

Draft Oil and Gas Ozone Reduction Strategies

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Presentation Overview

- Original strategy list (Dec 2007)
- 10 draft strategies (Feb 2008)
- Which strategies were not updated and why
- Which strategies were updated and how
- Posted at ozoneaware.org
- Draft

VOC Emission Reduction Options and Issues for Oil and Gas Sources (Presented to RAQC in December 2007)	Corresponding Strategy Paper (Presented to RAQC in February 2008)
Front Range Oil and Gas Growth	NA - Not an emissions reduction strategy
Quantification of Emissions from Uncategorized O&G Sources	Unregulated Source Categories
Eliminate Permitting and Reporting Exemptions for O&G Activities in Regulation No. 3 where Equipment Emissions are Likely to Exceed 2 tpy	NA - Not an emissions reduction strategy
Inclusion of Sources not Currently Addressed Through Specific Regulation	NA - Combined into Strategy No. 2
Retrofit and/or Replacement of High-Bleed Valves to Low-Bleed and/or No-Bleed Valves for Oil & Gas Systems in Reg. 7 New Installation Standards for Use of Low or No-Bleed Pnuematics or Instrument Air	High-Bleed Pneumatic Devices
40 hp - 100 hp Engines Subject to Reg. 7 Emission Limits	Engines
Statewide Oil and Gas BACT Program	NA - Will be addressed in future stakeholder meeting
Green Completions for Oil and Gas Well Development	Well Completions
Leak Detection and Repair (LDAR) Program at E&P Sites and Compressor Stations; Extend LDAR to Gas Plants Statewide	Leak Detection
Install Insulation on Separators	Heated Separator Insulation
Increase Stringency of Regulation No. 7 Condensate Tank Control Program	Condensate Tanks
Increase Stringency of Regulation No. 7 Dehydrator Control Program	Glycol Dehydrators
Require New Heater Treaters, Reboilers, and Process Heaters to be Equipped with BASO Valves	BASO Valves
Require Vapor Balance Recycling Lines during Condensate Loadout Operations	Condensate Loadout Operations
Funding for Initiatives	NA - Will be addressed in future stakeholder meeting
Require Existing Engines Outside of Front Range NA Area to Meet Requirements of Regulation No. 7 for EAC	NA - Combined into Strategy No. 6

<i>Strategy</i>	<i>Source Category</i>	<i>2006 NAA VOC Emissions (tpd)</i>	<i>Percent of 2006 NAA VOC Emissions</i>
Unregulated Source Categories ¹	Drilling Rigs ²	0.58	0.3
	Exempt Engines	0.44	0.2
	Heaters for Oil and Gas Wells	0.07	0.0
	Pneumatic Devices	24.83	14.0
	Fugitive Emissions at Oil & Gas Wells	8.21	4.6
	Well Completions	0.82	0.5
	Well Recompletions	1.10	0.6
	Well Blowdowns	3.90	2.2
	Pneumatic Pumps	1.79	1.0
	Workover Rigs	0.12	0.1
	Exempt Atmospheric Storage Tanks ³	15.12	8.5
	Exempt Truck Loading Activities	1.99	1.1
	Compressor Engines	4.84	2.7
	Other ⁴	0.60	0.3
High-Bleed Pneumatic Devices	See "Unregulated Source Categories"	See "Unregulated Source Categories"	See "Unregulated Source Categories"
Engines	Specific Engines ⁵	Not Available	Not Available
Well Completions	See "Unregulated Source Categories"	See "Unregulated Source Categories"	See "Unregulated Source Categories"
Leak Detection	Fugitive Emissions ⁶	1.22	0.7
Heated Separator Insulation	Heated Separators ⁵	Not Available	Not Available
Condensate Tanks	APEN Tanks ⁷	111.33	62.6
Glycol Dehydrators	Glycol Dehydrators ⁸	0.85	0.5
BASO [®] Valves	BASO [®] Valves ⁵	Not Available	Not Available
Condensate Loadout Operations	See "Unregulated Source Categories"	See "Unregulated Source Categories"	See "Unregulated Source Categories"

Selected Strategies not Further Developed

- Leak Detection

- 3rd highest VOC emission source (9 tpd)
- Primarily at wellheads
- LDAR/KKK and DI&M

- Well Completions

- VOC emissions not significant (IPAMS) (2 tpd)
- Being addressed by 1341 process

- Unregulated Sources (Drill Rigs) (NO_x vs VOC)

- Source categories represent many individual sources

Strategies Developed Further

Strategies that were developed further

- Pneumatic Devices
- Condensate Tanks

New information

- Inventory data
- Preliminary VOC reductions and cost analysis
- RACT considerations

Not all options developed

Pneumatic Device Options

- Install low- or no-bleed (new facilities)
- Retrofit or replace with low- or no-bleed (existing facilities)
- Enhanced maintenance (high-bleed)

Pneumatic Device Emissions

- 2006 VOC emissions 25 tpd
- 2010 VOC emissions 29 tpd
- Use low/no bleed - reduce 16 tpd
- Perform enhanced maintenance - reduce 1 tpd

Pneumatic Device Costs

<i>Option</i>	<i>Cost per Device</i>	<i>Cost with Enhanced Maintenance (\$/ton VOC)</i>	<i>Cost without Enhanced Maintenance (\$/ton VOC)</i>
Retrofit 80 % High-Bleed to Low-/No-Bleed	\$500	376	373
Replace 80 % High-Bleed to Low-/No-Bleed at End-of-Life	\$250	203	186
Early Replacement 80 % High-Bleed to Low-/No-Bleed	\$1350	962	1,007
Perform Enhanced Maintenance on 20% High-Bleed	\$176	NA	409

Condensate Tank Options

- Increase system-wide VOC emission control requirement
- Replace system-wide with emission threshold control requirements
- Eliminate APEN size-based exemption

Condensate Tank Emissions

- 2006 VOC emissions 111 tpd (permitted)/15 tpd (exempt)
- 2010 VOC emissions 110 tpd (permitted)/19 tpd (exempt)
- System-wide - reduce 12 to 49 tpd
- Emission threshold - reduce 43 tpd
- Eliminate APEN exemption – reduce 21 tpd

Condensate Tanks Costs

- Preliminary analysis
- Annualized cost per flare - \$7,189
- \$3,595 per ton VOC for 2 tpy tank
- \$719 per ton VOC for 10 tpy tank

Next Step for Strategies

- More detailed AQ and cost analysis
- Develop draft regulation language