emissions

		Criteria Pollutant (tons/year)						GHG (tons/year)		
State	**County**	**Carbon Monoxide**	**Nitrogen Oxides**	**PM10 Primary (Filt + Con**	**PM2.5 Primary (Filt + C**	**Sulfur Dioxide**	**Volatile Organic Compo**	**Carbon Dioxide**	**Methane**	**Nitrous Oxide**
Utah	Carbon	10,284	5,830	3,912	771	10,327	19,553	218,269	92	8
Utah	Utah	57,190	14,739	16,059	3,017	268	32,240	3,282,627	347	88
Utah	Emery	19,094	20,586	5,394	1,328	6,425	37,152	256,510	20	4
Utah	Grand-UT	15,631	2,592	1,645	301	22	45,883	290,497	53	5
Colorado	Mesa	36,994	5,328	5,780	1,744	121	39,808	894,756	493	36
Colorado	Boulder	39,396	8,714	5,953	1,349	990	13,057	1,522,393	201	59
Colorado	Eagle	15,429	2,979	1,963	511	48	14,845	548,494	100	15
Colorado	Garfield	24,881	12,942	3,365	1,137	114	38,874	581,608	163	16
Colorado	Gilpin	2,030	383	497	95	3	2,924	52,729	11	3
Colorado	Grand-CO	9,209	1,308	2,094	612	61	14,704	204,826	141	5
Colorado	Elbert	7,115	1,879	3,608	637	5	8,683	187,907	18	7
Colorado	Adams	60,756	18,029	11,084	2,833	3,314	17,127	2,752,367	301	94
Colorado	Jefferson	69,999	11,174	7,061	1,929	1,718	19,708	2,855,632	286	116
Colorado	Denver	79,106	15,490	12,609	2,518	566	14,355	3,896,013	314	132
Colorado	Arapahoe	74,823	10,839	12,494	2,690	171	16,439	2,840,375	288	121
Colorado	Weld	66,875	30,692	23,504	5,578	446	97,500	1,942,908	231	64
Colorado	Douglas	36,914	6,705	5,728	1,229	148	13,881	1,824,046	155	48

Source: U.S. EPA. 2014 National Emission Inventory Data. All Sectors Summary by County. https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data

Downline Emissions
Loco_EF

tons/train mile

Scenario	Year	Lookup	CO	Nox	PM10 Ex	PM 10 D	PM10 T	PM2.5 Ex	PM 2.5 D	PM10 T	Sox	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene (8)	Formaldehyde	DPM (10)	Napthalene (8)	POM (8)	CO2	CH4	N2O	CO2e
High	2025	High-2025	1.14E-03	3.16E-03	6.84E-05	—	6.84E-05	6.63E-05	—	6.63E-05	4.01E-06	1.12E-04	1.91E-06	2.30E-07	2.32E-06	9.73E-08	1.06E-09	2.94E-06	0	2.11E-07	5.48E-08	0.396	3.10E-05	1.01E-05	0.4

Source: linked to 'Ops_Loco'.xlsx

Days per Year 365

STB Thres	Trains/day	Percent Increase
Attainment	8	100%
Nonattainr	3	50%

Emissions Inventory—Cumulative (Construction)

Cumulative_Common
Emissions

Cumulative Peak Year Total Emissions (tons/year) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy	
	Source	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gallons)	Gasoline (gallons)
Low	Total	1,666	1,175	104	434	546	104	45	152	3	2,078	11.49	11.20	8.66	1.38	0.46	80.89	74.98	0.19	0.22	618,279	1,722	1.44	731,568	707,070	133,541
High	Total	4,454	3,146	278	1,164	1,463	278	120	406	8	5,558	30.73	29.97	23.14	3.70	1.22	216.36	200.60	0.52	0.59	1,653,830	4,606	3.84	1,958,190	1,902,809	333,853
Low	Termini Ops	146	51	0.32	22	30	0.29	3	7	0.07	51	0.07	0.01	0.10	0.02	0.04	0.11	0.24	0.01	0.02	7,790	0.42	0.12	84,585	599,273	133,541
High	Termini Ops	388	138	0.85	57	79	0.77	8	17	0.18	136	0.18	0.02	0.25	0.04	0.10	0.30	0.65	0.03	0.04	20,700	1.10	0.30	227,449	1,612,977	333,853
Low	Wells Construction	9	32	1.35	158	159	1.32	16	17	0.05	4	0.12	0.03	0.05	0.00	0.01	0.33	1.32	0.01	0.20	6,744	0.13	0.15	6,785	39,913	-
High	Wells Construction	25	86	3.67	429	432	3.58	44	47	0.15	10	0.32	0.09	0.13	0.01	0.03	0.89	3.58	0.02	0.54	18,292	0.35	0.42	18,404	108,263	-
Low	Wells Operation	1,511	1,092	102	254	356	102	26	128	3	2,023	11.30	11.16	8.51	1.37	0.41	80.44	73.42	0.17	0.00	603,746	1,722	1.17	640,198	67,884	-
High	Wells Operation	4,041	2,922	273	679	952	273	69	342	8	5,412	30.23	29.86	22.75	3.65	1.09	215.16	196.36	0.47	0.00	1,614,838	4,605	3.12	1,712,337	181,569	-

Termini One-Time Construction Emissions (tons/year) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
All Alts, All Scenarios	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
All	114.73	8.78	0.25	55.02	55.27	0.22	6.85	7.07	0.04	9.16	1.7E-01	1.1E-02	4.1E-01	6.2E-02	1.5E-01	1.1E-01	4.3E-03	2.1E-02	2.8E-02	6,076	0.5	0.5	6,229	10,055	572,947

Downstream Combustion Emissions (MT/year) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (bbl)
Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Crude
Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19,716,083	807	167	19,785,953	47,450,000
High	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53,081,761	2,172	449	53,269,873	127,750,000

Table. Cumulative Criteria Pollutant and HAP Emissions from Peak Year of Well Operations

Pollutants	Low Activity Scenario	High Activity Scenario
Criteria Pollutants and Volatile Organic Compounds (U.S. tons)		
CO	1,666	4,454
NO_X	1,175	3,146
PM10	546	1,463
PM2.5	152	406
SO_2	3	8
VOCs	2,078	5,558
Hazardous Air Pollutants (U.S. tons)		
Acetaldehyde	11	31
Acrolein	11	30
Benzene	9	23
1,3-Butadiene	1	4
Ethylbenzene	<1	1
Formaldehyde	81	216
DPM	75	201
Napthalene	<1	<1
POM	<1	<1

Table. Cumulative Greenhouse Gas Emissions from Peak Year of Well Operations

GHGs (metric tons)		
CO_2	618,279	1,653,830
CH_4	1,722	4,606
N_2O	1	4
CO_2e	731,568	1,958,190

Table. Downstream Greenhouse Gas Emissions from Well Product End Use

GHGs (metric tons)		
CO_2	19,716,083	53,081,761
CH_4	807	2,172
N_2O	167	449
CO_2e	19,785,953	53,269,873

Table. Termini Construction One-time Criteria Pollutant and HAP Emissions

Pollutants	Both Activity Scenarios
Criteria Pollutants and Volatile Organic Compounds (U.S. tons)	
CO	115
NO_X	9
PM10	55
PM2.5	7
SO_2	<1
VOCs	9
Hazardous Air Pollutants (U.S. tons)	
Acetaldehyde	0.17
Acrolein	0.01
Benzene	0.41
1,3-Butadiene	0.06
Ethylbenzene	0.15
Formaldehyde	0.11
DPM	<0.01
Napthalene	0.02
POM	0.03

Table. Termini Construction One-time GHG Emissions

GHGs (metric tons)		
CO_2	6,076	1,653,830
CH_4	<1	4,606
N_2O	<1	4
CO_2e	6,229	1,958,190

Table. Cumulative Criteria Pollutant and HAP Emissions by Source (Wells Canyon Alternative)

Pollutants	Low Activity Scenario				High Activity Scenario			
	Wells Construction	Wells Operation	Termini Operation	Total	Wells Construction	Wells Operation	Termini Operation	Total
Criteria Pollutants and Volatile Organic Compounds (U.S. tons)								
CO	9	1,511	146	1,666	25	4,041	388	4,454
NO_X	32	1,092	51	1,175	86	2,922	138	3,146
PM10	159	356	30	546	432	952	79	1,463
PM2.5	17	128	7	152	47	342	17	406
SO_2	0	3	0	3	0	8	0	8
VOCs	4	2,023	51	2,078	10	5,412	136	5,558
Hazardous Air Pollutants (U.S. tons)								
Acetaldehyde	0	11	0	11	0	30	0	31
Acrolein	0	11	0	11	0	30	0	30
Benzene	0	9	0	9	0	23	0	23
1,3-Butadiene	0	1	0	1	0	4	0	4
Ethylbenzene	0	0	0	0	0	1	0	1
Formaldehyde	0	80	0	81	1	215	0	216
DPM	1	73	0	75	4	196	1	201
Napthalene	0	0	0	0	0	0	0	1
POM	0	0	0	0	1	0	0	1

Table. Cumulative Greenhouse Gas Emissions by Source (Wells Canyon Alternative)

GHGs (metric tons)								
CO_2	6,744	603,746	7,790	618,279	18,292	1,614,838	20,700	1,653,830
CH_4	<1	1,722	<1	1,722	<1	4,605	1	4,606
N_2O	<1	1	<1	1.4	<1	3	<1	3.8
CO_2e	6,785	640,198	84,585	731,568	18,404	1,712,337	227,449	1,958,190

Uinta Project Information

Well Operation Features (4)		
Variable	Low	High
Bbl/day	130,000	350,000
gallon/day	5,460,000	14,700,000
Wells in Construction	80	217
Total Operating Wells	1,245	3,330

Variable	Value
Op Days/Yr (assumed)	365
Op Yrs/Proj (assumed)	30
Indian Canyon Op Yr (2)	2025
Whitmore Park Op Yr (2)	2025
Wells Draw Op Yr (2)	2026
Low Production (bbl/day) (3)	130,000
High Production (bbl/day) (3)	350,000

Energy Conversions

Variable	Value	Source
Gasoline Btu to gallon	8.31E-06	https://www.eia.gov/energyexplained/units-and-calculators/
Diesel Btu to gallon	7.28E-06	https://www.eia.gov/energyexplained/units-and-calculators/
joule to MMBtu	9.48E-10	
joule to Btu	9.48E-04	
Btu to MMBtu	1.00E-06	
Diesel density (kg/L)	0.85	
Liter to gallon	0.26	
kg to g	0.001	
Gram diesel fuel to gallon	0.000310791	

Sources

(2) Uinta Basin Rail Project Information Report. DATE.
(3) UBR_ProjectAttributesTable.xlsx as of 2/11/20. rows 87-88
(4) ICF. 2020. Draft Cumulative Air Quality and Greenhouse Gas Emission Inventory Methodology for the Uinta Rail Project

Cumulative_Wells_Construction
Annual

Uinta Cumulative-Level Well Construction Emissions Peak Year (tons/year)) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
	Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	Low	9	32	1	158	159	1	16	17	0.05	4	0.12	0.03	0.05	0.003	0.01	0.33	1.32	0.007	0.20	6,744	0.1	0.15	6,785	39,913	-
High	High	25	86	4	429	432	4	44	47	0.15	10	0.32	0.09	0.13	0.007	0.03	0.89	3.58	0.018	0.54	18,292	0.4	0.42	18,404	108,263	-

Uinta Cumulative-Level Well Construction Emissions (tons/year per well) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Activity	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Offroad	0.00076	0.00217	0.00014	0.00609	0.00623	0.00013	0.00326	0.00339	0.00001	0.00014	0.00001	0.000003	0.00001	0.0000002	0.000001	0.00003	0.00013	0.000001	0.00002	2	0.00001	0.00005	2	0.0002	
Onroad	0.00842	0.01083	0.00033	1.96844	1.96877	0.00030	0.19836	0.19866	0.00005	0.00120	0.00007	0.00001	0.00001	0.0000020	0.00001	0.00019	0.00030	0.00002	0.00002	5	0.00068	0.00001	5	496	
Erosion	-	-	-	0.00122	0.00122	-	0.00018	0.00018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Drills	0.10442	0.38315	0.01646	-	0.01646	0.01608	-	0.01608	0.00062	0.01999	0.00140	0.00039	0.00055	0.00003	0.00011	0.00389	0.01608	0.00007	0.00245	77	0.00093	0.00187	77	3	
Venting	-	-	-	-	-	-	-	-	-	0.02500	-	-	0.00003	-	-	-	-	-	-	0	-	-	0	-	
Total	0.11	0.40	0.02	1.98	1.99	0.02	0.20	0.22	0.0007	0.05	0.0015	0.0004	0.0006	0.0000	0.0001	0.0041	0.0165	0.0001	0.0025	84	0.002	0.002	85	499	

Well Development (wells/year)

Scenario	Wells Developed (1)
Low	80
High	217

Sources

(1) ICF. 2020. Draft Cumulative Air Quality and Greenhouse Gas Emission Inventory Methodology for the Uinta Rail Project

Cumulative_Wells_Construction
Assumptions

Constants and Scalars (1, unless otherwise noted)

Watering Control Efficiency	50%
Soil Moisture Content	7.9 %
Soil Silt Content	6.9 %

Silt content (S)	5.1
Unpaved Roundtrip miles	19
Precipitation days (P) (4)	63
Silt loading (sL)	0.6
Paved Roundtrip miles	6
Total RT miles	25

	Monument Butte
Wells	204
Well Pads	47
Disturbed Area for Well Pads (m^2)	380,405
Single Well for Scaling	1
Well Pads per Well	0.2
Disturbed Area per Well (m^2)	429.6

Conversions

Conversions	
gram to ton	0.000001
gram to MT	0.000001
acre to m^2	4,047
CH4 GWP (3)	28
N2O GWP (3)	265
lb to MT	0.0005
MMBtu to Btu	0.000001

Sources

(1) Butte Monument Oil and Gas Development Project FEIS. Appendix A-1. https://eplanning.blm.gov/epl-front-office/projects/nepa/62904/75396/83267/FEIS_3_Appendix_A_-_Appendix_K.pdf

(3) IPCC. 2014. Fifth Assessment Report. https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf

(4) Western Regional Climate Center. N.d. *Period of Record Genral Climate Summary - Precipitation.* Duchesne, Utah. 1902 - 2012. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ut2253

Cumulative_Wells_Construction
Off_Sum_Dust

Summary Offroad Fugitive Dust Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Well Pad - Dozer and Backhoe	-	-	-	3.12E-03	3.12E-03	-	1.72E-03	1.72E-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Well Pad - Grader	-	-	-	1.06E-04	1.06E-04	-	1.14E-05	1.14E-05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Road Construction - Dozer and Backhoe	-	-	-	7.91E-04	7.91E-04	-	4.35E-04	4.35E-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Road Construction - Grader	-	-	-	3.29E-05	3.29E-05	-	3.55E-06	3.55E-06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pipeline - Dozer and Backhoe	-	-	-	1.98E-03	1.98E-03	-	1.09E-03	1.09E-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pipeline - Grader	-	-	-	6.66E-05	6.66E-05	-	7.20E-06	7.20E-06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	6.09E-03	6.09E-03	-	3.26E-03	3.26E-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cumulative_Wells_Construction
Off_Pad_Dust_DB

(1) Dozer and Backhoe Fugitive Dust Emissions at Well Pad from Monument Butte (tons/year/well)

	Criteria Pollutants									
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Dozer				1.56E-03	1.56E-03		8.58E-04	8.58E-04		
Backhoe				1.56E-03	1.56E-03		8.58E-04	8.58E-04		
Total	-	-	-	3.12E-03	3.12E-03	-	1.72E-03	1.72E-03	-	-

Monument Butte Methodology (1)

Assumptions

Hours of construction	3	days per well pad	
	12	hours per day	
	36	hours per well pad	
Annual amount of well pads	0.23	pads/year	
Watering control efficiency	50%		
Soil moisture content (%)	7.90	%	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
Soil silt content	6.90	%	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM10 Multiplier	0.75 * PM15		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM2.5 Multiplier	0.105 * TSP		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
# of Dozers	1		
# of Backhoes	1		Backhoe emission factors conservatively estimated as equivalent to dozer's

Equations AP-42 Table 11.9-1 and 11.9-3 for Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * control efficiency
Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * control efficiency

Emission Factors

1.97	lb TSP/hour/piece of equipment	
0.50	lb PM15/hour/piece of equipment	
0.38	lb PM10/hour/piece of equipment	
0.21	lb PM2.5/hour/piece of equipment	

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
Off_Pad_Dust_G

(2) Grader Fugitive Dust Emissions at Well Pad from Monument Butte (tons/year/well)

	Criteria Pollutants									
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Grader				1.06E-04	1.06E-04		1.14E-05	1.14E-05		
Total	-	-	-	1.06E-04	1.06E-04	-	1.14E-05	1.14E-05	-	-

Monument Butte Methodology (1)

Assumptions

Hours of construction	3	days per well pad	
	12	hours per day	
	36	hours per well pad	
Annual amount of well pads	0.23	pads/year	
Distance graded - oil well	1.19	miles	
Watering control efficiency	50%		
Average grader speed	7.10	mph	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM10 Multiplier	0.6 * PM15		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM2.5 Multiplier	0.031 * TSP		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
# of Grader	1		

Equations AP-42 Table 11.9-1 and 11.9-3 for Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 0.040 * (mean vehicle speed)^2.5 * distance graded * control efficiency
Emissions (PM15 lbs/hr) = 0.051 * (mean vehicle speed)^2.0 * distance graded * control efficiency

Emission Factors

3.20	lb TSP/well pad	
1.53	lb PM15/well pad	
0.92	lb PM10/well pad	
0.10	lb PM2.5/well pad	

Sources

(1) Monument Butte Appendix A1

(3) Dozer and Backhoe Fugitive Dust Emissions from Road Construction from Monument Butte (tons/year/well)

Emission Source Category	Criteria Pollutants									
	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Dozer				3.95E-04	3.95E-04		2.17E-04	2.17E-04		
Backhoe				3.95E-04	3.95E-04		2.17E-04	2.17E-04		
Total	-	-	-	7.91E-04	7.91E-04	-	4.35E-04	4.35E-04	-	-

Monument Butte Methodology (1)

Assumptions

Hours of construction	4	days per mile	
	12	hours per day	
	0.19	miles of road per well pad	
	9	hours per well pad road	
Annual amount of well pads	0.23	pads/year	
Watering control efficiency	50%		
Soil moisture content (%)	7.90	%	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
Soil silt content	6.90	%	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM10 Multiplier	0.75 * PM15		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM2.5 Multiplier	0.105 * TSP		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
Dozers	1		
Backhoes	1		Backhoe emission factors conservatively estimated as equivalent to dozer's

Equations

AP-42 Table 11.9-1 and 11.9-3 for Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * control efficiency
Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * control efficiency

Emission Factors

1.97	lb TSP/hour/piece of equipment
0.50	lb PM15/hour/piece of equipment
0.38	lb PM10/hour/piece of equipment
0.21	lb PM2.5/hour/piece of equipment

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
Off_Road_Dust_G

(4) Grader Fugitive Dust Emissions from Road Construction from Monument Butte (tons/year/well)

	Criteria Pollutants									
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Grader				3.29E-05	3.29E-05		3.55E-06	3.55E-06		
Total	-	-	-	3.29E-05	3.29E-05	-	3.55E-06	3.55E-06	-	-

Monument Butte Methodology (1)

Assumptions

Hours of construction	9	hours per well pad roads	
Road construction grading distance	0.37	miles road per well pad	
Annual amount of well pads	0.23	pads/year	
Watering control efficiency	50%		
Average grader speed	7.10	mph	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM10 Multiplier	0.6 * PM15		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM2.5 Multiplier	0.031 * TSP		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
Grader	1		

Equations AP-42 Table 11.9-1 and 11.9-3 for Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 0.040 * (mean vehicle speed)^2.5 * distance graded * control efficiency
Emissions (PM15 lbs/hr) = 0.051 * (mean vehicle speed)^2.0 * distance graded * control efficiency

Emission Factors

0.99	lb TSP/well pad	
0.48	lb PM15/well pad	
0.29	lb PM10/well pad	
0.03	lb PM2.5/well pad	

Sources

(1) Monument Butte Appendix A1

(5) Dozer and Backhoe Fugitive Dust Emissions from Pipeline Construction from Monument Butte (tons/year/well)

	Criteria Pollutants									
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Dozer				9.89E-04	9.89E-04		5.43E-04	5.43E-04		
Backhoe				9.89E-04	9.89E-04		5.43E-04	5.43E-04		
Total	-	-	-	1.98E-03	1.98E-03	-	1.09E-03	1.09E-03	-	-

Monument Butte Methodology (1)

Assumptions

Hours of construction	10	days per mile	
	12	hours per day	
	0.19	miles of road per well pad	
	23	hours per well pad pipeline	
Annual amount of well pads	0.23	pads/year	
Watering control efficiency	50%		
Soil moisture content (%)	7.90	%	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
Soil silt content	6.90	%	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM10 Multiplier	0.75 * PM15		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM2.5 Multiplier	0.105 * TSP		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
Dozers	1		
Backhoes	1		Backhoe emission factors conservatively estimated as equivalent to dozer's

Equations

AP-42 Table 11.9-1 and 11.9-3 for Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * control efficiency
Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * control efficiency

Emission Factors

1.97	lb TSP/hour/piece of equipment	
0.50	lb PM15/hour/piece of equipment	
0.38	lb PM10/hour/piece of equipment	
0.21	lb PM2.5/hour/piece of equipment	

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
Off_Pipe_Dust_G

(6) Grader Fugitive Dust Emissions from Pipeline Construction from Monument Butte (tons/year/well)

	Criteria Pollutants									
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Grader				6.66E-05	6.66E-05		7.20E-06	7.20E-06		
Total	-	-	-	6.66E-05	6.66E-05	-	7.20E-06	7.20E-06	-	-

Monument Butte Methodology (1)

Assumptions

Hours of construction	23	hours per well pad roads	
Pipeline construction grading distance	0.75	miles road per well pad	
Annual amount of well pads	0.23	pads/year	
Watering control efficiency	50%		
Average grader speed	7.10	mph	AP-42 Table 11.9-3. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM10 Multiplier	0.6 * PM15		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
PM2.5 Multiplier	0.031 * TSP		AP-42 Table 11.9-1. https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
Grader	1		

Equations AP-42 Table 11.9-1 and 11.9-3 for Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 0.040 * (mean vehicle speed)^2.5 * distance graded * control efficiency
Emissions (PM15 lbs/hr) = 0.051 * (mean vehicle speed)^2.0 * distance graded * control efficiency

Emission Factors

2.01	lb TSP/well pad	
0.96	lb PM15/well pad	
0.58	lb PM10/well pad	
0.06	lb PM2.5/well pad	

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
On_Sum_Dust

Summary Onroad Fugitive Dust Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Construction	-	-	-	0.02	0.02	-	0.00	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drilling	-	-	-	0.69	0.69	-	0.07	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interim Reclamation	-	-	-	0.01	0.01	-	0.00	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Completion	-	-	-	1.25	1.25	-	0.13	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	1.97	1.97	-	0.20	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cumulative_Wells_Construction
On_Construct_Dust

(7) Construction Traffic Fugitive Dust Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Mean Vehicle				0.02	0.02		0.002	0.002															
Total	0	0	0	0.02	0.02	0	0.002	0.002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Monument Butte Methodology (1)

Assumptions & Activity

Hours per day	12	hour/day
Days per pa	3	day/well pad
Pads per ye	0.23	pads/year
Avg weight of vehicles traveling the road (W)		
Haul trucks	23	tons
Light trucks	4	tons
Mean Vehicle	10	tons
Roundtrips per day per well		
Haul trucks	1	
Light trucks	2	
Total	3	

Equations

Unpaved

E (PM10) / VMT = 1.5 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual
E (PM2.5) / VMT = 0.15 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual

Silt content (S)	5.1	AP-42. 13.2.2-1 Mean Silt Content Western Surface Mining Plant Roads
Roundtrip miles	19	
Precipitation days (P)	63	days/yr
Avg weight of vehicles traveling the road (W)		

Paved

E (PM10) / VMT = .0022 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual
E (PM2.5) / VMT = .00054 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual

Silt loading (sL)	0.6	AP-42. Table 13.2.1-3 baseline low volume roads
Roundtrip miles	6	
Precipitation days (P)	63	
Avg weight of vehicles traveling the road (W)		

Emission Factors

Unpaved	1.00	PM10 lb/VMT Annual per Wellpad
	0.10	PM2.5 lb/VMT Annual per Wellpad
Paved	0.014	PM10 lb/VMT Annual per Wellpad
	0.0035	PM2.5 lb/VMT Annual per Wellpad

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
On_Drill_Dust

(7) Drill Traffic Fugitive Dust Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Mean Vehicle				0.69	0.69		0.07	0.07															
Total	0	0	0	0.69	0.69	0	0.07	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Monument Butte Methodology (1)

Assumptions & Activity

Hours per day	24	hour/day
Days per w	6	day/well
Wells per y	1	wells/year
Avg weight of vehicles traveling the road (W)		
Haul trucks	23	tons
Logging/Mud trucks	20	tons
Water trucks	18	tons
Light trucks	4	tons
Mean Vehicle	13	tons
Roundtrips per day per well		
Haul trucks	2	
Logging/Mud trucks	1	
Water trucks	3	
Light trucks	5	
Total	11	

Equations

Unpaved	E (PM10) / VMT = 1.5 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365		Annual
	E (PM2.5) / VMT = 0.15 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365		Annual
Silt content (S)	5.1	AP-42. 13.2.2-1 Mean Silt Content Western Surface Mining Plant Roads	
Roundtrip miles	19		
Precipitation days (P)	63	days/yr	
Avg weight of vehicles traveling the road (W)			
Paved	E (PM10) / VMT = .0022 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4))		Annual
	E (PM2.5) / VMT = .00054 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4))		Annual
Silt loading (sL)	0.6	AP-42. Table 13.2.1-3 baseline low volume roads	
Roundtrip miles	6		
Precipitation days (P)	63		
Avg weight of vehicles traveling the road (W)			

Emission Factors

Unpaved	1.09	PM10 lb/VMT Annual per Wellpad
	0.11	PM2.5 lb/VMT Annual per Wellpad
Paved	0.017	PM10 lb/VMT Annual per Wellpad
	0.0043	PM2.5 lb/VMT Annual per Wellpad

Sources

(1) Monument Butte Appendix A1

(7) Interim Reclamation Traffic Fugitive Dust Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Mean Vehicle				1.48E-02	1.48E-02		1.49E-03	1.49E-03															
Total	-	-	-	1.48E-02	1.48E-02	-	1.49E-03	1.49E-03	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0

Monument Butte Methodology (1)

Assumptions & Activity

Hours per day	12	hour/day
Days per pa	3	day/well pad
Pads per ye	0.23	pads/year
Avg weight of vehicles traveling the road (W)		
Haul trucks	23	tons
Light trucks	4	tons
Mean Vehicle	13	tons
Roundtrips per day per well		
Haul trucks	1	
Light trucks	1	
Total	2	

Equations

Unpaved

E (PM10) / VMT = 1.5 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual

E (PM2.5) / VMT = 0.15 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual

Silt content (S)	5.1	AP-42. 13.2.2-1 Mean Silt Content Western Surface Mining Plant Roads
Roundtrip miles	19	
Precipitation days (P)	63	days/yr
Avg weight of vehicles traveling the road (W)		

Paved

E (PM10) / VMT = .0022 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual

E (PM2.5) / VMT = .00054 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual

Silt loading (sL)	0.6	AP-42. Table 13.2.1-3 baseline low volume roads
Roundtrip miles	6	
Precipitation days (P)	63	
Avg weight of vehicles traveling the road (W)		

Emission Factors

Unpaved	1.12	PM10 lb/VMT Annual per Wellpad
	0.11	PM2.5 lb/VMT Annual per Wellpad
Paved	0.018	PM10 lb/VMT Annual per Wellpad
	0.0045	PM2.5 lb/VMT Annual per Wellpad

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
On_Comp_Dust

(7) Completion Traffic Fugitive Dust Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Mean Vehicle				1.25E+00	1.25E+00		1.26E-01	1.26E-01															
Total	-	-	-	1.25E+00	1.25E+00	-	1.26E-01	1.26E-01	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0

Monument Butte Methodology (1)

Assumptions & Activity

Hours per day	24	hour/day
Days per w	7	day/well
Wells per y	1	wells/year

Avg weight of vehicles traveling the road (W)

Semi/transport/water trucks	23	tons
Haul trucks	23	tons
Light trucks	4	tons
Mean Vehicle	14	tons

Roundtrips per day per well

Semi/transport/water trucks	7
Haul trucks	2
Light trucks	7
Total	16

Equations

Unpaved

E (PM10) / VMT = 1.5 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual
E (PM2.5) / VMT = 0.15 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual

Silt content (S)	5.1	AP-42. 13.2.2-1 Mean Silt Content Western Surface Mining Plant Roads
Roundtrip miles	19	
Precipitation days (P)	63	days/yr

Avg weight of vehicles traveling the road (W)

Paved

E (PM10) / VMT = .0022 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual
E (PM2.5) / VMT = .00054 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual

Silt loading (sL)	0.6	AP-42. Table 13.2.1-3 baseline low volume roads
Roundtrip miles	6	
Precipitation days (P)	63	

Avg weight of vehicles traveling the road (W)

Emission Factors

Unpaved	1.16	PM10 lb/VMT Annual per Wellpad
	0.12	PM2.5 lb/VMT Annual per Wellpad
Paved	0.020	PM10 lb/VMT Annual per Wellpad
	0.0049	PM2.5 lb/VMT Annual per Wellpad

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
Erosion_Dust

(8) Wind Erosion Fugitive Dust Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Wells				1.22E-03	1.22E-03		1.82E-04	1.82E-04															
Roads/Pipelines				0.00E+00	0.00E+00		0.00E+00	0.00E+00															
Total	-	-	-	1.22E-03	1.22E-03	-	1.82E-04	1.82E-04	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0

Monument Butte Methodology (1)

Assumptions & Activity

Threshold Friction Velocity (Ut)	1.02	m/s (2.28 mph)	for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine)
	1.33	m/s (2.97 mph)	for roads (AP-42 Table 13.2.5-2 Roadbed material)
Initial Disturbance Area	377	acres	total disturbance for roads and pipelines per year
	1,523,892	m^2	total initial disutrbance for roads and pipelines
	0.1	acres	total disturbance for well pads per year
	430	m^2	total initial disutrbance for well pads
Exposed Surface Type	Flat		
Meteorological Data			2002 Grand Junction (obtained from NCDC website)
Fastest Mile Wind Speed (U10+)	20.12	meters/sec	(45 mph) reported as fastes 2-minute wind speed for Grand Junction (2002)
Number of soil disturbances	4		Assumption, disturbance at construction and reclamation
Particle Size Multiplier (k)			
30 um	1		Equates to TSP
<10 um	0.5		Equates to PM10
<2.5 um	0.075		Equates to PM2.5

Equations AP-42. 13.2.2-1 Mean Silt Content Western Surface Mining Plant Roads

Friction Velocity U* = 0.056 U10+

Erosion Potential P (g/m^2/period) = 58*(U*-Ut*) for U*>Ut*, P = 0 for U*<Ut*

Emissions (tons/year) = Erosion Potential * Disturbed area (m^2) * disturbances/year*(k)(453.6/lb)/2000 lbs/ton/development period

Friction Velocity	1.07		
Well Pad Erosion Potential	1.28	g/m^2	
Road Erosion Potential	0	g/m^2	Road erosion potential is zero because the calculated friction velocity is less than the threshold friciton velocity

Emission Factors

Per Well	0.002	tons/year TSP
	0.001	tons/year PM10
	0.0002	tons/year PM2.5
Roads/Pipelines	0.000000	tons/year TSP
	0.000000	tons/year PM10
	0.000000	tons/year PM2.5

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
On_Sum_Combust

Summary Onroad Combustion Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyd	Acrolein	Benzene	1,3-Butadien	Ethylbenzen	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Construction	1.12E-04	9.95E-05	2.65E-06	3.23E-06	5.88E-06	2.44E-06	4.27E-07	2.86E-06	4.48E-07	1.64E-05	9.36E-07	1.44E-07	1.82E-07	2.59E-08	8.16E-08	2.74E-06	2.44E-06	2.25E-07	2.59E-07	0.05	1.02E-05	1.85E-07	0.05	4.53	-
Drilling	3.05E-03	3.88E-03	1.16E-04	1.39E-04	2.56E-04	1.07E-04	1.83E-05	1.25E-04	1.76E-05	4.35E-04	2.40E-05	3.74E-06	4.69E-06	7.33E-07	2.08E-06	6.93E-05	1.07E-04	5.78E-06	6.76E-06	1.90	2.48E-04	5.17E-06	1.90	177.59	-
Interim Reclamation	1.44E-04	1.69E-04	4.98E-06	5.98E-06	1.10E-05	4.58E-06	7.88E-07	5.37E-06	7.66E-07	2.06E-05	1.15E-06	1.78E-07	2.24E-07	3.42E-08	9.96E-08	3.32E-06	4.58E-06	2.76E-07	3.22E-07	0.08	1.20E-05	2.42E-07	0.08	7.75	-
Completion	5.11E-03	6.68E-03	2.02E-04	2.41E-04	4.43E-04	1.86E-04	3.18E-05	2.17E-04	3.02E-05	7.27E-04	4.00E-05	6.23E-06	7.82E-06	1.23E-06	3.46E-06	1.15E-04	1.86E-04	9.63E-06	1.13E-05	3.27	4.11E-04	8.67E-06	3.28	305.91	-
Total	8.42E-03	1.08E-02	3.26E-04	3.90E-04	7.16E-04	3.00E-04	5.13E-05	3.51E-04	4.90E-05	1.20E-03	6.61E-05	1.03E-05	1.29E-05	2.03E-06	5.72E-06	1.91E-04	3.00E-04	1.59E-05	1.86E-05	5.29	6.81E-04	1.43E-05	5.31	495.78	-

Cumulative_Wells_Construction
On_Construct_Combust

(9) Construction Vehicle Tailpipe Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	2E-05	6E-05	2E-06	2E-06	4E-06	2E-06	3E-07	2E-06	3E-07	3E-06	1E-07	2E-08	2E-08	6E-09	1E-08	3E-07	2E-06	3E-08	4E-08	0.03	0.00	0.00	0.03	2.61	
Heavy Duty Pickups	9E-05	4E-05	7E-07	1E-06	2E-06	7E-07	1E-07	8E-07	2E-07	1E-05	8E-07	1E-07	2E-07	2E-08	7E-08	2E-06	7E-07	2E-07	2E-07	0.02	0.00	0.00	0.02	1.92	
Total	1E-04	1E-04	3E-06	3E-06	6E-06	2E-06	4E-07	3E-06	4E-07	2E-05	9E-07	1E-07	2E-07	3E-08	8E-08	3E-06	2E-06	2E-07	3E-07	0.05	0.00	0.00	0.05	4.53	-

Monument Butte Methodology (1)

Assumptions & Activity

Average round trip distance	25.0	miles
Hours per day for construction	12	hours/day
Days for construction	3	days/well pad
Well pads per year	0.23	well pads/year
Number of heavy diesel truck trips	1	trips/day-well pad
Number of light truck trips	2	trips/day-well pad

Emission Factors (2)

	Criteria Pollutants (g/mile)										Hazardous Air Pollutants (g/mile)									Greenhouse Gas Emissions (g/mile)				Energy (joules)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	1.085039	2.975737	0.101636	0.12	0.22	0.0935	0.02	0.11	0.013554	0.135856	0.006424615	0.001059	0.001304	0.000296	0.000533	0.017201	0.093505	0.001573	0.001989	1611.618	0.051121	0.002184	1613.546	21878888	
Heavy Duty Pickups	2.389477	1.123023	0.018735	0.03	0.04	0.0172	0.00	0.02	0.004975	0.363466	0.021356138	0.003251	0.004114	0.000531	0.001876	0.063211	0.017236	0.005108	0.005795	594.1814	0.26961	0.004269	602.1837	8066432	

Sources

(1) Monument Butte Appendix A1
(2) EPA. 2020. MOVES2014B.

Cumulative_Wells_Construction
On_Drill_Combust

(11) Drilling Vehicle Tailpipe Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	1E-03	3E-03	1E-04	1E-04	2E-04	9E-05	2E-05	1E-04	1E-05	1E-04	6E-06	1E-06	1E-06	3E-07	5E-07	2E-05	9E-05	2E-06	2E-06	1.45	0.00	0.00	1.45	135.85	
Heavy Duty Pickups	2E-03	9E-04	2E-05	2E-05	4E-05	1E-05	3E-06	2E-05	4E-06	3E-04	2E-05	3E-06	3E-06	4E-07	2E-06	5E-05	1E-05	4E-06	5E-06	0.45	0.00	0.00	0.45	41.74	
Total	3E-03	4E-03	1E-04	1E-04	3E-04	1E-04	2E-05	1E-04	2E-05	4E-04	2E-05	4E-06	5E-06	7E-07	2E-06	7E-05	1E-04	6E-06	7E-06	1.90	0.00	0.00	1.90	177.59	-

Monument Butte Methodology (1)

Assumptions & Activity

Number of oil wells drilled	1	wells
Average roundtrip distance	25	miles
Hours of Operation	144	hours per site (oil well)
Days of Operation	6	days per site (oil well)
Number of heavy diesel truck trips	6	trips/day-well (oil)
Number of light truck trips	5	trips/day-well (oil)

Emission Factors (2)

	Criteria Pollutants (g/mile)										Hazardous Air Pollutants (g/mile)									Greenhouse Gas Emissions (g/mile)				Energy (joules)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	1.0850387	2.9757367	0.1016365	0.12	0.22	0.0935	0.02	0.11	0.0135544	0.1358562	0.006425	0.001059	0.001304	0.000296	0.000533	0.017201	0.093505	0.001573	0.001989	1611.6181	0.0511212	0.0021839	1613.5459	21878888	
Heavy Duty Pickups	2.3894765	1.1230235	0.018735	0.03	0.04	0.0172	0.00	0.02	0.0049745	0.3634661	0.021356	0.003251	0.004114	0.000531	0.001876	0.063211	0.017236	0.005108	0.005795	594.18136	0.2696102	0.0042692	602.18367	8066431.7	

Sources

(1) Monument Butte Appendix A1
(2) EPA. 2020. MOVES2014B.

(12) Completion Vehicle Tailpipe Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	2E-03	5E-03	2E-04	2E-04	4E-04	2E-04	3E-05	2E-04	2E-05	2E-04	1E-05	2E-06	2E-06	5E-07	9E-07	3E-05	2E-04	3E-06	3E-06	2.54	0.000081	0.000003	2.54	237.74	
Heavy Duty Pickups	3E-03	2E-03	3E-05	3E-05	6E-05	2E-05	5E-06	3E-05	7E-06	5E-04	3E-05	4E-06	6E-06	7E-07	3E-06	9E-05	2E-05	7E-06	8E-06	0.73	0.000330	0.000005	0.74	68.17	
Total	5E-03	7E-03	2E-04	2E-04	4E-04	2E-04	3E-05	2E-04	3E-05	7E-04	4E-05	6E-06	8E-06	1E-06	3E-06	1E-04	2E-04	1E-05	1E-05	3.27	0.000411	0.000009	3.28	305.91	-

Monument Butte Methodology (1)

Assumptions & Activity

Number of oil wells drilled	1	wells
Average roundtrip distance	25	miles
Hours of Operation	168	hours per site (oil well)
Days of Operation	7	days per site (oil well)
Number of heavy diesel truck trips	9	trips/day-well (oil)
Number of light truck trips	7	trips/day-well (oil)

Equations

Emission Factors (2)

	Criteria Pollutants (g/mile)										Hazardous Air Pollutants (g/mile)									Greenhouse Gas Emissions (g/mile)				Energy (joules)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	1.0850387	2.9757367	0.1016365	0.12	0.22	0.0935	0.02	0.11	0.0135544	0.1358562	0.006424615	0.001059	0.001304	0.000296	0.000533	0.017201	0.093505	0.001573	0.001989	1611.6181	0.0511212	0.0021839	1613.5459	21878888	
Heavy Duty Pickups	2.3894765	1.1230235	0.018735	0.03	0.04	0.0172	0.00	0.02	0.0049745	0.3634661	0.021356138	0.003251	0.004114	0.000531	0.001876	0.063211	0.017236	0.005108	0.005795	594.18136	0.2696102	0.0042692	602.18367	8066431.7	

Sources

(1) Monument Butte Appendix A1
(2) EPA. 2020. MOVES2014B.

Cumulative_Wells_Construction
On_Interim_Combust

(13) Reclamation Tailpipe Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	4E-05	1E-04	4E-06	5E-06	9E-06	4E-06	6E-07	5E-06	6E-07	6E-06	3E-07	4E-08	5E-08	1E-08	2E-08	7E-07	4E-06	7E-08	8E-08	0.06	1.92E-06	8.19E-08	0.06	5.66	
Heavy Duty Pickups	1E-04	5E-05	8E-07	1E-06	2E-06	7E-07	1E-07	9E-07	2E-07	2E-05	9E-07	1E-07	2E-07	2E-08	8E-08	3E-06	7E-07	2E-07	2E-07	0.02	1.01E-05	1.60E-07	0.02	2.09	
Total	1E-04	2E-04	5E-06	6E-06	1E-05	5E-06	8E-07	5E-06	8E-07	2E-05	1E-06	2E-07	2E-07	3E-08	1E-07	3E-06	5E-06	3E-07	3E-07	0.08	1.20E-05	2.42E-07	0.08	7.75	-

Monument Butte Methodology (1)

Assumptions & Activity

Number of oil wells drilled	1	wells
Average roundtrip distance	25	miles
Hours of Operation	36	hours per site (oil well)
Days of Operation	1.5	days per site (oil well)
Number of heavy diesel truck trips	1	trips/day-well (oil)
Number of light truck trips	1	trips/day-well (oil)

Equations

Emission Factors (2)

	Criteria Pollutants (g/mile)										Hazardous Air Pollutants (g/mile)									Greenhouse Gas Emissions (g/mile)				Energy (joules)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	1.0850387	2.9757367	0.1016365	0.12	0.22	0.0935	0.02	0.11	0.0135544	0.1358562	0.006424615	0.001059	0.001304	0.000296	0.000533	0.017201	0.093505	0.001573	0.001989	1611.6181	0.0511212	0.002183892	1613.5459	21878887.98	
Heavy Duty Pickups	2.3894765	1.1230235	0.018735	0.03	0.04	0.0172	0.00	0.02	0.0049745	0.3634661	0.021356138	0.003251	0.004114	0.000531	0.001876	0.063211	0.017236	0.005108	0.005795	594.18136	0.2696102	0.004269206	602.18367	8066431.7	
	2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*

Sources

(1) Monument Butte Appendix A1
(2) EPA. 2020. MOVES2014B.

Cumulative_Wells_Construction
Off_Construct_Combust

(10) Construction Heavy Equipment Tailpipe Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
Backhoe	3.7E-04	6.1E-04	6.0E-05	-	6.0E-05	5.8E-05	-	5.8E-05	1.5E-06	6.5E-05	5.9E-06	1.4E-06	2.4E-06	1.2E-07	4.0E-07	1.6E-05	5.8E-05	2.5E-07	1.0E-05	0.19	3.1E-06	4.9E-06	0.19	1.8E-05
Dozer	2.1E-04	9.3E-04	3.7E-05	-	3.7E-05	3.6E-05	-	3.6E-05	5.0E-06	3.6E-05	3.4E-06	6.0E-07	1.7E-06	5.8E-08	1.9E-07	9.2E-06	3.6E-05	1.5E-07	6.0E-06	0.67	2.9E-06	1.7E-05	0.68	6.5E-05
Grader	1.8E-04	6.4E-04	3.9E-05	-	3.9E-05	3.8E-05	-	3.8E-05	8.4E-06	3.6E-05	3.1E-06	5.2E-07	1.4E-06	4.8E-08	2.3E-07	7.9E-06	3.8E-05	1.3E-07	5.3E-06	1.14	2.5E-06	2.9E-05	1.15	1.1E-04
Total	7.6E-04	2.2E-03	1.4E-04	-	1.4E-04	1.3E-04	-	1.3E-04	1.5E-05	1.4E-04	1.2E-05	2.6E-06	5.5E-06	2.3E-07	8.2E-07	3.4E-05	1.3E-04	5.4E-07	2.2E-05	2.00	8.5E-06	5.1E-05	2.01	1.9E-04

Monument Butte Methodology (1)

Assumptions & Activity

Development Rate 0.23 new pads per year

Equipment	miles per pad	hours per p	HP	LF
Backhoe	0.58	67.3	87.17	0.21
Dozer	2.3	67.3	136.1	0.59
Grader	2.3	67.3	231.2	0.59

Assumptions: *Assumed 1/4 of dozer or grader mileag Average HI Default LF from NONROAD model for selected equipment*

Equations

Emissions (tons/year) = (EF (g/hp-hr) * HP * Hours * LF * development rate / (g/ton)

Emission Factors (2)

		Criteria Pollutants (g/hp-hr)										Hazardous Air Pollutants (g/hp-hr)									Greenhouse Gas Emissions (g/hp-hr)				Energy	
	Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	BSFC (grams	Diesel (gallons
elTractors/Loaders/Backhoes	Backhoe	1.2E+00	1.9E+00	1.9E-01	-	1.9E-01	1.9E-01	-	1.9E-01	4.7E-03	2.1E-01	1.9E-02	4.6E-03	7.8E-03	3.9E-04	1.3E-03	5.3E-02	1.9E-01	8.1E-04	3.3E-02	665.43	1.1E-02	1.7E-02	670.28	2.1E+02	0.06
DieselCrawler Tractor/Dozers	Dozer	1.5E-01	6.8E-01	2.7E-02	-	2.7E-02	2.6E-02	-	2.6E-02	3.6E-03	2.6E-02	2.5E-03	4.4E-04	1.2E-03	4.3E-05	1.4E-04	6.7E-03	2.6E-02	1.1E-04	4.4E-03	539.75	2.3E-03	1.4E-02	543.49	1.7E+02	0.05
2025DieselGraders	Grader	7.6E-02	2.7E-01	1.7E-02	-	1.7E-02	1.6E-02	-	1.6E-02	3.6E-03	1.5E-02	1.3E-03	2.2E-04	6.0E-04	2.1E-05	9.9E-05	3.4E-03	1.6E-02	5.7E-05	2.3E-03	537.66	1.2E-03	1.4E-02	541.36	1.7E+02	0.05
		2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*

Sources

(1) Monument Butte Appendix A1
(2) EPA. 2020. MOVES2014B.

Cumulative_Wells_Construction
Drill_Rig_Combust

(14) Drilling Heavy Engine Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	.,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel (gllaons)
Drill	7.1E-02	2.6E-01	1.3E-02	-	1.3E-02	1.2E-02	-	1.2E-02	5.6E-04	1.6E-02	1.4E-03	3.9E-04	5.2E-04	3.0E-05	1.1E-04	3.9E-03	1.2E-02	6.1E-05	2.5E-03	70.68	6.7E-04	1.8E-03	71.19	3.1E+00
Total	7.1E-02	2.6E-01	1.3E-02	-	1.3E-02	1.2E-02	-	1.2E-02	5.6E-04	1.6E-02	1.4E-03	3.9E-04	5.2E-04	3.0E-05	1.1E-04	3.9E-03	1.2E-02	6.1E-05	2.5E-03	70.68	6.7E-04	1.8E-03	71.19	3.1E+00

Monument Butte Methodology (1)

Assumptions & Activity

Drilling hours of operation	144	hours/oil well	
Development rate	1	oil wells/year	
LF	0.41		
Drill rig engines	2217	HP	
Diesel fuel sulfur content	0.0015	%	EPA standard value
Engine Tier	4		

Equations

Emissions (tons/year) = (EF (lb/hp-hr) * HP * Hours (hours/year) * LF * development rate / (lb/ton)

Emission Factors (2)

		Criteria Pollutants (g/hp-hr)									Hazardous Air Pollutants (g/hp-hr)									Greenhouse Gas Emissions (g/hp-hr)				Energy	
	Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	.,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	BSFC (grams)	iesel (gllaon
5DieselBore/Drill Rigs	Drill	0.49	1.82	0.09	0.00	0.09	0.08	0.00	0.08	0.00	0.11	1E-02	3E-03	4E-03	2E-04	8E-04	3E-02	8E-02	4E-04	2E-02	540.03	0.01	0.01	543.85	169.389	0.05

Sources

(1) Monument Butte Appendix A1
(2) EPA. 2020. MOVES2014B.

Cumulative_Wells_Construction
Drill_Frac_Combust

(15) Well Fracturing Engine Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Drill	3E-02	1E-01	4E-03	0E+00	4E-03	4E-03	0E+00	4E-03	6E-05	4E-03	1E-06	3E-07	3E-05	0E+00	0E+00	3E-06	4E-03	5E-06	3E-06	6.32	2.60E-04	5.10E-05	6.30
Total	3E-02	1E-01	4E-03	0E+00	4E-03	4E-03	0E+00	4E-03	6E-05	4E-03	1E-06	3E-07	3E-05	0E+00	0E+00	3E-06	4E-03	5E-06	3E-06	6.32	2.60E-04	5.10E-05	6.30

Monument Butte Methodology (1)

Assumptions & Activity

Average gallons of diesel used per frac job	566	gallons/well (oil well)	
Hours per frac job	25.2	hours/well (oil well)	
Development rate - oil wells	1	wells/year (oil wells)	
Diesel fuel sulfur content	0.0015	%	EPA standard value
Diesel density	7.1	lb/gal	
Diesel heating value	19,300	BTU/lb	

Equations

Emission factor conversion: lb/hp-hr = AP-42 emission factor (lb/Mmbtu) * 7000 average BTU/hp-hr / 1,000,000
Emissions (tons/year) = (EF (lb/MMBtu) * Density (lb/gal) * Heat value (Btu/lb) * Fuel per well (gal/well) / 1,000,000 (Btu/MMBtu) * 2000 (lb/tons)

Emission Factors (2)

	Criteria Pollutants (ton/yr-well)										Hazardous Air Pollutants (ton/yr-well)									Greenhouse Gas Emissions (ton/yr-well)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Drill	0.033	0.12	0.0039		0.00	0.0039		0.00	5.90E-05	0.0035	1.00E-06	3.10E-07	3.00E-05	0	0	3.10E-06	0.0039	5.00E-06	3.00E-06	6.32	2.60E-04	5.10E-05	6.30

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Construction
Vent_Dev

(16) Oil Well Development Venting Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Vented Gas	0	0	0	0	0	0	0	0	0	0.025	0	0	2.68E-05	0	0	0	0	0	0	0.000776	0	0	0.000776
Total	0	0	0	0	0	0	0	0	0	0.025	0	0	2.68E-05	0	0	0	0	0	0	0.000776	0	0	0.000776

Monument Butte Methodology (1)

Assumptions & Activity

Amount of vented gas	5 MSCF per well	average volume estimated
Development rate	1 oil wells/year	
Control rate	0 percent from flaring	

Emission Factors

	Criteria Pollutants (ton/well)										Hazardous Air Pollutants (ton/well)									Greenhouse Gas Emissions (ton/well)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Vented Gas										0.025			2.68E-05							7.76E-04			7.76E-04

Sources

(1) Monument Butte Appendix A1

Emissions Inventory—Cumulative (Operations)

Cumulative_Wells_Operation
Annual

Uinta Cumulative-Level Operation Emissions Peak Year (tons/year) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
	Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	Low	1511	1,092	102	254	356	102	26	128	3	2,023	11	11	9	1	0.41	80	73	0.17	0.002	603,746	1,722	1	640,198	67,884	-
High	High	4,041	2,922	273	679	952	273	69	342	8	5,412	30	30	23	4	1	215	196	0.47	0.005	1,614,838	4,605	3	1,712,337	181,569	-

Uinta Cumulative-Level Operation Emissions Peak Year (tons/year per well) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Activity	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Wellsites	0.81	0.68	0.07	0.03	0.10	0.07	0.00	0.07	0.0020	1.29	0.01	0.01	0.01	0.0008	0.00029	0.06	0.05	1.00E-04	7.56E-07	389	1.2	0.0007	415	7	-
GOSP	0.25	0.13	0.01	0.17	0.18	0.01	0.02	0.03	0.0003	0.19	0.001	0.001	0.001	0.0002	0.00002	0.01	0.01	2.52E-05	6.96E-07	60	0.13	0.0001	63	48	-
Water Treatment Facilities	0.1502	0.0751	0.0060	-	0.0060	0.0060	-	0.0060	0.0002	0.14290	0.0004	0.0004	0.0005	0.0001	0.00002	0.00316	-	1.48E-05	-	36	0.0	0.0001	37	-	-
Total	1.21	0.88	0.08	0.20	0.29	0.08	0.02	0.10	0.0024	1.63	0.0091	0.0090	0.0068	0.0011	0.0003	0.0646	0.0590	1.40E-04	1.45E-06	485	1.383	0.001	514	55	-

Well Development (wells/year)

Scenario	Alternative	Scenario	Wells Operating (1)
Low	Indian Canyon	Low	1,245
High	Indian Canyon	High	3,330

Sources

(1) ICF. 2020. Draft Cumulative Air Quality and Greenhouse Gas Emission Inventory Methodology for the Uinta Rail Project

Cumulative_Wells_Operation
Assumptions

Constants and Scalars

Watering Control Efficiency	50%
Soil Moisture Content	7.9 %
Soil Silt Content	6.9 %

Silt content (S)	5.1
Unpaved Roundtrip miles	19
Precipitation days (P) (4)	63
Silt loading (sL)	0.6
Paved Roundtrip miles	6.2
Total RT miles	25.2

	Monument Butte
Wells not Producing GOSP (1)	1450
Wells Producing to GOSP	1800
Total Wells (1)	3250
Bbl oil per day - all wells (not to GOSP)	13,195
Bbl oil per day per well (not to GOSP)	9
Well Pads	1088
Disturbed Area for Well Pads (m^2)	380,405
Single Well for Scaling	1
Well Pads per Well	0.3
Disturbed Area per Well (m^2)	262.3

Conversions

Conversions	
gram to ton	0.000001
gram to MT	0.000001
lb to MT	0.0005
MMBtu to Btu	0.000001
MMscf to scf	0.001
hr to day	24
day to year	365
bbl to gallon	42

Sources

(1) Butte Monument Oil and Gas Development Project FEIS. Appendix A-1. https://eplanning.blm.gov/epl-front-office/projects/nepa/62904/75396/83267/FEIS_3_Appendix_A_-_Appendix_K.pdf

(4) Western Regional Climate Center. N.d. *Period of Record Genral Climate Summary - Precipitation.* Duchesne, Utah. 1902 - 2012. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ut2253

Cumulative_Wells_Operation
Well_Sum

Summary Well Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	‚3-Butadien:thylbenzenormaldehyd		DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Onroad Combustion	3.12E-04	1.47E-04	2.44E-06	3.27E-06	5.71E-06	2.25E-06	4.41E-07	2.69E-06	6.49E-07	4.74E-05	2.79E-06	4.24E-07	5.37E-07	6.93E-08	2.45E-07	8.25E-06	2.25E-06	6.66E-07	7.56E-07	7.03E-02	3.19E-05	5.05E-07	0.07	6.59	-
Onroad Dust	-	-	-	0.03	0.03	-	2.99E-03	2.99E-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tanks	-	-	-	-	-	-	-	-	-	0.26	-	-	1.23E-03	-	6.46E-05	-	-	-	-	0.0044	0.09	-	1.94	-	-
Flaring	-	-	-	-	-	-	-	-	-	0.27	-	-	8.58E-04	-	4.31E-05	-	-	-	-	0.0041	0.06	-	1.36	-	-
Loadout	-	-	-	-	-	-	-	-	-	0.14	-	-	4.50E-04	-	2.30E-05	-	-	-	-	0.0011	0.03	-	0.71	-	-
Pneumatic	-	-	-	-	-	-	-	-	-	0.12	-	-	6.57E-05	-	-	-	-	-	-	0.0038	0.43	-	9.07	-	-
Engines	0.62	0.45	0.05	-	0.05	0.05	-	0.05	0.00	0.12	0.01	0.01	2.00E-03	8.30E-04	1.10E-04	0.06	0.05	9.80E-05	-	118.90	2.20E-03	2.22E-04	118.98	-	-
Heater	0.19	0.23	0.02	-	0.02	0.02	-	0.02	0.00	0.01	-	-	4.76E-06	-	-	0.00	-	1.38E-06	-	268.84	0.01	5.10E-04	269.10	-	-
Fugitive	-	-	-	-	-	-	-	-	-	0.37	-	-	1.02E-03	-	4.92E-05	-	-	-	-	0.01	0.59	-	12.47	-	-
Flaring	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	0.00	1.00E-06	1.07	-	-
Total	0.81	0.68	0.07	0.03	0.10	0.07	0.00	0.07	0.00	1.29	0.01	0.01	0.01	0.00	0.00	0.06	0.05	0.00	0.00	388.83	1.23	7.34E-04	414.77	6.59	-

Cumulative_Wells_Operation
Well_On_Combust

(18) Operation Vehicle Tailpipe Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyc	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Heavy Duty Pickups	3.12E-04	1.47E-04	2.44E-06	3.27E-06	5.71E-06	2.25E-06	4.41E-07	2.69E-06	6.49E-07	4.74E-05	2.79E-06	4.24E-07	5.37E-07	6.93E-08	2.45E-07	8.25E-06	2.25E-06	6.66E-07	7.56E-07	7.03E-02	3.19E-05	5.05E-07	7.13E-02	6.59E+00	
Total	3.12E-04	1.47E-04	2.44E-06	3.27E-06	5.71E-06	2.25E-06	4.41E-07	2.69E-06	6.49E-07	4.74E-05	2.79E-06	4.24E-07	5.37E-07	6.93E-08	2.45E-07	8.25E-06	2.25E-06	6.66E-07	7.56E-07	7.03E-02	3.19E-05	5.05E-07	7.13E-02	6.59E+00	0.00E+00

Monument Butte Methodology (1)

Assumptions & Activity

Total tanker truck mileage	0	miles/year
Operation pickup truck mileage	171,615	miles/year-all wells
Operating wells	1,450	wells/yr
Total tanker truck mileage per well	0	miles/year
Operation pickup truck mileage per well	118	miles/year
Pumper operation	10	hours/day
	3,650	hours/year

Note: emissions from truck trips already accounted for in the termini_ops workbook. Zeroed out to avoid double-counting this activity.

Equations

Emissions (tons/year) = (EF (lb/mile) * VMT (miles/yr) / 2000 (lb/ton)

Emission Factors (2)

		Criteria Pollutants (g/mile)										Hazardous Air Pollutants (g/mile)									Greenhouse Gas Emissions (g/mile)				Energy (joules)	
	Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyc	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
ion Long-haul Truck	Heavy Haul Trucks	1.09	2.98	0.10	0.12	0.22	0.09	0.02	0.11	0.01	0.14	6.42E-03	1.06E-03	1.30E-03	2.96E-04	5.33E-04	1.72E-02	9.35E-02	1.57E-03	1.99E-03	1612	0.0511	0.0022	1614	21,878,888	
FuelPassenger Truck	Heavy Duty Pickups	2.39	1.12	0.02	0.03	0.04	0.02	0.00	0.02	0.00	0.36	2.14E-02	3.25E-03	4.11E-03	5.31E-04	1.88E-03	6.32E-02	1.72E-02	5.11E-03	5.80E-03	594	0.2696	0.0043	602	8,066,432	
		2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*

Sources

(1) Monument Butte Appendix A1
(2) EPA. 2020. MOVES2014B.

(19) Operations Traffic Fugitive Dust Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants									
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Mean Vehicle				2.98E-02	2.98E-02		2.99E-03	2.99E-03		
Total	-	-	-	2.98E-02	2.98E-02	-	2.99E-03	2.99E-03	-	-

Monument Butte Methodology (1)

Assumptions & Activity

Hours per day	10	hour/day	
Wells not producing to GOSP	1,450	wells	
Avg weight of vehicles traveling the road (W)			
Haul trucks	0	tons	*Note: emissions from truck trips already accounted for in the termini_ops workbook. Zeroed out to avoid double-counting this activity.*
Light trucks	4	tons	
Mean Vehicle	4	tons	
Roundtrips per day per all wells			
Haul trucks	0		*Note: emissions from truck trips already accounted for in the termini_ops workbook. Zeroed out to avoid double-counting this activity.*
Light trucks	19		
Total	19		
Roundtrips per day per well			
Haul trucks	-		
Light trucks	0.01		
Total	0.01		

Equations

Unpaved

E (PM10) / VMT = 1.5 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual
E (PM2.5) / VMT = 0.15 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual

Silt content (S)	5.1	AP-42. 13.2.2-1 Mean Silt Content Western Surface Mining Plant Roads
Roundtrip miles	19	
Precipitation days (P)	63 days/yr	NCDC data for Ouray, UT 1955-2004
Avg weight of vehicles traveling the road (W)		

Paved

E (PM10) / VMT = .0022 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual
E (PM2.5) / VMT = .00054 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual

Silt loading (sL)	0.6	AP-42. Table 13.2.1-3 baseline low volume roads
Roundtrip miles	6.2	
Precipitation days (P)	63	NCDC data for Ouray, UT 1955-2004
Avg weight of vehicles traveling the road (W)		

Emission Factors

Unpaved	0.65	PM10 lb/VMT Annual per Wellpad
	0.07	PM2.5 lb/VMT Annual per Wellpad
Paved	0.005	PM10 lb/VMT Annual per Wellpad
	0.0013	PM2.5 lb/VMT Annual per Wellpad

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
Well_Tanks

(20) Oil Storage Tank Working/Breathing Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Tank W&B	-	-	-	-	-	-	-	-	-	0.26	-	-	0.001227	-	6.45561E-05	-	-	-	-	0.00	0.09	-	1.94

Monument Butte Methodology (1)

Assumptions & Activity

Oil Production rate	13,195	bbls oil per day - all wells (not to GOSP)
Oil Production rate	9.1	bbls oil per day - per well (not to GOSP)
Well pads with tanks	1088	well pads
Tanks per wellsite	2	tanks
Well pads without controls	726	well pads
Well pads with controls	362	well pads
Uncontrolled tanks	1452	tanks
Controlled tanks	724	tanks
Total tanks	2176	tanks
Control efficiency of tanks	95	%
Average throughput	92,959	gallons per year per tank
tanks per well	0.67	

Equations

Emission Factors

	Criteria Pollutants (ton/yr/tank)										Hazardous Air Pollutants (ton/yr/tank)									Greenhouse Gas Emissions (ton/yr/tank)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Tank W&B										0.38			0.001832		9.64187E-05					0.01	0.14		2.90

Sources

(1) Monument Butte Appendix A1

(21) Oil Storage Tank Flashing Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Flashing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.000858	0.00	4.30769E-05	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.36

Monument Butte Methodology (1)

Assumptions & Activity

Oil Production rate	13,195	bbls oil per day - all wells (not to GOSP)
Oil Production rate	9.1	bbls oil per day - per well (not to GOSP)
Well pads with tanks	1088	well pads
Tanks per wellsite	2	tanks
Tanks per project	2176	tanks
Tanks per well	0.67	
Well pads without controls	726	well pads
Well pads with controls	362	well pads
Uncontrolled tanks	1452	tanks
Controlled tanks	724	tanks
Control efficiency of tanks	95	%
Tank Vent GOR	7.76	scf/bbl

Equations

Emission Factors

	Criteria Pollutants (ton/yr/tank)										Hazardous Air Pollutants (ton/yr/tank)									Greenhouse Gas Emissions (ton/yr/tank)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Flashing										0.40			0.001282		6.43382E-05					0.01	0.10		2.03

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
Well_Loadout

(22) Oil Truck Loadout (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Controlled Tank W&B	-	-	-	-	-	-	-	-	-	0.14	-	-	0.00045	-	0.000023	-	-	-	-	0.00	0.03	-	0.71

Monument Butte Methodology (1)

Assumptions & Activity

Oil Production rate	9.1	bbls oil per day - per well (not to GOSP)
Wells not producing to a GOSP	1450	wells

Equations

L-L = 12.46 * S * P * M / T
L-L = Loading loss emission factor (lbs VOC/1000 gal loaded)
S = Saturation factor (0.6 for submerged loading - dedicated service)
p = True vapor pressure of the loaded liquid (psi)
M = Vapor molecular weight of the loaded liquid (lbs/lbmol)
T = temperature of loaded liquid (*R)

Oil Loading

S	0.6	
P	2.7	
M	50	
T	520.0	
LL	2.01	lb/1000 gal

Emission Factors

	Criteria Pollutants (ton/yr/well)										Hazardous Air Pollutants (ton/yr/well)									Greenhouse Gas Emissions (ton/yr/well)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Controlled Tank W&B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00045	0.00	0.000023	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.71

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
Well_Pneum

(23) Operations Pneumatic (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Pneumatic Device	-	-	-	-	-	-	-	-	-	0.12	-	-	0.0000657	-	0	-	-	-	-	0.00	0.43	-	9.07

Monument Butte Methodology (1)

Assumptions & Activity

Oil Production rate	1.39	scf/hr
Number of oil wells	3,250	
Pneumatic sources/well		
liquid level controllers	2	

Emission Factors

	Criteria Pollutants (ton/yr/well)										Hazardous Air Pollutants (ton/yr/well)									Greenhouse Gas Emissions (ton/yr/well)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Pneumatic Device	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.0000657	0.00	0	0.00	0.00	0.00	0.00	0.00	0.43	0.00	9.07

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
Well_Engines

(24) Pumping Unit Engines (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Pumpjack	0.62	0.45	0.049	-	0.05	0.0490	-	0.05	0.0006	0.120	0.0079	0.0079	0.002	0.00083	0.00011	0.056	0.05	0.000098	-	119	0.0022	0.000222	119

Monument Butte Methodology (1)

Assumptions & Activity

Pumpjack engine power	65	hp
Wells requiring pumping unit engines	3,250	wells

Equation

Emissions (tons/yr) = [EF (g/hp-hr) * Power (hp) * 8,760 (hr/yr) * LF] / 453.6 (g/lb) * 2000 (lb/ton)

Emission Factors

	Criteria Pollutants (ton/yr/well)										Hazardous Air Pollutants (ton/yr/well)									Greenhouse Gas Emissions (ton/yr/well)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Pumpjack	0.62	0.45	0.049	0.00	0.05	0.0490	0.00	0.05	0.0006	0.120	0.0079	0.0079	0.002	0.00083	0.00011	0.056	0.05	0.000098	0	119	0.0022	0.000222	119

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
Well_Heater

(25) Production Heater (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Production Heater	0.189407	0.22548276	0.017138	-	0.02	0.02	-	0.02	0.00	0.01	-	-	4.75862E-06	-	-	0.000172	-	1.37931E-06	-	268.8366	0.005069	0.00051	269.1

Monument Butte Methodology (1)

Assumptions & Activity

Oil wellsite separator heater size	500	Mbtu/hr	
Oil wellsite tank heater size	250	Mbtu/hr per tank	
Fuel gas heat value	1,020	Btu/scf	(standard heating value from AP-42)
Oil wells with heater treaters	1,450	wells	
Oil well tanks	2,176	tanks	
LF	0.6	load rate	

Equation

Emissions (tons/yr) = [AP -42 EF (lbs/MMscf) * Fuel consumption (MMscf/yr) * Fuel heating value (BTU/scf)] / 2000 (lb/ton) * 1,020 (Btu/scf - standard fuel heating value)

Emission Factors

	Criteria Pollutants (ton/yr/well)										Hazardous Air Pollutants (ton/yr/well)									Greenhouse Gas Emissions (ton/yr/well)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Total Heater	0.189	0.225	0.017	0.00	0.02	0.0171	0.00	0.02	0.001	0.012	0	0	4.76E-06	0	0	1.72E-04	0	1.38E-06	0	268.8366	0.01	0.00051	269.10

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
Well_Fug

(26) Oil Well Fugitives (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Production Heater	-	-	-	-	-	-	-	-	-	0.37	-	-	0.0010185	-	4.92308E-05	-	-	-	-	0.01	0.59	-	12.47

Monument Butte Methodology (1)

Assumptions & Activity

Number of producing well 3,250 wells

Emission Factors

	Criteria Pollutants (ton/yr/well)										Hazardous Air Pollutants (ton/yr/well)									Greenhouse Gas Emissions (ton/yr/well)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Multiple Pieces of Equipment										0.37			1.02E-03		4.92E-05					0.0052	0.59		12.47

Sources

(1) Monument Butte Appendix A1

(27) Wellsite Flare Emissions (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Wellsite Flare	0.0029	0.0006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	0.003	1.00246E-06	1.07

Monument Butte Methodology (1)

Assumptions & Activity

Number of oil well pads with controls	362	well pads
Number of oil wells	3,250	
% of wells with well pads with controls	11%	
Vent gas from each well pad	8	scf/hr-well pad
Average heating value of combusted gas	2,100	btu/scf
Average heat rating per flare	0	MMBtu/hr

Emission Factors

	Criteria Pollutants (ton/yr/pad)										Hazardous Air Pollutants (ton/yr/pad)									Greenhouse Gas Emissions (ton/yr/pad)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Wellsite Flare	0.026	0.005																		9.0	0.03	0.000009	9.58

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
GOSP_Sum

Summary GOSP Emissions from Monument Butte (tons/year)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Engines	0.25	0.13	0.01	-	0.01	0.01	-	0.01	0.00	0.09	0.00	0.00	4.07E-04	0.00	6.67E-06	0.01	0.01	0.00	-	59.7467	1E-03	1E-04	59.80	-	-
Loadout	-	-	-	-	-	-	-	-	-	0.03	-	-	8.00E-05	-	4.20E-06	-	-	-	-	0.0002	0.01	-	0.13	-	-
Fugitive	-	-	-	-	-	-	-	-	-	0.08	-	-	1.94E-04	-	8.33E-06	-	-	-	-	0.0010	0.12	-	2.49	-	-
Combustion	3.8E-04	1.0E-03	3.6E-05	4.2E-05	7.7E-05	3.3E-05	5.5E-06	3.8E-05	4.7E-06	4.8E-05	2.2E-06	3.7E-07	4.56E-07	1.0E-07	1.87E-07	6.0E-06	3.3E-05	5.5E-07	7.0E-07	0.5118	1.6E-05	6.9E-07	0.51	47.94	-
Dust	-	-	-	0.17	0.17	-	0.02	0.02	-	-	-	-	-	-	-	-	-	-	-	0.0000	-	-	-	-	-
Total	0.25	0.13	0.01	0.17	0.18	0.01	0.02	0.03	3E-04	0.19	0.00	0.00	6.82E-04	1.7E-04	1.94E-05	0.01	0.01	0.00	0.00	60.2597	0.13	1E-04	62.94	47.94	-

Cumulative_Wells_Operation
GOSP_Engines

(35) GOSP Engines (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	l,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Generators	0.2504	0.125066667	0.009933	-	0.01	0.0099	-	0.01	0.0003	0.088	0.000733333	0.000667	0.0004067	0.000167	6.66667E-06	0.005267	0.01	2.46667E-05	-	60	0.001133	0.000133	60

Monument Butte Methodology (1)

Assumptions & Activity

Number of GOSPs	12	facilities
Generator size	1,945	HP
Generators per GOSP	1	engines/facility
Stations per well	0.0067	

Equation

Emissions (tons/yr) = [EF (g/hp-hr) * Power (hp) * 8,760 (hr/yr)] / 453.6 (g/lb) * 2000 (lb/ton)

Emission Factors

	Criteria Pollutants (ton/yr/facility)										Hazardous Air Pollutants (ton/yr/facility)									Greenhouse Gas Emissions (ton/yr/facility)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	l,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Generators	37.6	18.8	1.5	0.00	1.49	1.5	0.00	1.49	0.0	13.2	0.1	0.1	0.1	0.0	0.0	0.8	1.5	0.0	0.0	8962.0	0.2	0.0	8970.6

Sources

(1) Monument Butte Appendix A1

(36) GOSP Truck Loadout (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	L,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Compressor Station Truck	-	-	-	-	-	-	-	-	-	0.03	-	-	0.00008	-	0.0000042	-	-	-	-	0.00	0.01	-	0.13

Monument Butte Methodology (1)

Assumptions & Activity

Facility production rate	5,000	bbls/day/facility
Total facilities	12	central tank batteries
Control efficiency	95%	
Stations per well	0.0067	

Equations

L-L = 12.46 * S * P * M / T
L-L = Loading loss emission factor (lbs VOC/1000 gal loaded)
S = Saturation factor (0.6 for submerged loading - dedicated service)
P = True vapor pressure of the loaded liquid (psi)
M = Vapor molecular weight of the loaded liquid (lbs/lbmol)
T = temperature of loaded liquid (*R)

Oil Loading

S	0.6	
TVP (psi)	2.8	
M	50	
T	520.0	
LL	2.01	lb/1000 gal

Emission Factors

	Criteria Pollutants (ton/yr/facility)										Hazardous Air Pollutants (ton/yr/facility)									Greenhouse Gas Emissions (ton/yr/facility)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	L,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Compressor Station Truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.86	0.00	0.00	0.012	0.00	0.00063	0.00	0.00	0.00	0.00	0.03	0.92	0.00	19.44

Sources

(1) Monument Butte Appendix A1

(37) GOSP Fugitives (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Equipment - Fugitives	-	-	-	-	-	-	-	-	-	0.08	-	-	0.0001944	-	8.33333E-06	-	-	-	-	0.00	0.12	-	2.49

Monument Butte Methodology (1)

Assumptions & Activity

Total stations	12	stations
Stations per well	0.0067	

Equations

VOC Emissions (tons/yr) = [EF (lb/hr) * # of units * Hours of operation (hr/yr) * VOC wt. fraction] / 2000 (lb/ton)

Emission Factors

	Criteria Pollutants (ton/yr/facility)										Hazardous Air Pollutants (ton/yr/facility)									Greenhouse Gas Emissions (ton/yr/facility)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Equipment - Fugitives										11.61			2.92E-02		1.25E-03					0.1560	17.80		373.97

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
GOSP_Combust

(38) GOSP Truck Tailpipe (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Heavy Haul Trucks	4E-04	1E-03	4E-05	4E-05	8E-05	3E-05	5E-06	4E-05	5E-06	5E-05	2E-06	4E-07	5E-07	1E-07	2E-07	6E-06	3E-05	6E-07	7E-07	5E-01	2E-05	7E-07	5E-01	5E+01	
Heavy Duty Pickups	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	4E-04	1E-03	4E-05	4E-05	8E-05	3E-05	5E-06	4E-05	5E-06	5E-05	2E-06	4E-07	5E-07	1E-07	2E-07	6E-06	3E-05	6E-07	7E-07	5E-01	2E-05	7E-07	5E-01	5E+01	-

Monument Butte Methodology (1)

Assumptions & Activity

Total tanker truck mileage	571,656	miles/year-all wells
Operation pickup truck mileage	0	miles/year-all wells
Operating wells to GOSP	1,800	wells/yr
Total tanker truck mileage per well	317.6	miles/year
Operation pickup truck mileage per well	0.0	miles/year
Pumper operation	10	hours/day
	3,650	hours/year

Equations

Emissions (tons/year) = (EF (lb/mile) * VMT (miles/yr) / 2000 (lb/ton)

Emission Factors (2)

		Criteria Pollutants (g/mile)										Hazardous Air Pollutants (g/mile)									Greenhouse Gas Emissions (g/mile)				Energy (joules)	
	Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
tion Long-haul Truck	Heavy Haul Trucks	1.09	2.98	0.10	0.12	0.22	0.09	0.02	0.11	0.01	0.14	6.42E-03	1.06E-03	1.30E-03	2.96E-04	5.33E-04	1.72E-02	9.35E-02	1.57E-03	1.99E-03	1612	0.0511	0.0022	1614	21,878,888	
FuelPassenger Truck	Heavy Duty Pickups	2.39	1.12	0.02	0.03	0.04	0.02	0.00	0.02	0.00	0.36	2.14E-02	3.25E-03	4.11E-03	5.31E-04	1.88E-03	6.32E-02	1.72E-02	5.11E-03	5.80E-03	594	0.2696	0.0043	602	8,066,432	
		2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*

Sources

(1) Monument Butte Appendix A1
(2) EPA. 2020. MOVES2014B.

(39) GOSP Traffic Fugitive Dust Emissions (tons/year/well)

	Criteria Pollutants									
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC
Mean Vehicle				1.74E-01	1.74E-01		1.76E-02	1.76E-02		
Total	-	-	-	1.74E-01	1.74E-01	-	1.76E-02	1.76E-02	-	-

Monument Butte Methodology (1)

Assumptions & Activity

Hours per day	10	hour/day
Number of GOSPs	12	facilities
Stations per well	0.0067	
Avg weight of vehicles traveling the road (W)		
Haul trucks	23	tons
Light trucks	4	tons
Mean Vehicle	23	tons
Roundtrips per day per facility		
Haul trucks	5.25	
Light trucks	-	
Total	5.25	
Roundtrips per day per well		
Haul trucks	0.0350	
Light trucks	-	
Total	0.0350	

Equations

Unpaved

E (PM10) / VMT = 1.5 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual

E (PM2.5) / VMT = 0.15 * (S/12)^0.9 * (W/3)^0.45 * (365-p)/365 Annual

Silt content (S)	5.1	AP-42. 13.2.2-1 Mean Silt Content Western Surface Mining Plant Roads
Roundtrip miles	19	
Precipitation days (P)	63	days/yr
Avg weight of vehicles traveling the road (W)		

Paved

E (PM10) / VMT = .0022 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual

E (PM2.5) / VMT = .00054 * (sL)^0.91 * (W)^1.02 * (1-(p/(365/4)) Annual

Silt loading (sL)	0.6	AP-42. Table 13.2.1-3 baseline low volume roads
Roundtrip miles	6.2	
Precipitation days (P)	63	
Avg weight of vehicles traveling the road (W)		

Emission Factors

Unpaved	1.42	PM10 lb/VMT Annual per Wellpad
	0.14	PM2.5 lb/VMT Annual per Wellpad
Paved	0.032	PM10 lb/VMT Annual per Wellpad
	0.0078	PM2.5 lb/VMT Annual per Wellpad

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
WTP_Sum

Summary WTP Emissions from Monument Butte (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Tanks	-	-	-	-	-	-	-	-	-	0.02	-	-	7.60E-05	-	3.96E-06	-	-	-	-	0.0002	6E-03	0E+00	0.12
Flashing	-	-	-	-	-	-	-	-	-	0.06	-	-	1.97E-04	-	1.02E-05	-	-	-	-	0.0005	0.01	-	0.31
Fugitive	-	-	-	-	-	-	-	-	-	0.00	-	-	1.02E-05	-	4.92E-07	-	-	-	-	0.0001	0.01	-	0.18
Engines	1.5E-01	7.5E-02	6.0E-03	-	6.0E-03	6.0E-03	-	6.0E-03	1.8E-04	5.3E-02	4.4E-04	4.0E-04	2.44E-04	1.0E-04	4.00E-06	3.2E-03	-	1.5E-05	-	35.8480	6.8E-04	6.8E-05	35.88
Total	1.50E-01	7.51E-02	5.96E-03	-	5.96E-03	5.96E-03	-	5.96E-03	1.80E-04	1.43E-01	4.40E-04	4.00E-04	5.27E-04	1.00E-04	1.86E-05	3.16E-03	-	1.48E-05	-	35.8487	0.03	0.0001	36.50

(40) Water Treatment Facility Oil Storage Tank Working/Breathing (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Condendate Tanks	-	-	-	-	-	-	-	-	-	0.02	-	-	0.000076	-	0.00000396	-	-	-	-	0.00	0.01	-	0.12

Monument Butte Methodology (1)

Assumptions & Activity

Average oil production rate		
Facility production rate	160	bbls/day per facility
Total facilities	13	WTP facilities
Stations per well	0.004	
Throughput	2,452,800	gallons per year per facility
	408,800	gallons per year per tank

Emission Factors

	Criteria Pollutants (ton/yr/facility)										Hazardous Air Pollutants (ton/yr/facility)									Greenhouse Gas Emissions (ton/yr/facility)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Condendate Tanks										6.10			0.019		0.00099					0.05	1.46		30.70

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
WTP_Flashing

(41) Water Treatment Facility Tank Oil Storage Tank Flashing Emissions (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	l,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Flashing	-	-	-	-	-	-	-	-	-	0.06	-	-	0.000197	-	1.01538E-05	-	-	-	-	0.00	0.01	-	0.31

Monument Butte Methodology (1)

Assumptions & Activity

Water treatment facilities	13
Stations per well	0.004

Emission Factors

	Criteria Pollutants (ton/yr/facility)										Hazardous Air Pollutants (ton/yr/facility)									Greenhouse Gas Emissions (ton/yr/facility)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	l,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Flashing										15.56			0.049231		0.002538462					0.12	3.73		78.35

Sources

(1) Monument Butte Appendix A1

(42) Water Treatment Facility Fugitives (tons/year/well)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	l,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Equipment - Fugitives	-	-	-	-	-	-	-	-	-	0.00	-	-	1.01538E-05	-	4.92308E-07	-	-	-	-	0.00	0.01	-	0.18

Monument Butte Methodology (1)

Assumptions & Activity

Total stations	13	stations
Stations per well	0.0040	

Equations

VOC Emissions (tons/yr) = [EF (lb/hr) * # of units * Hours of operation (hr/yr) * VOC wt. fraction] / 2000 (lb/ton)

Emission Factors

	Criteria Pollutants (ton/yr/facility)										Hazardous Air Pollutants (ton/yr/facility)									Greenhouse Gas Emissions (ton/yr/facility)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	l,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Equipment - Fugitives										0.92			2.54E-03		1.23E-04					0.0190	2.17		45.51

Sources

(1) Monument Butte Appendix A1

Cumulative_Wells_Operation
WTP_Engines

(43) Water Treatment Plant Generator (tons/year)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	l,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Generators	0.15024	0.07512	0.00596	-	0.01	0.0060	-	0.01	0.00018	0.053	0.00044	0.0004	0.000244	0.0001	0.000004	0.00316	-	0.0000148	-	36	0.0007	0.000068	36

Monument Butte Methodology (1)

Assumptions & Activity

Total stations 13 facilities
Stations per well 0.004

Equation

Emissions (tons/yr) = [EF (g/hp-hr) * Power (hp) * 8,760 (hr/yr)] / 453.6 (g/lb) * 2000 (lb/ton)

Emission Factors

	Criteria Pollutants (ton/yr/facility)										Hazardous Air Pollutants (ton/yr/facility)									Greenhouse Gas Emissions (ton/yr/facility)			
Emission Source Category	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	l,3-Butadien	Ethylbenzene	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e
Generators	37.56	18.78	1.49	0.00	1.49	1.4900	0.00	1.49	0.045	13.150	0.11	0.1	0.061	0.025	0.001	0.79	0	0.0037	0	8,962	0.17	0.017	8,971.00

Sources

(1) Monument Butte Appendix A1

Emissions Inventory—Cumulative (Rail Terminals)

Cumulative_Termini_Construction
Temini_Employee

Termini Constructio: Termini Construction Emissions (tons/year) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
	Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	Low & High	114.7317	8.7831	0.2496	55.0158	55.2654	0.2210	6.8530	7.0740	0.0448	9.1588	1.66E-01	1.11E-02	4.05E-01	6.25E-02	1.55E-01	1.07E-01	4.34E-03	2.07E-02	2.79E-02	6,076	0.5157	0.4676	6,229	10,055	572,947

Termini Constructio: Termini Construction (tons/day) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)		
	Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline	
Low & High	Low & High	0.4396	0.0337	0.0010	0.2108	0.2117	0.0008	0.0263	0.0271	0.0002	0.0351	6.36E-04	4.24E-05	1.55E-03	2.39E-04	5.92E-04	4.11E-04	1.66E-05	7.92E-05	1.07E-04	23	0.0020	0.0018	24	39	2,195	*2025*

MOVES2014 Employ MOVES2014 Employee Vehicle Emission Factors (g/mile)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)		
	Employee Vehicle Year	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	al Energy Consumpt	Diesel	Gasoline
2025	2025Gas/DieselCar/Truck	6.02	0.46	0.01	0.02	0.04	0.01	0.003	0.01	0.002	0.48	8.71E-03	5.81E-04	2.12E-02	3.28E-03	8.10E-03	5.62E-03	2.27E-04	1.08E-03	1.46E-03	351	0.03	0.03	360	4884965	84,253	4,800,712

Diesel % of Annual Total Fuel Consumption	
2025Gas/DieselCar/Truck	1.7%

AP-42 Road Dust Em AP-42 Road Dust Emission Factors (g/mile)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)		
Road Type	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	al Energy Consumpt	Diesel	Gasoline
Paved				0.81			0.20																			
Unpaved				5.88			0.59																			

Terminal Informatio Terminal Information

Project Op Year (4)	Value
Indian Canyon Op Yr	2025
Whitmore Park Op Yr	2025
Wells Draw Op Yr	2026

Note: Conservativel using 2025 as Wells Draw operational year, when vehicle emission factors would be higher than 2026.

Terminal Construction Features	
Number of Terminals (3)	2
Construction Length per Year(years)	1
Days per Year of Construction (assumed)	261

Average Employees/Day for All Terminals (1)			
Scenario	Employees (3)	Trips	One-way trips per Employee per Day (assumed)
Low & High	600	1200	2

Average One-way Trip Distance (2)	
Total	55
Paved	33
Unpaved	22
Average VMT per Day (calc'd)	
Low & High	66,278
Paved	39,461
Unpaved	26,817

Low & High
Paved
Unpaved

Conversions **Conversions**

Conversions	
gram to ton	0.000001
gram to MT	0.000001

Sources **Sources**

(1) Response to OEA IR 3. Venable response PDF. November 25, 2019. G:\Sacramento\LGT-Air&Noise\Air\Uinta Basin Railway EIS 00060.19 (Utah)\01 Project Info\04 Data\2019-12-03 Response to OEA IR 3
(2) ICF. 2020. GIS. 'AirQuality_20200319'
(3) ICF. 2020. Uinta Basin Rail Project Environmental Impact Statement. Cumulative Impacts Section.
(4) Uinta Basin Rail Project Information Report. DATE.

Cumulative_Termini_Operations
Termini_Sum

Termini Operation Emissions (tons/year) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	cetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	145.9	51.3	0.3	22.2	30.2	0.3	3.0	6.5	0.07	50.7	7.0E-02	7.5E-03	1.0E-01	1.6E-02	3.9E-02	1.1E-01	2.4E-01	1.2E-02	1.6E-02	7,790	0.4	0.1	84,585	599,273	133,541
High	387.5	137.8	0.8	57.2	78.9	0.8	7.7	17.3	0.18	136.2	1.8E-01	2.0E-02	2.5E-01	3.9E-02	9.7E-02	3.0E-01	6.5E-01	3.2E-02	4.1E-02	20,700	1.1	0.3	227,449	1,612,977	333,853

Termini Operation Emissions (tons/day) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)		
Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	cetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline	
Low	0.3996	0.1407	0.0009	0.0607	0.0828	0.0008	0.0081	0.0179	0.0002	0.1390	1.9E-04	2.1E-05	2.8E-04	4.3E-05	1.1E-04	3.1E-04	6.6E-04	3.4E-05	4.3E-05	21	0.0011	0.0003	232	1,642	366	*2025*
High	1.0617	0.3776	0.0023	0.1567	0.2162	0.0021	0.0210	0.0473	0.0005	0.3731	5.0E-04	5.4E-05	6.9E-04	1.1E-04	2.7E-04	8.3E-04	1.8E-03	8.9E-05	1.1E-04	57	0.0030	0.0008	623	4,419	915	*2025*

Uinta Termini Details

Number of Terminals (1)	2
Days per Year of Operation (assumed)	365

Sources

(1) ICF. 2020. Uinta Basin Rail Project Environmental Impact Statement. Cumulative Impacts Section.

Cumulative_Termini_Operations
Termini_Direct

Uinta Project Operation Emissions (tons/year) (calc'd **Uinta Project Operation Emissions (tons/year) (calc'd)**

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
	Alternative	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	cetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	Indian Canyon	112.6	40.0	-	-	7.8	-	-	3.3	-	48.0	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	-	-	76,749	-	-
High	Indian Canyon	303.3	107.8	-	-	20.9	-	-	8.8	-	129.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-	-	-	206,631	-	-

Uinta Project Emission Benefits (tons/day) (calc'd) **Uinta Project Emission Benefits (tons/day) (calc'd)**

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
	Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	cetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	Low	0.31	0.11			0.02			0.01		0.13													210		
High	High	0.83	0.30			0.06			0.02		0.35													566		

UINTA BASIN RAIL EIS -- EMISSIONS FROM OIL TRANSLOADING FACILITY

Method: use air permit data from an existing facility, scale by throughput

Existing facility: Price River Terminal LLC - Oil Tr **Existing facility: Price River Terminal LLC - Oil Transloading Facility, Wellington, UT**

Source: Price River Terminal air permit.pdf provided by David Bauer 2/4/20
Utah DEQ Permit No.: DAQE-AN148620001-15
Permit Type: Approval Order [minor source]
Permitted Equipment (copied from permit):
II.A.1 Crude Oil Transloading Facility
II.A.2 Oil Storage Tank
One (1) Oil Storage Tank
Maximum Capacity: 88,300 bbl
Tank VOC Control Type: Floating Roof
II.A.3 Flare
One (1) Flare
Maximum Capacity: 0.48 MMBTU/hr
II.A.4 Adsorption Unit
Five (5) Carbon Adsorber Units each equipped with a breakthrough monitor
Maximum Flowrate: 150 acfm
II.A.5 Tank Heater
One (1) Tank Heater
Maximum Rated Capacity: 3 MMBTU/hr
II.A.6 Diesel Storage Tank
One (1) Diesel Storage Tank*
Maximum Tank Capacity: 1,000 gallons
*Tank is noted for informational purposes only
II.A.7 Loading/Unloading Racks

Permit Throughput Limits (bbl/yr as rolling 12-mo):

Transload (truck to storage tank to railcar)	14,640,000
Mobile operations (truck to railcar)	10,400,000
Total throughput	25,040,000

Ignore shares of transload vs. mobile because we don't know what they could be for Uinta's facility. Assume same emission rates for both (not true in real world).

Emission Limits

Pollutant	Permit (tons/yr)	tons/yr/bbl
PM10 (point + fugitive)	4.09	1.63339E-07
PM2.5 (point + fugitive)	1.73	6.90895E-08
NOx	21.13	8.4385E-07
CO	59.44	2.3738E-06
VOC	25.33	1.01158E-06
Total HAPs	0.97	3.8738E-08
CO2e	40,501.26	0.001617462

Uinta Facility (or total from both facilities)

	Low Scenario	High Scenario
Production (bbl/day)	130,000	350,000
Production (bbl/yr)	47,450,000	127,750,000
Source:	UBR_ProjectAttributesTable.xlsx as of 2/11/20. rows 87-88	

Uinta Emissions, scaled from Price (tons/day) -- to use for EIS

Pollutant	Low Scenario	High Scenario
PM10 (point + fugitive)	0.02	0.06
PM2.5 (point + fugitive)	0.01	0.02
NOx	0.11	0.30
CO	0.31	0.83
VOC	0.13	0.35
Total HAPs	0.01	0.01
CO2e	210	566

Assumptions

Ignored shares of transload vs. mobile because we don't know what they could be for Uinta's facility. Assume same emission rates for both (not true in real world).
Assumes emissions vary linearly with throughput
Does not include mobile sources, does not include non-oil cargo.
CO2e likely in US tons not tonnes
Operating days/yr 365
Operating days/yr

Cumulative_Termini_Operations
Termini_ShortHaul

Uinta Project Operation Emissions (tons/year) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)
Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel
Low	6	9	0.26	9	10	0.24	1	1.60	0.06	0.6	3.1E-02	5.0E-03	6.2E-03	1.1E-03	2.7E-03	8.9E-02	2.4E-01	7.6E-03	9.1E-03	6,373	0.299	0.012	6,384	596,929
High	17	25	0.70	25	26	0.65	4	4.31	0.16	1.6	8.5E-02	1.3E-02	1.7E-02	2.9E-03	7.2E-03	2.4E-01	6.5E-01	2.0E-02	2.4E-02	17,159	0.804	0.032	17,188	1,607,118

Uinta Project Emission Benefits (tons/day) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)
Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel
Low	1.77E-02	2.54E-02	7.15E-04	2.56E-02	2.63E-02	6.58E-04	3.73E-03	4.39E-03	1.61E-04	1.63E-03	8.6E-05	1.4E-05	1.7E-05	3.0E-06	7.4E-06	2.4E-04	6.6E-04	2.1E-05	2.5E-05	17	0.00082	0.00003	17	1,635
High	4.77E-02	6.83E-02	1.92E-03	6.89E-02	7.08E-02	1.77E-03	1.00E-02	1.18E-02	4.34E-04	4.38E-03	2.3E-04	3.7E-05	4.6E-05	8.0E-06	2.0E-05	6.6E-04	1.8E-03	5.6E-05	6.7E-05	47	0.00220	0.00009	47	4,403

MOVES2014 Haul Truck Emission Factors (g/mile)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)	
	Employee Vehicle	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum	Total
2025	2025Diesel FuelCo	1.43	2.05	0.06	0.11	0.17	0.05	0.01	0.07	0.01	0.13	6.95E-03	1.10E-03	1.37E-03	2.41E-04	5.95E-04	1.97E-02	5.31E-02	1.68E-03	2.01E-03	1556	0.073	0.003	1558	1.71E+07	2.11E+07
		2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*

AP-42 Road Dust Emission Factors (g/mile)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)	
Road Type	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyd	Acrolein	Benzene	,3-Butadien	thylbenzen	ormaldehyd	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Petroleum	Total
Paved				0.81			0.20																		
Unpaved				5.88			0.59																		

Cumulative_Termini_Operations
Termini_ShortHaul

Well Hauling Activity Data

Variable	Value	Source
Truck Oil Haul Capacity (	209	(1)
Low Volume Production	130,000	(3)
High Volume Production	350,000	(3)
Trucks Moving to Termir	100%	assumed
Low Haul Trips/Day	622	calculated
High Haul Trips/Day	1,675	calculated
Trip distance	18	(2)
Paved	14	(2)
Unpaved	4	(2)
Low VMT/Day	11,224	calculated
Paved	8,687	calculated
Unpaved	2,537	calculated
High VMT/Day	30,219	calculated
Paved	23,389	calculated
Unpaved	6,830	calculated

Conversion

Variable	Value
g to ton	1.10E-06
g to MT	1.00E-06

Sources

(1) Monument Butte. See pers. comm. Email "Re: Uinta - truck capacity."
(2) ICF. 2020. GIS. 'AirQuality_20200319'
(3) UBR_ProjectAttributesTable.xlsx as of 2/11/20. rows 87-88

Cumulative_Termini_Operations
Termini_Employee

Termini Construction Emissions (tons/year) (calc'd)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
	Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	Low	27	2	0.06	13	13	0.05	2	1.65	0.01	2	3.9E-02	2.6E-03	9.4E-02	1.5E-02	3.6E-02	2.5E-02	1.0E-03	4.8E-03	6.5E-03	1,416	0.120	0.109	1,452	2,344	133,541
High	High	67	5	0.15	32	32	0.13	4	4.12	0.03	5	9.7E-02	6.5E-03	2.4E-01	3.6E-02	9.0E-02	6.2E-02	2.5E-03	1.2E-02	1.6E-02	3,541	0.301	0.272	3,629	5,859	333,853

Termini Construction (tons/day) (calc'd)

	Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (gallons)	
Scenario	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	Diesel	Gasoline
Low	7.33E-02	5.61E-03	1.59E-04	3.51E-02	3.53E-02	1.41E-04	4.38E-03	4.52E-03	2.86E-05	5.85E-03	1.1E-04	7.1E-06	2.6E-04	4.0E-05	9.9E-05	6.8E-05	2.8E-06	1.3E-05	1.8E-05	3.88	0.0003	0.0003	4	6	366
High	1.83E-01	1.40E-02	3.98E-04	8.78E-02	8.82E-02	3.53E-04	1.09E-02	1.13E-02	7.16E-05	1.46E-02	2.7E-04	1.8E-05	6.5E-04	1.0E-04	2.5E-04	1.7E-04	6.9E-06	3.3E-05	4.5E-05	9.70	0.0008	0.0007	10	16	915

MOVES2014 Employee Vehicle Emission Factors (g/mile)

		Criteria Pollutants										Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)		
	Employee Vehicle Year	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	al Energy Consumpt	Diesel	Gasoline
2025	2025Gas/DieselCar/Truck	6.02	0.46	0.01	0.02	0.04	0.01	0.003	0.01	0.00	0.48	8.71E-03	5.81E-04	2.12E-02	3.28E-03	8.10E-03	5.62E-03	2.27E-04	1.08E-03	1.46E-03	351	0.03	0.03	360	4884965	84,253	4,800,712

Diesel % of Annual Total Fuel Consumption	
2025Gas/DieselCar/Truck	1.7%

AP-42 Road Dust Emission Factors (g/mile)

	Criteria Pollutants									Hazardous Air Pollutants									Greenhouse Gas Emissions				Energy (joules)		
Road Type	CO	NOx	PM10 Ex	PM10 D	PM10 T	PM2.5 Ex	PM2.5 D	PM2.5 T	SO2	VOC	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	DPM	Napthalene	POM	CO2	CH4	N2O	CO2e	al Energy Consumpt	Diesel	Gasoline
Paved				0.81			0.20																			
Unpaved				5.88			0.59																			

Cumulative_Termini_Operations
Termini_Employee

Terminal Information

Terminal Operation Features	
Number of Terminals (3)	2
Days per Year of Operation (assumed)	365

Average Employees/Day for All Terminals (1)			
Scenario	Employees (3)	One-way Trips	One-way trips per Employee per Day (assumed)
Low	100	200	2
High	250	500	

Average One-way Trip Distance (2)	
Total	55
Paved	33
Unpaved	22
Average VMT per Day (calc'd)	
Low	11,046
Paved	6,577
Unpaved	4,470
High	27,616
Paved	16,442
Unpaved	11,174

Conversions

Conversions	
gram to ton	0.000001
gram to MT	0.000001

Sources

(1) Response to OEA IR 3. Venable response PDF. November 25, 2019. G:\Sacramento\LGT-Air&Noise\Air\Uinta Basin Railway EIS 00060.19 (Utah)\01 Project Info\04 Data\2019-12-03 Response to OEA IR 3
(2) ICF. 2020. GIS. 'AirQuality_20200319'
(3) ICF. 2020. Uinta Basin Rail Project Environmental Impact Statement. Cumulative Impacts Section.
(4) Uinta Basin Rail Project Information Report. DATE.

Emissions Inventory—Cumulative (Downstream Greenhouse Gases)

Cumulative_Product Combustion
Product_Combust

Downstream Combustion Emissions (MT/year) (calc'd)

Scenario	Greenhouse Gas Emissions CO2	CH4	N2O	CO2e	Energy (bbl) Crude
Low	19,716,083	807	167	19,785,953	47,450,000
High	53,081,761	2,172	449	53,269,873	127,750,000

Downstream Combustion (MT/day) (calc'd)

Well Development Scenario	Greenhouse Gas Emissions CO2	CH4	N2O	CO2e	Energy (bbl) Crude
Low	54,016.66	2.210	0.457	54,208	130,000
High	145,429.48	5.951	1.230	145,945	350,000

Peak Year Scenario Well Information

Combustion Product by End	% ' (2)	GHG Emission Factors (g/gal) (4) CO2	CH4	N2O	CO2e
gasoline	43%	8,780	0.38	0.08	8,813
distillate fuel oil n	31%	10,960	0.44	0.09	10,998
jet fuel	10%	9,750	0.41	0.08	9,784
hydrocarbon gas l	5%	7,360	0.33	0.07	7,389
petroleum coke	5%	14,640	0.43	0.09	14,678
still gas	4%	8,880	0.38	0.08	8,913
residual fuel oil n	2%	11,270	0.45	0.09	11,308
petrochemical fee	0%	n/a	n/a	n/a	n/a
Weighted Average		9,893	0.40	0.08	9,928

Conversions

Conversions	
gram to ton	0.000001
gram to MT	0.000001
kg to g	1,000
gallon to bbl	42

GWPs (3)	
CH4	25
N2O	298

Sources

(1) ICF. 2020. Draft Cumulative Air Quality and Greenhouse Gas Emission Inventory Methodology for the Uinta Rail Project
(2) EIA. 2020. *PADD 3 Refinery Yield.*
(3) IPCC. 2007. Fourth Assessment Report.
(4) EPA. 2020. *Emission Factors for GHG Inventories*

Emissions Inventory—Global Warming Potentials

Global Warming Potentials

GHG	100-Year GWPs	20-Year GWPs
CO2	1	1
CH4	25	72
N2O	298	289

Source: AR4. Table 2.14. https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg1-chapter2-1.pdf

Note that the 20-year GWPs are applied to the CO2e emission totals calculated in EIS Table 3.7-4, 3.7-8, and 3.7-10. The 100-year GWPs are otherwise used throughout the calculations.

Attachment I

Air Quality Impact Assessment Modeling Protocol

UINTA BASIN RAILWAY
ENVIRONMENTAL IMPACT STATEMENT
AIR QUALITY IMPACT ASSESSMENT
MODELING PROTOCOL

PREPARED FOR:

Surface Transportation Board, Office of Environmental Analysis
395 E Street SW
Washington DC 20423
Contact: Joshua Wayland
202.245.0330

August 2021

ICF

ICF. 20212120. *Uinta Basin Railway Environmental Impact Statement Air Quality Impact Assessment Modeling Protocol*. AugustOctober. (ICF 00060.19) Prepared for Surface Transportation Board, Office of Environmental Analysis, Washington DC.

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Acronyms and Abbreviations

the Basin	Uinta Basin
ASL	above sea level
Board	Surface Transportation Board
C.F.R.	Code of Federal Regulations
CO	carbon monoxide
Coalition	Seven County Infrastructure Coalition
DB	dynamic braking
DEM	Digital Elevation Model
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
m/s	miles per second
NAAQS	National Ambient Air Quality Standards
NO	nitri~~cogen~~ oxide
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
OEA	Office of Environmental Analysis
OLM	Ozone Limiting Method
PM	particulate matter
$PM_{2.5}$	particulate matter with a diameter of 2.5 micrometers or less
PM_{10}	particulate matter with a diameter of 10 micrometers or less
ppb	parts per billion
QA/QC	quality assurance/quality control
µg/m^3	micrograms per cubic meter
Utah DEQ	Utah Department of Environmental Quality

Chapter 1
Introduction

This document outlines the procedures and methods that the Surface Transportation Board (Board) Office of Environmental Analysis (OEA) will use to conduct air quality dispersion modeling for assessing the potential air quality impacts from the proposed rail line that would connect two terminals in the Uinta Basin (Basin) near South Myton Bench and Leland Bench, Utah. The modeling will identify the potential worst-case air quality impacts from rail-related emissions associated with the operation of the proposed rail line at key locations within the ~~Uinta Basin (the~~ Basin~~)~~.

1.1 Project Discussion

OEA has identified three alternatives to be analyzed in the environmental impact statement (EIS): Indian Canyon, Wells Draw and Whitmore Park (collectively, the Action Alternatives). ICF identified locations along the Action Alternatives where maximum air quality impacts would most likely occur during operation of the proposed rail line, due to topography and meteorology, as well as emissions.

The conditions that can lead to high concentrations of pollutants include the following factors:

- Steep grade
- Switchbacks
- Winds frequently oriented along the direction of the rail alignment
- Valley location where emissions could be trapped under temperature inversions
- Frequent stagnation conditions or low wind speeds

Table 1 describes the three locations identified by Action Alternative. Figure 1 shows the three locations in the context of the project region. Figures 2, 3, and 4 show the general rail alignment layout and topography near these three locations, respectively. Air quality dispersion modeling will be conducted at each of these locations using conservative assumptions, as described in this document, to identify the most reasonably foreseeable worst-case impacts on air quality.

Table 1. Locations along the Action Alternatives with the Potentially Highest Air Pollutant Concentrations

Location	Indian Canyon Alternative	Wells Draw Alternative	Whitmore Park Alternative
Switchbacks near Minnie Maud Road			X
Bear Claw Valley south of Argyle Canyon Road		X	
Rail alignment south of the community of Myton	X	X	X

1.1.1 Switchbacks near Minnie Maud Road

At this location the rail tracks have four switchbacks climbing from about 7,435 feet above sea level (ASL) to 7,795 feet ASL in 2.5 miles, a little less than a 3-percent grade. Wind data from the nearby Indian Canyon Summit meteorological monitoring station suggests that the wind direction frequently aligns parallel to the rail alignment at this location, and wind speeds less than 0.5 mile per second (m/s) occur about 5 percent of the time which could lead to potentially high concentrations that could reach the 1-hour nitrogen dioxide (NO_2) and 24-hour particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$) National Ambient Air Quality Standards (NAAQS). However, no residences or businesses are near this location.

1.1.2 Bear Claw Valley South of Argyle Canyon Road

Although the Wells Draw Alternative does not show a steep grade with switchbacks, data from the Indian Canyon Summit monitor suggests that the wind direction frequently aligns parallel to the alternative at this valley location with relatively slow wind speeds. Wind speeds less than 0.5 m/s occur about 5 percent of the time, which could lead to potentially high concentrations that reach the 1-hour NO_2 and 24-hour $PM_{2.5}$ NAAQS. The nearest residence to this location is about 1,000 feet from the proposed alignment.

1.1.3 Rail Alignment South of the Community of Myton

This location is near the proposed rail connection approximately 7 miles south of the town of Myton. Wind data from the Pleasant Valley meteorological monitoring station shows winds infrequently align parallel to the proposed rail line and wind speeds less than 0.5 m/s also occur infrequently. Idling emissions associated with switching at this connection point could lead to exceedances of the 1-hour NO_2 and 24-hour $PM_{2.5}$ NAAQS in the local area. However, it does not appear there are any residences or businesses in the vicinity, and the rail line has very little grade at this location.

Figure 1. Study Locations in the Project Region

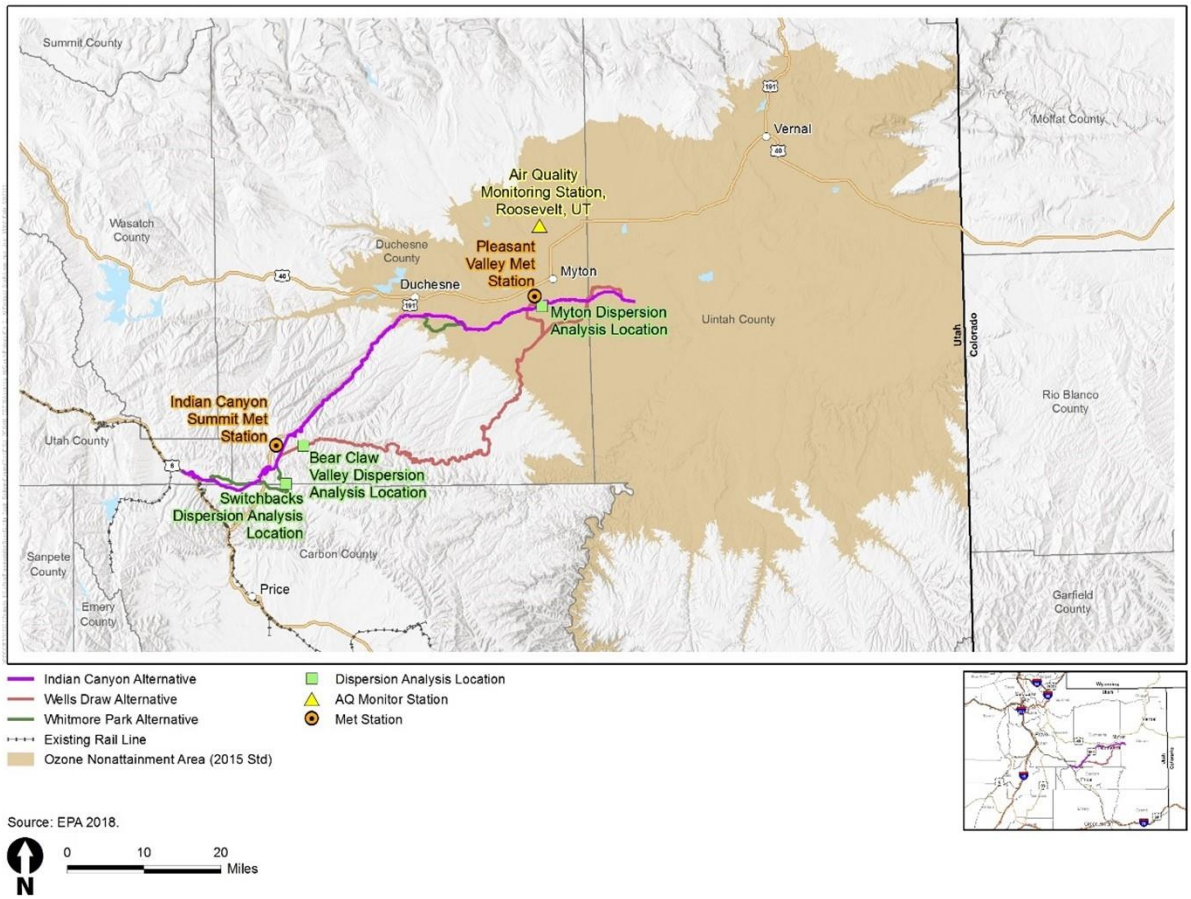


Figure 2. Switchback near Minnie Maul Road (Whitmore Park Alternative)

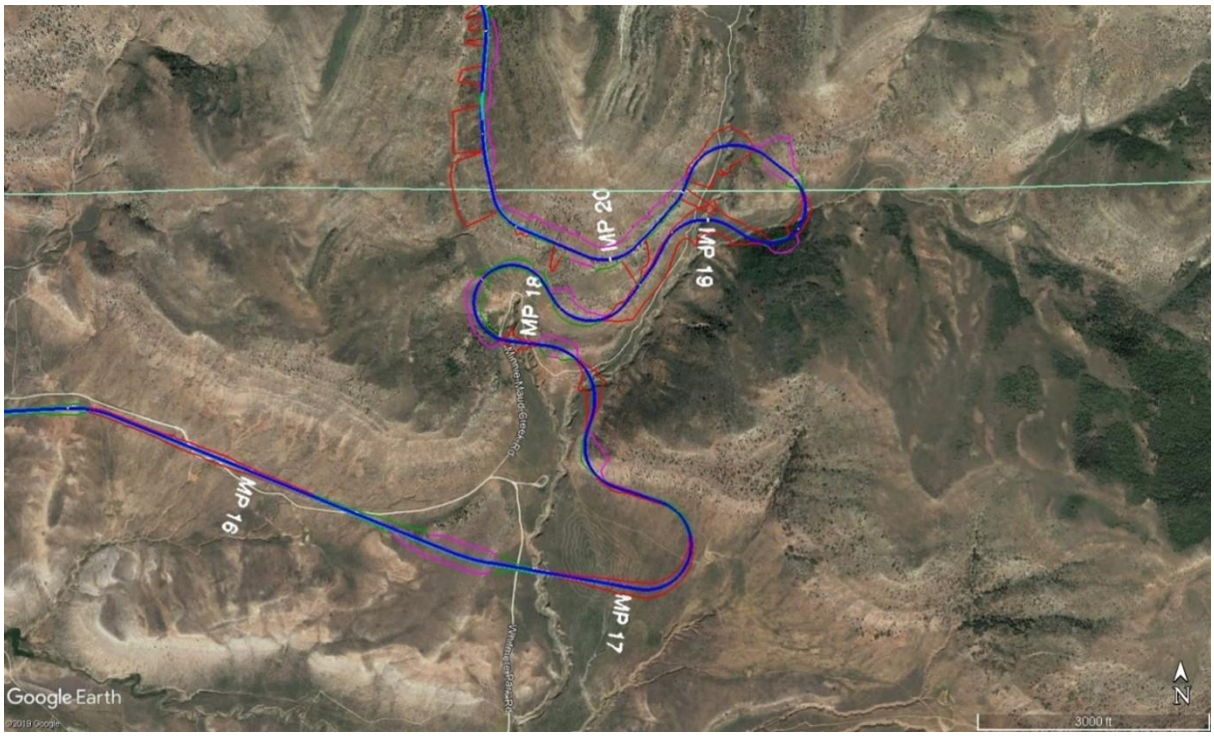
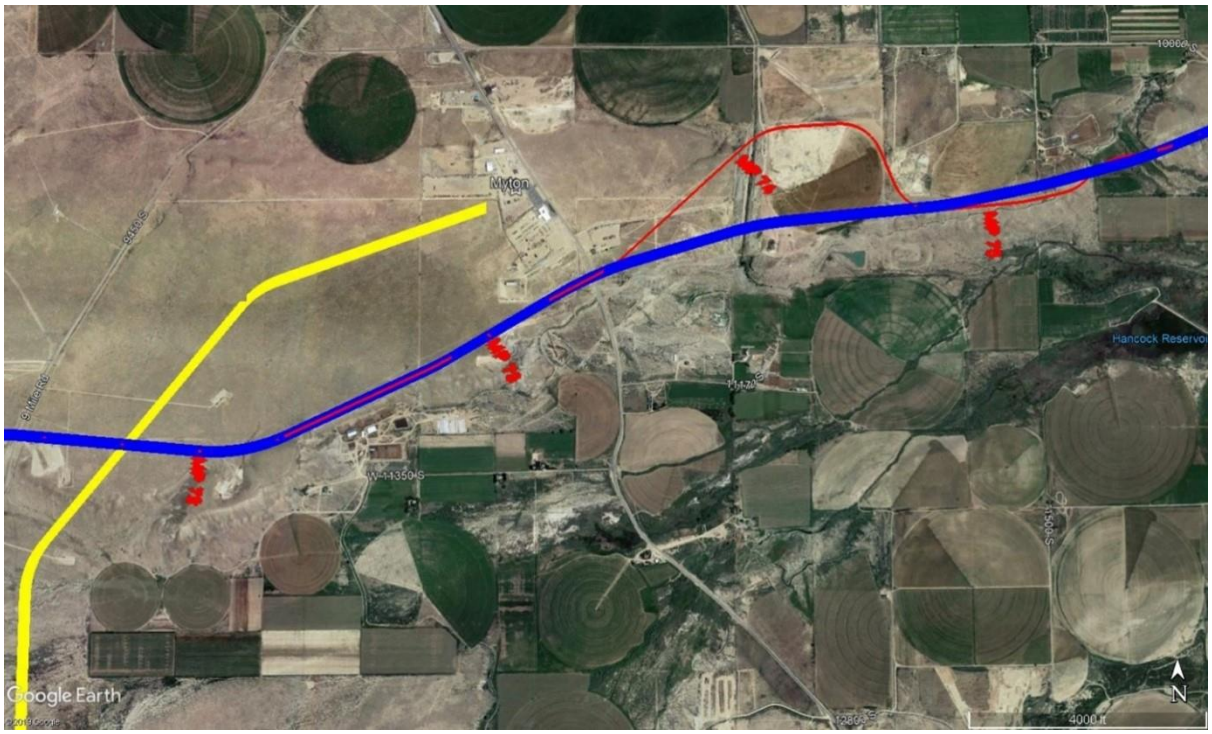


Figure 3. Bear Claw Valley South of Argyle Canyon Road (Wells Draw Alternative)

Figure 4. Rail Alignment South of the Community of Myton



Notes:
Blue = Indian Canyon Alternative; yellow = Wells Draw Alternative; red = Whitmore Park Alternative

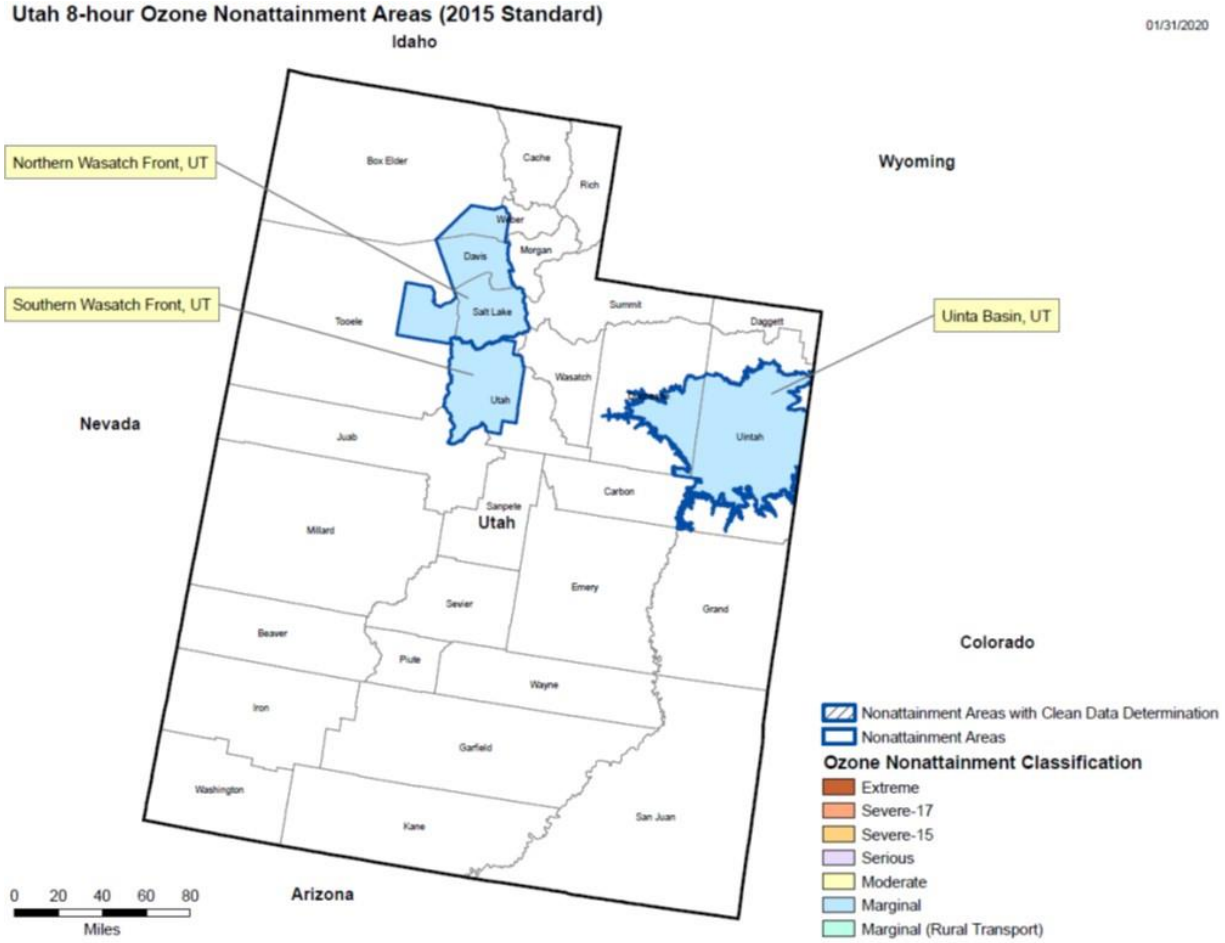
1.2 Assessment Approach

The air quality analysis includes an assessment of expected future impacts from locomotive emissions operating at maximum activity levels. OEA will evaluate air quality impacts using the U.S. Environmental Protection Agency (EPA) guideline model AERMOD version 19191 and all supporting software.

1.2.1 Modeling Analysis Components

The analysis will focus on $PM_{2.5}$ and NO_2 criteria air pollutants as these are the primary emissions of concern from locomotives. Both federal and state regulations require that ambient concentrations for these criteria pollutants not exceed applicable NAAQS. Part of the Uinta Basin Railway alignment is in the ~~Uinta Basin (the~~ Basin~~)~~ ozone nonattainment area (Figure 5), an area that extends over portions of the alignment where elevations are below 6,250 feet. This suggests that for these locations sufficient ozone would frequently be available, to rapidly convert fresh nitric oxide (NO) emissions to NO_2.

Figure 5. Ozone Nonattainment Areas in Utah



The assessment will focus on the area immediately surrounding and near the proposed rail line. Additional detail is discussed in Chapter 3, *Modeling Analyses*.

The impacts analysis modeling will be conducted based on train activity levels specifically developed by the proponents Coalition for the maximum activity along the proposed rail line. OEA will develop and use project-specific emissions estimates to specify the emissions inputs for the application of AERMOD.

1.2.2 AERMOD Model Description

As described in Chapter 3, *Modeling Analyses*, OEA will use AERMOD to assess near-field impacts and compare them with applicable air quality standards. The analysis will focus on impacts of emissions associated with the operation of the proposed rail line only.

AERMOD is a steady-state Gaussian dispersion model designed to simulate the local-scale dispersion of pollutants from low-level or elevated sources in simple or complex terrain. It is an EPA "preferred" model (40 Code of Federal Regulations [C.F.R.] Part 51, Appendix W, *Guideline on Air Quality Models*).

Recent versions of AERMOD include algorithms for simulating deposition of gaseous and particulate pollutants.

AERMOD consists of four main components:

- The AERMOD dispersion model
- The AERMET meteorological data preprocessor
- The AERMAP terrain preprocessor
- AERSURFACE, a land cover data preprocessor for surface characteristics for use in AERMET

OEA will use the latest versions of these tools for this study. These include version 19191 of AERMOD, version 19191 of AERMET, and version 13016 of AERSURFACE[1] and version 18081 of AERMAP. The dispersion algorithms are based on the similarity theory of planetary boundary layer meteorology. Simulating dispersion includes the airflow and stability characteristics (e.g., convective versus stable), as well as the vertical structure of the boundary layer. Numerous features and options accommodate a variety of source types, pollutants, and land use and topographical features.

[1] AERSURFACE version 20060, though dated by EPA as being released on February 29, 2020, was actually publicly released and posted to EPA's website on April 7, 2020, which was after this study was begun. The most important new feature of version 20060 is that it can access more recent land use/land cover databases than the 1992 National Land Cover Database (NLCD) used in version 13016. However, the land cover/land use in the study area has changed very little since 1992 and the 1992 NLCD remains representative of the study area.

Chapter 2
Emissions

For the development of the project-specific emissions rates, the Seven County Infrastructure Coalition (Coalition) provided information on the "low" and "high" scenario train activity levels at any location along the alignment.[2] OEA will conduct the air modeling assuming the highest emissions density possible for each of the three averaging periods as shown below.

- **1-hour:** a total of 2 train passbys in a single hour ("low" or "high" activity level)
- **24-hour:** a maximum of 14 passbys in a single day (maximum trains per day for the "high" activity level)
- **Annual:** 3,840 trains per year, corresponding to an average of 9.91 passbys per day (oil) + 0.60 passby (sand) per day = 10.52 passbys per day (average trains per day at 365 operating days per year for the "high" activity level)

OEA will model trains assuming the trains may operate at any time of day and that the number of trains per hour or per day can vary subject to the maximums noted above, but the maximums will be used in the modeling.

Operation of the proposed rail line is scheduled to begin in 2025 (Indian Canyon Alternative and Whitmore Park Alternative) and in 2026 (Wells Draw Alternative). To estimate emissions factors, OEA will use EPA's 2025 (Indian Canyon Alternative and Whitmore Park Alternative) and 2026 (Wells Draw Alternative) national locomotive fleet average emissions factors (grams per gallon [g/gal]) for large Class 1 line-haul locomotives to estimate emissions rates for both $PM_{2.5}$ and oxides of nitrogen ($NO_{x)}$. (EPA-420-F-09-025).

The proposed rail line has a projected maximum train speed of 40 miles per hour (mph) but an average speed for a loaded train of between 10 to 20 mph. As a reasonable estimate of exposure duration and plume behavior, OEA will assume an average train speed of 10 mph for the uphill[3] direction for the "Switchback Near Minnie Maul Road" and 20 mph for the downhill[4] direction for the "Switchback Near Minnie Maul Road." For the more level section "Just South of Myton" and "Bear Claw Valley" OEA will use an average speed of 30 mph.[5]

Emissions from wheel-rail dust generated by the frictional processes of the wheels against the steel rails and brake dust are very small relative to exhaust particulate matter emissions and will not be considered in the modeling assessment.

[2] Seven County Infrastructure Coalition's Response to OEA's Information Request No. 3, November 25, 2019.

[3] Assuming notch 8 throttle setting for a suite of locomotive engines (CARB 2004: Table G-1).

[4] Assuming dynamic braking (DB-1) throttle setting for a suite of locomotive engines (CARB 2004: Table G-1).

[5] Assuming notch 5 throttle setting for a suite of locomotive engines (CARB 2004: Table G-1).

Chapter 3
Modeling Analyses

This chapter presents the methods OEA will use to apply AERMOD. AERMOD is designed to simulate the local-scale (within 50 kilometers) dispersion of pollutants from low-level or elevated sources in simple or complex terrain. OEA based the selection of AERMOD on the technical formulation and capabilities of the model, as well as its extensive use for other source-specific model applications. The dispersion algorithms are based on the similarity theory of planetary boundary layer meteorology. The airflow and stability characteristics (e.g., convective versus stable), as well as the vertical structure of the boundary layer, are characterized within the dispersion model. Numerous features and options accommodate a variety of source types, pollutants, and land use and topographical features.

3.1 Modeling Approach

OEA will quantify near-field ambient air quality impacts within and near the Action Alternatives using AERMOD version 19181 (EPA 2019a, 2019b). OEA will apply AERMOD using multiple years of on-site meteorological data as described below. Modeling scenarios will examine the impacts of emissions from operation of the proposed rail line on nearby receptor locations**.**

3.1.1 Modeling Domain

OEA based the modeling domains defined by the three study locations on the expected locations of the maximum concentrations, and as such, they depart from EPA's standard modeling guidance (40 Code of Federal Regulations [C.F.R.] Part 51, Appendix W, *Guideline on Air Quality Models*). EPA modeling guidance is oriented toward stationary-source permitting in which multiple elevated emissions sources produce an irregular spatial pattern of concentrations, and the maximum concentration can occur many kilometers from the source to be permitted. However, the proposed rail line is a single, linear, near-ground source and for such a source the variation of concentration with distance from the track is the same for all locations along the line. Because locomotive exhaust is released at low elevation (i.e., the top of the locomotive) and has little plume rise compared to the typical stack of a major industrial source, the maximum concentration occurs relatively close to the track (within a few hundred meters at most). The result is a linear modeling domain defined by lines of receptors that follow the track alignment and extend to a distance of a few hundred meters from the track.

Based on inspection of the topography and review of previous modeling of railroads, OEA expects that this distance will be sufficient to capture the locations of maximum concentrations and any exceedances of the NAAQS. A Cartesian receptor grid extending tens of kilometers, as typically specified based on Appendix W, is not necessary and only increases the input data requirements and model runtime. Exceedance of the NAAQS is the criterion for an adverse air quality impact under NEPA; locations and concentration gradients in which concentrations do not exceed the NAAQS are not relevant to NEPA decisions. This approach is commonly used in environmental assessments (EAs) and EISs for modeling air quality impacts of railroads, as well as highways that are also linear, near-

ground emissions sources. Section 3.1.5, *Assessment Area and Receptor Grids*, discusses the receptor locations used in the modeling.

Although elevated terrain near the track can increase the distance at which the maximum concentration occurs, inspection of the terrain variations near the three modeling locations indicates that the selected receptor distances are sufficient to encompass any areas in which terrain could affect the location of the maximum concentrations.

3.1.2 Model Options

For this application, OEA will run AERMOD using regulatory default options for most settings. However, we have observed the in-stack ratios from line-haul locomotives to be considerably lower than the default in-stack ratio used in AERMOD. To make use of this more realistic parameter, we will use EPA's Tier 3 ozone limiting screening method (OLM) using a measured in-stack NO_2/NO_X ratio of 0.05 for line-haul locomotives.[6] Although OEA will conduct the modeling using a single area source,[7] OEA will specify the OLMGROUP ALL option. The Tier 3 modeling requires using hourly ozone concentrations, as well as using input of hourly NO_X emissions rates. To determine the nearest representative ozone monitoring site, OEA will review three relatively close ozone monitoring stations following its review of the Utah DEQ Quality Assurance Program Plan (QAPP) for the Price and Roosevelt monitors (UDEQ 2017), the Ute Indian Tribe QAPP (Trinity Consultants 2021), and the EPA *Quality Assurance Audit Report-Technical Systems Audit Ute Indian Tribe* (EPA 2018b) for the Myton monitor. OEA will pair the~~The~~ meteorological data used in AERMOD ~~will be paired~~ in time with the corresponding hourly ozone data. ~~time period.~~ Further discussion on the selection of the background ozone ~~Roosevelt~~ data can be found in Section 3.1.6, *Background Air Quality Data*.

Within AERMOD, sources can be treated as point, volume, or area sources. For this analysis, we will treat the locomotive emissions as a line area source, meaning we will specify length and width for the series of area sources that represent the rail line. We will maintain an aspect ratio between 100:1 and 10:1 for line area sources.

OEA generally uses the FASTAREA modeling option for the area sources to improve model runtimes and because this option is sufficiently accurate for NEPA assessments (nonregulatory assessments). Sensitivity testing with and without the FASTAREA option generally shows slightly higher concentrations when using FASTAREA for most receptors but with differences generally less than 10 percent. This is one reason why FASTAREA is the default option used in AERSCREEN (AERMOD screening model) (EPA 2021) to determine concentrations from area source emissions. While FASTAREA generally yields more conservative results, OEA will use the default area source algorithm as used in regulatory assessments for this analysis, at the request of EPA.

Tables 2 and 3 show the parameter values to be included for the modeling of the locomotive emissions. To derive the parameters in Table 2, OEA used SCREEN3 (EPA 1995) to calculate plume rise for locomotives accounting for downwash and momentum-induced mixing and adjusting using

[6] About 5 percent of NO_X freshly emitted from locomotives is in the form of NO_2 (Fritz pers. comm. 2014, 2020) Steven Fritz , P.E., is the manager of the Locomotive Technology Center at the Southwest Research Institute (SWRI). SWRI is one of the few facilities in the nation capable of conducting locomotive emissions testing. Their certification and testing programs are primarily focused on nonroad diesel, gasoline, and alternative-fueled engine testing for EPA and California Air Resource Board certification requirements.

[7] The modeling input files will show more than one area source. This is because there are separate sources for daytime and night time and only one source is operating at a time for a given hour.

the wind speed set equal to the maximum locomotive speeds. These two assumptions result in lower plume rise height adjustments. Adjusting for gradual plume rise while including downwash would be redundant and overly conservative. The approach used here is similar to the method developed and evaluated~~given~~ in Appendix G of CARB 2004.[8] OEA derived the initial sigma-z values by dividing the top of the plume height by 2.15 per the AERMOD User's Guide. This same methodology for determining plume rise has been extensively used in 17 subsequent rail studies in California, which were reviewed and approved by CARB staff.[9] These studies use the stack height plus plume rise height to determine effective stack height.[10] The plume rise adjustment varies depending on engine-notch setting and locomotive speed and stack release parameters. Plume height can span a large range depending on the engine workload (throttle notch). For example, in the BNSF San Diego Rail Yard Study (Environ 2008) reported plume height (physical stack height plus locomotive plume rise) of 37.8 meters (daytime Stability D) and 37.3 meters (nighttime stability F) with a notch setting of 4. Similarly, plume heights would be relatively large in the Basin because the locomotive engines operate under higher engine loads but travel at slower speeds up the grades in the mountainous terrain, resulting in higher plume rise than seen in the Roseville Rail Yard Study (CARB 2004) where engines operated at lower throttle notch settings with travel over flat terrain. In that study, notch setting and travel speeds increased in unison, while in this study the steep grades have the locomotive engine working hard (notch 8) when traveling at a slower speed. The large plume rise value seen in this study for notch 8 also occurred in the BNSF San Bernardino Rail Yard Study (Environ 2008b) where switch engines were modeled with a notch setting of 8 and a locomotive speed of 2.2 m/s which resulted in a plume rise height of 68.6 meters during the daytime and 45.2 meters at night both of which are higher than our notch 8 setting. The values in this study are slightly lower because of our slightly higher locomotive travel speed. Also, in the San Bernardino Study, Table 4-2 explicitly calls out in footnote 3 that the plume height is equal to the physical height of the locomotive plus plume rise.

Because the release height of the source is elevated above ground, the plume centerline also will be elevated, and as a result the maximum concentrations at a receptor location will occur at greater than zero elevation. Therefore, using a 1.8-m flagpole height instead of zero is conservative.

[8] To use the newer version of the screening tool, AERSCREEN, testing and evaluation of the original CARB methodology using SCREEN3 versus AERSCREEN would need to be undertaken to evaluate if this same approach could be used with AERSCREEN. A further complication would be having to change the stability parameterization from Pasquill-Gifford stability classes to the Monin-Obkhov length. Such a research effort is not necessary for the NEPA evaluation of the Uinta Basin Railway.

[9] https://ww2.arb.ca.gov/resources/documents/railyard-health-risk-assessments-and-mitigation-measures.

[10] While the CARB (2004) study reports that the plume rise shown in Table G:1 does not include the stack height, it was meant to show to the reader how much the plume rise contribution varied with notch setting and stability. Air dispersion modeling for the effective stack height should still include both the stack height and plume rise.

Table 2. Stack Parameters for Modeling of Locomotive Emissions

Period of Day	Throttle Notch	Speed (m/s)	Plume Rise Height, Δh (m)	Release Height (m)	Initial Sigma-z (m)
Daytime[a]	Dynamic Brake	8.9	5.5	10.4	9.67
	Notch 5	13.4	7.1	12.0	11.2
	Notch 8	4.5	40.7	45.6	~~29.7~~42.4
Nighttime[b,d]	Dynamic Brake	4.0[c]	20.3	14.7[e]	13.7
	Notch 5	4.0[c]	30.5	17.7[e]	16.5
	Notch 8	4.0[c]	40.8	29.7[e]	27.6

Notes:

[a] Based on screening modeling for dynamic braking (DB), notch 5 and notch 8 throttle setting for day (D stability) plume rise height for a Class 1 line-haul locomotive engine based on methodology, Appendix G of the Roseville Rail Yard Study (CARB 2004). Using a 15-foot stack height of hood top plus 1 foot for track height, total stack elevation 16 feet or 4.88-m.

[b] Based on screening modeling dynamic braking (DB), notch 5 and notch 8 throttle setting for night (F stability) plume rise height for Class 1 line-haul locomotive engine based on methodology, Appendix G of the Roseville Rail Yard Study (CARB 2004). Using a 15-foot stack height of hood top plus 1 foot for track height, total stack elevation 16 feet or 4.88-m.

[c] Maximum allowed wind speed (locomotive speed) by SCREEN3 with Stability ~~D~~ F (nighttime) is 4.0 m/s.

[d] For Pleasant Valley, F stability is the prevailing nighttime condition with wind speeds less the 4.0 m/s reported for 81% of the nighttime hours; similarly, Indian Canyon reports that two-thirds of the nighttime hours have wind speeds less than 4.0 m/s.

[e] As done in the CARB study, the plume rise for dynamic braking, notch 5 and notch 8 is adjusted downward by assuming the plume rise is proportional to (1/wind speed)^(1/3).

m = meters; m/s = miles per second

OEA based the emissions rates for locomotives on EPA (2009) guidance and used the EPA fuel-based emissions factors for line-haul locomotives in 2025 (the opening year of the project): 74 grams per gallon of diesel fuel (g/gal) for NO_X and 1.55 g/gal for $PM_{2.5}$ (calculated as 97 percent of PM_{10}). OEA converted these to distance-based factors based on the predicted round-trip average fuel consumption in gallons per car-mile, which varied slightly between routes. The resulting distance-based factors are 0.82 gram NO_X per train-mile and 0.017 gram $PM_{2.5}$ per train-mile. OEA then converted these factors to emissions rates in grams per second (g/sec) using the assumed train speed and the length of the modeled track section (2 miles). For example, a train traveling at 30 miles per hour would traverse 2 miles in 240 seconds, during which time it would emit 197 grams of NO_X and 4.08 grams of $PM_{2.5}$. If this were the only train to pass by the receptor in an hour, and every hour had exactly one train pass-by, the modeled hourly emissions rates would be these quantities divided by 3,600 sec/hour, or 0.055 g/sec NO_X and 0.0011 g/sec $PM_{2.5}$. Finally, OEA divided these rates by the source areas to arrive at the applicable emission rates in grams per second per square meter.

Table 3. Area Source Parameters for Modeling of Locomotive Emissions

Source Type	Emissions Rate (g/(sec-m²)) Period	NO_X	$PM_{2.5}$	Release Height (m)	X-init (m)	Y-init (m)	Angle	Sigma-z (m)
Area (all sources)	Hourly	~~4.76~~5.65E-05[a] ~~4.44~~5.27E-05[b]	~~4.44~~1.18E-0~~5~~6[a] ~~9.37~~1.11E-~~07~~[b]06[b]	See Table 2	Variable per track alignment	9	Variable per track directional orientation	See Table 2
	Daily	1.~~60~~35E-05[a] 1.~~50~~26E-05[b]	~~2.84~~3.36E-~~05~~[a]07[a] ~~2.66~~3.15E-07[b]					
	Annual	1.~~02E~~20E-05[a] ~~9.48~~1.12E-~~06~~[b]05[b]	~~2.13~~2.53E-~~05~~[a]07[a] ~~9.48~~2.37E-~~06~~[b]07[b]					

Notes:

[a] Switchbacks site (all Action Alternatives), Bear Claw Valley site (all Action Alternatives), and Myton site (Indian Canyon Alternative and Whitmore Park Alternative).

[b] Myton site (Wells Draw Alternative).

NO_X = oxides of nitrogen; $PM_{2.5}$ = particulate matter with a diameter of 2.5 micrometers or less; m = meters

Railroads move locomotives where needed to meet freight shipping demand and would not dedicate specific locomotives to the proposed rail line. Potentially any line-haul locomotive in the rail line operator's fleet could be assigned to pull a project train. Thus, a fleet average emissions rate is the most appropriate approach to estimating locomotive emissions. Use of fleet average emissions is standard practice in mobile source emissions modeling as done in state implementation planning (SIPs)and EIS documents. The fleet mix, thus, provides a realistic estimate of emissions. Earlier years provide higher individual emissions rates (hence OEA's modeling the project opening year of 2025) and would provide more conservative estimates of short-term average concentrations paired with worst-case meteorological conditions. Depending on the make-up of the operator's fleet, a train could be pulled by only lower-Tier (e.g., Tier 0+), higher-emitting locomotives. However, modeling such a train assumes that higher-emitting trains always operate simultaneously with the occurrence of meteorology that is not conducive to pollutant dispersion, and that this scenario occurs often enough to generate the number of exceedances necessary to define a modeled violation. OEA believes this is a worst-case, excessively conservative assumption. NEPA does not require analysis of a worst-case scenario.

OEA will model emissions sources as a set of area sources with a width of 9 meters, which is the width of the train (10 feet) + 3 meters on either side to allow for turbulent mixing from a moving train. Three meters per side, a value typically assumed when modeling highway vehicles, reflects several factors that affect turbulent mixing. The front of a locomotive typically presents a large, blunt profile with respect to aerodynamic drag, and this will result in generation of turbulence as the air is pushed aside by the train. Some additional turbulence is generated by protruding equipment on the cars and the gaps between the cars. A long freight train with multiple locomotives usually will have one or more of its locomotives at the rear of the train. The rear of a locomotive is not streamlined and will create a turbulent wake immediately behind the train that will affect the dispersion of exhaust emitted from the top of the locomotive, likely similar to the way the wake created by a heavy trailer truck affects the dispersion of emissions from its high-mounted exhaust. The air that is dragged by the train, due to the viscosity of the air, is known as slipstream. This

phenomenon can cause wind gusts and creates both near and far field wake regions. The near field wake depends on the shape of the train but can create rotating vortices. These effects have been reported in studies such as in Sterling et al. (2008).

Each train will have eight locomotives and all are assumed to be operating at the indicated throttle setting. AERMOD does not explicitly model movement of a mobile source, but instead distributes the emissions uniformly throughout the modeled line area source, which represents the travel path of the actual mobile source. In calculating the modeled emissions rate per train for each line area source, the sum of the gram/second emissions rates for all locomotives is adjusted according to the fraction of each modeled hour that the train is present, i.e., the time required to traverse the length of the area source at the assumed train speed, divided by 1 hour. Because the line area source represents the passage of the train as a whole, the position of each locomotive in the train consist does not affect the emissions calculation. We will model emissions sources as having a total length of 2 miles to minimize end effects.

3.1.3 Pollutants and Averaging Periods

OEA will use AERMOD to examine the impacts of emissions of $PM_{2.5}$ and NO_2, which are the pollutants of greatest concern for locomotive emissions. OEA will base the averaging periods for each criteria pollutant on the relevant NAAQS. The averaging periods are as follows:

- **$PM_{2.5}$**: 24-hour and annual averaging periods
- **NO_2:** 1-hour and annual averaging periods

We will use the latest EPA guidance (Appendix W, 2017) for the analysis. We will base modeled concentration results on average across the years modeled for each Action Alternative while maintaining the form of the standards. We will base the predicted model results on a 2-year average for the Myton site, while the 5-year average will be used for the Switchbacks and Bear Claw sites. Discussion of additional air quality issues (other than issues relevant to the dispersion modeling) will be provided in the EIS analysis.

For diesel-fueled emissions sources, such as railroads and heavy trucks, the 1-hour NO_2 and 24-hour $PM_{2.5}$ concentrations are likely to be the highest as a percentage of the NAAQS among all criteria pollutants and averaging periods. OEA assumed that if concentrations of 1-hour NO_2 and 24-hour $PM_{2.5}$ are less than the NAAQS at the modeled locations where the maximum concentrations would be expected, then concentrations at other locations along the alignment also would be less than the NAAQS. Because 1-hour NO_2 and 24-hour $PM_{2.5}$ concentrations are likely to be highest as a percentage of the NAAQS among all criteria pollutants, OEA also assumed that if concentrations of 1-hour NO_2 and 24-hour $PM_{2.5}$ are less than the NAAQS, then concentrations of carbon monoxide (CO), PM_{10}, and sulfur dioxide (SO_2) also would be less than the NAAQS. For example, the Tongue River Railroad Draft Environmental Impact Statement[11] and the Millennium Bulk Terminals—Longview Draft Environmental Impact Statement,[12] both of which had locomotive exhaust as their primary source of air emissions, showed that only $PM_{2.5}$ and NO_2 emissions were sufficient to produce concentrations approaching the NAAQS. Therefore, concentrations of CO, PM_{10}, and SO_2 will not be modeled.

[11] See https://www.stb.gov

[12] See https://www.millenniumbulkeiswa.gov/

3.1.4 Input Preparation

AERMOD requires several input files. The simulation control file specifies which options and features of AERMOD are to be applied, and contains information about the emissions sources (location, emissions rate, stack parameters), as well as the receptor locations (elevation, topography, and land use). The model generates two meteorological input files that provide detailed information about the characteristics of the surface layer (wind, temperature, stability parameters) and the vertical structure of temperature and wind near the source location.

3.1.4.1 Topographical Data

The terrain along the Action Alternatives consists of canyons and valleys with steep and rugged terrain in some locations. OEA will make use of the highest resolution available (1/3 arc second ~ 10-m horizontal resolution) for the three focus areas shown in Figures 2 through 4. We will obtain the terrain data from the U.S. Geological Survey and processed for use in AERMOD using the AERMAP preprocessor program (version 18081) (EPA 2018a).

3.1.4.2 Meteorological and Land Use Data

ICF identified the locations and meteorological data for air quality modeling with AERMOD. OEA identified two meteorological datasets for use in the air quality modeling effort: Indian Canyon Summit and Pleasant Valley (Figure 1). Indian Canyon data covers 5 years of meteorological data (2014 through 2018) and is paired with the nearby Price, Utah station for cloud cover. The Utah Department of Transportation maintains and operates the Indian Canyon Summit monitor, and data and was accessed through the University of Utah's MesoWest network.[13] The Pleasant Valley meteorological data were available for 2 years (2018 through 2019) and are paired with the nearby Vernal, Utah station for cloud cover. Although ideally an analysis should use a station with 5 years of data available, due to local terrain and the small number of meteorological monitoring stations in the region, Pleasant Valley was selected as being most representative of the analysis area. The Utah State University's Utah Climate Center Agrimet network maintains and operates the Pleasant Valley data.[14] Both surface stations used the Salt Lake City upper-air site for input to AERMET because it is the nearest upper-air station and is in the prevailing upwind direction from the Basin.

The Indian Canyon Summit wind rose shows two prevailing wind directions: from the west-northwest and from the south-southeast with about 5 percent of the hours reported as calm (Figure 6). OEA will use this meteorological dataset for two locations, the Switchbacks near Minnie Maud Road and Bear Claw Valley assessment south of the Argyle Canyon Road.

The Pleasant Valley wind rose is dominated with winds from the west for most hours and with less than 1 percent of the hours reporting calm conditions as shown in Figure 7. OEA will use the meteorological dataset for the assessment location south of Myton.

[13] MesoWest is a cooperative project started at the University of Utah in 1996, with the goal of providing access to current and archived weather observations across the United States through web-based resources (~~http~~s://mesowest.utah.edu/html/help/main_index.html#overview). Support for this initiative has been funded primarily by the National Weather Service through a variety of research and operations-specific projects.

[14] The Agrimet Cooperative Agricultural Weather Network, established in 1983 by the U.S. Bureau of Reclamation and partnered with the Utah Climate Center, is a network of automated agricultural weather stations used to support crop water use modeling and other agricultural applications (https://www.usbr.gov/pn/agrimet/general.html).

AERMET requires additional information about the land use characteristics of the area in which the surface meteorological monitoring site is located. OEA will obtain this information using the AERSURFACE preprocessor program (EPA 2013), and will run the AERSURFACE program at the meteorological monitor location using the 1992 U.S. Geological Survey National Land Cover Database as these locations have not changed their land use and land cover significantly since 1992. We will use the land use and land cover to determine the seasonal albedo and surface roughness. We will use default season land use settings and surface moisture condition (wet, dry, average) derived from Price and Vernal monthly precipitation data compared with 30-year climatological normal for determination of the Bowen Ratio. It is difficult to review the AERMET-derived meteorological files from a physical meteorological perspective. AERMET, however, provides report files that contain error and warning messages for identifying problems with data completeness or questionable values in the observed data or calculated parameters. We will carefully review the report files.

Figure 6. Indian Canyon Summit Wind Rose

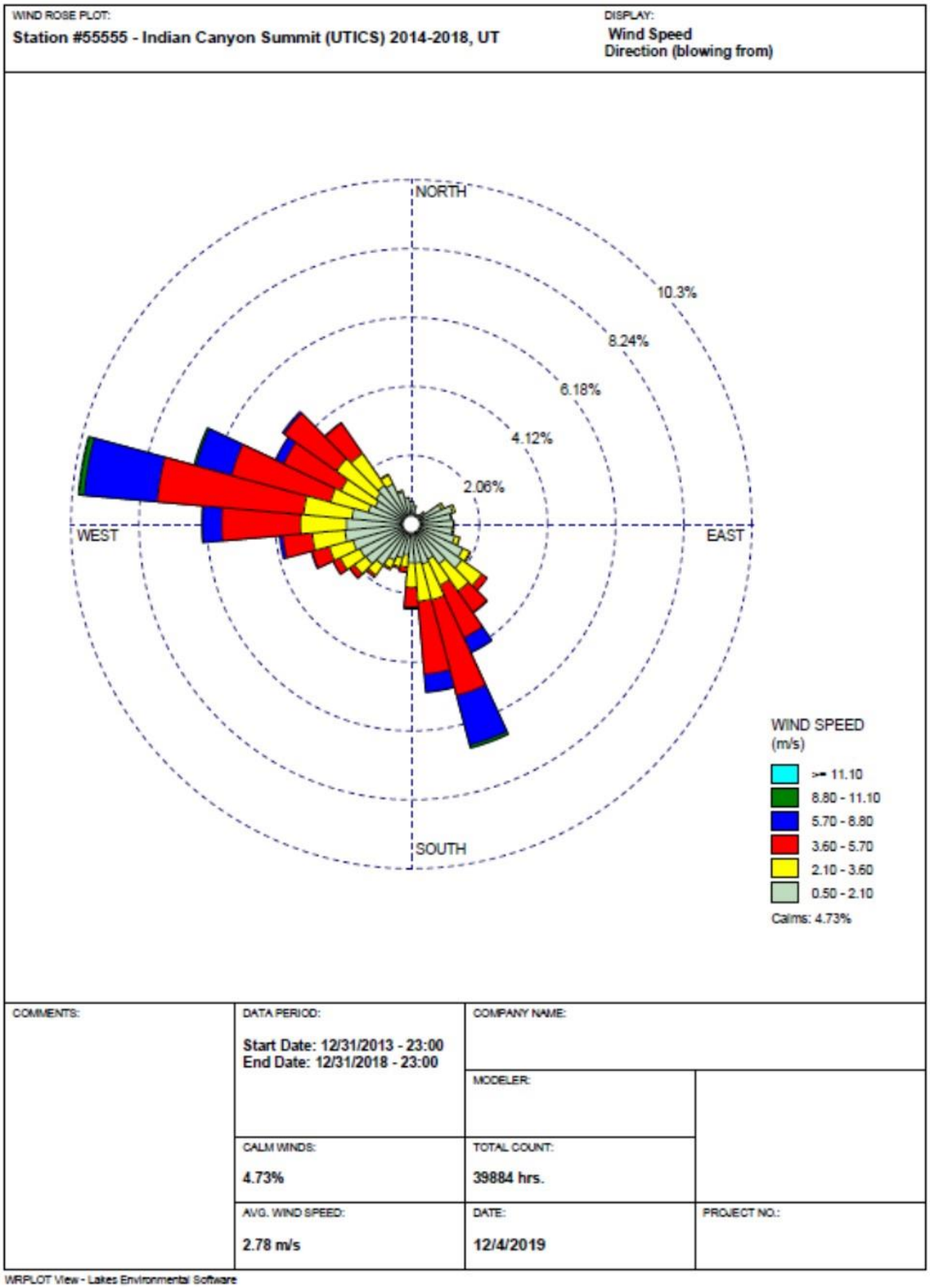
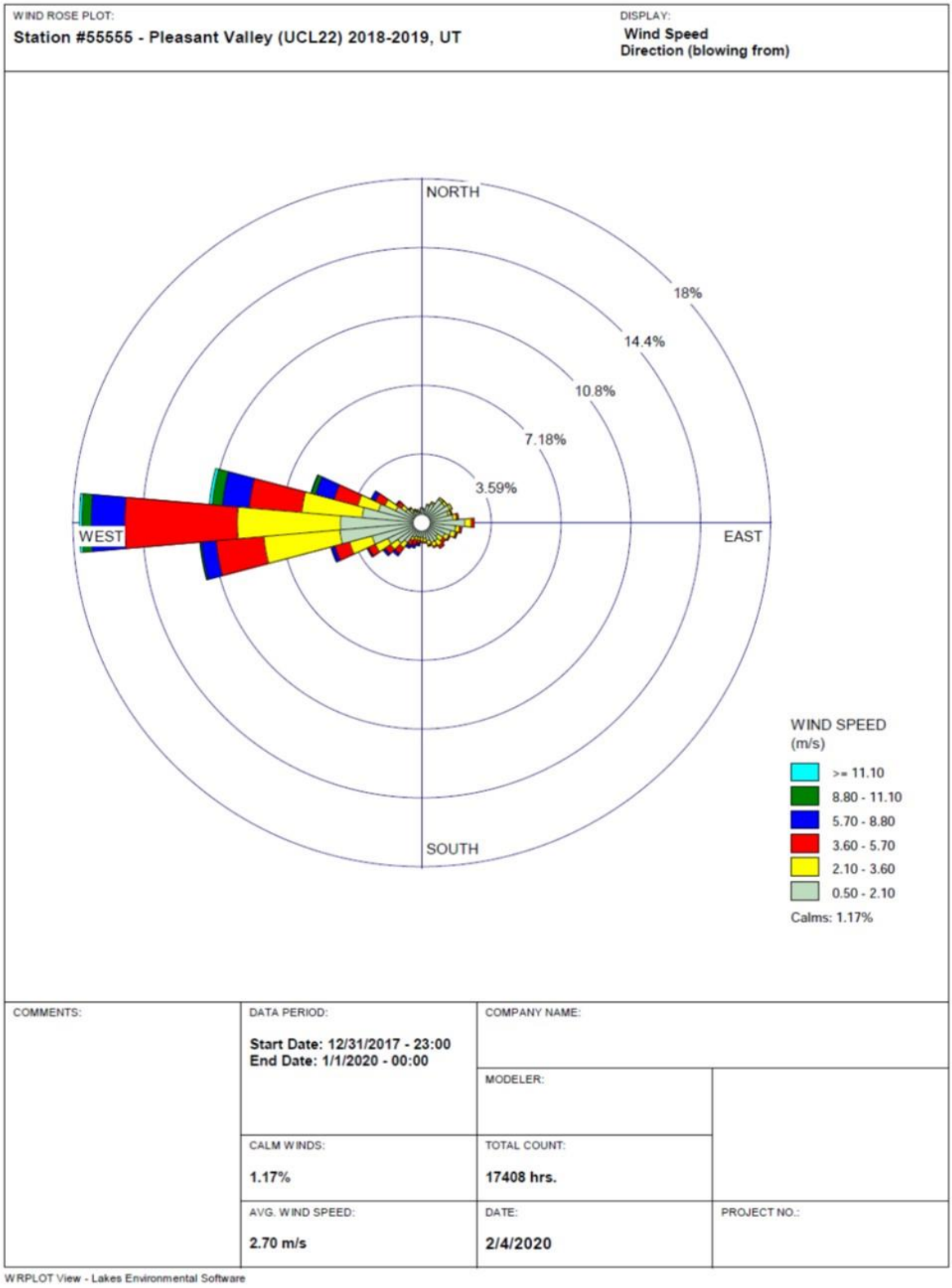


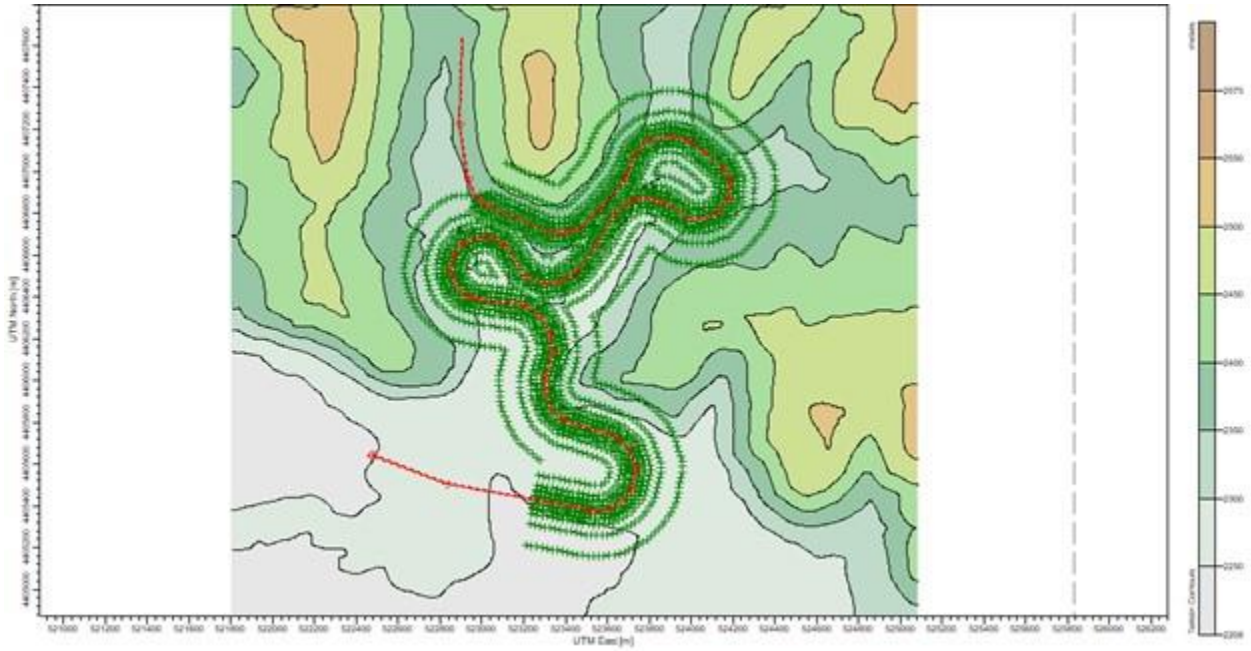
Figure 7. Pleasant Valley Wind Rose



3.1.5 Assessment Area and Receptor Grids

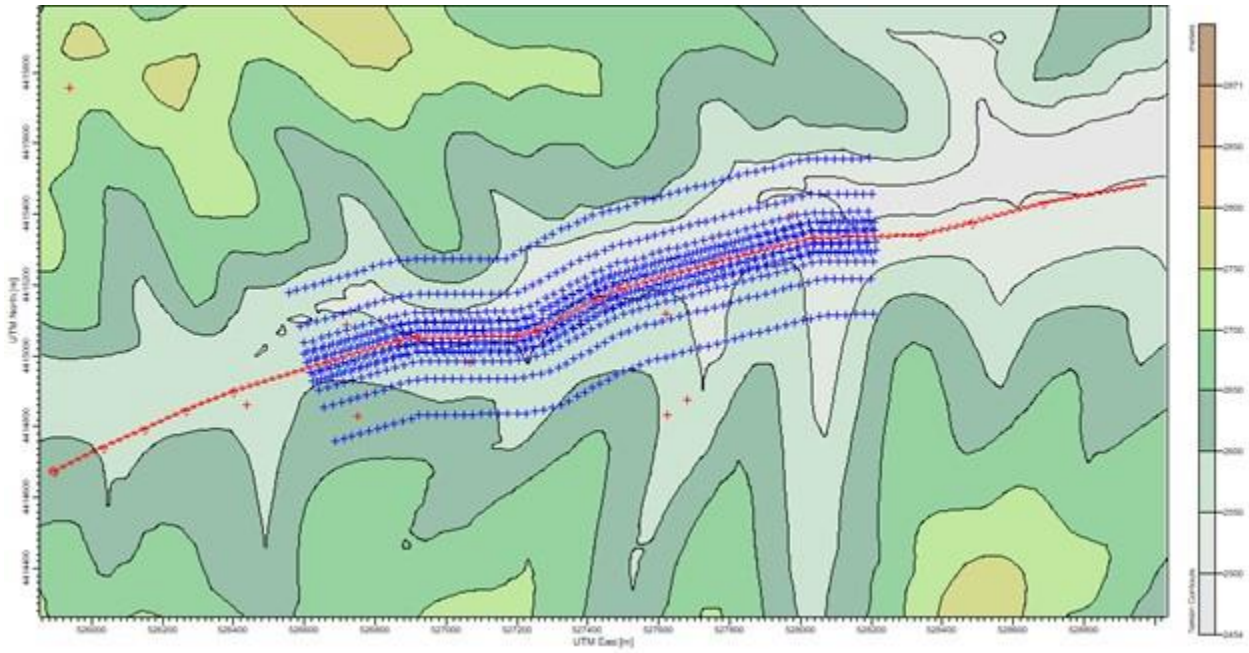
Figures 8, 9, and 10 show the overall layout of the proposed receptor grid for the three locations along the Action Alternatives that would be most likely to experience higher pollutant concentrations (Switchback near Minnie Maul Road, Bear Claw Valley south of Argyle Canyon Road, and the alignment south of the community of Myton). No existing sensitive receptors (e.g., residences) are found for the Switchback Near Minnie Maul Road. Figure 9 shows the sensitive receptors (residences) as red crosses. Figure 10 shows the location of sensitive receptors (residences or businesses), which appear as blue crosses just south of the community of Myton.

Figure 8. Receptor Grid for Switchback Area near Minnie Maul Road (Whitmore Park Alternative)



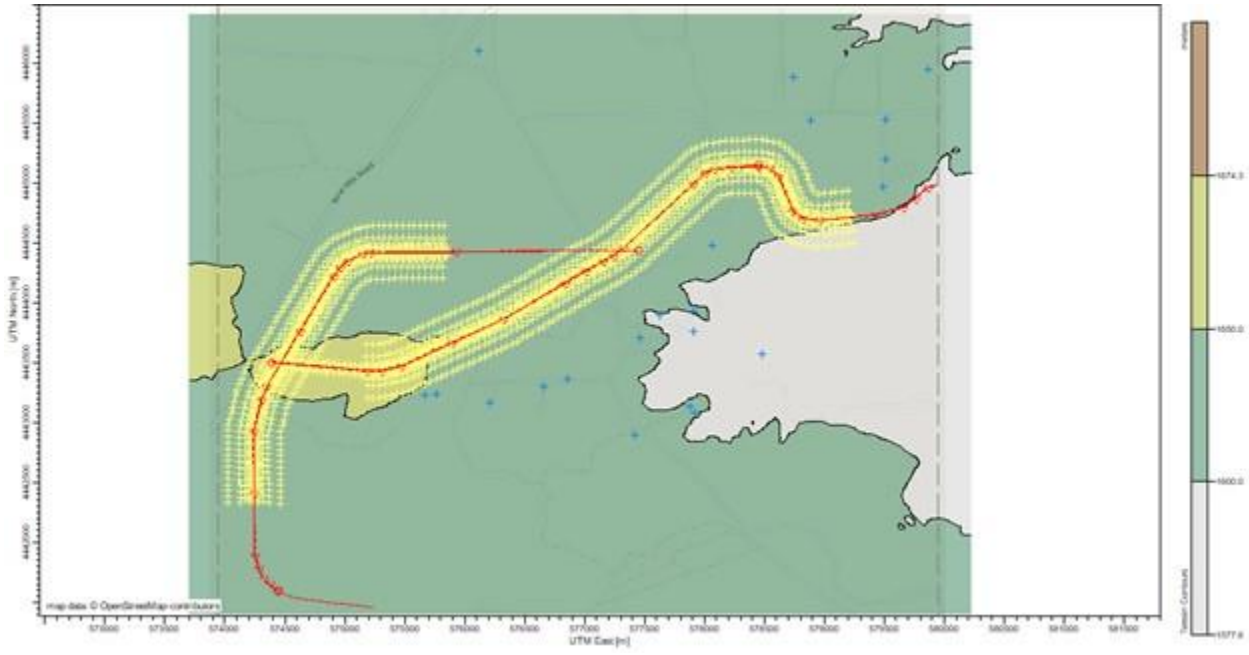
Notes:
Red line indicates the rail alignment. The receptor grid is shown in green crosses.

Figure 9. Receptor Grid for Bear Claw Valley just south of Argyle Canyon Road (Wells Draw Alternative)



Notes:
Red line indicates the rail alignment.

Figure 10. Receptor Grid for the Alignment South of the Community of Myton



Notes:
Red line indicates the rail alignment.

In general, a grid is overlaid in the study area with the first set of receptors beginning at the edge of the 100-foot right-of-way (50 feet on either side of the track) extending to approximately 720 feet (220 m) from the proposed rail line. Intermediate receptors are located at 65 feet (20 meters), 82 feet (25 meters), 150 feet (45 meters), 230 feet (70 meters), and 390 feet (120 meters) from the rail centerline. In addition, the receptors representing the nearest residences will be included. Because the emissions release height is relatively low (Table 2), the highest concentrations will likely be found near the edge of the right-of-way. Terrain variations are not anticipated to result in maximum concentrations farther than 720 feet from the proposed rail line (Figures 2 through 4).

Although the area within the right-of-way could be considered "ambient air" per EPA guidance, entry by humans onto the right-of-way would constitute trespassing. OEA typically does not consider impacts on trespassers. Portions of the right-of-way may be signed or fenced to preclude entry in accordance with agreements with abutters or land management agencies.

3.1.6 Background Air Quality Data

Total pollutant concentration is the sum of the AERMOD-derived impacts plus background pollutant concentrations for the region. The background concentrations are intended to account for sources not included in the modeling. Background concentrations should be representative of the regional air quality in the vicinity of the proposed alignment. In this exercise we are only investigating the impacts on $PM_{2.5}$ and NO_2. Two ~~Only two~~ monitoring stations are relatively close to the eastern portion of ~~a large portion of~~ the rail line: the Ute Indian Tribe Myton monitor (AIRS ID: 490137011) and the Utah DEQ Roosevelt monitor (AIRS ID: 490130002). The Myton site only measures ozone and NO_2, while the Roosevelt site measures ozone, $PM_{2.5}$, and NO_2~~:~~. ~~however, the Vernal site is more distant from the alignment and had some quarters in 2017 and 2018 with less than 75 percent data completeness.~~ OEA conducted a quality assurance review of the tribal data to determine if the Myton site was of high quality and is preferable for both the background NO_2 and hourly ozone concentration needed for the Tier 3 NO_2 assessment~~:~~. This included reviewing the 2018 Quality Assurance Audit Report (EPA 2018b) and the Quality Assurance Project Plan (Trinity Consultants 2021), as well as the hourly data as reported out of EPA's AirData reporting system. The review showed that the data was of high quality and suitable for determining NO_2 background concentration, as well as the ozone data for use in the Tier 3 NO_2 analysis for the eastern portion of the proposed rail line. ~~The Roosevelt site also collects hourly ozone data as well. Thus, we used the Roosevelt site as the background concentration station (Figure 1). The Roosevelt monitor is a Utah Department of Environmental Quality (Utah DEQ) site located at 290 South 1000 West, Roosevelt, at an elevation of 5,205 feet. We will use the 2014–2019 data because of the QA/QC data, which includes routine audits. The data are further QA'd as part of the reporting to EPA AIRS system. We considered obtaining the ozone data from the Northern Ute Indian Tribe's Air Quality ozone-only monitoring stations at Price and Myton, Utah, but were concerned with the quality of the data as the data are not reported to EPA AIRS or Utah DEQ. The monitoring program was designed for the needs of the Ute and was unclear as to the QA/QC procedures.~~ For the western portion of the proposed rail line, OEA will use the 3 most recent complete years (2017–2019) of Price (AIRS ID: 490071003) monitoring data to determine the NO_2 background. Additionally, OEA will use the hourly ozone data from Price from the 2014–2018 time period in the Tier 3 NO_2 assessment for the Bear Claw Valley/Wells Draw and the Switchbacks near Minnie Maul Road locations. This time period is consistent with the meteorological days used in the air dispersion modeling.

We will use the Roosevelt monitor (Figure 1) to determine background $PM_{2.5}$ concentrations using the 3 most recent years available (2017–2019) for all locations.

OEA will calculate the concentration metrics consistent with the form of the standard for each pollutant and averaging period. The 24-hour $PM_{2.5}$ concentration is the average over the 3-year period of the 98th percentile of the 24-hour average concentration. The 1-hour NO_2 concentration is the 3-year average of the 98th percentile of the daily maximum 1-hour concentrations. The annual $PM_{2.5}$ concentration is the average over the most recent 3-year period of the annual average concentration. The annual NO_2 concentration is the annual mean.

To further refine the background concentration associated with meteorological conditions accompanying the 1-hour NO_2 averaging period, we will develop~~ed~~ seasonal and hour-of-day background concentrations using the hourly NO_2 data from ~~for the 2016–2018~~ 2017–2019.[15] We will then process the data to determine the statistical form of the 1-hour NO_2 standard following ~~time period at the Roosevelt monitor, following~~ the method described in EPA's memorandum *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard* (EPA 2011: 19). Figures 11 and 12~~1~~ shows ~~an example of~~ the background monitored NO_2 concentrations by season and hour-of-day for the ~~Roosevelt~~ Myton and Price monitors for the period ~~2016~~2017–~~2018~~2019. OEA will pair these background concentrations with the modeled concentration to determine the 1-hour concentration for use in comparing the modeling results to the 1-hour NO_2 NAAQS. We will add these background concentrations directly into AERMOD for each season's diurnal profile so that the statistical form of the 1-hour NO_2 NAAQS can be directly assessed in the modeled output. Annual NO_2 modeling will use a simple annual average as the background concentration.

[15] This time period is the 3 most recent years of complete data. Myton data were only available through June 30, 2020, and Price through October 31, 2020.

Figure 1111. Monitored Background Concentrations for RooseveltMyton, UT Monitor 20162017–2018 2019 1-Hour NO_2 Concentrations

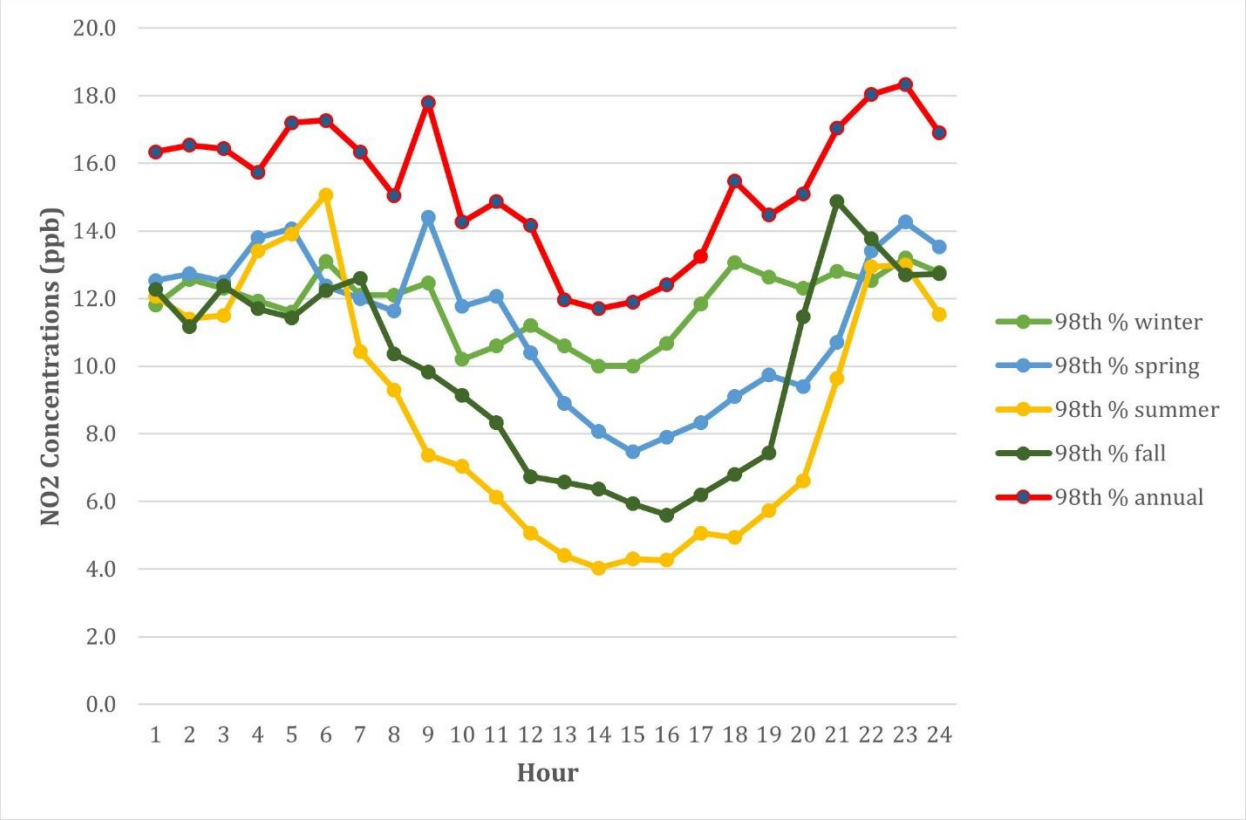
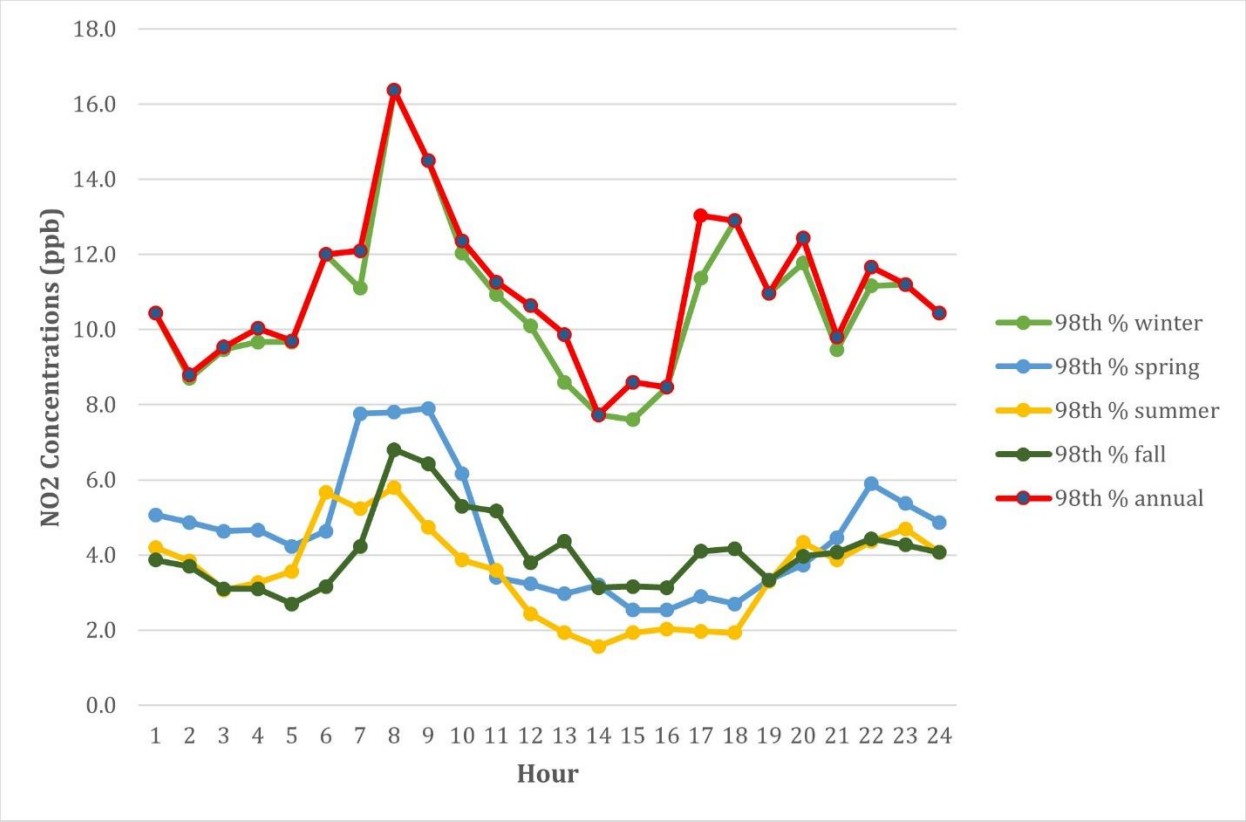


Figure 12. Monitored Background Concentrations for Price, UT Monitor 2017–2019 1-Hour NO_2 Concentrations



AERMOD Modeling Scenarios

OEA designed the modeling scenarios to simulate the maximum impact associated with the operations of the proposed railway along the alignment. Given the distance between the identified worst-case modeling locations, we will model each location in a separate AERMOD simulation using the maximum proposed train activity along the alignment using the worst-case emission year. Each model run will use the actual emissions rate as model input, not unit emissions rates, to determine maximum air concentration impacts.

Since the trains are proposed to operate at all hours of the day, both the short-term (1-hour and 24-hour) and the long-term (annual) assessment will model operations as occurring at any time of the day, seven days per week, 365 days per year.

3.2 Criteria Pollutant Modeling and Impact Assessment

OEA will add the AERMOD-derived impacts on ambient air quality to representative background air quality concentrations and compare them to the NAAQS. Table 4 summarizes these standards.

Table 4. Summary of Ambient Air Quality Standards

Pollutant (Units)	Averaging Period	NAAQS
$PM_{2.5}$ (µg/m^3)	24-hour[a]	35
	Annual[b]	12
NO_2 (ppb)	1-hour[c]	100
	Annual[d]	53

Notes:

[a] The 3-year average of the 98th percentile 24-hour average concentration must not exceed this standard.
[b] The 3-year average of the annual average concentration must not exceed this standard.
[c] The 3-year average of the 98th percentile of the daily maximum 1-hour average is not to exceed this standard.
[d] Not to be exceeded.

$PM_{2.5}$ = particulate matter with a diameter of less than 2.5 micrometers; µg/m^3 = micrograms per cubic meter; NO_2 = nitrogen dioxide; ppb = parts per billion; NAAQS = National Ambient Air Quality Standards

OEA will report the predicted concentrations at all receptors where violations ~~exceedance~~s of the NAAQS are modeled, if any, and will include a graphic figure showing the spatial distribution of the predicted concentrations at receptors for the location at which the maximum impacts are predicted. OEA also will provide the model input and output files in an appendix.

Chapter 4
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