NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Chapter 10
Review of Selected Non-Routine Incidents in Pennsylvania

Final

Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

Chapter 10 – Review of Selected Non-Routine Incidents in Pennsylvania

CHAPTER 10 REVIEW OF SELECTED NON-ROUTINE INCIDENTS IN PENNSYLVANIA 10-1

10.1 GAS MIGRATION – SUSQUEHANNA AND BRADFORD COUNTIES 10-1
10.1.1 Description of Incidents 10-1
10.1.2 New York Mitigation Measures Designed to Prevent Gas Migration Similar to the Pennsylvania Incidents 10-1

10.2 FRACTURING FLUID RELEASES – SUSQUEHANNA AND BRADFORD COUNTIES 10-2
10.2.1 Description of Incidents 10-2
10.2.2 New York Mitigation Measures Designed to Prevent Fracturing Fluid Releases 10-3

10.3 UNCONTROLLED WELLBORE RELEASE OF FLOWBACK WATER AND BRINE – CLEARFIELD COUNTY 10-3
10.3.1 Description of Incident 10-3
10.3.2 New York Mitigation Measures Designed to Prevent Uncontrolled Wellbore Release of Flowback Water and Brine 10-4

10.4 HIGH TOTAL DISSOLVED SOLIDS (TDS) DISCHARGES – MONONGAHELA RIVER 10-4
10.4.1 Description of Incidents 10-4
10.4.2 New York Mitigation Measures Designed to Prevent High In-Stream TDS 10-4

This page intentionally left blank.

Chapter 10 REVIEW OF SELECTED NON-ROUTINE INCIDENTS IN PENNSYLVANIA

More than 3,000 Marcellus wells have been drilled in Pennsylvania since 2005, most of which have been or will be developed by high-volume hydraulic fracturing. A number of regulatory violations, non-routine incidents and enforcement cases have been widely publicized. Some of them are briefly described below, with information about the measures currently required in New York or those that the Department proposes to require that are designed to prevent similar problems if high-volume hydraulic fracturing is permitted in the Empire State.

10.1 Gas Migration – Susquehanna and Bradford Counties

10.1.1 Description of Incidents

In 2009, the appearance of methane in water wells in an area in Dimock Township, Susquehanna County, was attributed to excessive pressures and improperly or insufficiently cemented casings at nearby Marcellus wells.[564] Numerous occurrences of methane migration into residential water wells during 2010 in Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County were attributed to the failure to properly case and cement wells.[565]

10.1.2 New York Mitigation Measures Designed to Prevent Gas Migration Similar to the Pennsylvania Incidents

The potential for water wells to be impacted by methane migration associated with gas well construction was a high-profile concern in Chautauqua County, New York, in the 1980s. Then-Commissioner Henry Williams addressed the situation in a decision issued after a public hearing held in Jamestown. That decision, which among other things directed staff to (1) require wells in primary and principal aquifers to be cemented to surface and (2) prohibit excessive annular pressure, is the foundation of New York's current well construction requirements. The 1992 GEIS adopted minimum casing and cement practices, which are augmented as necessary to address site-specific conditions and incorporated as conditions of every well permit the Department issues. Additionally, the Department does not issue a permit to drill any well until the proposed wellbore design for that specific well and location has been reviewed by

[564] PADEP, 2009, p. 3.
[565] PADEP, 2011, p. 9.

Department staff and deemed satisfactory. Permits are not issued for improperly designed wells, and for high-volume hydraulic fracturing, as-built wellbore construction would be verified as described in Chapter 7. Additionally, intermediate casing would be required, unless clearly justified otherwise, with the setting depths of both surface and intermediate casing determined by site-specific conditions.

The effectiveness of the Department's well construction approach with respect to gas migration is demonstrated by the rarity of gas migration incidents in New York. The most recent incident occurred 15 years prior to the date of this document, in 1996, and resulted not from well construction but from the operator reacting improperly to a problem encountered while drilling. More than 3,000 wells have been drilled under ECL Article 23 permits since 1996 without another occurrence.

As noted in the 1992 GEIS and in Section 4.7 of this document, methane is naturally present in water wells in many locations in New York, for many reasons unrelated to gas well drilling. This is a fact which must be evaluated and considered when a gas drilling impact is suspected as a source of methane in water wells.

10.2 Fracturing Fluid Releases – Susquehanna and Bradford Counties

10.2.1 Description of Incidents

In 2009, three fracturing fluid releases occurred at a single well pad in Dimock Township, Susquehanna County. The releases resulted from equipment failures when the pressure rating of some piping components on the well pad were exceeded while the operator was mixing and pumping fluid for hydraulic fracturing. This resulted from a combination of pressure fluctuations while pumping and a significant elevation difference between the fresh water tanks and the well pad. The fresh water tanks were located 240 feet above the well pad and the mixing area was 190 feet above and over 2,000 feet away from the well pad.[566]

On April 19, 2011, an uncontrolled flow of hydraulic fracturing fluid occurred during fracture stimulation of Chesapeake Energy's Atlas 2H well in LeRoy Township, Bradford County. The Department's Commissioner visited this site on June 16, 2011, and was briefed by officials from

[566] Cabot Oil & Gas Corporation, 2009.

the Pennsylvania Department of Environmental Protection, Chesapeake Energy, and the Bradford County Soil and Water Conservation District. At the briefing and tour of the well pad, it was learned that a failure occurred at a valve flange connection to the wellhead, causing fluid to be discharged from the wellhead at high pressure. Approximately 60,000 gallons of fluid were discharged to the well pad, of which 10,000 gallons flowed over the top of the containment berms. A portion of this fluid made its way into an unnamed tributary of Towanda Creek. The wellhead failure is under investigation to determine the precise cause of the breach. The wellhead was pressure-tested after installation and after each hydraulic fracturing stage prior to the breach. According to Chesapeake officials, it passed all tests. The discharge of fluid from the well pad was caused by the failure of stormwater controls on the well pad due to extraordinary precipitation and other factors.[567]

10.2.2 New York Mitigation Measures Designed to Prevent Fracturing Fluid Releases

The site layout in Dimock was unusual and, if proposed in New York, would be flagged during the Department's review of the application materials, which always include maps and a pre-permitting site inspection. Such a layout would not be approved by the Department without site-specific permit conditions designed to address the risks associated with hillside locations. Steep slopes above surface water bodies reduce the time available to respond to a release or spill, and in New York locations on steep slopes above potential drinking water supplies are not eligible for authorization under a general stormwater permit.

It is important to note that in both cases it was mixed fracturing fluid that was released, not undiluted additives. Supplementary permit conditions for high-volume hydraulic fracturing in New York will require pressure testing of fracturing equipment components with fresh water prior to introducing additives.

10.3 Uncontrolled Wellbore Release of Flowback Water and Brine – Clearfield County

10.3.1 Description of Incident

In 2010 an operator in Lawrence Township, Clearfield County, lost control of a wellbore during post-fracturing cleanout activities, releasing natural gas, flowback water and brine into the

[567] Although described in press accounts as a "blowout," such terminology is not technically correct because the source of pressure was the fracturing operations on the surface. A blowout is an uncontrolled intrusion of fluid under high pressure into the wellbore, from the rock formation.

environment. It was determined that blowout prevention equipment was inadequate and that certified well-control personnel were not on-site.[568]

10.3.2 New York Mitigation Measures Designed to Prevent Uncontrolled Wellbore Release of Flowback Water and Brine

Proposed supplementary permit conditions for high-volume hydraulic fracturing would require pressure testing of blowout prevention equipment, the use of at least two mechanical barriers that can be tested, the use of specialized equipment designed for entering the wellbore when pressure is anticipated and the on-site presence of a certified well control specialist.

10.4 High Total Dissolved Solids (TDS) Discharges – Monongahela River

10.4.1 Description of Incidents

During seasonal low-flow conditions in the Monongahela River in 2008, an increase in gas-drilling wastewater discharges may have provided the TDS "tipping point" for the Monongahela River. At the time, many rivers in that state were unable to assimilate new high-TDS waste streams because they were already impaired by pre-existing elevated TDS levels from various historic practices, and Pennsylvania's regulations did not include a surface water quality standard for TDS. In the three years since these events occurred, Pennsylvania has enacted new regulations that restrict discharge of high-TDS wastewater associated with Marcellus Shale development. The PADEP has also requested that Marcellus operators discontinue discharging flowback water to facilities that are "grandfathered" from the new requirements. Additionally, as discussed in Section 1.1.1, operators in Pennsylvania are now reusing flowback water for subsequent fracturing operations.

10.4.2 New York Mitigation Measures Designed to Prevent High In-Stream TDS

New York's water quality standards include an in-stream limit for TDS and SPDES permits include effluent limitations based on a stream's assimilative capacity. As described in Chapters 7 and 8, and in Appendix 22, the Department has a robust permitting and approval process in place to address any proposals to discharge flowback water or production brine to wastewater treatment plants. Additionally, the Department anticipates that operators will favor reusing flowback water for subsequent fracturing operations as they are now doing in Pennsylvania.

[568] PADEP, 2010.