APCD
Oil & Gas Team

Memo

To: Mark McMillan and Scott Patefield

From: Tim Taylor

Date: August 5, 2010

Re: Antero Resources Piceance Corp. – Watson Ranch (AIRS ID 045/1903) Odor Complaint Investigation

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On July 26 and 27, 2010, Tim Taylor of the Air Pollution Control Division (APCD) visited the area surrounding Antero Resources Piceance Corporation's (Antero) Watson Ranch site (AIRS ID 045/1903) near Battlement Mesa in Garfield County, Colorado, in response to several citizen odor complaints filed with the APCD concerning the site. Mr. Taylor was certified to conduct odor measurements on October 14, 2010 and the certification is effective for one (1) year. At the time of the odor investigation by Mr. Taylor, Watson Ranch contained existing condensate tanks controlled by an enclosed flare, as well as natural gas drilling equipment, including a drill rig, drill rig engines, numerous fracturing ("fracing") liquid holding tanks and a second larger flare for burning off flow back gasses from the drilling operation. Drilling operations were being conducted at the site both days of the investigation. As part of the investigation, Mr. Taylor used a certified calibrated Nasal Ranger (serial no. 90201215; calibrated April 3, 2009) to determine if there were violations of Air Quality Control Commission (AQCC), Regulation No. 2 Odor Emission, 5 C.C.R. 1001-4. Prior to each use of the Nasal Ranger, Mr. Taylor verified the Nasal Ranger had a leak tight fit, and then would set the Nasal Ranger Dilution-to-Threshold (D/T) ratio dial to a "blank" position in order to inhale odor-free filtered air several times, then adjust the Nasal Ranger to the first D/T ratio setting (60/1) to begin an odor measurement. A summary of Mr. Taylor's investigation is noted below. Also included is a basic map outlining the Watson Ranch site and surrounding area, including where Mr. Taylor conducted the odor measurements.

DATE: July 26, 2010
TIME: 6:28 p.m.
WIND DIRECTION & SPEED: Out of the southwest at approximately 5 – 10 miles per hour (mph).
DETAILS: I was positioned downwind or northeast of Watson Ranch at the corner of Underwood Lane and Gardner Lane, which was the closest possible public access point to the site based on the wind direction at the time, and was approximately half a mile from the site. I positioned myself at this location, as I was able to periodically detect a slight petrochemical/hydrocarbon-smelling odor on my own (not using Nasal Ranger) from this location over a period of one (1) hour. However, I was unable to detect the same odor using the Nasal Ranger at any D/T ratio (60/1 – 2/1) during this time period. Note that I did not observe any other oil or natural gas operations upwind or southwest of the Watson Ranch site.

DATE: July 26, 2010
TIME: 8:45 p.m.
WIND DIRECTION & SPEED: Out of the southwest at approximately 5 – 10 miles mph.
DETAILS: I again positioned himself downwind or northeast of Watson Ranch at the closest possible public access point to the site at the corner of Underwood Lane and Gardner Lane and was able to periodically detect a slight petrochemical/hydrocarbon-smelling odor on my own (not using Nasal Ranger) from this location over a period of 45 minutes. However, I was unable to detect the same odor using the Nasal Ranger at any D/T ratio (60/1 – 2/1) during this time period.

DATE: July 27, 2010
TIME: 10:00 a.m.
WIND DIRECTION & SPEED: Out of the northeast at approximately 5 – 10 miles mph.
DETAILS: I positioned downwind or southwest of Watson Ranch at a public access point to the site located near 304 County Road (CR) 303, just east of the intersection of CR 300 and CR 303, and approximately one-eighth (1/8) mile from Watson Ranch . I positioned myself at this location, as I was able to periodically detect a distinct petrochemical/hydrocarbon-smelling odor on my own (not using Nasal Ranger) from this location. I also spoke with the owner of the property at address 304 CR 303 who came out to the County Road to inquire about my activities at the time. According to this individual (name not obtained), he had been working on building a house on his property, which was not complete at the time, for several months, and over the prior week had noticed a petrochemical/hydrocarbon-smelling odor that appeared to be coming from the Watson Ranch site that was particularly strong during the early morning hours when there was little to no wind present. I provided this individual with my APCD business card for contact purposes.

At 11:34 a.m., I detected the petrochemical/hydrocarbon-smelling odor on my own at the public access point located near 304 CR 303and upon using the Nasal Ranger was able to detect the same odor beginning at the 7/1 D/T ratio and at the 4/1 and 2/1 D/T ratios, but not at any D/T ratio higher than 7/1. At 12:04 p.m., I again detected the petrochemical/hydrocarbon-smelling odor on my own and upon using the Nasal Ranger was able to detect the same odor beginning at the 7/1 D/T ratio and at the 4/1 and 2/1 D/T ratios, but not at any D/T ratio higher than 7/1. I then travelled to an upwind or northeast location from the Watson Ranch site at the corner of Underwood Lane and Gardner Lane and using the Nasal Ranger pointed into the direction of the wind, which was still blowing out of the northeast, was unable to detect any odor at any D/T ratio (60/1 – 2/1). I then travelled to the guarded entrance to the Watson Ranch site and requested to meet with an Antero representative in order to present and discuss my odor findings. However, instead of an Antero representative, Mr. John Flahie, Assistant Operations Manager with Safety Inc. (Watson Ranch security contractor) came down to meet with me and I presented my odor findings in writing to him and asked that the information be passed along to Antero, which Mr. Flahie indicated would be done. Mr. Flahie noted that the odor findings were passed along to Antero's Piceance Basin Operations Manager, John Black (phone 970-231-1997).

According to AQCC, Regulation No. 2, Part A, section I and I.A., detectable odors measured in excess of seven (7) or more volumes of odor free air, or a 7/1 D/T ratio, in a predominately residential area is considered a violation. Regulation No. 2, Part A, section II requires two (2) odor measurements be made within a period of one (1) hour, with the measurements separated by at least 15 minutes. Watson Ranch appears to be located in a predominately residential area, as several residences are located directly south and west of the site. As noted, Mr. Taylor was unable to obtain an odor measurement at the site in excess of the 7/1 D/T ratio (next highest setting on Nasal Ranger is 15/1 D/T ratio). However, because two (2) odor measurements were obtained at the 7/1 D/T ratio within one (1) hour and separated by at least 15 minutes, APCD does have ongoing concern regarding the odor complaints filed in relation to Watson Ranch and the odor measurements obtained by Mr. Taylor.
In order to address those concerns, Mr. Taylor followed up with Mr. John Black of Antero on August 2, 2010 to further discuss Mr. Taylor's odor readings for Watson Ranch and any actions Antero had taken or was planning to take to address the odor issue. Mr. Black indicated Antero was aware of the odor issue and associated complaints, particularly since the Watson Ranch site had recently been investigated and cited by the Colorado Oil and Gas Conservation Commission (COGCC) regarding the odors prior to Mr. Taylor's investigation, and as a result, along with being aware of Mr. Taylor's investigation, Antero had taken a number of steps to address the issue. First and foremost, Mr. Black noted that the "frac" tanks on site had been completely emptied on Thursday, July 29, 2010 and completion of the three (3) remaining wells at Watson Ranch was put on hold while Antero investigated use of a product or compound d known as "Humates" to control odors, which Mr. Black indicated was a naturally-occurring type of bio-mud used predominately in the Agriculture industry. Mr. Black stated Antero was awaiting results from the Humates sampling and testing that had been conducted for Watson Ranch, but, regardless of the results, Antero planned to use fresh water for fracing and well completion activities when those resume at Watson Ranch to minimize odor. Finally, Mr. Black indicated Antero had installed a Photo Ionization Detector (PID) the weekend of July 24-25, 2010 northwest of the Watson Ranch site to measure and record any hydrocarbons blowing downstream in that direction from the Watson Ranch site, since the odor complainants reside in residential areas northwest of the site. Mr. Black also stated a Meteorological (MET) station was installed at Watson Ranch on July 14, 2010 to measure and record meteorological data. Should there be additional odor complaints filed concerning Watson Ranch in the future, the Inspector recommends requesting the MET and PID data from Antero if the Division investigates the issue.

Finally, on August 3, 2010, Mr. Taylor was contacted by Mr. Cole Kilstrom of Antero to inform him that Antero was drafting an official response to the COGCC summarizing the actions Antero had taken and was planning to take to address the Watson Ranch odor issue. Mr. Kilstrom inquired if Mr. Taylor would like to be copied on that response, which Mr. Taylor confirmed. As of the date of this memo, the response had not been received.

MAP OF WATSON RANCH SITE AND SURROUNDING AREA