pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Investigation Report
September 24, 2015 Green Ridge Malodor Chemical Discharge
Scranton City & Dunmore Borough, Lackawanna County
January 20, 2016

I. Initial Response

On Thursday, September 24, 2015 at 8:45 p.m., the Department of Environmental Protection's (DEP) Northeast Emergency Response office (ER) received a message from DEP's Emergency Response Director in Harrisburg concerning a citizen's complaint about a "horrendous odor" in the Green Ridge section of Scranton. By 9:20 p.m., ER staff was on site conducting an investigation. A second ER staff member was dispatched at 10:30 p.m. A very strong, chemical odor was detected and appeared to coming from the sewer in the area of Capouse Avenue and Drinker Place. According to the complainant, the Scranton Sewer Authority (SSA) responded, but left prior to ER staff arriving. Shortly after arriving on site, ER staff requested SSA return and they did so by 11:05 p.m. ER staff, accompanied by SSA personnel, investigated and conducted air monitoring with a Photoionization Detector (PID) and Four Gas Meter along the sewer line and manholes.

> A PID is a hand help instrument used to obtain instantaneous readings of volatile organic compound concentrations in the air. A PID meter does not have the ability to identify specific compounds.
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> A Four Gas Meter is a hand held instrument used to obtain instantaneous readings of Oxygen (O_2), Carbon Monoxide (CO), Hydrogen Sulfide (H_2S), and flammable gas concentrations in the air. O_2, CO, and H_2S concentrations are in parts per million (ppm), while explosive gas concentrations are in percent of lower explosive limit (%LEL).

ER staff identified a "solvent" odor and noticed flow in the sewer line. Elevated levels of volatile organic compounds were recorded. (See Attachment A for ER air monitoring results and locations.) There were no elevated readings recorded above background levels for the following parameters: Lower Explosive Level (LEL), Hydrogen Sulfide (H_2S), and Carbon Monoxide (CO). The oxygen (O_2) levels were normal.

At 11:55 p.m., samples of untreated sewage were collected from the manhole located along Drinker Place upstream of Capouse Avenue. At that time, ER staff began monitoring the sewer line upstream in an attempt to identify the origin of the chemical odor in the sewer line system. The manhole along Reeves Street and Monahan Avenue was monitored and a similar odor detected. A strong odor was also detected from the manhole behind the Sleep Inn, located at 102 Monahan Avenue. VOC readings at the manholes ranged from 45ppm-160ppm, the highest reading was found at the manhole near the Sleep Inn off of

Monahan Avenue. The local Fire Department evacuated the hotel guests and advised the Hotel to ventilate the affected building area. DEP recommended that SSA flush the sewer line.

At 1:50 a.m., ER staff reached the Keystone Sanitary Landfill and contacted Dan O'Brien, Facility Manager, to conduct an inspection of the leachate treatment plant. Inspection was conducted at 3:00 a.m. and no odor, other than ammonia, was detected.

At 3:15 a.m., SSA flushed the line by introducing 1500 gallons of water into the collection system at Monahan Avenue.

At 3:20 a.m., ER staff collected additional samples from the manhole along Drinker Place (upstream of Capouse Avenue). No evidence of Combined Sewer Overflow (CSO) discharge into the Lackawanna River was found during the inspection. The presence of a strong chemical odor in the sewer system was found in the line from Monahan Avenue to Capouse Avenue. DEP and SSA were unable to determine or locate the source of the odor. The initial investigation concluded at 3:45 a.m.

DEP received a second odor complaint on Friday, September 25, 2015 at ~2:30 p.m. The complainant indicated that there was an odor emanating from the intersection of Sanderson Ave. and Detty St. at the Lackawanna River. ER staff was dispatched to the scene and met with the complainant and a representative from SSA. They investigated the sewer line along the river at several manhole locations. No odor or flow was detected at this location.

ER and SSA staff then traveled to Capouse Ave., where DEP collected samples on September 24th. The manhole cover was lifted and the sewer was flowing and some odor detected. Every so often a strong odor would be detected, suspected from residual flow from the previous evening. The manhole cover was replaced and no observable odor was detected.

II. Investigation

DEP Sampling

On the morning of September 25th, DEP field staff collected water samples at SSA's clarifier and Keystone Landfill's treated leachate. On Monday, September 28th, DEP staff collected three samples of untreated leachate at Keystone Landfill. In total, the Department collected 10 water samples for this investigation. Also on Monday, September 28th, DEP and SSA staff responded to an odor complaint on North Irving Street in Dunmore. No odors were detected. As a follow-up to the September 24th incident DEP and SSA staff then proceeded to the Reeves Street/Monahan Avenue manhole and observed what was believed to be typical flow of sewage into the sewer line. There was no flow of any kind coming from KSL at that time.

SSA Investigation

In an effort to identify the source of the September 24, 2015 odor causing substance, SSA canvassed the area of Monahan and Reeves Street in Dunmore, PA over the past several months. The SSA initially created a list of 19 commercial users that were to be thoroughly inspected. It was also determined that there were over 1000 potential points of entry between the Monahan Ave/Reeves Street manhole and the area in Green Ridge where the odors were first detected. During the inspections, an additional 4 commercial users were discovered and also examined. SSA scrutinized a total of 23 commercial users in the Monahan / Reeves area. During the commercial user investigations, industries were very cooperative and accommodating in helping the SSA complete the investigations to determining the September 24th odor issue. No evidence of the illegal discharge or of the odor causing substance was found at the 23 commercial user sites. Commercial users were informed to contact the SSA with any suspicious activity in the area that would be related to the odor issue.

In addition to commercial user site inspections, SSA also dispatched a camera crew that televised and documented the main lines along Monahan and Reeves Street in Dunmore over the course of several weeks. The closed circuit television ("CCTV") investigation concluded no unusual or atypical signs (as well as additional attempts to discharge) of the sewer substance that caused the September 24th odor issue.

As part of the investigation, a dye testing study of the SSA collection system was performed between the intersection of Reeves Street and Monahan Avenue to the Authority's Waste Water Treatment Plant (WWTP). It was the goal of the SSA during this study to identify the amount of time it would take for the substance to reach key points along the collection system. The key points of the collection system were identified as points that were visited by the PA DEP and SSA on the night of September 24th and early morning of September 25th under dry weather flow conditions. Additional points were identified by observing the dye pass through the collection system downstream of the areas visited by DEP and SSA on the 24th and 25th, and as close to one mile increments as possible. The amount of time it would take the dye to travel through the collection system between key points was recorded and then more dye was added to the system to enhance the color. When dye testing the lines upstream of the Sleep Inn at the intersection of Monahan Ave. and Reeves Street to the area where the first odor complaint was received, it was discovered that under normal flow conditions, it would take nearly two hours for the dye / wastewater to reach the sewer system at the intersection of Capouse Avenue and Drinker Place. Furthermore, it was also discovered that the approximate amount of time for the dye / wastewater to reach the WWTP under normal flow conditions was roughly 6 hours. Because the amount of product that was released into the system is believed to be very concentrated and small in volume in comparison to the amount of daily flow at the WWTP and throughout the SSA's collection system, the window of opportunity to identify the exact point of entry for the product was almost non-existent without an eye witness.

Evaluation of Keystone Sanitary Landfill ("KSL")

DEP conducted meetings with representatives of KSL on October 1, 2015 and October 27, 2015 in order to evaluate what role, if any, KSL may have had in the September 24th odor incident. EPA was present at the October 1st meeting and has since sent KSL an Information Request requiring KSL to provide information related to the permit KSL has with SSA, the manner in which KSL wastewater is conveyed to the SSA waste water treatment plant, analytical data for KSL wastewaters, and description of any substances that may have been discharged the night of the odor incident. KSL responded to that information request on November 12, 2015. This response is currently being reviewed by the EPA.

An additional meeting was held at KSL on October 27th. Representatives of SSA, DEP, and KSL were present. The purpose of this meeting at the KSL facility was to attempt to recreate the events that occurred at the landfill the night of the odor incident. A report detailing this meeting is included with this report. (See Attachment B-Memo to KSL Correspondence File dated October 27, 2015)

As a result of the October 1st and 27th meetings with Keystone, DEP learned the following:

1. The pump that conveys treated leachate from KSL to the permitted discharge point on Drinker Street went down sometime between Thursday (September 24, 2015) at approximately 4:30 p.m. and the arrival of DEP ER staff at approximately 3:00 a.m. Friday (September 25, 2015).
2. The pump is located in a wet well approximately 3000 ft from the leachate treatment plant. When this pump fails, all of the pumps that convey treated and untreated leachate to and from the leachate treatment plant trip off.
3. Raw leachate continues to gravity flow from the disposal areas, through the leachate collection system, to the raw leachate lagoons.
4. The valve that controls the flow of treated leachate from the treatment plant to the alternate line via the Reeves/Monahan Manhole was partially open (3 turns). It is believed that the valve was not properly seated when it was exercised earlier in the year. Keystone was unsure as to whether or not treated leachate could have been flowing through this unseated valve into the Reeves/Monahan Manhole.
5. During the October 27, 2015 meeting at KSL, flow into the Reeves/Monahan Manhole was observed by the same DEP and SSA staff that responded to the odor complaint the night of the odor incident. Upon observation of the flows all staff agreed that there was no discharge of any kind from Keystone entering the Reeves/Monahan Manhole the night of the odor incident.
6. Based on this information, DEP staff requested that KSL provide DEP with a statement explaining how inaccurate information was conveyed to DEP staff the night of the incident and to the press the day after. This letter was received by DEP on November 11, 2015. (See Attachment C-KSL letter to DEP dated November 11, 2015) This letter indicates that there was a misunderstanding regarding a statement made by DEP staff to the KSL representative the night of the incident. DEP staff conveyed to the KSL representative that flow was observed in the Reeves/Monahan Manhole. The KSL representative interpreted that to mean that DEP staff had determined that the flow into the

Reeves/Monahan Manhole was coming from the landfill, so the KSL representative communicated to the DEP staff member that they must have been discharging to that line. Based on this belief the same statement was made by KSL representatives to the press the next day. After further investigation, it was determined that KSL was not discharging to the Reeves/Monahan Manhole the night of the incident.

The facts and data indicate that KSL was not discharging into the sewer line at the Reeves/Monahan manhole, and was not otherwise the source of the odors detected on September 24, 2015. This conclusion is based on the following:

- The ER and SSA staff who responded on September 24, 2015, did not observe any flow coming from KSL at the Reeves/Monahan manhole. This observation was confirmed by the October 27, 2015 on site test.
- When DEP ER staff arrived at the KSL leachate treatment plant the night of the incident, they did not observe any substances or odors similar to those observed in the sewers.
- DEP staff had conducted a full compliance evaluation of KSL on September 23, 2015. The results of this inspection did not indicate the presence of any unusual substances or odors.
- DEP staff were at the KSL facility on September 24, 2015, the day of the incident, to observe the operation of the new leachate treatment plant. These DEP staff did not observe any unusual substances or odors.
- The results of the analysis conducted on the samples collected from the sewer lines, the SSA clarifier, and the raw leachate lagoon at KSL, show that the substance that caused the odor problem is chemically different from the treated and raw leachate at KSL.
- While DEP has concluded that there was no discharge from KSL into the Reeves/ Monahan manhole the night of the incident it was determined that documentation clarifying the use of this alternate discharge point would be beneficial. On December 17, 2015, SSA reissued the Industrial Wastewater Contribution Permit number 97-007 to KSL indicating that the Reeves/Monahan manhole as an approved outfall for wastewater discharges from KSL.
- As a result of the DEP's evaluation of the events that occurred at KSL the night of the incident, KSL has made system enhancements to the facility. KSL installed a light on the outside of the force main pump building to alert site personnel when the force main pump goes down; and a lock has been placed on the valve that controls the flow of KSL wastewater to the Reeves/Monahan manhole. The key to this lock is held by SSA. At this time the only way to open the valve and utilize the Reeves/Monahan outfall is if SSA personnel remove the lock. Also, the new leachate treatment plant is now operational. This plant has systems to alert KSL personnel of issues with the leachate treatment and conveyance systems and records the time of any system failures. It also allows for KSL staff to monitor the systems and make adjustments remotely.

Additional DEP Follow-Up

On November 17, 2015, DEP contacted Sister Mary Alice from St. Joseph Center, which is located at 2010 Adams Avenue in Scranton. At 3:30 a.m. on Friday, September 25th, the 24 hour nursing supervisor contacted Sister Mary Alice about an odor in one of the apartments. A decision was made by St. Joseph's staff to move residents to the multi-purpose room, which is located about 1 city block from the apartments. UGI was contacted and arrived at the campus. Dunmore Fire Department and ambulance responded. No one was taken to the hospital.

Also, on November 17, 2015, DEP contacted Chief DeNaples from the Dunmore Fire Department. The Fire Department responded to both the Sleep Inn located at 102 Monahan Ave. and St. Joseph Center. Chief DeNaples' decision to evacuate Sleep Inn was due to the odor making people uncomfortable. No one claimed to be sick. Due to St. Joseph staff voluntarily relocating residents to another building on campus, there was no need for Chief DeNaples to order an evacuation.

III. Evaluation of Sample Results

Five (5) samples of the substance found in the sewer system and another sample of a substance floating on the surface of the Scranton Sewer Authority treatment plant were analyzed by DEP's Bureau of Laboratories in Harrisburg. In addition, four (4) samples of raw and treated leachate from Keystone Landfill were collected and analyzed as part of DEP's investigation. SSA also obtained and analyzed a sample of the substance that caused the odor problem from their treatment plant. The results of this analysis matched the results of the analysis of the substance performed by the DEP.

After analysis, DEP has determined that the malodorous substance is a chemical mixture of a petroleum product, similar to diesel fuel or home heating oil, and a number of other chemicals, such as, terpenes and methylated cyclosiloxanes, which are not typically associated with petroleum products. Terpenes are a class of organic compounds often found in citrus-based cleaning products and aromatherapy oils. Methylated cyclosiloxanes may be used in the production of silicone rubbers, as an alternative dry-cleaning solvent, and/or as an ingredient in cosmetic applications like skin creams and deodorants. A document describing the analysis results of the odorous substance is included as an attachment (Attachment D) to this report. Also attached to this report is a table (Attachment E) compiling the chemicals that were qualified and quantified in each of the DEP samples taken during this investigation.

Based on the analysis, a number of the chemicals identified are known to have strong odors. However, neither DEP nor SSA has been able to determine which specific chemical or combination of chemicals caused the malodor. A review of the analysis does indicate that the samples obtained from the sewer lines and the SSA treatment plant contain many of the same compounds, verifying that the substance that was causing the odors from the sewer lines was the same substance obtained from the Scranton Sewer Authority treatment plant.

DEP compared all of the sample results from this incident to typical Oil and Gas industry fluids or wastes. Based on this review, it is not believed that the substance that caused the odor problem is related to any Oil and Gas industry fluids or wastes. DEP has also determined, through the lab analysis, that the materials present in the samples of the malodorous substance are not the same as materials present in the KSL treated or raw leachate samples.

DEP also shared the sampling results with the Pennsylvania Department of Health (PADOH) and the Agency for Toxic Substance and Disease Registry (ATSDR). PADOH/ATSDR indicated that strong odor causing chemicals e.g. Naphthalene, ammonia, phenol etc., were detected in the liquid sampled from the sewer system at the time and immediately following the odor event. Odors alone, not necessarily associated with any harmful chemicals, can cause symptoms including headaches and irritation to the eyes, nose and throat without causing any long term health effects. Since air samples identifying exactly what residents were exposed to were not collected at the time the odors occurred in the community, they cannot determine the health impact, if any, of the odors. However, a one-time exposure to a transient or short-term odor(s) is unlikely to result in any long term health effects.

IV. Conclusions and Recommendations

The most likely source of the odorous substance was a one-time release of a petroleum-based liquid waste to the sewer conveyance system in the Monahan Avenue area. Based on the PID readings it appears that it was most likely introduced into the sewer conveyance system servicing businesses in the Monahan Avenue, O'Neil Highway, and Keystone Industrial Park Road area. Due to the small amount believed to be dumped (as indicated by the dye test and the fact that there was no measureable flow increase at the plant or plant upset), the large number of potential introduction locations (over 1,000 potential entry points), the need to flush the sewer lines to alleviate the odor issues, and the fact that the initial investigation of the incident was conducted at night, it was very difficult if not impossible to locate the source of the odorous substance the night of the incident. In the days following the incident, DEP and SSA utilized significant resources in an unsuccessful attempt to determine a responsible party for the release.

DEP and SSA have discussed additional investigative tools that can be utilized if similar incidents occur in the future. SSA is developing written procedures for their staff to follow when investigating these types of odor incidents and they are prepared to deploy samplers in areas that may isolate introduction points and reduce the size of the area believed to be the source of the problem. DEP is evaluating the use of additional sample equipment such as Summa Canisters, to capture air samples and a portable gas chromatograph/mass spectrometer, to immediately analyze samples, if a similar incident occurs in the future. These tools may provide additional data to help categorize and identify substances improperly introduced into the sewer system.