



State of Utah

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Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF AIR QUALITY
Bryce C. Bird
Director

DAQ-045-14

MEMORANDUM

TO: Air Quality Board

THROUGH: Bryce C. Bird, Executive Secretary

FROM: Colleen Delaney, Environmental Scientist

DATE: May 21, 2014

SUBJECT: PROPOSE FOR PUBLIC COMMENT: New Rules R307-501. Oil and Gas Industry: General Provisions; R307-502. Oil and Gas Industry: Pneumatic Controllers; R307-503. Oil and Gas Industry: Combustion Devices; R307-504. Oil and Gas Industry: Tank Truck Loading.

Background

Ozone is created by a photochemical reaction and the main precursors are volatile organic compounds (VOC) and nitrogen oxides (NO_x). High ozone levels have been measured in the Uinta Basin during winter temperature inversions when there is snow on the ground, which enhances the chemical reactions that create ozone. Elevated summertime ozone levels occur throughout the state. While summertime ozone is currently below the National Ambient Air Quality Standards (NAAQS), EPA is expected to lower the ozone standard to within the range of 60 – 70 ppb within the next two years. Depending on the level of the standard, a significant portion of Utah may exceed the new NAAQS. See Figure 1.

4th High, Daily Maximum, 8-Hour Ozone Trends

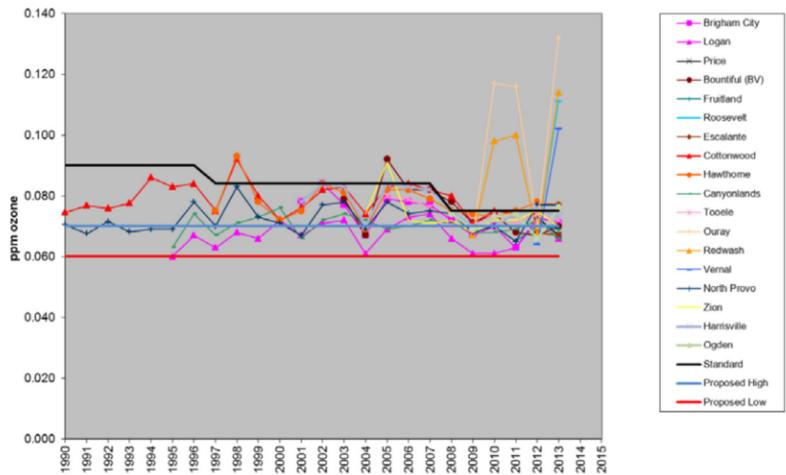


Figure 1. Ozone Trends in Utah, Source EPA AirData

Oil and gas production is the most significant source of anthropogenic VOC in Utah. In the Uinta Basin, oil and gas production accounts for 97% of anthropogenic VOC emissions.

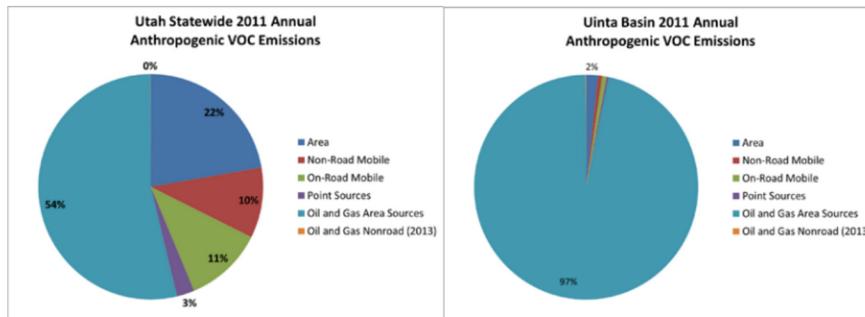


Figure 2. 2011 Annual Emissions

The State of Utah entered into EPA’s Ozone Advance Program in 2012 with the goal to proactively lower ozone values in the Uinta Basin. As part of that effort, DAQ drafted the four attached rules to establish general operating provisions for the oil and gas industry, establish control requirements that are highly cost-effective, and ensure that existing air pollution control equipment operates effectively. These draft rules were presented at an Oil and Gas Stakeholder public information meeting on July 30, 2013, and have been revised to address stakeholder comments.

General Provisions

The General Provisions rule, R307-501, establishes general requirements for prevention of emissions and use of good air pollution control practices for all oil and gas exploration, production, transmission and distribution operations; well production facilities; natural gas compressor stations; and natural gas processing plants. The rule requires that operating and maintenance procedures are conducted in a manner consistent with good air pollution control practices.

Pneumatic Controllers

Pneumatic controllers powered by pressurized natural gas are used in the oil and gas industry. In the past, high-bleed devices that vent natural gas to the atmosphere were commonly used. The recent oil and gas New Source Performance Standard (NSPS) OOOO requires the use of low-bleed controllers in most circumstances. R307-502 would require the replacement of existing high-bleed devices with low-bleed devices so that all pneumatic controllers in the state would meet the NSPS standard. While there is an initial cost to replace these controllers, there is also a benefit to the operators because the natural gas is recaptured and can be sold as product. EPA's Natural Gas Star Program estimates a cost of \$2,104¹ to replace an existing high-bleed controller. More recently, Colorado² estimated initial costs of \$1,420 to replace each high-bleed pneumatic controller. At current natural gas prices the new devices will pay for themselves in about 1½ to 2 years and will then continue to provide on-going savings to the company.

Implementation of this rule is estimated to reduce VOC emissions by 3,716 tons/year in the 5-county area included in the WRAP Phase III inventory for oil and gas (Duchesne, Uintah, Carbon, Emery, and Grand Counties). The draft rule phases in the requirement over several years. High-bleed pneumatic devices in Duchesne and Uintah Counties must be replaced by December 1, 2015 to provide reductions prior to the 2015/16 winter ozone season. High-bleed pneumatic devices in the rest of the state must be replaced prior to April 1, 2017 to provide reductions prior to the 2017 summer ozone season.

Flares

New or modified oil and gas well production sites are required to capture and control VOC emissions, and the typical control device is a flare. Utah's proposed General Approval Order (GAO) for a Crude Oil and Natural Gas Well Site and/or Tank Battery requires the VOC control device to reduce VOC emissions by 98%. The proposed GAO requires continuous compliance with this control efficiency standard. Because many well production sites are unmanned, if the wind or a surge of gas blows out the pilot light, it is possible for the combustion device to cease working for an extended period of time until personnel visit the site and relight the pilot light. During its recent rulemaking effort, Colorado estimated that pilot lights were not functioning about 3% of the time, leading to significant uncontrolled VOC emissions. Colorado estimated a cost of \$2,348 to retrofit an existing flare with an auto igniter, with an annualized cost of \$475. The overall cost effectiveness of the retrofit was \$302/ton of VOC reduced.³

R307-503 would require all new flares to be equipped with a self-igniter to relight the pilot light if the flame is extinguished. The rule would also require all existing flares in Duchesne and Uintah Counties to be retrofitted with self-igniters by December 1, 2015, to provide reductions prior to the 2015/2016 winter

¹ 2006 cost estimate adjusted to current costs using September 2013 Nelson-Farrar Refinery Operation Index as recommended in *Options for Reducing Methane Emissions from Pneumatic Devices in the Natural Gas Industry*, US EPA, October 2006.

² Regulatory Analysis for Proposed Revisions to Colorado Air Quality Control Commission Regulation Numbers 3, 6 and 7, February 11, 2014, pages 54-55.

³ *Ibid.*, pages 52-53.

ozone season. Flares in the rest of the state must be replaced prior to April 1, 2017, to provide reductions prior to the 2017 summer ozone season.

Tank Truck Loading

The proposed General Approval Order for a Crude Oil and Natural Gas Well Site and/or Tank Battery contains a requirement that all tanker trucks loading on-site use either bottom filling or submerged filling to reduce VOC emissions created by splashing of liquids when loading oil, condensate, or produced water. R307-504 would expand this requirement to all existing operations. DAQ estimates that this change could reduce VOC emissions due to tank truck loading by about 59% (1,017 tons/year in the Uinta Basin in 2015). In practice, many trucks are already equipped to meet the requirements established in existing approval orders so the overall benefit will be lower if fewer retrofits are required. The new rule will provide a consistent standard for all operators. Top-loading trucks can be inexpensively retrofitted by installing a pipe at the inlet to ensure that liquids are loaded using submerged fill instead of splash loading.

Staff Recommendation: Staff recommends the Board propose for public comment new rules R307-501, R307-502, R307-503, and R307-504.

1 **R307. Environmental Quality.**

2 **R307-501. Oil and Gas Industry: General Provisions.**

3 **R307-501-1. Purpose.**

4 R307-501 establishes general requirements for prevention of
5 emissions and use of good air pollution control practices for all oil
6 and gas exploration and production operations, well production
7 facilities, natural gas compressor stations, and natural gas
8 processing plants.

9
10 **R307-501-2. Definitions.**

11 (1) The definitions in 40 CFR 60, Subpart OOOO Standards of
12 Performance for Crude Oil and Natural Gas Production, Transmission and
13 Distribution, which is incorporated by reference in R307-210 apply to
14 R307-501.

15 (2) "Well production facility" means all equipment at a single
16 stationary source directly associated with one or more oil wells or
17 gas wells. This equipment includes, but is not limited to, equipment
18 used for storage, separation, treating, dehydration, artificial lift,
19 combustion, compression, pumping, metering, monitoring, and flowline.

20
21 **R307-501-3. Applicability.**

22 (1) R307-501 applies to all oil and gas exploration, production,
23 distribution, and transmission operations; well production facilities;
24 natural gas compressor stations; and natural gas processing plants in
25 Utah.

26 (2) R307-501 does not apply to oil refineries.

27
28 **R307-501-4. General Provisions.**

29 (1) General requirements for prevention of emissions and use of
30 good air pollution control practices.

31 (a) All intermediate hydrocarbon liquids collection, storage,
32 processing and handling operations, regardless of size, shall be
33 designed, operated and maintained so as to minimize emission of
34 volatile organic compounds to the atmosphere to the extent reasonably
35 practicable.

36 (b) At all times, including periods of start-up, shutdown, and
37 malfunction, the installation and air pollution control equipment
38 shall be maintained and operated in a manner consistent with good air
39 pollution control practices for minimizing emissions.

40 (c) Determination of whether or not acceptable operating and
41 maintenance procedures are being used will be based on information
42 available to the director, which may include, but is not limited to,
43 monitoring results, infrared camera images, opacity observations,
44 review of operating and maintenance procedures, and inspection of the
45 source.

1 (2) General requirements for air pollution control equipment.

2 (a) All air pollution control equipment shall be operated and
3 maintained pursuant to the manufacturing specifications or equivalent
4 to the extent practicable and consistent with technological
5 limitations and good engineering and maintenance practices.

6 (b) The owner or operator shall keep manufacturer specifications
7 or equivalent on file.

8 (c) In addition, all such air pollution control equipment shall
9 be adequately designed and sized to achieve the control efficiency
10 rates established in rules or in approval orders issued under R307-401
11 and to handle reasonably foreseeable fluctuations in emissions of VOCs
12 during normal operations. Fluctuations in emissions that occur when
13 the separator dumps into the tank are reasonably foreseeable.

14
15 KEY: air pollution, oil, gas,

16 Date of Enactment or Last Substantive Amendment: 2014

17 Authorizing, and Implemented or Interpreted Law: 19-2-104(1)(a)

1 **R307. Environmental Quality.**

2 **R307-502. Oil and Gas Industry: Pneumatic Controllers.**

3 **R307-502-1. Purpose.**

4 (1) The purpose of R307-502 is to reduce emissions of volatile
5 organic compounds from pneumatic controllers that are associated with
6 oil and gas operations.

7 (2) The rule requires existing pneumatic controllers to meet the
8 standards established for new controllers in 40 CFR Part 60, Subpart
9 0000.

10
11 **R307-502-2. Definitions.**

12 (1) The definitions in 40 CFR 60, Subpart 0000 Standards of
13 Performance for Crude Oil and Natural Gas Production, Transmission and
14 Distribution, which is incorporated by reference in R307-210 apply to
15 R307-502.

16 (2) “Existing pneumatic controller” means a pneumatic controller
17 affected facility as described in 40 CFR 60.5365(d)(1) through (3)
18 that was constructed, modified, or reconstructed prior to October 15,
19 2013.

20
21 **R307-502-3. Applicability.**

22 R307-502 applies to the owner or operator of any existing
23 pneumatic controller in Utah.

24
25 **R307-502-4. Retrofit Requirements.**

26 (1) Effective December 1, 2015, all existing pneumatic
27 controllers in Duchesne County or Uintah County shall meet the
28 standards established for pneumatic controller affected facilities
29 that are constructed, modified or reconstructed on or after October
30 15, 2013, as specified in 40 CFR 60, Subpart 0000 Standards of
31 Performance for Crude Oil and Natural Gas Production, Transmission and
32 Distribution.

33 (2) Effective April 1, 2017 all existing pneumatic controllers
34 in Utah shall meet the standards established for pneumatic controller
35 affected facilities that are constructed, modified or reconstructed on
36 or after October 15, 2013 as specified in 40 CFR 60, Subpart 0000
37 Standards of Performance for Crude Oil and Natural Gas Production,
38 Transmission and Distribution.

39
40 **R307-502-5. Documentation Required.**

41 The owner or operator shall identify all existing pneumatic
42 controller facilities that were replaced or retrofitted to meet the
43 requirements of R307-502-4 in the annual report required under 40 CFR
44 60.5420.

45

- 1 KEY: air pollution, oil, gas, pneumatic controllers
- 2 Date of Enactment or Last Substantive Amendment: 2014
- 3 Authorizing, and Implemented or Interpreted Law: 19-2-104(1)(a)

1 **R307. Environmental Quality.**
 2 **R307-503. Oil and Gas Industry: Flares.**
 3 **R307-503-1. Purpose.**

4 R307-503 establishes conditions to ensure that combustion devices
 5 used in the oil and gas industry are operated effectively.
 6

7 **R307-503-2. Definitions.**

8 "Auto igniter" means a device which will automatically attempt to
 9 relight the pilot flame in the combustion chamber of a control device
 10 in order to combust volatile organic compound emissions.
 11

12 **R307-503-3. Applicability.**

13 (1) R307-503 applies to all oil and gas exploration and
 14 production operations, well sites, natural gas compressor stations,
 15 and natural gas processing plants in Utah.

16 (2) R307-503 does not apply to oil refineries.
 17

18 **R307-503-3. Auto-Igniters.**

19 (1) All open or enclosed flares used to control emissions of
 20 volatile organic compounds shall be equipped with and operate an auto-
 21 igniter as follows:

22 (a) All open or enclosed flares installed on or after November
 23 1, 2014, shall be equipped with an operational auto-igniter upon
 24 installation of the flare.

25 (b) All open or enclosed flares installed before November 1,
 26 2014, in Duchesne County or Uintah County shall be equipped with an
 27 operational auto-igniter by December 1, 2015, or after the next flare
 28 planned shutdown, whichever comes first.

29 (c) All open or enclosed flares installed before November 1,
 30 2014, in all other areas of Utah shall be equipped with an operational
 31 auto-igniter by April 1, 2017, or after the next flare planned
 32 shutdown, whichever comes first.
 33

34 **R307-503-4. Recordkeeping.**

35 The owner or operator shall maintain records demonstrating the
 36 date of installation and manufacturer specifications for each auto-
 37 igniter required under R307-503-3.
 38

39 **KEY: air pollution, oil, gas, flares**
 40 **Date of Enactment or Last Substantive Amendment: 2014**
 41 **Authorizing, and Implemented or Interpreted Law: 19-2-104(1) (a)**

1 **R307. Environmental Quality.**

2 **R307-504. Oil and Gas Industry: Tank Truck Loading.**

3 **R307-504-1. Purpose.**

4 R307-504 establishes control requirements for the loading of
5 liquids containing volatile organic compounds at oil or gas well
6 sites.

7
8 **R307-504-2. Definitions.**

9 (1) The definitions in 40 CFR 60, Subpart 0000 Standards of
10 Performance for Crude Oil and Natural Gas Production, Transmission and
11 Distribution that is incorporated by reference in R307-210 apply to
12 R307-504.

13 (2) "Bottom Filling" means the filling of a tank through an
14 inlet at or near the bottom of the tank designed to have the opening
15 covered by the liquid after the pipe normally used to withdraw liquid
16 can no longer withdraw any liquid.

17 (3) "Submerged Fill Pipe" means any fill pipe with a discharge
18 opening which is entirely submerged when the liquid level is six
19 inches above the bottom of the tank and the pipe normally used to
20 withdraw liquid from the tank can no longer withdraw any liquid.

21 (4) "Well production facility" means all equipment at a single
22 stationary source directly associated with one or more oil wells or
23 gas wells.

24
25 **R307-504-3. Applicability.**

26 R307-504 applies to any person who loads or permits the loading
27 of any intermediate hydrocarbon liquid or produced water at a well
28 production facility after January 1, 2015.

29
30 **R307-504-4. Tank Truck Loading Requirements.**

31 Tank trucks used for intermediate hydrocarbon liquid or produced
32 water shall be loaded using bottom filling or a submerged fill pipe.

33
34 **KEY: air pollution, oil, gas**

35 **Date of Enactment or Last Substantive Amendment: 2014**

36 **Authorizing, and Implemented or Interpreted Law: 19-2-104(1) (a)**

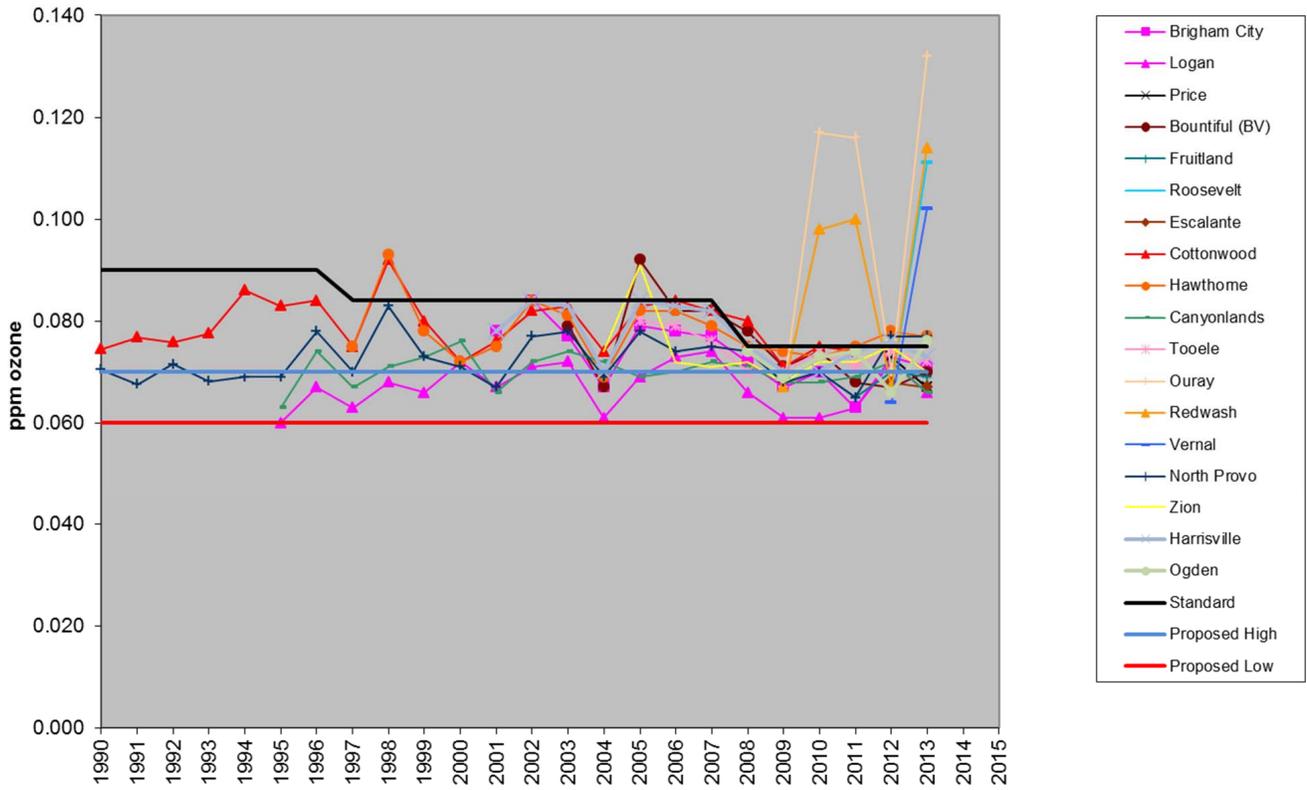
Oil and Gas Rulemaking

Colleen Delaney

Utah Division of Air Quality

June 4, 2014

4th High, Daily Maximum, 8-Hour Ozone Trends

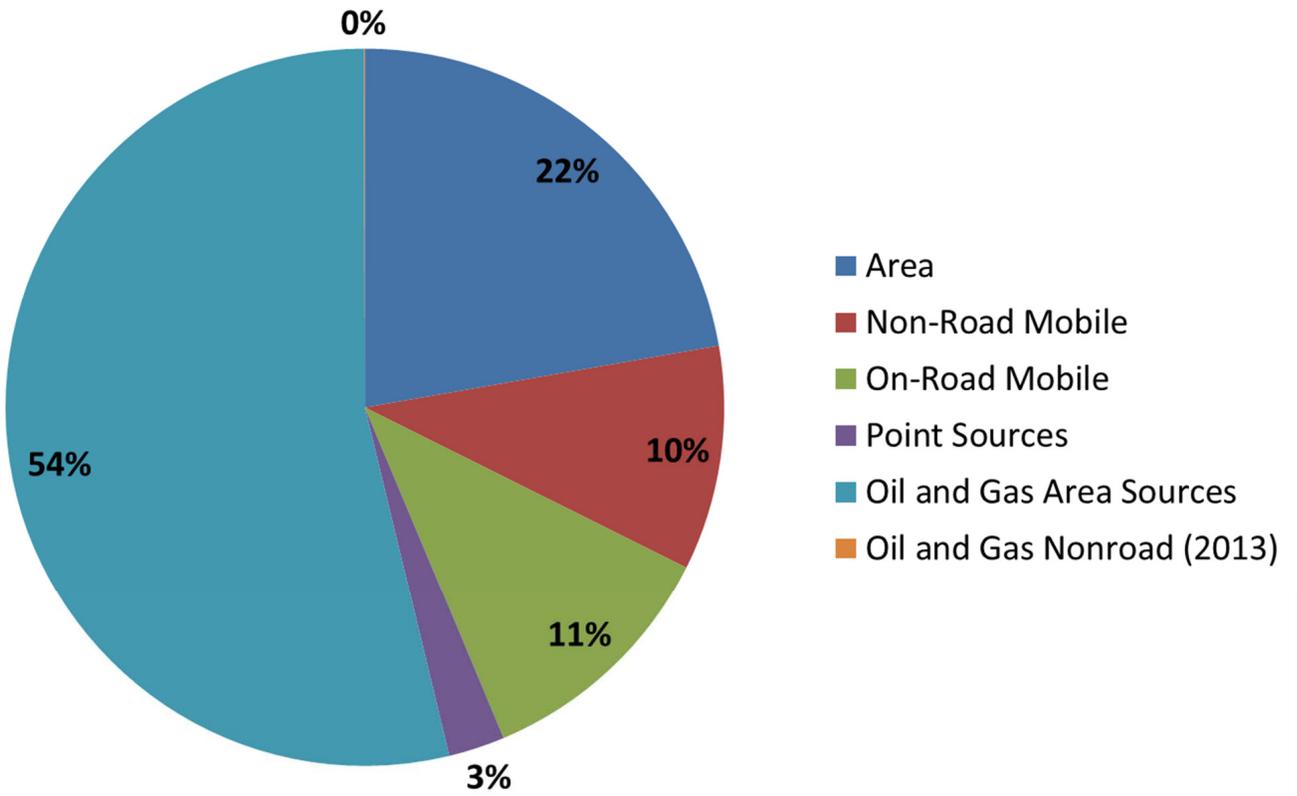


Source: EPA AirData

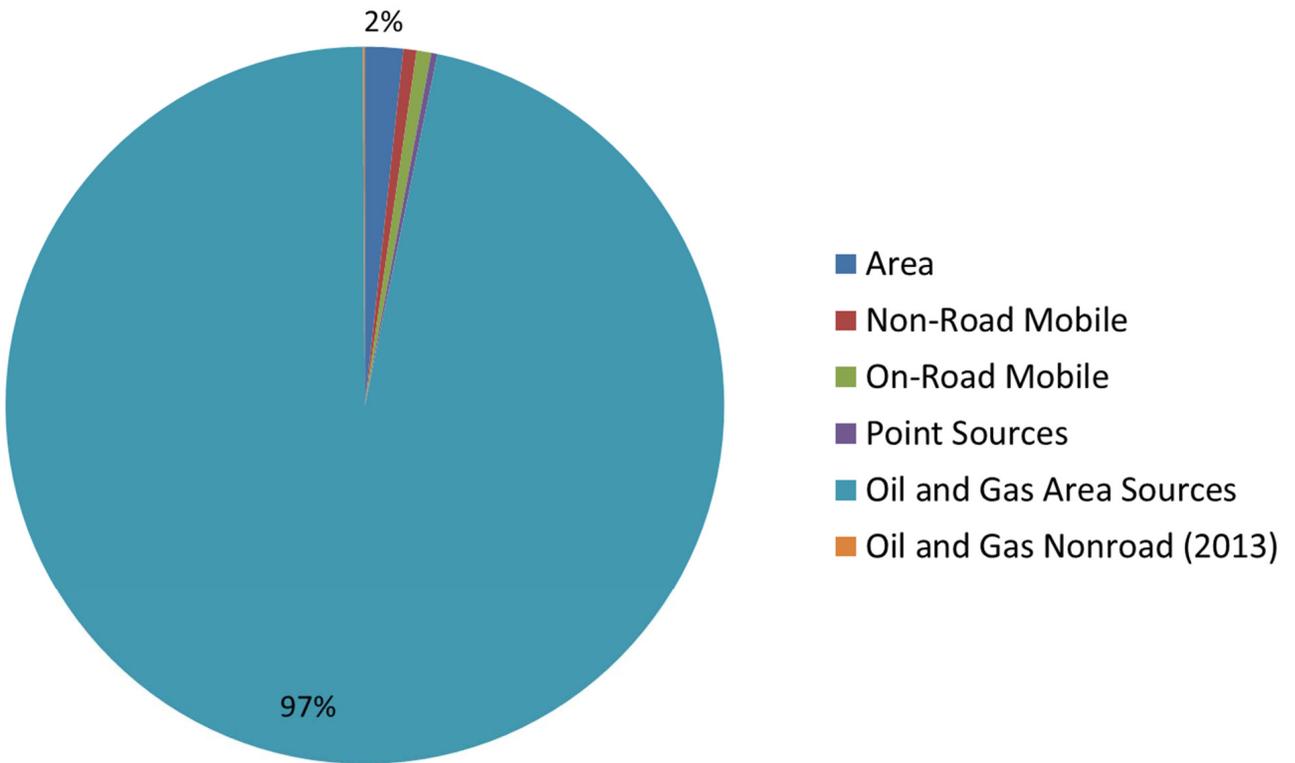
Ozone

- Statewide ☐ Summertime ☐ Ozone
 - EPA ☐ expected to propose tighter standard in December 2014
- Uinta Basin ☐ Wintertime ☐ Ozone
 - Occurs during temperature inversions when there is snow on the ground
 - Extensive research since 2010
 - VOC reductions are most likely to reduce ozone
 - DAQ focus
 - Research, emission inventory, modeling development to ensure that ozone formation is understood and strategies are effective
 - Permitting
 - Ensure new sources are well controlled
 - Existing sources above permitting thresholds required to have an approval order
 - Emission reductions from existing, legacy equipment that is not well controlled
 - Retrofit rules, first round
 - Cost effective
 - Ensure existing equipment is operating as designed
 - Comments received through stakeholder process prior to proposal
 - Additional retrofit strategies through Ozone Advance Program

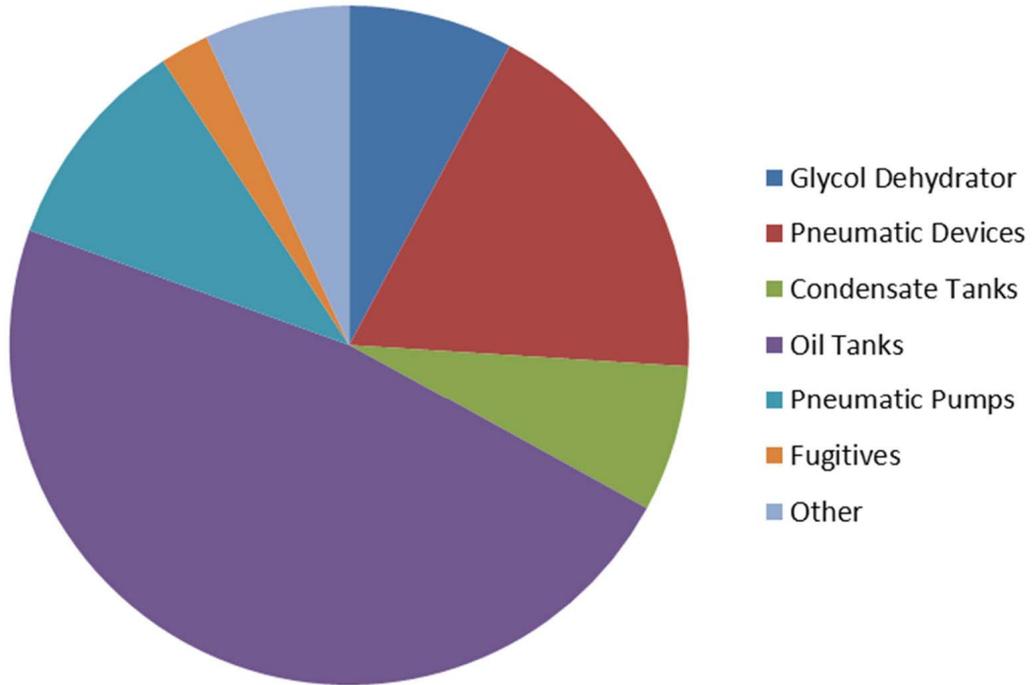
Utah Statewide 2011 Annual Anthropogenic VOC Emissions



Uinta Basin 2011 Annual Anthropogenic VOC Emissions



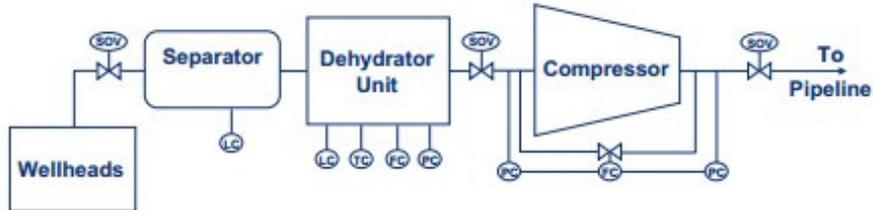
VOC Emissions Duchesne and Uintah Counties State Jurisdiction Only



Proposed Oil and Gas Rules

- R307-501 General Provisions
 - VOC emissions minimized
 - Equipment must be properly maintained and operated
 - Equipment sized properly
- R307-502 Pneumatic Controllers
 - Accelerate implementation of NSPS standards
 - Replace high-bleed controllers with low-bleed or no-bleed controllers
 - December 1, 2015 in Uinta Basin
 - April 1, 2017 statewide
 - Controllers pay for themselves in 1 ½ - 2 years in most cases
 - Estimated emission reduction 3,716 tons VOC/yr statewide

Location of Pneumatic Devices at Production Sites



- SOV = Shut-off valve (Unit isolation)
- LC = Level control (Separator, contactor, flash tank separator, TEG regenerator)
- TC = Temperature control (Regenerator fuel gas)
- FC = Flow control (TEG circulation, compressor bypass)
- PC = Pressure control (FTS pressure, compressor suction/discharge)

Low and No-bleed Pneumatic Valves





Examples of Electric-Actuated Valves



Proposed Oil and Gas Rules

- R307-503 Flares
 - Require all new flares to be equipped with an automatic igniter
 - Require existing flares to be retrofit
 - December 1, 2015 Uinta Basin
 - April 1, 2017 statewide
 - Estimated cost \$302/ton VOC reduced
- R307-504 Tank Truck Loading
 - Require bottom filling or submerged pipe filling

Bottom or Submerged Filling

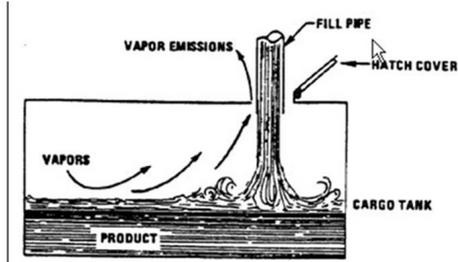


Figure 5.2-2. Splash loading method.

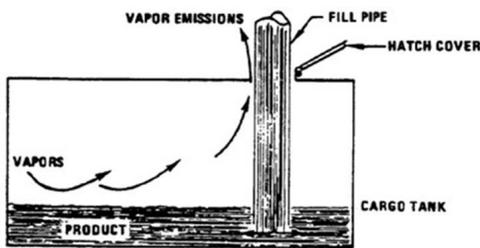


Figure 5.2-3. Submerged fill pipe.

- Condensate, oil, and produced water are collected at many oil or gas well sites
- Splash loading of tanker trucks churns the liquid, increasing VOC emissions
- Bottom filling or submerged loading of tank trucks reduces loading loss by about 59% when compared to splash loading (AP-42, page 5.2-4)
 - Inexpensive retrofit
 - Currently required in UDAQ approval orders