

VOC EMISSION REDUCTION OPTIONS AND ISSUES FOR OIL AND GAS SOURCES

December 2007

Oil and Gas Option/Issue	Brief Description	Implementation	Questions / Comments
Front Range Oil and Gas Growth	Determine 2010 and 2020 growth rates	By March 2008	IPAMs data to be informative for Front Range and Statewide growth (for WRAP Phase III O&G EI)
Quantification of Emissions from Uncategorized O&G Sources	<ul style="list-style-type: none"> - There are numerous emission sources where emissions are currently unquantified - APCD is working with IPAMs to develop emission estimates for the NA area 	By February 1, 2008	<ul style="list-style-type: none"> - The results will inform the APCD of which sources have significant emissions - Statewide information will be available by June 2008
Eliminate Permitting and Reporting Exemptions for O&G Activities in Regulation No. 3 where Equipment Emissions are Likely to Exceed 2 tpy	<ul style="list-style-type: none"> - Internal combustion engines on drill rigs - Petroleum industry flares < 5 tpy emissions - Crude oil truck loading equipment - Oil/gas production wastewater tanks - Storage of butane, propane, LPG - Crude oil storage tanks - Oil and gas production activities including: well drilling, workovers and completions - Stationary RICE meeting horsepower and hours of operation restrictions - Venting of natural gas lines for safety purposes (closer evaluation) - Condensate tanks with production 730 BBL/year or less - Heater treaters - Separators - Reboilers on dehydrators 		<p>Estimate equipment emissions based on latest information</p> <p>Review existing exemptions and reevaluate the significance of the emissions. Determine if any exemption should be eliminated</p> <p>The results will inform the APCD of which sources have significant emissions</p> <p>4CAQTF: Rig Engines options: Natural Gas Fired Rig RICE; SCR and SNCR on drill rig RICE</p>

VOC EMISSION REDUCTION OPTIONS AND ISSUES FOR OIL AND GAS SOURCES

December 2007

Air Pollution Control Division

Oil and Gas Option/Issue	Brief Description	Implementation	Questions / Comments
Inclusion of Sources not Currently Addressed through Specific Regulation	<ul style="list-style-type: none"> - Pigging/pipeline maintenance - Pneumatic actuated devices w/ high pressure gas - Tank truck loadout - Emergency shutdowns - Vehicle traffic - exhaust and unpaved roads - Reserve pits - Well pad construction - Soil land farming - Amine units - Gas actuated pumps 		Evaluate potential emissions from these sources to determine if appreciable emissions reductions may be achieved through reasonable cost emissions controls
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 pneumatics or instrument air	<ul style="list-style-type: none"> - Require installation of low/no-bleed pneumatic actuated valves at all new E&P sites - Require installation of low/no-bleed pneumatic actuated valves when maintenance of existing valves is performed - Require retrofit of existing high-bleed pneumatic actuated valves with low/no-bleed pneumatic actuated valves - Implementation of optical imaging at the wellhead to monitor and minimize leaks - Alternative: discharge lines must be routed into fuel gas supply lines or any line which will be tied into a closed or controlled system - Alternative: install instrument air system to replace natural gas for pneumatic process controllers - Alternative: install electric/solar pumps 		<p>Benefits to be determined</p> <p>This strategy achieves a co-benefit; it reduces VOCs and methane, a greenhouse gas</p> <p>Safety considerations where appropriate</p> <p>4CAQTF: Convert High-Bleed to Low-or No bleed Gas Pneumatic Controls; Convert Gas Pneumatics to Instrument Air; Utilizing Electric Chemical Pumps; Optical Imaging to Detect Gas Leaks</p>
40 hp - 100 hp Engines Subject to Reg. 7 Emission Limits	Reduce applicability threshold in Regs. 3/7 from 100 hp to 40 hp for new/relocated engines		<p>Benefits to be determined</p> <p>Consistent with proposed federal NSPS</p> <p>4CAQTF: Application of NSPS to existing RICE</p>

VOC EMISSION REDUCTION OPTIONS AND ISSUES FOR OIL AND GAS SOURCES

December 2007

Air Pollution Control Division

Oil and Gas Option/Issue	Brief Description	Implementation	Questions / Comments
Statewide Oil and Gas BACT Program	<p>- NA area: BACT required for any source with emissions \geq 2 tpy VOC or 5 tpy NO_x</p> <p>- Rest of State: BACT required for any source with emissions \geq 5 tpy VOC or 10 tpy NO_x</p>		<p>Benefits to be determined: would address NO_x, VOC, CO and greenhouse gases, methane; regional haze and ozone benefits</p> <p>IPAMs emissions work will inform</p>
Green Completions for Oil and Gas Well Development	Use of equipment to capture natural gas and VOCs through well-drilling completion activities		<p>Benefits to be determined</p> <p>More benefit on western slope Piceance basin due to higher field pressures and possibly higher VOC concentrations; Denver Julesburg basin benefits will be smaller due to lower field pressures; practical for infill areas where natural gas gathering lines exist</p> <p>Temporary emissions source, so permitting may not be practical</p> <p>Best required through the application for permit to drill process through the COGCC – to be proposed as part of the 1341 process</p> <p>4CAQTF: Implementation of reduced emissions completions; venting v. flaring during well completions</p>

VOC EMISSION REDUCTION OPTIONS AND ISSUES FOR OIL AND GAS SOURCES

December 2007

Air Pollution Control Division

Oil and Gas Option/Issue	Brief Description	Implementation	Questions / Comments
Leak Detection and Repair (LDAR) Program at E&P Sites and Compressor Stations; Extend LDAR to Gas Plants Statewide	<ul style="list-style-type: none"> - Valves, pump seals, connectors, flanges, open-ended lines - Follow KKK procedures - For valves, reduce 10,000 ppm detection threshold to 500 ppm 		<p>500 ppm for valves (Suncor and Roche already implementing)</p> <p>Rate (ppm) for other components to be determined</p> <p>Predominately a greenhouse gas, methane, reduction program with co-benefit of VOCs</p> <p>Benefits to be determined</p>
Install Insulation on Separators	Require existing and new separator vessels to be insulated in order to reduce fuel use and subsequently combustion emissions		<p>Energy efficiency measure leading to reduced emissions</p> <p>Benefits to be determined</p> <p>4CAQTF: Installation of Insulation on separators</p>
Increase Stringency of Regulation No. 7 Condensate Tank Control Program	<ul style="list-style-type: none"> - Eliminate 730 BBL/yr categorical APEN exemption that correlates to roughly 5 tons VOC per year, thereby effectively reducing the APEN reporting threshold to 1 tpy and subjecting all tanks greater than 1 tpy into the system wide 75% control requirement - Increase 75% system-wide condensate tank control requirements towards 95% - Simplify and convert recordkeeping and reporting intense system-wide control program to: All condensate tank batteries with actual uncontrolled emissions greater than or equal to 5 tpy are required to install controls meeting 95% efficiency - Increase 95% efficiency requirement to 98% (this is simply a paperwork change; the control device will continue to be the same) 		<p>WYO requires 98% control efficiency (technology already deployed in CO meets 98%; APCD would assign greater credit), based on specific tank tpy thresholds – thresholds differ across the state</p> <p>Benefits to be determined</p> <p>4CAQTF: BMPs for Tank Batteries; Install VRU/Gas Blankets/Floating Roofs</p>

VOC EMISSION REDUCTION OPTIONS AND ISSUES FOR OIL AND GAS SOURCES

December 2007

Air Pollution Control Division

Oil and Gas Option/Issue	Brief Description	Implementation	Questions / Comments
Increase Stringency of Regulation No. 7 Dehydrator Control Program	<ul style="list-style-type: none"> - Reduce dehydrator applicability requirement from 15 tpy to 2 tpy Increase 90% control requirement to 98% - Require optimization of lean glycol pump circulation rates on those dehydrators not subject to 98% control - Require installation of flash tank separators on new dehydration units to reduce emissions of methane - Alternative to install [portable] desiccant dehydrators - Alternative to use combustors for still vents 		<p>WYO requires 98% control efficiency</p> <p>Benefits to be determined</p> <p>4CAQTF: Replace Glycol Dehydrators with Desiccant Dehydrators; Portable Desiccant Dehydrators; Control Glycol Pump Rates</p>
Require New Heater Treaters, Reboilers and Process Heaters to be Equipped with BASO Valves	BASO valves prevent gas loss when pilot lights on combustion sources are extinguished by wind. The valve stops the flow of natural gas reducing methane emissions		<p>Predominantly greenhouse gas reduction</p> <p>Benefits to be determined</p>
Require Vapor Balance Recycling Lines during Condensate Loadout Operations	Require transport trucks and condensate storage tanks to be designed with vapor recycle lines to minimize the vapor displacement emissions that occur during loading		Benefits to be determined
Funding for Initiatives	<ul style="list-style-type: none"> - Cash for clunkers programs - Lawn mower/equipment trade-out programs - Diesel school bus retrofits 		<p>Benefits to be determined</p> <p>4CAQTF: School Bus Retrofit</p>
Require Existing Engines Outside of Front Range NA Area to Meet Requirements of Regulation No. 7 for EAC	<ul style="list-style-type: none"> - Retrofit of existing engines Statewide with NSCR controls on rich burn engines and oxidation catalyst on all lean burn engines greater than or equal to 500 HP - Alternative: install electronic compression 		<p>VOC, NOx and CO reductions to benefit regional haze and ozone</p> <p>Benefits to be determined</p> <p>4CAQTF: Stationary RICE Options for retrofit installation of controls; Interim Recommendations for Stationary RICE</p>

VOC EMISSION REDUCTION OPTIONS AND ISSUES FOR OIL AND GAS SOURCES

December 2007

Air Pollution Control Division