

COMPANY	
AREA	
BLOCK	
LEASE	
PLATFORM	
WELL	
DISTANCE TO SHORE IN MILES	
DRILLING RIG NAME	
DRILLING RIG TYPE	
COMPANY CONTACT	
TELEPHONE NO.	
EMAIL ADDRESS	
REMARKS	
START YEAR	2015

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:	
YEAR	TOTAL NUMBER OF CONSTRUCTION DAYS
2015	
2016	
2017	
2018	
2019	
2020	
2021	
2022	
2023	
2024	

AIR EMISSIONS COMPUTATION FACTORS

Fuel Usage Conversion Factors	Natural Gas Turbines (SCF/hp-hr)	Natural Gas Engines (SCF/hp-hr)	Diesel Recip. Engine (GAL/hp-hr)	Diesel Turbines (GAL/hp-hr)
	9.524	9.524	0.051	0.073

Equipment/Emission Factors	UNITS	PM10-PRI	PM2.5-PRI	SO2	SOx	NOx	VOC	CO	Pb	NH3	CO2	CH4	N2O
NG Turbines	lbs/MMBtu	0.0019	0.0019	0.00057	0.00057	0.32	0.0021	0.082	N/A	N/A	110	8.60E-03	0.003
Diesel Turbines	lbs/MMBtu	0.0043	0.0043	0.00152	0.00152	0.88	0.00041	0.0033	1.40E-05	N/A	157	N/A	N/A
NG 2-cycle Lean Engine	lbs/MMBtu	0.0384	0.0384	5.88E-04	5.88E-04	3.17	0.12	0.386	N/A	N/A	110	1.45	N/A
NG 4-cycle Lean Engine	lbs/MMBtu	7.71E-05	7.71E-05	5.88E-04	5.88E-04	4.08	0.118	0.557	N/A	N/A	110	1.25	N/A
NG 4-cycle Rich Engine	lbs/MMBtu	0.0095	0.0095	5.88E-04	5.88E-04	2.27	0.0296	3.72	N/A	N/A	110	0.23	N/A
Diesel Recip. Engine < 600 hp.	lbs/MMBtu	0.31	0.31	0.29	0.29	4.41	0.33	0.95	N/A	N/A	164	N/A	N/A
Diesel Recip. Engine < 600 hp.	lbs/hp-hr	2.20E-03	2.20E-03	2.05E-03	2.05E-03	3.10E-02	2.29E-03	6.68E-03	N/A	N/A	521.6	N/A	N/A
Gasoline Recip. Engine < 600 hp.	lbs/MMBtu	0.1	0.1	0.084	0.084	1.63	3.03	0.99	N/A	N/A	154	N/A	N/A
Gasoline Recip. Engine < 600 hp.	lbs/hp-hr	7.21E-04	7.21E-04	5.91E-04	5.91E-04	1.10E-02	2.16E-02	6.96E-03	N/A	N/A	489.9	N/A	N/A
Diesel Recip. Engine > 600 hp.	lbs/MMBtu	0.0573	0.0556	0.001515	0.001515	3.2	0.0819	0.85	N/A	N/A	165	N/A	N/A
Diesel Recip. Engine > 600 hp.	lbs/hp-hr	7.00E-04	7.00E-04	1.21E-05	1.21E-05	2.40E-02	6.42E-04	5.50E-03	N/A	N/A	526.2	N/A	N/A
Diesel Heater/Boiler/Burner >100 MMBtu/hr	lbs/kgal	1	0.25	0.213	0.213	24	0.2	5	1.22E-03	0.80	2.23E+04	0.052	0.26
Diesel Heater/Boiler/Burner <100 MMBtu/hr	lbs/kgal	1	0.25	0.213	0.213	20	0.2	5	1.22E-03	0.80	2.23E+04	0.052	0.26
NG Heater/Boiler/Burner >100 MMBtu/hr	lbs/MMscf	1.9	1.9	0.6	0.6	280	5.5	84	0.0005	3.20	1.20E+05	2.3	2.2
NG Heater/Boiler/Burner <100 MMBtu/hr	lbs/MMscf	1.9	1.9	0.6	0.6	100	5.5	84	0.0005	3.20	1.20E+05	2.3	2.2
NG Flares	lbs/MMscf	17.1	17.1	0.6	0.6	3045.0	6.3	357.0	N/A	N/A	1.20E+05	132.3	2.1
Liquid Flaring	lbs/kgal	2.3	1.55	142	142	20	0.34	5	1.22E-03	N/A	N/A	N/A	N/A
Tank Vapors	tons/yr/tank	N/A	N/A	N/A	N/A	N/A	2.98	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	lbs/component/day	See Fugitive THC Emission Factors in tab "Fugitive Factors".											
Glycol Dehydrator Vent	tons/yr/dehydrator	N/A	N/A	N/A	N/A	N/A	16.77	N/A	N/A	N/A	N/A	N/A	N/A
Gas Venting	tons/yr/vent	N/A	N/A	N/A	N/A	N/A	31.95	N/A	N/A	N/A	N/A	N/A	N/A
Amine Gas Sweetening Unit	tons/yr/unit	N/A	N/A	14.1	N/A	N/A	0.96	N/A	N/A	N/A	N/A	N/A	N/A
Loading Operations	tons/yr/operation	N/A	N/A	N/A	N/A	N/A	0.65	N/A	N/A	N/A	N/A	N/A	N/A
Mud Degassing, Water-based	lbs/day/operation	N/A	N/A	N/A	N/A	N/A	236.54	N/A	N/A	N/A	N/A	N/A	N/A
Mud Degassing, Oil-based	lbs/day/operation	N/A	N/A	N/A	N/A	N/A	53.22	N/A	N/A	N/A	N/A	N/A	N/A
Mud Degassing, Synthetic-based	lbs/day/operation	N/A	N/A	N/A	N/A	N/A	53.22	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Pumps													
Pressure Level Controllers													

Calculated based on information entered on Emissions tabs and Fugitive THC Emission Factors shown below

NH3 Source: Battye R., W. Battye, C. Overcash, and S. Fudge; Development and Selection of Ammonia Emission Factors - Final Report. EC/R Incorporated; Durham, NC. Report prepared for USEPA Office of Research and Development; August, 1994.

Sulfur Content for Stationary Sources

Sulfur Content Source	Value	Units
Fuel Gas (as H ₂ S)	3.38	ppmv
Diesel Fuel*	0.0015	% weight
Produced Gas (Flares)	3.38	ppmv
Produced Oil (Liquid Flaring)	1	% weight

* Revise the surrogate diesel fuel sulfur content if not using ultra low-sulfur fuel.

AIR EMISSIONS COMPUTATION FACTORS

Fugitive THC Emission Factors (lbs/component-day)

Fuel	Connector	Flange	Open-end	Other	Pump	Valve	MAX	VOC Fraction	CH4 Fraction
Gas	1.10E-02	2.10E-02	1.10E-01	4.70E-01	1.30E-01	2.40E-01	4.70E-01	0.0396	0.881
Natural Gas Liquid	1.10E-02	5.80E-03	7.40E-02	4.00E-01	6.90E-01	1.30E-01	6.90E-01	0.296	0.612
Heavy Oil (<20 API Gravity)	4.00E-04	2.10E-05	7.40E-02	1.70E-03	6.90E-01	4.40E-04	6.90E-01	0.03	0.942
Light Oil (>20 API Gravity)	1.10E-02	5.80E-03	7.40E-02	4.00E-01	6.90E-01	1.30E-01	6.90E-01	0.296	0.612
Water/Oil	5.80E-03	1.50E-04	1.30E-02	7.40E-01	1.30E-03	5.20E-03	7.40E-01	0.296	0.612
Oil/Water/Gas	1.10E-02	2.10E-02	1.10E-01	7.40E-01	1.30E-01	2.40E-01	7.40E-01	0.296	0.612

Component type "Other" includes compressor seals, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, and vents
Stream type "Oil/Water/Gas" is assumed to be equal to either gas or water/oil, whichever is greater

Default Speciation Weight Fractions for Fugitive THC Emissions by Stream Type

THC Fraction	Gas	Natural Gas Liquid	Heavy Oil (<20 API Gravity)	Light Oil (>20 API Gravity)	Water/Oil	Oil/Water/Gas
VOC	0.0396	0.296	0.03	0.296	0.296	0.296
CH4	0.881	0.612	0.942	0.612	0.612	0.612

Default Sales Gas Composition

Component	Default Mol%	Mole Weight (lb/lb-mole)
CO ₂	0.8	44.01
CH ₄	94.5	16.043
C ₂	3.33	30.07
C ₃	0.75	44.097
i-C ₄	0.15	58.124
n-C ₄	0.15	58.124
i-C ₅	0.05	72.15
n-C ₅	0.05	72.15
C ₆	0.099	86.177
C ₇	0.011	100.272
C ₈ +	0.007	114.231

Source: Developed from average sales gas weight percents for OCS platforms.
Default Mol % column may not sum to 100 due to rounding.

Mud Degassing THC Emission Factors

Mud Type	Emission Factor (lbs THC/day)
Water-based	881.84
Oil-based	198.41
Synthetic-based	198.41

AIR EMISSIONS COMPUTATION FACTORS

THC Emission Speciation for Mud Degassing

Component	Percent Composition by Volume (%)
Methane	64.705
Ethane	7.834
Propane	12.977
Butane	8.973
Pentane	4.873

Density and Heat Value of Diesel Fuel

Density	7.05	lbs/gal	Source
Heat Value	19,300	Btu/lb	AP42, Chapter 3.3, Table 3.3-1 footnotes

Density and Heat Value of Gasoline Fuel

Density	6.17	lbs/gal	Source
Heat Value	20,300	Btu/lb	AP42, Chapter 3.3, Table 3.3-1 footnotes

Heat Value of Natural Gas

Heat Value	1,050	MMBtu/MMscf
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AIR EMISSIONS COMPUTATION FACTORS

REF.
AP42, Chapter 3.1, Tables 3.1-1 and 3.1-2a
AP42, Chapter 3.1, Tables 3.1-1 and 3.1-2a
AP42, Chapter 3.2, Table 3.2-1
AP42, Chapter 3.2, Table 3.2-2
AP42, Chapter 3.2, Table 3.2-3
AP42, Chapter 3.3, Table 3.3-1
AP42, Chapter 3.3, Table 3.3-1
AP42, Chapter 3.3, Table 3.3-1
AP42, Chapter 3.3, Table 3.3-1
AP42, Chapter 3.4, Tables 3.4-1 and 3.4-2
AP42, Chapter 3.4, Tables 3.4-1 and 3.4-2
AP42, Chapter 1.3, Tables 1.3-1 through 1.3-3, 1.3-6, and 1.3-10; NH3: Battye et al. 1994
AP42, Chapter 1.3, Tables 1.3-1 through 1.3-3, 1.3-6, and 1.3-10; NH3: Battye et al. 1994
AP42, Chapter 1.4, Tables 1.4-1 and 1.4-2; NH3: Battye et al. 1994
AP42, Chapter 1.4, Tables 1.4-1 and 1.4-2; NH3: Battye et al. 1994
AP42, Chapter 13.5 (Draft Section on 8/19/14), Table 13.5-2
AP42, Chapter 1.3, Tables 1.3-1 through 1.3-3, 1.3-6, and 1.3-10
2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)
Calculation workbook for Oil and Gas Production Equipment Fugitive Emissions: Health and Environmental Sciences Department, American Petroleum Institute (API) Publication Number 4628
2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)
2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)
2011 Gulfwide Inventory; Avg emiss
2005 Gulfwide Inventory; Avg emiss
EPA Report: <i>Atmospheric Emissions from Offshore Oil and Gas Development and Production</i>

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Category	EF (g/kW-hr)							
	PM10	PM2.5	SO2	NOx	VOC	CO	Lead	NH3
C1	0.070	0.068	0.00625	17.000	0.229	8.000	1.05E-05	1.40E-03
C2	0.182	0.176	0.00625	17.000	0.138	5.000	2.73E-05	3.64E-03
C3	0.469	0.455	4.16428	18.492	0.776	5.000	1.23E-05	2.24E-03

1. Penny Carey (EPA) Data C1&C2_EFs_byCY_7-13-09.xls
2. <http://www.epa.gov/otaq/standards/nonroad/marineci.htm> (uncontrolled were higher and therefore used)
3. Calculated based on Fuel Sulfur (Assume 10,000 ppm Cat 3 and 15 ppm for Cat1/2 based on <http://www.epa.gov/otaq/standards/nonroad/marineci.htm> therefore used)
4. Penny Carey (EPA) Data C3 base & ctl inv_wSO2fix_FINAL.xls
5. EPA's NEI 2008 Underway HAP Speciation Profile

Emission Adjustment Factors for Operating Loads Less than 20%

Load (%)	PM	PM	SO ₂	NO _x	VOC	CO	Pb	NH ₃
1	19.17	19.17	5.99	11.47	62.24	19.32	19.17	19.17
2	7.29	7.29	3.36	4.63	22.24	9.68	7.29	7.29
3	4.33	4.33	2.49	2.92	12.26	6.46	4.33	4.33
4	3.09	3.09	2.05	2.21	8.1	4.86	3.09	3.09
5	2.44	2.44	1.79	1.83	5.89	3.89	2.44	2.44
6	2.04	2.04	1.61	1.6	4.57	3.25	2.04	2.04
7	1.79	1.79	1.49	1.45	3.7	2.79	1.79	1.79
8	1.61	1.61	1.39	1.35	3.1	2.45	1.61	1.61
9	1.48	1.48	1.32	1.27	2.65	2.18	1.48	1.48
10	1.38	1.38	1.26	1.22	2.31	1.96	1.38	1.38
11	1.3	1.3	1.21	1.17	2.06	1.79	1.3	1.3
12	1.24	1.24	1.18	1.14	1.85	1.64	1.24	1.24
13	1.19	1.19	1.14	1.11	1.68	1.52	1.19	1.19
14	1.15	1.15	1.11	1.08	1.54	1.41	1.15	1.15
15	1.11	1.11	1.09	1.06	1.43	1.32	1.11	1.11
16	1.08	1.08	1.07	1.05	1.32	1.24	1.08	1.08
17	1.06	1.06	1.05	1.03	1.24	1.17	1.06	1.06
18	1.04	1.04	1.03	1.02	1.17	1.11	1.04	1.04
19	1.02	1.02	1.01	1.01	1.1	1.05	1.02	1.02
20	1	1	1	1	1	1	1	1

Emission Factors for On-Ice Equipment and Vehicles (Onroad Diesel Fuel)

Pollutant	PM ₁₀	PM _{2.5}	SO ₂	NO _x	VOC	CO	Pb	NH ₃
Emission Factor (lbs/gal)	0.0425	0.0425	0.0397	0.604	0.0493	0.13	N/A	0.0029

Fuel S ppm	References							
	PM10	PM2.5	SO2	NOx	VOC	CO	Lead	NH3
15	3	3	3	2	1	2	5	5
15	3	3	3	2	1	2	5	5
10000	3	3	3	2	4	2	5	5

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www.dieselnet.com/standards/us/fuel.php) (uncontrolled were higher and

Vessel Type	Category	Engine Type
Anchor Handling Tugs	N/A	Main (Default kW rating)
Anchor Handling Tugs	N/A	Auxiliary (Default kW rating)
Drilling	Drillship	Main (Default kW rating)
Drilling	Drillship	Auxiliary (Default kW rating)
Drilling	Inland Barge	Main (Default kW rating)
Drilling	Inland Barge	Auxiliary (Default kW rating)
Drilling	Jackup	Main (Default kW rating)
Drilling	Jackup	Auxiliary (Default kW rating)
Drilling	Platform Rig	Main (Default kW rating)
Drilling	Platform Rig	Auxiliary (Default kW rating)
Drilling	Semi-submersible	Main (Default kW rating)
Drilling	Semi-submersible	Auxiliary (Default kW rating)
Drilling	Submersible	Main (Default kW rating)
Drilling	Submersible	Auxiliary (Default kW rating)
FPSO	N/A	Main (Default kW rating)
FPSO	N/A	Auxiliary (Default kW rating)
FSO	N/A	Main (Default kW rating)
FSO	N/A	Auxiliary (Default kW rating)
Ice Breakers	N/A	Main (Default kW rating)
Ice Breakers	N/A	Auxiliary (Default kW rating)
Pipelaying	N/A	Main (Default kW rating)
Pipelaying	N/A	Auxiliary (Default kW rating)
Shuttle Tanker	N/A	Main (Default kW rating)
Shuttle Tanker	N/A	Auxiliary (Default kW rating)
Supply Tender	N/A	Main (Default kW rating)
Supply Tender	N/A	Auxiliary (Default kW rating)
Support	N/A	Main (Default kW rating)
Support	N/A	Auxiliary (Default kW rating)
Survey	Seismic Survey Vessels	Main (Default kW rating)
Survey	Seismic Survey Vessels	Auxiliary (Default kW rating)
Tugs	N/A	Main (Default kW rating)
Tugs	N/A	Auxiliary (Default kW rating)
Well Stimulation/Fracking	N/A	Main (Default kW rating)
Well Stimulation/Fracking	N/A	Auxiliary (Default kW rating)

Max kW rating	Main Source
27,000	IHS 2014 Data
10,061	IHS 2014 Data
48,000	ERG 2012
2,429	IHS 2014 Data
5,816	ERG 2012
3,020	IHS 2014 Data
13,422	ERG 2012
2,237	IHS 2014 Data
30,114.35	ERG 2012
18,032.00	IHS 2014 Data
90,000	ERG 2012
1,902	IHS 2014 Data
32,480	ERG 2012
1,086	IHS 2014 Data
111,480	IHS 2014 Data
15,280	IHS 2014 Data
36,938	IHS 2014 Data
14,581	IHS 2014 Data
57,372	IHS 2014 Data
1,656	IHS 2014 Data
67,200	IHS 2014 Data
4,770	IHS 2014 Data
28,956	IHS 2014 Data
16,000	IHS 2014 Data
8,960.00	IHS 2014 Data
912	IHS 2014 Data
57,833	ERG 2012
11,020	IHS 2014 Data
9,485.30	ERG 2012
9,120.00	IHS 2014 Data
19,990	IHS 2014 Data
5,040	IHS 2014 Data
15,680	IHS 2014 Data
2,500	IHS 2014 Data

Notes

Assuming Drillship for Aux

Assuming Drillship for Aux

Barge Carrier for Inland Barge, memo kW was too small (125 kW)

Barge Carrier for Inland Barge, memo kW was too small (125 kW)

Assuming Drillship for Aux

Assuming Drillship for Aux

Assuming Drillship for Aux

Assuming Drillship for Aux

Assuming Drillship for Aux

Assuming Drillship for Aux

Assuming Drillship for Aux

Assuming Drillship for Aux

Floating Production Storage and Offloading (FPSO)*; Assume little propulsion all evaporative

Floating Production Storage and Offloading (FPSO)*; Assume little propulsion all evaporative

Floating Storage and Offloading (FSO)*; Assume little propulsion all evaporative

Floating Storage and Offloading (FSO)*; Assume little propulsion all evaporative

Pipe Layer Crane Vessel

Pipe Layer Crane Vessel

Offshore support vessel for Aux

Offshore support vessel for Aux

Research Survey for Aux

Research Survey for Aux

Operations	Equipment	Methodology
	MUD DEGASSING WATER-BASED	Emissions (lbs/hr) = Number of Mud Degassing Operations * Emission Factor (lbs/day/operation) * 1 day/24 hrs
	MUD DEGASSING OIL-BASED	Emissions (lbs/hr) = Number of Mud Degassing Operations * Emission Factor (lbs/day/operation) * 1 day/24 hrs
	MUD DEGASSING SYNTHETIC-BASED	Emissions (lbs/hr) = Number of Mud Degassing Operations * Emission Factor (lbs/day/operation) * 1 day/24 hrs
	PNEUMATIC PUMPS	Emissions (lbs/hr) = Fuel Usage Rate (scf/hr) * Mole Weight of Gas (lbs/lb-mol) * 1 lb-mol/379.4 scf
	PRESSURE LEVEL CONTROLLERS	Emissions (lbs/hr) = Fuel Usage Rate (scf/hr) * Mole Weight of Gas (lbs/lb-mol) * 1 lb-mol/379.4 scf
Drilling Well	OIL BURN	Emissions (lbs/hr) = Volume Flared (bbl/day) * 42 gal/bbl * 1 kgal/1,000 gal * Emission Factor (lbs/kgal) * 1 day/24 hrs
Test	GAS FLARE	Emissions (lbs/hr) = Volume Flared (scf/hr) * Emission Factor (lbs/MMscf) * 1 MMscf/10 ⁶ scf
FPSO	FPSO/FSO propulsion	Emissions (lbs/hr) = Emission Rate (g/kW)*Max Engine Rating (kW)*0.0022046(lb/g)*Load.
	Evaporative emissions from lightening	Ev (tons) = (Annual amount of product transferred (gallons)) * (Total organic compound content of crude oil (0.86 lb of TOC/103 gal of crude oil)) * (TOC to VOC conversion factor (0.85))
	Evaporative emissions from ballasting	Eb (tons) = (Capacity (gallons)) * 0.40 *(Total organic compound content of crude oil (0.86 lb of VOC/103 gal of crude oil)) * (TOC to VOC conversion factor (0.85))
On Ice Equipment	ON-ICE EQUIPMENT	Emissions (lbs/hr) = Total Fuel Use (gal/yr) * Emission Factor (lbs/kgal) * 1 yr/365 days * 1 day/24 hrs

To Convert from lbs/hr to tons/yr:

Emissions (tons/yr) = Emissions (lbs/hr) * 1 ton/2,000 lbs * hrs/day * days/yr

AN EMISSIONS CALCULATION - 2011

Table with columns: COMPANY, AREA, BLOCK, LEASE, PLATFORM, BELL, CONTACT, PNOISE, BMAIL, REMARKS. Main data columns include Equipment Category, Equipment/Vessel Type, Engine Type, Category, Line, ACTIVITY, UNITS, and 17 pollutant columns: CO, HC, SOx, NOx, PM, VOC, PHE, HAP, CH4, N2O, PHE-FRI, PHE-SPI, SO, NO, VOC, ESTIMATED TONS PER YEAR. Rows are categorized by operations (Drilling, Rig Installation, Facility Installation, Production) and equipment types (Prime Mover, Drilling, PHE, Turbine, etc.).

Summary table with columns: SECTION, DISTANCE TO SHORE IN MILES, and numerical values for each pollutant.

AN EMISSIONS CALCULATION - 2011

Table with columns: COMPANY, AREA, BLOCK, LEASE, PLATFORM, BELL, CONTACT, PHONE, EMAIL, REMARKS. It contains multiple sections: OPERATIONS, FACILITY INSTALLATION, PRODUCTION, DRILLING, PFD, DRILLING WELLS TEST, DRILLING EQUIPMENT & FACILITIES, and EMISSION CALCULATION. Each section lists various equipment and activities with associated emission data.

AN EMISSIONS CALCULATION - 2011

Main data table with columns for COMPANY, AREA, BLOCK, LEASE, PLATFORM, DRILL, CONTRACT, FINGER, BLOCK, REMARKS, OPERATIONS, EQUIPMENT Category, Equipment/Vessel Type, Engine Type, Category, LINE, ACTIVITY, UNITS, and various MAMMUM POUNDS PER HOUR and ESTIMATED TONS PER YEAR columns.

Summary table with columns: DISTANCE TO SHORE IN MILES, and a grid of values for various parameters.

AIR EMISSIONS CALCULATION - 2011

Table with columns: COMPANY, AREA, BLOCK, LEASE, PLATFORM, WELL, CONTACT, PHASE, ESTIMATE, REMARKS. Main table columns include: OPERATIONS, EQUIPMENT Category, Equipment/Vessel Type, Engine Type, Category, LINE, ACTIVITY, UNITS, No Abatement, RUN TIME, Exhausted (Steam, Oil, Both), and 20 MAXIMUM POUNDS PER HOUR (CO2, SO2, NOx, VOC, CH4, C2H6, H2S, HCN, NH3, CS2, CH3I, N2O, PM10-FINE, PM10-COARSE, SO4, NO, VOC, ESTIMATED TONS PER YEAR (PM10-FINE, PM10-COARSE, SO4, NO, VOC, Pb, NiL, CO, CH4, N2O)). Includes sub-sections for DRILLING, PULVE, FACILITY, PRODUCTION, DRILLING WELL TEST, FPD, DRILLING EQUIPMENT, and DRILLING EQUIPMENT & WELLS. Ends with SUMMARY, ZED, and EMISSION CALCULATION.

