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February 26, 2021

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

RE: Mountain Valley Pipeline, LLC
Docket No. CP21-57-000
Supplemental Information – Resource Report 9

Dear Secretary Bose:

On February 19, 2021, Mountain Valley Pipeline, LLC ("Mountain Valley") filed an application in the above-captioned docket requesting that the Commission issue an order on an expedited basis amending Mountain Valley's certificate of public convenience and necessity for the Mountain Valley Pipeline Project to grant Mountain Valley the ability to change the crossing method for specific wetlands and waterbodies yet to be crossed by the Project from the open-cut crossings to one of several trenchless methods.

In Resource Report 9 (Air and Noise Quality) of the Exhibit F-1 Environmental Report, Mountain Valley indicated that it was in the process of conducting an analysis of the total estimated construction emissions for the subject wetland and waterbody crossings using the proposed trenchless methods as compared to open-cut method as certificated for the same crossings. Mountain Valley has completed the analysis and is submitting it herewith to supplement Resource Report 9. Mountain Valley is completing the noise analysis and will file a fully updated Resource Report 9 the week of March 1, 2021.

If you have any questions, please do not hesitate to contact me at (412) 553-5786 or meggerding@equitransmidstream.com. Thank you.

Respectfully submitted,
Mountain Valley Pipeline, LLC
by and through its operator,
EQM Gathering Opco, LLC

By:

Matthew Eggerding
Assistant General Counsel

Attachments

RESOURCE REPORT 9 – AIR AND NOISE QUALITY

This report includes discussion of air quality and noise impacts that will result from the proposed trenchless crossings that may differ from the Certificated Project. Air quality resources and potential impacts from the proposed trenchless crossings are discussed in Section 9.1. Noise quality resources and potential impacts from the proposed trenchless crossings are discussed in Section 9.2. The duration of the trenchless crossings may affect both air emissions and construction noise. Estimated bore durations are included in Appendix K.

9.1 AIR QUALITY

Short-term and temporary air quality impacts will result from construction activities necessary to install the proposed trenchless waterbody and wetland crossings. There would be no long-term air quality impacts as a result of the proposed trenchless crossings.

The proposed trenchless crossings are located in the counties of Wetzel, Harrison, Doddridge, Lewis, Webster, Nicholas, Greenbrier, Summers, and Monroe, West Virginia, and Giles, Montgomery, Roanoke, Franklin, and Pittsylvania, Virginia. All counties listed are in attainment with the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants.[1]

Mountain Valley conducted an analysis of estimated emissions from the proposed trenchless crossing methods compared to open-cut crossings, which is attached hereto as Appendix A. Mountain Valley calculated emissions from the equipment used for stream crossing operations using U.S. EPA's MOVES2014b program. The output from the MOVES2014b program was combined with the specific equipment type and anticipated operation for the crossings. Mountain Valley calculated the difference in cumulative emissions for all 120 locations where the crossing method has been proposed to be changed. Other locations not impacted by the proposed changes were not included in this assessment. Cumulative emissions for the crossings where changes are proposed were calculated assuming all crossings were completed using open cuts (prior proposal) and all crossings were completed using the proposed bore methods (new proposal) as follows:

- Open-Cut Crossing: Mountain Valley used the equipment setup for an open-cut crossing and the total cumulative days of operation for the crossings if they were to be completed using an open-cut. Twelve hours of operation were assumed for each day.
- Bore Crossing: A bore crossing includes both a pit excavation and bore portion, each of which uses specific equipment. Mountain Valley used the equipment setup specific to both the pit excavation and boring portions of the boring crossing and the total cumulative days of operation for each portion (pit excavation and boring) of the bore crossings. Twelve hours of operation were assumed for each day. The equipment and duration of the boring portion of the crossings were further categorized by the proposed bore type (conventional, guided conventional, and Direct Pipe).

The proposed trenchless crossings will result in higher construction emissions for the waterbody and wetland crossings for some pollutants, as compared to using the open-cut method as certificated. The potential emissions for the trenchless crossing methods are presented in Table 9.1-1 for comparison to the open-cut method.

[1] Note that per West Virginia Code of State Regulations (CSR), Title 45 section 8 (45 CSR 8), West Virginia follows the NAAQS and has not imposed State Ambient Air Quality Standards that differ from the NAAQS. Note also that, because each of the counties is in attainment with the NAAQS, a General Conformity analysis is not required.

Table 9.1-1 Open-Cut and Bore Construction Emissions Comparison (in tons)

Operation	Construction Emissions (tons)						
	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CO_2
Open Cut	47.50	16.28	0.12	0.40	2.80	2.71	16,159.16
Proposed Bore Type:[1]							
Conventional	93.83	29.38	0.19	0.73	4.90	4.75	25,480.10
Guided Conventional	7.85	2.01	0.01	0.06	0.35	0.34	1,429.18
Direct Pipe	6.57	2.03	0.01	0.05	0.34	0.33	1,551.70
Total Proposed Bore (120 crossings)	**108.26**	**33.42**	**0.22**	**0.84**	**5.59**	**5.42**	**28,460.98**
Cumulative Difference (Proposed Bore Crossings – Open-Cut Crossings)	**60.75**	**17.14**	**0.10**	**0.43**	**2.79**	**2.70**	**12,301.83**
Total Project[2]	**2,389.9**	**5,090.3**	**192.6**	**564.7**	**4,449.6**	**921.9**	**967,411.1**

[1] Emissions include both the pit excavation and boring portion.
[2] Emissions from Year 1-3 from Table 4.11.1-5 in the Final Environmental Impact Statement (FERC 2017).

Table 4.11.1-5 in the FEIS provides the total Project construction emissions for each of these pollutants, which allows the above-described net change in emissions to be put in context. Overall Project construction emissions for NOx were estimated to be 2,389.9 tpy. The additional 60.75 tpy in NOx emissions for the proposed trenchless crossings represents a 2.5% increase. Overall Project construction emissions for CO were estimated at 5,090.3 tpy. The additional 17.14 tpy in CO emissions for the proposed trenchless crossings represents a 0.34% increase. Overall Project construction emissions for SO_2 were estimated to be 192.6 tpy. The additional 0.10 tpy in SO_2 emissions for the proposed trenchless crossings represents a 0.05% increase.

Overall Project construction emissions for VOC were estimated at 564.7 tpy. The additional 0.43 tpy in VOC emissions for the proposed trenchless crossings represents a 0.08% increase. Overall Project construction emissions for PM_{10} were estimated at 4,449.6 tpy. The additional 2.79 tpy in PM_{10} emissions for the proposed trenchless crossings represents a 0.06% increase. Overall Project construction emissions for $PM_{2.5}$ were estimated at 921.9 tpy. The additional 2.70 tpy in $PM_{2.5}$ emissions for the proposed trenchless crossings represents a 0.29% increase. Overall Project construction emissions for CO_2 were estimated at 967,411.1 tpy. The additional 12,301.83 tpy in CO_2 emissions for the proposed trenchless crossings represents a 1.27% increase.

The construction emissions that will result from the proposed trenchless crossings are temporary in nature and are expected to have minimal impact on the air quality in the surrounding area, which is not significantly different than analyzed in the FEIS. However, Mountain Valley will implement the same measures to reduce construction emissions as the Certificated Project and as described in the FEIS.

9.2 NOISE

Mountain Valley is completing the noise analysis and will file a fully updated Resource Report 9 the week of March 1, 2021.

APPENDIX A – SUPPORTING EMISSIONS CALCULATIONS

Mountain Valley Pipeline Project

Table A-1. Criteria Pollutant Emissions from Construction Engines, Mountain Valley Pipeline - Open Cut

Equipment Type	SCC	Max. Engine Rating (hp)	Load Factor[1]	Average Engine Load (hp)	2020 Construction Year																	
					Operations[3]			Emission Factor[1] (g/hp-hr)									Emissions (tpy)								
					Quantity	hr/day	total days	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O[2]	CO_2	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O	CO_2
Air Compressor B	2270006015	400	0.43	172	1	12	1157	2.33E+00	7.11E-01	4.25E-03	1.68E-02	1.12E-01	1.09E-01	9.64E-04	2.44E-02	5.31E+02	6.14E+00	1.87E+00	1.12E-02	4.41E-02	2.95E-01	2.86E-01	2.54E-03	6.42E-02	1.40E+03
Booster/Pumps	2270006010	475	0.43	204.25	3	12	1157	2.91E+00	9.67E-01	4.33E-03	2.35E-02	1.53E-01	1.49E-01	9.11E-04	2.44E-02	5.30E+02	2.73E+01	9.07E+00	4.06E-02	2.21E-01	1.44E+00	1.39E+00	8.54E-03	2.28E-01	4.97E+03
Dozers	2270002069	300	0.59	177	1	12	1157	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	1.82E+00	5.91E-01	1.01E-02	1.21E-02	1.11E-01	1.08E-01	1.21E-03	6.68E-02	1.45E+03
Excavator	2270002036	200	0.59	118	4	12	1157	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	3.96E+00	1.29E+00	2.66E-02	2.62E-02	2.53E-01	2.45E-01	2.57E-03	1.78E-01	3.88E+03
Excavator - Rock Drill	2270002036	200	0.59	118	2	12	1157	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	1.98E+00	6.46E-01	1.33E-02	1.31E-02	1.26E-01	1.23E-01	1.29E-03	8.91E-02	1.94E+03
SideBoom	2270002069	200	0.59	118	2	12	1157	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	2.43E+00	7.89E-01	1.35E-02	1.62E-02	1.48E-01	1.44E-01	1.62E-03	8.90E-02	1.94E+03
Skid Steer Loader	2270002078	200	0.21	42	1	12	1157	4.41E+00	2.04E+00	5.36E-03	7.86E-02	4.87E-01	4.72E-01	3.66E-03	2.87E-02	6.25E+02	2.84E+00	1.31E+00	3.45E-03	5.05E-02	3.13E-01	3.03E-01	2.35E-03	1.84E-02	4.01E+02
Welding Machine	2270006025	40	0.21	8.4	2	12	1157	4.01E+00	2.75E+00	5.66E-03	7.73E-02	4.48E-01	4.34E-01	3.70E-03	3.19E-02	6.94E+02	1.03E+00	7.08E-01	1.46E-03	1.99E-02	1.15E-01	1.12E-01	9.52E-04	8.20E-03	1.78E+02

[1]Per EPA MOVES2014b.

[2]N_2O emission factor is based on 2020 Climate Registry Default Emission Factors, Released: April 2020, Tables 2.1 and 2.7, ratioed based on CO_2 emission factor from EPA MOVES2014b (https://www.theclimateregistry.org/wp-content/uploads/2020/04/The-Climate-Registry-2020-Default-Emission-Factor-Document.pdf).

[3]Based on data provided by client.

Mountain Valley Pipeline Project

Table A-2.1 Criteria Pollutant Emissions from Construction Engines, Mountain Valley Pipeline - Conventional Bore Pit Excavation

Equipment Type	SCC	Max. Engine Rating (hp)	Load Factor[1]	Average Engine Load (hp)	2020 Construction Year																	
					Operations[3]			Emission Factor[1] (g/hp-hr)									Emissions (tpy)								
					Quantity	hr/day	total days	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O[2]	CO_2	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O	CO_2
Booster/Pumps	2270006010	475	0.43	204.25	3	12	1634	2.91E+00	9.67E-01	4.33E-03	2.35E-02	1.53E-01	1.49E-01	9.11E-04	2.44E-02	5.30E+02	3.86E+01	1.28E+01	5.74E-02	3.12E-01	2.03E+00	1.97E+00	1.21E-02	3.23E-01	7.03E+03
Dozers	2270002069	300	0.59	177	2	12	1634	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	5.15E+00	1.67E+00	2.85E-02	3.43E-02	3.13E-01	3.04E-01	3.42E-03	1.89E-01	4.11E+03
Excavator	2270002036	200	0.59	118	2	12	1634	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	2.79E+00	9.12E-01	1.88E-02	1.85E-02	1.78E-01	1.73E-01	1.82E-03	1.26E-01	2.74E+03
Excavator - Rock Drill	2270002036	200	0.59	118	2	12	1634	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	2.79E+00	9.12E-01	1.88E-02	1.85E-02	1.78E-01	1.73E-01	1.82E-03	1.26E-01	2.74E+03

[1]Per EPA MOVES2014b.
[2]N_2O emission factor is based on 2020 Climate Registry Default Emission Factors, Released: April 2020, Tables 2.1 and 2.7, ratioed based on CO_2 emission factor from EPA MOVES2014b (https://www.theclimateregistry.org/wp-content/uploads/2020/04/The-Climate-Registry-2020-Default-Emission-Factor-Document.pdf).
[3]Based on expected equipment and duration.

Table A-2.2 Criteria Pollutant Emissions from Construction Engines, Mountain Valley Pipeline - Conventional Bore Boring Process

Equipment Type	SCC	Max. Engine Rating (hp)	Load Factor[1]	Average Engine Load (hp)	2020 Construction Year																	
					Operations[3]			Emission Factor[1] (g/hp-hr)									Emissions (tpy)								
					Quantity	hr/day	total days	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O[2]	CO_2	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O	CO_2
Air Compressor B	2270006015	400	0.43	172	3	12	472	2.33E+00	7.11E-01	4.25E-03	1.68E-02	1.12E-01	1.09E-01	9.64E-04	2.44E-02	5.31E+02	7.51E+00	2.29E+00	1.37E-02	5.40E-02	3.61E-01	3.51E-01	3.11E-03	7.85E-02	1.71E+03
Booster/Pumps	2270006010	475	0.43	204.25	6	12	472	2.91E+00	9.67E-01	4.33E-03	2.35E-02	1.53E-01	1.49E-01	9.11E-04	2.44E-02	5.30E+02	2.23E+01	7.40E+00	3.31E-02	1.80E-01	1.17E+00	1.14E+00	6.97E-03	1.86E-01	4.06E+03
Bore Machine	2270002033	765	0.43	328.95	1	12	472	5.41E+00	9.27E-01	4.57E-03	3.33E-02	1.78E-01	1.73E-01	7.64E-04	2.44E-02	5.30E+02	1.11E+01	1.90E+00	9.38E-03	6.84E-02	3.66E-01	3.55E-01	1.57E-03	5.00E-02	1.09E+03
Dozers	2270002069	300	0.59	177	1	12	472	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	7.44E-01	2.41E-01	4.12E-03	4.95E-03	4.53E-02	4.39E-02	4.94E-04	2.72E-02	5.93E+02
Excavator	2270002036	200	0.59	118	2	12	472	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	8.07E-01	2.64E-01	5.43E-03	5.34E-03	5.15E-02	5.00E-02	5.25E-04	3.63E-02	7.91E+02
SideBoom	2270002069	200	0.59	118	1	12	472	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	4.96E-01	1.61E-01	2.75E-03	3.30E-03	3.02E-02	2.93E-02	3.30E-04	1.82E-02	3.95E+02
Skid Steer Loader	2270002078	200	0.21	42	1	12	472	4.41E+00	2.04E+00	5.36E-03	7.86E-02	4.87E-01	4.72E-01	3.66E-03	2.87E-02	6.25E+02	1.16E+00	5.36E-01	1.41E-03	2.06E-02	1.28E-01	1.24E-01	9.59E-04	7.52E-03	1.64E+02
Welding Machine	2270006025	40	0.21	8.4	2	12	472	4.01E+00	2.75E+00	5.66E-03	7.73E-02	4.48E-01	4.34E-01	3.70E-03	3.19E-02	6.94E+02	4.21E-01	2.89E-01	5.94E-04	8.11E-03	4.70E-02	4.56E-02	3.88E-04	3.34E-03	7.28E+01

[1]Per EPA MOVES2014b.
[2]N_2O emission factor is based on 2020 Climate Registry Default Emission Factors, Released: April 2020, Tables 2.1 and 2.7, ratioed based on CO_2 emission factor from EPA MOVES2014b (https://www.theclimateregistry.org/wp-content/uploads/2020/04/The-Climate-Registry-2020-Default-Emission-Factor-Document.pdf).
[3]Based on expected equipment and duration.

Mountain Valley Pipeline Project

Table A-3.1 Criteria Pollutant Emissions from Construction Engines, Mountain Valley Pipeline - Guided Conventional Bore Pit Excavation

Equipment Type	SCC	Max. Engine Rating (hp)	Load Factor[1]	Average Engine Load (hp)	2020 Construction Year																	
					Operations[3]			Emission Factor[1] (g/hp-hr)									Emissions (tpy)								
					Quantity	hr/day	total days	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O[2]	CO_2	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O	CO_2
Booster/Pumps	2270006010	475	0.43	204.25	4	12	75	2.91E+00	9.67E-01	4.33E-03	2.35E-02	1.53E-01	1.49E-01	9.11E-04	2.44E-02	5.30E+02	2.36E+00	7.84E-01	3.51E-03	1.91E-02	1.24E-01	1.20E-01	7.38E-04	1.97E-02	4.30E+02
Bore Machine	2270002033	765	0.43	328.95	1	12	75	5.41E+00	9.27E-01	4.57E-03	3.33E-02	1.78E-01	1.73E-01	7.64E-04	2.44E-02	5.30E+02	1.77E+00	3.03E-01	1.49E-03	1.09E-02	5.82E-02	5.64E-02	2.49E-04	7.95E-03	1.73E+02
Dozers	2270002069	300	0.59	177	1	12	75	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	1.18E-01	3.83E-02	6.54E-04	7.86E-04	7.19E-03	6.98E-03	7.85E-05	4.33E-03	9.42E+01
Excavator	2270002036	200	0.59	118	2	12	75	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	1.28E-01	4.19E-02	8.63E-04	8.49E-04	8.19E-03	7.94E-03	8.34E-05	5.77E-03	1.26E+02
Excavator - Rock Drill	2270002036	200	0.59	118	1	12	75	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	6.41E-02	2.09E-02	4.32E-04	4.24E-04	4.09E-03	3.97E-03	4.17E-05	2.89E-03	6.28E+01

[1]Per EPA MOVES2014b.
[2]N_2O emission factor is based on 2020 Climate Registry Default Emission Factors, Released: April 2020, Tables 2.1 and 2.7, ratioed based on CO_2 emission factor from EPA MOVES2014b (https://www.theclimateregistry.org/wp-content/uploads/2020/04/The-Climate-Registry-2020-Default-Emission-Factor-Document.pdf).
[3]Based on expected equipment and duration.

Table A-3.2 Criteria Pollutant Emissions from Construction Engines, Mountain Valley Pipeline - Guided Conventional Bore Boring Process

Equipment Type	SCC	Max. Engine Rating (hp)	Load Factor[1]	Average Engine Load (hp)	2020 Construction Year																	
					Operations[3]			Emission Factor[1] (g/hp-hr)									Emissions (tpy)								
					Quantity	hr/day	total days	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O[2]	CO_2	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O	CO_2
Air Compressor B	2270006015	400	0.43	172	1	12	28	2.33E+00	7.11E-01	4.25E-03	1.68E-02	1.12E-01	1.09E-01	9.64E-04	2.44E-02	5.31E+02	1.49E-01	4.53E-02	2.71E-04	1.07E-03	7.15E-03	6.93E-03	6.14E-05	1.55E-03	3.38E+01
Booster/Pumps	2270006010	475	0.43	204.25	5	12	28	2.91E+00	9.67E-01	4.33E-03	2.35E-02	1.53E-01	1.49E-01	9.11E-04	2.44E-02	5.30E+02	1.10E+00	3.66E-01	1.64E-03	8.90E-03	5.80E-02	5.62E-02	3.45E-04	9.22E-03	2.01E+02
Bore Machine	2270002033	765	0.43	328.95	3	12	28	5.41E+00	9.27E-01	4.57E-03	3.33E-02	1.78E-01	1.73E-01	7.64E-04	2.44E-02	5.30E+02	1.98E+00	3.39E-01	1.67E-03	1.22E-02	6.52E-02	6.32E-02	2.79E-04	8.90E-03	1.94E+02
Dozers	2270002069	300	0.59	177	1	12	28	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	4.42E-02	1.43E-02	2.44E-04	2.94E-04	2.69E-03	2.61E-03	2.93E-05	1.62E-03	3.52E+01
Excavator	2270002036	200	0.59	118	2	12	28	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	4.79E-02	1.56E-02	3.22E-04	3.17E-04	3.06E-03	2.97E-03	3.11E-05	2.16E-03	4.69E+01
Excavator - Rock Drill	2270002036	200	0.59	118	1	12	28	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	2.39E-02	7.82E-03	1.61E-04	1.58E-04	1.53E-03	1.48E-03	1.56E-05	1.08E-03	2.35E+01
Skid Steer Loader	2270002078	200	0.21	42	1	12	28	4.41E+00	2.04E+00	5.36E-03	7.86E-02	4.87E-01	4.72E-01	3.66E-03	2.87E-02	6.25E+02	6.87E-02	3.18E-02	8.34E-05	1.22E-03	7.57E-03	7.34E-03	5.69E-05	4.46E-04	9.71E+00

[1]Per EPA MOVES2014b.
[2]N_2O emission factor is based on 2020 Climate Registry Default Emission Factors, Released: April 2020, Tables 2.1 and 2.7, ratioed based on CO_2 emission factor from EPA MOVES2014b (https://www.theclimateregistry.org/wp-content/uploads/2020/04/The-Climate-Registry-2020-Default-Emission-Factor-Document.pdf).
[3]Based on expected equipment and duration.

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Table A-4.1 Criteria Pollutant Emissions from Construction Engines, Mountain Valley Pipeline - Direct Pipe Bore Pit Excavation

Equipment Type	SCC	Max. Engine Rating (hp)	Load Factor[1]	Average Engine Load (hp)	2020 Construction Year																	
					Operations[3]			Emission Factor[1] (g/hp-hr)									Emissions (tpy)								
					Quantity	hr/day	total days	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O[2]	CO_2	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O	CO_2
Booster/Pumps	2270006010	475	0.43	204.25	3	12	62	2.91E+00	9.67E-01	4.33E-03	2.35E-02	1.53E-01	1.49E-01	9.11E-04	2.44E-02	5.30E+02	1.46E+00	4.86E-01	2.18E-03	1.18E-02	7.70E-02	7.47E-02	4.58E-04	1.22E-02	2.67E+02
Dozers	2270002069	300	0.59	177	1	12	62	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	9.78E-02	3.17E-02	5.41E-04	6.50E-04	5.95E-03	5.77E-03	6.49E-05	3.58E-03	7.79E+01
Excavator	2270002036	200	0.59	118	2	12	62	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	1.06E-01	3.46E-02	7.13E-04	7.02E-04	6.77E-03	6.57E-03	6.90E-05	4.77E-03	1.04E+02
Excavator - Rock Drill	2270002036	200	0.59	118	1	12	62	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	5.30E-02	1.73E-02	3.57E-04	3.51E-04	3.38E-03	3.28E-03	3.45E-05	2.39E-03	5.19E+01

[1]Per EPA MOVES2014b.
[2]N_2O emission factor is based on 2020 Climate Registry Default Emission Factors, Released: April 2020, Tables 2.1 and 2.7, ratioed based on CO_2 emission factor from EPA MOVES2014b (https://www.theclimateregistry.org/wp-content/uploads/2020/04/The-Climate-Registry-2020-Default-Emission-Factor-Document.pdf).
[3]Based on expected equipment and duration.

Table A-4.2 Criteria Pollutant Emissions from Construction Engines, Mountain Valley Pipeline - Direct Pipe Bore Boring Process

Equipment Type	SCC	Max. Engine Rating (hp)	Load Factor[1]	Average Engine Load (hp)	2020 Construction Year																	
					Operations[3]			Emission Factor[1] (g/hp-hr)									Emissions (tpy)								
					Quantity	hr/day	total days	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O[2]	CO_2	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CH_4	N_2O	CO_2
Air Compressor B	2270006015	400	0.43	172	1	12	41	2.33E+00	7.11E-01	4.25E-03	1.68E-02	1.12E-01	1.09E-01	9.64E-04	2.44E-02	5.31E+02	2.18E-01	6.63E-02	3.97E-04	1.56E-03	1.05E-02	1.01E-02	8.99E-05	2.27E-03	4.95E+01
Bending Machine	2270002081	265	0.59	156.35	1	12	41	1.08E+00	3.57E-01	3.91E-03	9.76E-03	7.64E-02	7.41E-02	6.13E-04	2.46E-02	5.37E+02	9.18E-02	3.03E-02	3.31E-04	8.27E-04	6.48E-03	6.29E-03	5.20E-05	2.09E-03	4.55E+01
Booster/Pumps	2270006010	475	0.43	204.25	8	12	41	2.91E+00	9.67E-01	4.33E-03	2.35E-02	1.53E-01	1.49E-01	9.11E-04	2.44E-02	5.30E+02	2.58E+00	8.57E-01	3.84E-03	2.09E-02	1.36E-01	1.32E-01	8.07E-04	2.16E-02	4.70E+02
Bore Machine	2270002033	765	0.43	328.95	1	12	41	5.41E+00	9.27E-01	4.57E-03	3.33E-02	1.78E-01	1.73E-01	7.64E-04	2.44E-02	5.30E+02	9.66E-01	1.65E-01	8.15E-04	5.94E-03	3.18E-02	3.09E-02	1.36E-04	4.34E-03	9.46E+01
Dozers	2270002069	300	0.59	177	1	12	41	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	6.47E-02	2.10E-02	3.58E-04	4.30E-04	3.93E-03	3.81E-03	4.29E-05	2.37E-03	5.15E+01
Excavator	2270002036	200	0.59	118	2	12	41	5.48E-01	1.79E-01	3.69E-03	3.62E-03	3.50E-02	3.39E-02	3.56E-04	2.47E-02	5.37E+02	7.01E-02	2.29E-02	4.72E-04	4.64E-04	4.48E-03	4.34E-03	4.56E-05	3.16E-03	6.87E+01
Generators	2270006005	500	0.43	215	1	12	41	2.91E+00	9.54E-01	4.33E-03	2.34E-02	1.47E-01	1.42E-01	9.09E-04	2.44E-02	5.30E+02	3.39E-01	1.11E-01	5.05E-04	2.73E-03	1.71E-02	1.66E-02	1.06E-04	2.84E-03	6.18E+01
Hydraulic Hammer	2270003040	405	0.43	174.15	1	12	41	2.17E+00	5.78E-01	4.15E-03	1.36E-02	9.03E-02	8.75E-02	8.61E-04	2.44E-02	5.31E+02	2.05E-01	5.46E-02	3.92E-04	1.29E-03	8.52E-03	8.27E-03	8.13E-05	2.30E-03	5.01E+01
SideBoom	2270002069	200	0.59	118	4	12	41	6.74E-01	2.18E-01	3.73E-03	4.48E-03	4.10E-02	3.97E-02	4.47E-04	2.47E-02	5.37E+02	1.72E-01	5.59E-02	9.54E-04	1.15E-03	1.05E-02	1.02E-02	1.15E-04	6.31E-03	1.37E+02
Skid Steer Loader	2270002078	200	0.21	42	1	12	41	4.41E+00	2.04E+00	5.36E-03	7.86E-02	4.87E-01	4.72E-01	3.66E-03	2.87E-02	6.25E+02	1.01E-01	4.66E-02	1.22E-04	1.79E-03	1.11E-02	1.08E-02	8.33E-05	6.53E-04	1.42E+01
Sweeper	2270003030	12	0.43	5.16	1	12	41	3.77E+00	1.50E+00	5.42E-03	3.92E-02	1.73E-01	1.68E-01	3.45E-03	2.71E-02	5.89E+02	1.05E-02	4.19E-03	1.52E-05	1.10E-04	4.84E-04	4.69E-04	9.67E-06	7.58E-05	1.65E+00
Welding Machine	2270006025	40	0.21	8.4	2	12	41	4.01E+00	2.75E+00	5.66E-03	7.73E-02	4.48E-01	4.34E-01	3.70E-03	3.19E-02	6.94E+02	3.66E-02	2.51E-02	5.16E-05	7.04E-04	4.08E-03	3.96E-03	3.37E-05	2.90E-04	6.32E+00

[1]Per EPA MOVES2014b.
[2]N_2O emission factor is based on 2020 Climate Registry Default Emission Factors, Released: April 2020, Tables 2.1 and 2.7, ratioed based on CO_2 emission factor from EPA MOVES2014b (https://www.theclimateregistry.org/wp-content/uploads/2020/04/The-Climate-Registry-2020-Default-Emission-Factor-Document.pdf).
[3]Based on expected equipment and duration.