

From: [Jerry Alberts](#)
To: [Ash, Margaret](#); [Neslin, David](#)
Subject: Response to Watson Ranch NOAV
Date: Tuesday, August 10, 2010 12:39:23 PM
Attachments: [xMSDS-Citric acid-9923494.pdf](#)
[AreaRAE_datasheet.pdf](#)
[MECT-WS-1 MSDS.PDF](#)
[MECT-WS-1 PDB.DOC](#)

Margaret and Dave,

This email is provided as Antero's response to the COGCC July 16, 2010 NOAV issued by your staff on July 14, 2010 for API 05-045-19108. The odor reduction BMP list(s) are included as part of this response and they also serve to address your request as per our July 22 meeting.

Please contact me at your convenience with any questions regarding these issues and the information presented herein.

Best regards, - - Jerry

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Response to July 16, 2010 Notice of Alleged Violation (NOAV)

Operator Number: 10079
Well Name: BAT, Well Number: 13B-17-07-95
Facility Number: 415587
API Number: 05 045 19108 00
COGCC Representative: Shaun Kellerby

Date of Alleged Violation:

July 14, 20109

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Description of Alleged Violation:

On 7/14/10 COGCC staff conducted an inspection of API 05-045-19108 in response to a complaint of a hydrocarbon odor. Before entering the pad site a strong odor was noticed on Gardner Lane. On pad site odor was noticed with flow back activity, contractor stated that seven (7) wells were actively in flow back at the time of the inspection. Flow back tanks were open top tanks, and tanks with hatch's that were open during the flow back process. A gas monitor indicated that a small amount of methane was present in the flow back tanks being used at the time of the inspection.

Act, Order, Regulation, Permit Condition Cited:

805.a. General. Oil and gas facilities and equipment shall be operated in such a manner that odors and dust do not constitute a nuisance or hazard to public welfare.

Abatement or Corrective Action Required to be Performed by Operator:

Operator will monitor completion operations for odor, and adjust operations as needed, to eliminate odor.

Abatement or Corrective Action to be Completed by:

July 16, 2010

Antero NOAV Response:

Antero regrets that unpleasant odors were detected by some residents and Mr. Kellerby of the COGCC staff, during the early and late evening periods of several days in mid-July, downwind of the Watson Ranch site. After looking into these odor issues, Antero believes that they likely arose from a specific biocide applied to flowback water during a discrete part of Antero's completion process and were detected because of the wind direction during that period of time. Antero notes that the unpleasant odors would be described as "organic" in nature – more like a septic system odor rather than some type of non-natural chemical odor. Antero strives to utilize the best practical treatment, maintenance or control technologies and operational practices to minimize odors.

To address odors arising from evening flowback operations during the completion process, as described in more detail in our response below, Antero has already: installed a portable meteorological station onsite to better understand wind and weather patterns in the local Watson Ranch site vicinity, installed tarps on the open top flowback tanks, performed daily checks on its auto-igniter equipment, undertook operational modifications (adding the biocide to full, rather than near empty flowback tanks), and completed the initial testing of an alternative biocide(s) for treating the flowback water. As our response details, Antero will continue to implement these odor reduction actions and otherwise further adjust its operations as needed to minimize odors. Although no data suggests that the odors constituted any public health hazard to nearby residents, Antero will continue to take steps to ensure that nearby or downwind residents do not detect unpleasant odors as a result of Antero's operations.

Odor Reduction Strategies Implemented Prior the Commencement of Fracture Stimulation Operations

1. Combustor VOC Controls – Vapors from production tanks are routed to a combustor equipped with an automatic igniter. Vapors are controlled in accordance to CDPHE General Permit standards.
2. Salable and Non-salable Flowback Gases - Collected and either routed to a portable flare or to the sales pipeline.
 - a. Initial flowback is routed to a flash separator (closed system) and then to an open top flowback tank. The flash separator acts to reduce odors by allowing the non-salable gas in the flowback to be collected and routed to the portable flare.
 - b. Initial flowback is eventually routed to a four-phase separator (green completion skid) as the volume of flowback water returned from the well decreases.
 - c. Non-salable gas from the four-phase separator is routed to the above portable flare for a short period of time until the 4-phase separator pressure increases such that it allows the gas to be routed to the sales pipeline.
 - d. Flowback water is continuously routed to the flash separator to reduce odors and then to the open top flowback tank until the well is placed on production.
 - e. The open top flowback tanks were subsequently equipped with tarps to reduce odors on July 16, 2010.
 - f. Temporary flare operates with an automatic igniter.
3. Frac Storage Tank Hatches – Were inspected on July 14, 2010 and the hatches on tanks

that held flowback water were confirmed as closed. The Antero Standard Operating Procedure (SOP) states that all frac storage tank hatches are closed until the tanks are being prepared to receive flowback water. At that time the hatches are open until they are deemed full and then subsequently closed.

4. Air Monitoring Study – Collected VOC data for a 24-hour period on July 15/16, 2010 and again towards the end of August during frac/flowback operations at the Watson Ranch Pad. Monitoring included grab samples collected during potential odor events. Targeted compounds including but not limited to glutaraldehyde. Data will be available in September/October and shared with the COGCC, CDPHE and the Colorado School of Public Health.

Odor Reduction Adjustments Completed in Response to July 16, 2010 NOAV

1. Open top flowback tanks were retrofitted with tarps to reduce odors.
2. Portable meteorological weather station installed on July 15 – Includes data logger to archive wind speed/direction, temp and humidity. Information to be shared with COGCC and CDPHE during future odor investigations.
3. Frac Storage Tanks – Were emptied pending resumption of fracing schedule to reduce potential odors following last batch of July fracture stimulations. A total of 39 frac/flowback tanks were emptied and this effort commenced on July 16 and took about 6 days to complete.
4. Adjustments to 4-Phase Separators – Purpose is to reduce gas in water that is dumped to the flash separator and then to the open top flowback tank.
5. Frac Storage Tanks Treatment with Citric Acid - Immediately introduced to the frac storage tanks (41) as a countermeasure to reduce odors. About 5 gallons of citric acid were used to treat about 300 bbls of water in the frac storage tanks. The MSDS for this product is attached.
6. Auto Igniters – Daily site visits by pumpers to monitor performance.
7. CDPHE Tim Taylor conducted odor monitoring at the Watson Ranch Pad on July 27, 2010
 - Findings demonstrate compliance with Reg 2 Odor Standard
 - Odor monitoring collected according to CDPHE Reg 2 Methodology
 - Used Nasal Ranger and appropriate dilutions, (2:1, 4:1, 7:1 and 15:1)
 - Results compared to odor standards application to “residential” areas

Odor Reduction Strategies to Supplement Existing Odor Reduction BMPs for the Watson Ranch August/September 2010 Fracture Stimulation Operations

1. Pilot project to evaluate the operational feasibility of alternative Biocides whose chemical properties suggest an odor reduction benefit. The pilot project will be implemented during the Aug/Sept fracture stimulations scheduled for the Watson Ranch Pad. The MSDSs for the two biocides that are likely to be evaluated are attached for your review.
2. Engage with Roxana Witter of the Colorado School of Public Health to evaluate the toxicology and odor reduction benefits of the alternative biocides under consideration in pilot study.
3. Standard Operating Procedure for biocide treatment of frac storage tanks was revised.
 - a. Biocide typically added in the evening to each empty frac storage tank and during the night the storage tanks are filled with flowback water from the well.
 - b. Revised SOP is to batch treat with the biocide after the flowback tanks are deemed full.
4. Endorsed RAE Photo Ionization Detector. Used to detect hydrocarbons releases and potential HC odors from open top flowback tanks. Brochure is attached.

Supplemental Odor Reduction Adjustments Under Consideration for Future Fracture Stimulation Operations

1. Strategies for additional collection and treatment of vapors from open top flowback tanks are under investigation. For example, routing the flowback tank overhead to a charcoal scrubber.
2. Odor Mitigation via Bio Remediation Technologies. Treating frac storage tanks to further reduce potential hydrocarbon odors. Pilot study is ongoing. AquaSol and Trident3 are products under consideration.

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