## United States Greenhouse Gas Reporting Program for Coal Mine Methane

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## **Coal Mine Methane and U.S. Greenhouse Gas Reporting Program (GHGRP)**

- In the United States, major industrial facilities are required to report their GHG emissions, as per 40 U.S. Code of Federal Regulations (CFR) Part 98. This applies to **active (working) underground coal mines**.
  - The threshold for reporting requirements: mines liberating at least 36.5 million ft<sup>3</sup> (1.04 mill. m<sup>3</sup>) or more of methane per year
  - Emissions are self-reported annually based on quarterly (for ventilation systems) and weekly (for degasification systems) measurements for safety requirements
  - Data are public at facility (mine) level the only publicly available dataset of such granularity in the world.

#### https://www.epa.gov/ghgreporting





#### US Coal Mines Annual Greenhouse Gas Emissions Reporting Requirements

- Major industrial facilities in the United States report their GHG emissions to U.S. Environmental Protection Agency (U.S. EPA) through the online reporting system
- Does not apply to:
  - Surface mines
  - Abandoned underground mines
  - Post-mining emissions
- Emission calculations are based on measured data:
  - Flow meters, Sampling, Continuous emissions monitoring systems (CEMS)
  - Measured parameters: CH4%, flow rate, temperature, pressure, moisture content
- Reporters can cease reporting if they fall below the reporting threshold for 3-5 years or cease operation
- Annual emissions reports are self-certified by the facility
  - USEPA verifies reports using a range of tools including statistical checks
  - Does not entail 3rd party verification
- Reports are due in March; data are published on the USEPA website in October each year





## **Reporting Requirements for Underground Coal Mines**

			Allowed Monitoring Methods				
Data Element	Monitoring Points	Monitoring Frequency	MSHA Quarterly Inspection Reports	Manual sampling by mine staff	Continuous Emissions Monitoring	Notes	
MSHA ID						Mine Safety & Health Administration ID to check operating status and coal production	
Description of degasification system						Manufacturer, capacity, # of wells, surface area, operating hours	
CH <sub>4</sub> liberated from ventilation systems	Each exhaust shaft	Quarterly	•	•	•	CH <sub>4</sub> %, volumetric flow rate	
CH <sub>4</sub> liberated from degasification systems	Each well or centralized monitoring point	Weekly	N/A	•	•	CH <sub>4</sub> %, volumetric flow rate	
CH <sub>4</sub> destroyed on-site/sent off-site	Each destruction device or point of transfer off-site	Weekly	N/A	N/A	•	CH <sub>4</sub> %, volumetric flow rate	
Net CH <sub>4</sub> emissions	Mine-wide	Quarterly				Ventilation CH <sub>4</sub> liberated + Degasification CH <sub>4</sub> liberated - CH <sub>4</sub> Destroyed/Sent Off-site	
CO <sub>2</sub> emissions (on-site destruction/no energy recovery)	Mine-wide	Quarterly				Flaring, Ventilation Air Methane (VAM) destruction	
CO <sub>2</sub> emissions (on-site destruction/energy recovery)	Mine-wide					Reported under Subpart C, combustion emissions	

#### **U.S. GHGRP Coverage of the Active U.S. Underground Coal Mines**

- U.S. GHGRP covers the gassiest underground coal mines that were estimated (through national inventory) to emit 99% of emissions from all active U.S. underground coal mines, or 83% from all active coal mines, including surface, and 72% including post-mine emissions.
- Total underground production covered by GHGRP: 53%
- Total coal production (surface + underground) covered by GHGRP: 27%
- GWP of CH4=28
- In summary, GHGRP focuses on the largest source and captures 99% of national emissions from this sector.

	Underground Mines & Emissions							
Source	2015	2016	2017	2018	2019	2020	2021	
Mines Reporting to GHGRP	125	95	79	75	69	72	60	
Active US underground mines	305	253	237	236	226	196	174	
Total net CH <sub>4</sub> emissions GHGRP (MMTCO <sub>2</sub> e)*	49	44	43	40	39	35	32	
Total net CH <sub>4</sub> emissions (MMTCO <sub>2</sub> e) estimated in national inventory	50	46	46	44	39	35	33	
GHGRP Emissions Coverage	98%	96%	93%	92%	100%	99%	99%	

\*GWP 28 used here for comparison purposes. GHGI began using GWP 28 in 2021 Inventory. GHGRP still uses GWP 25, but EPA proposed changing to CH4 GWP to 28 in May 2023 rulemaking proposal.



## Monitoring Methods Used by Reporters for Ventilation and Degasification Systems

Source of Emissions	Monitoring Method	Share of Facilities Using Each Method			
		2019	2020	2021	
	Quarterly measurement by mine staff (grab samples)	38%	40%	42%	
Ventilation systems	CEMS	0%	0%	0%	
	MSHA samples during quarterly inspections	62%	60%	58%	
	CEMS	11%	14%	22%	
Degasification systems*	Weekly measurement by mine staff (grab samples)	89%	86%	78%	



#### **GHGRP** Data Presentation



- Data publicly available using 2 online portals:
- Facility Level Information on Greenhouse gases Tool (FLIGHT)
  - HTML format
- **Envirofacts** 
  - Metadata at emission source level \_

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NAICS Code: 212112	Measurement Methods Used	Coaster Datas where active ventilation of mining operations is taking place (MM/DD/YYYY) (\$08.328(0)] - Start date Bog date Method used for flow rate (568.328(P), (r), (s)]	1 2021-01 2021-01 2021-01 2021-01	1-01 3-31 ed using 98.324(b)(2)
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	Information on Underground Coal Mine	Late or each measurement of how rate used in Eq. (++) (1990/0011171) (2991-2007) Dates when continuous monitoring equipment for the flow rate is not properly functioning, if applicable (MM/DD/YYYY) [198.326 Stop date Method used for concentration (568.326(d), 17, (4))	n)] - Start date	ed using 98.326/b1(2)
Download reported data (XML)	Number of wells	C - Quantariar CH4 concentration used in Eq. #F-1 (volume %) (\$99.326(g)) Nas Eq. #F-9 required to calculate CH4 concentration? (\$98.326(o)) Byes, provide the gaenous organic concentration correction fastus, used in Eq. #F-9 (\$98.326(o))	0.01 No	
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	Type(s) of destruction device(s)	P - Absplate Pressure used in Eq. FF-1 (4m) (\$98.328(o)) Length of time that substitute data are used for the pressure used in Eq. FF-1 (hours) [\$98.3(c)(8), \$98.328(o)] Direr the Quarterly Ventiliation Hum Rate and Quarterly CH4 Concentration measured on the same basin? [\$98.328(f)-(q)]	0.90580 0 Flow rat	58 re and CH4 concentration w
	used	Hiss a flow meter use? (98.326(7):(g)) Pit20 - Niebierc context used in E., FF-1 (cubic feet water per cubic feet biogas) (§98.326(o)) anyth of time that subditute data are used for the moisture context used in Eq. FF-1 (hours) [§98.3(c)(8), §98.326(o)] biothese context in further used in B. FF-1 (EB 2706/3)	A flow n	teter was used and the flow
	MSHA Id	Length of time that substitute data are used for the maisture correction factor used in Eq. #F-1 (hours) (598.32(c)(8), 598.326(c) CH4V - Quarterly CH4 liberated from ventilation monitoring point (YTC CH4) (598.326(a)) — Output of Eq. #F-1 File name of H5Ms-report used to report quarterly CH4 concentration and volumetric from rates (598.326(a))	2.09154	195
	Is gas transported off site?	Jointitisis Hontoning Point that corresponds to centralized monitoring point or individual shaft from previous tab [\$98.326(1)] Quarter Datas where active ventilation of mining operations is taking place (HM(DD/YYYY) [\$98.326(1)] - Start date	HC001 2 2021-04	4-01
		poop owe Hethod used for flow rate (\$99.326/f), (r), (s)] V - Queterly volumetric flow rate used in Eq. FF-1 (actim or scim per selection in column &7) (\$99.326(f)) Insuch with the sensemble W another without file water (File 326/f)	2021-06 Honitor 8910	ed using 98.324(b)(2)
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#### **GHGRP** Data Presentation

## **Envirofacts**



#### Resources

#### **Voluntary Programs**

- Global Methane Initiative
  - <u>https://www.globalmethane.org</u>
- U.S. EPA Coalbed Methane Outreach Program
  - <u>https://www.epa.gov/cmop</u>

#### GHGRP

- Greenhouse Gas Reporting Program:
  - <u>http://www.epa.gov/ghgreporting</u>
- Subpart FF (includes training materials):
  - <u>https://www.epa.gov/ghgreporting/subpart-ff-underground-coal-mines</u>
- Data Source: Facility Level Information on Greenhouse Gases Tool (Flight):
  - <u>https://ghgdata.epa.gov/ghgp/main.do#</u>
- Data Source: Envirofacts (Greenhouse Gas Customized Search):
  - <u>https://www.epa.gov/enviro/greenhouse-gas-</u> <u>customized-search</u>
- 40 CFR Part 98—MANDATORY GREENHOUSE GAS REPORTING:
  - <u>https://www.ecfr.gov/cgi-bin/text-</u> idx?tpl=/ecfrbrowse/Title40/40cfr98 main 02.tpl



# Thank You

Presentation supported by U.S. EPA under the auspices of GMI Contact Information:

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