

Antero Resources

Gypsum Ranch B Pad Response to NOAV 200332643

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Antero Resources
Gypsum Ranch B Pad: Response to NOAV 200332643
Spill/Release Tracking Number 2597032

Introduction

On December 6, 2011 a produced water spill occurred at Antero Resources' ("Antero") Gypsum Ranch B Pad. The details of this spill were provided to the COGCC in a Form 19 on December 12, 2011. The information provided in the Form 19 contained among other things; Antero's detailed description of the cause of the spill, Antero's emergency spill response and Antero's proposed actions to prevent the problem from reoccurring. The submitted Form 19 is provided with this submittal in Appendix A, "Gypsum Ranch B Pad Form 19."

The produced water spill impacted approximately 11,758 total square feet. The majority of the spill was limited to the Gypsum Ranch B pad and access road, however approximately 1 bbl of produced water impacted the adjacent gravel pit pond. A map of the impacted area is provided in Appendix A.

At the time of the incident the temperature was significantly below freezing and the impacted pond was frozen. Based on Antero's investigation of the spill, the produced water that impacted the pond was limited to a thin layer on top of the frozen pond surface and the produced water soon froze to the ponds surface.

Section 1: Remediation Plan

Antero implemented a strategy to remediate the impacted area of the frozen pond by removing the ice with a track hoe. The area of pond impacted by the spill is approximately 15 feet by 15 feet starting at the point of entry. Antero utilized a track hoe with a 27 foot reach to break the impacted ice and store the ice at the Gypsum Ranch B Pad. A confirmation water sample was collected from the water surface once the impacted ice was removed. The removed ice was placed in a metal trough located within the Gypsum Ranch B pad perimeter berm. When the ice melted, the water was transported to Antero's Wasatch Bench Water Management Facility to be re-used in Antero's water recycling system.

Immediately upon the spill discovery, Vac Trucks were sent to the location to remove the free standing liquids. Microblaze was applied to the impacted areas soon after the liquids were removed with a Vac Truck. Soil samples were collected two days later on December 8, 2011 by a third party and analyzed for compliance with the Table 910-1 constituents. Analytical summary tables, the lab results, and the soil and water sample location map are provided in Appendix B "Pad Sampling Analytical Results." The results show that the impacted areas do not exceed Table 910-1 standards for soil and water. Antero had deemed the site as in compliance with the COGCC cleanup standards and therefore is not planning to conduct additional pad and access road remediation work.

Section 2: Engineering Evaluation of the Water Line Failure

The spill was located at an above ground pipeline manifold at the Gypsum Ranch B Pad of Antero's Phase V of the Piceance water network. The well pads connected by Phase V of the water network are the Snyder C Pad, Snyder D Pad, Snyder A Pad, Gypsum Ranch B Pad, and the Gypsum Ranch A Pad. The purpose of Phase V of the network was to extend the pipeline infrastructure from the Dever A Pad to the Snyder C Pad and continue it west to the Gypsum Ranch A Pad. The pipeline is design with 12 inch PE-4710, SDR 9.0 pipeline. The material pressure rating is 252 psi, with a design pressure of 200 psi.

The cause of the spill was due to the insufficient closing of the gate valve on the pipeline manifold. Since the gate valve wasn't completely closed, there was a small space for produced water to slowly move from the main water line into the valve cap space. The cap area slowly filled with water and when temperatures were well below freezing for a significant period of time, the water expanded by 10% in volume by converting to ice. Due to the increase in volume, pressure built up inside the valve cap and caused it to release at the point of least resistance, the metal cap. A typical drawing of what occurred and a picture of the rupture is provided in Appendix C.

Three direct measures are being taken to prevent this problem from re-occurring, as stated in the submitted Form 19. The measures include the following; 1) insulate above ground pipeline manifolds, 2) drain the production water from isolated pipeline sections that are not used daily, and 3) conduct monthly field wide maintenance/housekeeping visits during the winter months (e.g. checking gate valves).

Integrity testing of this specific section of the Phase V pipeline network was conducted most recently on November 22, 2011. The original integrity test conducted after installation was completed on February 18, 2009. These two integrity tests are included in Appendix D, "Integrity Testing Records."

Section 3: Ice/Water Samples of the Impacted Pond at Entry Point

Antero engaged a third party consulting firm to assess the spill impacts and to collect water quality data to support this analysis. As such, a water sample was collected at the pond entry point on December 8, 2011. At the time of collection, the water sample was collected by chipping ice from the surface of the pond until a representative sample of produced water at the impact point was collected. The results from this sampling are included in Appendix B and show small traces of diesel range organics, benzene, and toluene, but all the parameters analyzed meet Table 910-1 standards.

A confirmation water sample was taken on January 31, 2012 by a third party consulting firm. This sample was taken after the impacted frozen surface layers of the pond were removed. The results of the sampling are including in Appendix B. The results show no detectable traces of hydrocarbons and a pH in the normal range. All other sampled parameters tested for meet Table 910-1 standards. Based on the analytical results obtained from the pond sample, Antero requests that no further pond remediation is necessary.

Section 4: Chemical Analysis of the Produced Water in the Water Line

After the spill incident, Phase V of Antero's water pipeline was drained and a produced water sample could not be collected straight from the waterline at the spill origin. However, a representative sample of the produced water that was in the water pipeline was collected at the Wasatch Bench Pond on December 21, 2011. This sample is similar to the produced water that spilled on December 6, 2011. The water line produced water results are provided in Appendix E.

Section 5: Gypsum Ranch B Pad Chemical Inventory

Condition number seven of NOAV 200332643 requests that Antero provide the chemical inventory sheets for all wells on the gathering line. The most recent wells in this area were drilled and completed in 2007 and 2008. As such, Antero does not have chemical inventory records for these wells. However, Antero is maintaining chemical inventory records for its wells drilled and completed after the effective date of the chemical inventory rule.

Section 6: Antero's Post Construction Stormwater Program

Antero's stormwater program commences prior to pad construction with the installation of proposed stormwater Best Management Practices ("BMP's") as designed by a third party survey company. The BMPs are identified on the pad plat package and are designed by a water engineer or stormwater specialist employed or contracted by the survey company. The BMPs are maintained during the active life of the well pad. Antero engaged LT Environmental (LTE) to perform routine stormwater inspections at all of its pads and pipelines. Pads and pipelines are inspected on a 14-day schedule until the ground is stabilized by erosion blankets or by vegetation cover. Stabilized sites are subject to a 30-day inspection schedule until the site is fully reclaimed (80% or greater relative cover of surrounding vegetation). The focus of the stormwater inspections is to prevent discharges of sediment offsite. The LTE inspections are followed by an "Antero Daily Stormwater Contractor Work Order." The work order reports include instructions on the maintenance required and the location of each stormwater corrective action. Antero routinely follows-up on each work order until they have been closed out by our field personnel. These stormwater work orders are passed on to Stampfel Construction Company, a construction company that carries out the BMP maintenance.

A copy of the November and December 2011 stormwater inspection work orders for the Gypsum Ranch B Pad are provided in Appendix F, "Gypsum Ranch B Pad Stormwater Work Orders." A copy of Antero's Stormwater Management Plan is available upon request.

Conclusion

The purpose of this submittal is to provide the COGCC with an update regarding the remediation work following the Gypsum Ranch B Pad spill that occurred on December 6, 2011. Remediation of the spill was completed early this year and a confirmation water sample was taken on January 31, 2012. The confirmation water sample shows compliance with Table 910-1 standards. Based on the analytical data Antero requests your concurrence that further remediation at this site is not necessary. Antero has identified the cause of the spill and has taken direct measures to address the problem to prevent future spills.

Appendix B: Soil Sample Results

Metals															Moisture & pH		Organic Compounds	
Sample ID	Sample Date	Chromium, Hexavalent (mg/Kg-dry)	Chromium, Trivalent (mg/Kg-dry)	Mercury (mg/Kg-dry)	Arsenic (mg/Kg-dry)	Barium (mg/Kg-dry)	Cadmium (mg/Kg-dry)	Chromium (mg/Kg-dry)	Copper (mg/Kg-dry)	Lead (mg/Kg-dry)	Nickel (mg/Kg-dry)	Selenium (mg/Kg-dry)	Silver (mg/Kg-dry)	Zinc (mg/Kg-dry)	Moisture (% of sample)	pH	Diesel Range Organics - DRO (C10-C28) (mg/Kg-dry)	Gasoline Range Organics - GRO (C6-C10) (mg/Kg-dry)
Table 910-1 Standards	12/8/2011	23	120,000	23	0.39	15,000	70		3,100	400	1,600	390	390	23,000			500	500
Point of Origin	12/8/2011	< 0.57	9.6	< 0.018	3.0	500	0.99	9.6	9.1	82	9.7	0.96	< 0.88	140	14	7.96	27	< 5.8
Sample Pt 1	12/8/2011	< 0.56	7.9	< 0.022	2.8	290	1.2	7.9	7.8	79	7.8	< 0.74	< 0.74	140	13	8.79	39	< 5.8
Sample Pt 2	12/8/2011	< 0.54	7.0	< 0.019	1.3	910	< 0.35	7.0	6.5	8.0	6.2	< 0.88	< 0.88	59	8.7	8.90	33	< 5.5
Sample Pt 3	12/8/2011	< 0.55	8.2	< 0.019	2.8	290	1.0	8.2	7.3	84	8.3	< 0.68	< 0.68	130	11	8.45	110	< 5.6
Sample Pt 4	12/8/2011	< 0.55	8.9	< 0.021	2.6	650	0.55	8.9	8.2	32	8.5	< 0.77	< 0.77	79	11	8.61	39	< 5.6
BKGD 1	12/8/2011				2.4										34			
BKGD 2	12/8/2011				4.2										8.6			
BKGD 3	12/8/2011				3.4										5.8	8.73		

Volatile Organic Compounds								Sodium Absorption Ratio
Sample ID	Sample Date	Benzene (µg/Kg-dry)	Ethylbenzene (µg/Kg-dry)	m,p-Xylene (µg/Kg-dry)	o-Xylene (µg/Kg-dry)	Toluene (µg/Kg-dry)	Xylenes, Total (µg/Kg-dry)	SAR
Table 910-1 Standards	12/8/2011	170	100,000	175,000	175,000	85,000	175,000	<12
Point of Origin	12/8/2011	< 120	< 230	< 230	< 120	< 170	< 350	89.9
Sample Pt 1	12/8/2011	< 120	< 230	< 230	< 120	< 170	< 350	78.5
Sample Pt 2	12/8/2011	< 110	< 220	< 220	< 110	< 160	< 330	55
Sample Pt 3	12/8/2011	< 110	< 220	< 220	< 110	< 170	< 340	78.3
Sample Pt 4	12/8/2011	< 110	< 220	< 220	< 110	< 170	< 340	41.5
BKGD 1	12/8/2011							
BKGD 2	12/8/2011							
BKGD 3	12/8/2011							40.5

Semi-Volatile Organic Compounds															
Sample ID	Sample Date	Acenaphthene (µg/Kg-dry)	Anthracene (µg/Kg-dry)	Benzo(a)anthracene (µg/Kg-dry)	Benzo(a)pyrene (µg/Kg-dry)	Benzo(b)fluoranthene (µg/Kg-dr)	Benzo(g,h,i)perylene (µg/Kg-dr)	Benzo(k)fluoranthene (µg/Kg-dr	Chrysene (µg/Kg-dry)	Dibenzo(a,h)anthracene (µg/Kg-	Fluoranthene (µg/Kg-dry)	Fluorene (µg/Kg-dry)	Indeno (1,2,3-cd)pyrene (µg/Kg-	Naphthalene (µg/Kg-dry)	Pyrene (µg/Kg-dry)
Table 910-1 Standards	12/8/2011	1,000,000	1,000,000	220	22	220		2200	22,000	22	1,000,000	1,000,000	220	23,000	1,000,000
Point of Origin	12/8/2011	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34
Sample Pt 1	12/8/2011	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	< 34	74	< 34
Sample Pt 2	12/8/2011	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33
Sample Pt 3	12/8/2011	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	72	< 33
Sample Pt 4	12/8/2011	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33

Confirmation Water Sample

Volatile Organic Compounds							
Sample ID	Sample Date	Benzene (µg/Kg-dry)	Ethylbenzene (µg/Kg-dry)	m,p-Xylene (µg/Kg-dry)	o-Xylene (µg/Kg-dry)	Toluene (µg/Kg-dry)	Xylenes, Total (µg/Kg-dry)
Table 910-1 Standards	1/31/2012	<1.0	<1.0	<2.0	<1.0	<1.0	<3.0
Pond Sample	1/31/2012	ND	ND	ND	ND	ND	ND

Anions by Ion Chromatograph			
Sample ID	Sample Date	Chloride	Sulfate
Table 910-1 Standards	1/31/2012	<1.25 x background	<1.25 x background
Pond Sample	1/31/2012	170	350

PH		
Sample ID	Sample Date	PH
Table 910-1 Standards	1/31/2012	6-9
Pond Sample	1/31/2012	7.77

Total Dissolved Solids		
Sample ID	Sample Date	TDS
Table 910-1 Standards	1/31/2012	<1.25 x background
Pond Sample	1/31/2012	1,100