

Monitoring Division Summary of May 14-18, 2018, Pearland Sampling Event

OBJECTIVE:

The purpose of this sampling event was to assist Region 12 environmental investigators in determining the source of the odors in the Shadow Creek Ranch neighborhood in Pearland, Texas.

SAMPLING STRATEGY:

1. Conduct sampling during times that are consistent with the times documented complaints occurred. Most complaints from the Shadow Creek Ranch area over the last three years were documented as occurring between 8:00 p.m. and 8:00 a.m. as shown in Figure 1. Refer to the map of open complaints, Attachment A, for a visual representation of the investigation area. In addition, use wind direction to correlate odors observed in the neighborhood and documented in frequency, intensity, duration, and offensiveness (FIDO) surveys with the possible origins by conducting simultaneous downwind/upwind FIDO surveys around area facilities.

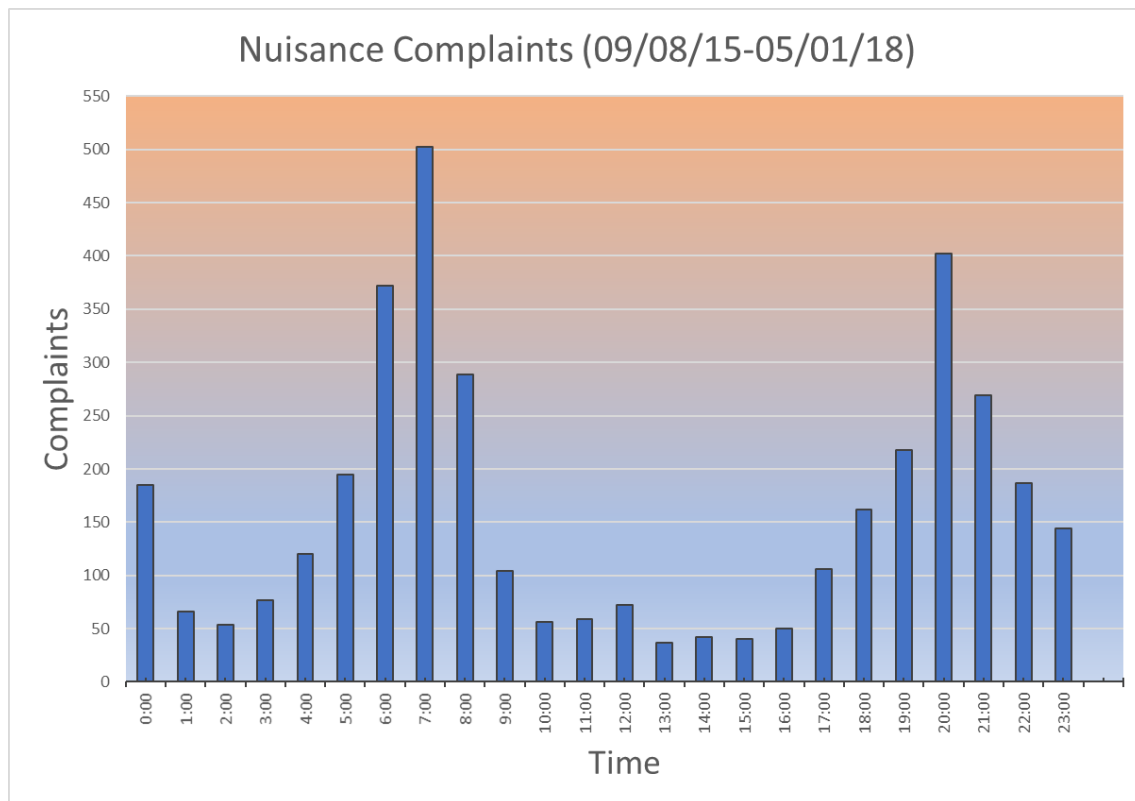


Figure 1: Number of odor complaints as reported throughout the day

2. Identify measurable “markers” related to instrument measurements and odor characterizations from FIDO surveys. Methane comprises a large portion of landfill gas and, while odorless, is a marker for the presence of other odorous compounds within the landfill gas make-up, including hydrogen sulfide (H₂S). Utilizing the ratio of methane to H₂S concentrations, establish a marker to distinguish between odor plumes from Blue Ridge Landfill and Lone Star Disposal and Recycling Facility (Lone Star Disposal).
3. Characterize odors for area facilities using instrumentation and FIDO surveys.

RESULTS AND CONCLUSIONS:

1. FIDO surveys were conducted in the Shadow Creek Ranch neighborhood, when odors warranted, at various times and locations between midnight and 10 a.m. on the mornings of May 15-17, 2018. In addition, specific downwind/upwind FIDO surveys and instrument measurements were conducted at each facility throughout the week. See Attachment B for a complete list of FIDO surveys conducted. Locations varied depending on wind direction at the time of the surveys but were generally in the western half of the neighborhood along Farm-to-Market (FM) 521 between Broadway and McHard Road.
 - Odorous conditions were observed in the Shadow Creek Ranch neighborhood the week of May 14-18, 2018, when winds were calm to light with a westerly component.
2. FIDO surveys were documented in coordination with measurements from the Picarro methane and H₂S analyzer to determine if either of these measurable compounds could be used as “markers” for odorous conditions. While there was no quantitative correlation between methane concentration and H₂S concentration as postulated, the methane concentration and odor intensity exhibited a qualitative correlation that can be used as a marker.
 - When winds had a westerly component, medium to very strong odors and methane concentrations up to 60 parts per million (ppm) were consistently observed downwind of the Blue Ridge Landfill in the Shadow Creek Ranch neighborhood. These odors qualitatively correlated to methane as a “marker.” These odors coupled with methane at these concentrations were not present downwind of other facilities.
 - Figure 2 shows a graphical representation of the correlation between methane concentration and odor. As odors decrease for FIDO Log 9, the methane concentration also decreases at a similar rate, until the odors are no longer detected. Minutes later, the methane concentration approaches background levels of 2 ppm.

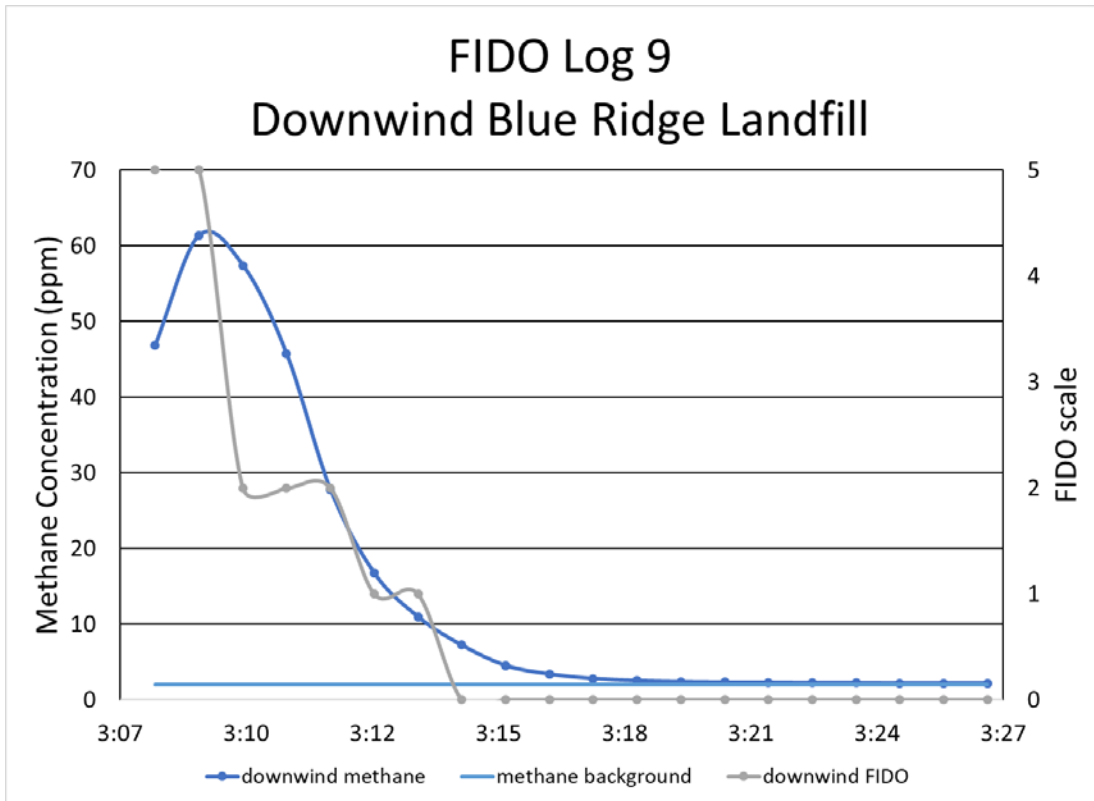


Figure 2: May 16, 2018–Comparison of downwind methane concentration measured with coinciding odor survey data. Wind speed averaged 3 mph out of the west-northwest direction.

- A correlation between H₂S and odors was not observed as no measurable (above method detection limits) H₂S was detected in the Shadow Creek Ranch neighborhood.
 - Blue Ridge Landfill and Lone Star Disposal were the only facilities in the area with measurable methane concentrations above background levels. The two landfills differed in ratio of methane to H₂S content making the two distinguishable from one another.
 - No concentrations were collected in the Shadow Creek Ranch neighborhood with the methane to H₂S ratio marker that would denote Lone Star Disposal as a contributor to odors observed.
3. Each potential source was assessed concurrently upwind and downwind to determine its odor profile. Each of the area facilities had its own distinct odor characteristics and differed from each other, except for Brenntag at which no odors were ever detected. Blue Ridge Landfill and Lone Star Disposal both have garbage odors, but odor characteristics are distinct between the two facilities due in part to the difference in H₂S content. Area facilities, excluding Blue Ridge, produce notable odors that are not consistent in character with odors observed in the Shadow Creek Ranch neighborhood. The odor characteristics in Shadow Creek Ranch neighborhood were consistent with the odors from Blue Ridge Landfill and were accompanied with the signature methane measurements associated with the landfill gases.

- **Shadow Creek Ranch**

Odors observed in the Shadow Creek Ranch neighborhood were described as moldy, soured garbage and were consistently observed with calm to light winds with a westerly component.

- **Blue Ridge Land Fill**

Odor descriptions of Blue Ridge Landfill were moldy, soured garbage odors consistent with those odors detected in the Shadow Creek Ranch neighborhood. These odors were detected, regardless of wind direction, when downwind of Blue Ridge Landfill.

- **Lone Star Disposal and Recycling Facility**

The light rancid popcorn garbage odors, observed northeast of the landfill were not intense enough to be compared to odors observed in the Shadow Creek Ranch neighborhood. Although methane was measured consistently above background levels (Figure 3) during the downwind FIDO surveys, concentrations were generally lower than those measured around Blue Ridge Landfill, making it difficult to correlate the light smell with minimal methane concentrations. H₂S concentrations were below the odor threshold of 7 parts per billion (ppb) and were difficult to correlate with the FIDO scale, indicating H₂S was not the likely cause of the observed odors.

Odors observed by investigators downwind of Lone Star Disposal were consistently lower in intensity, based on FIDO surveys, and higher in H₂S concentration than those documented downwind of the Blue Ridge Landfill. Figure 3 denotes a comparison of downwind methane and H₂S levels at Blue Ridge Landfill and Lone Star Disposal, showing the two facilities are distinguishable from one another based on methane and H₂S ratios.

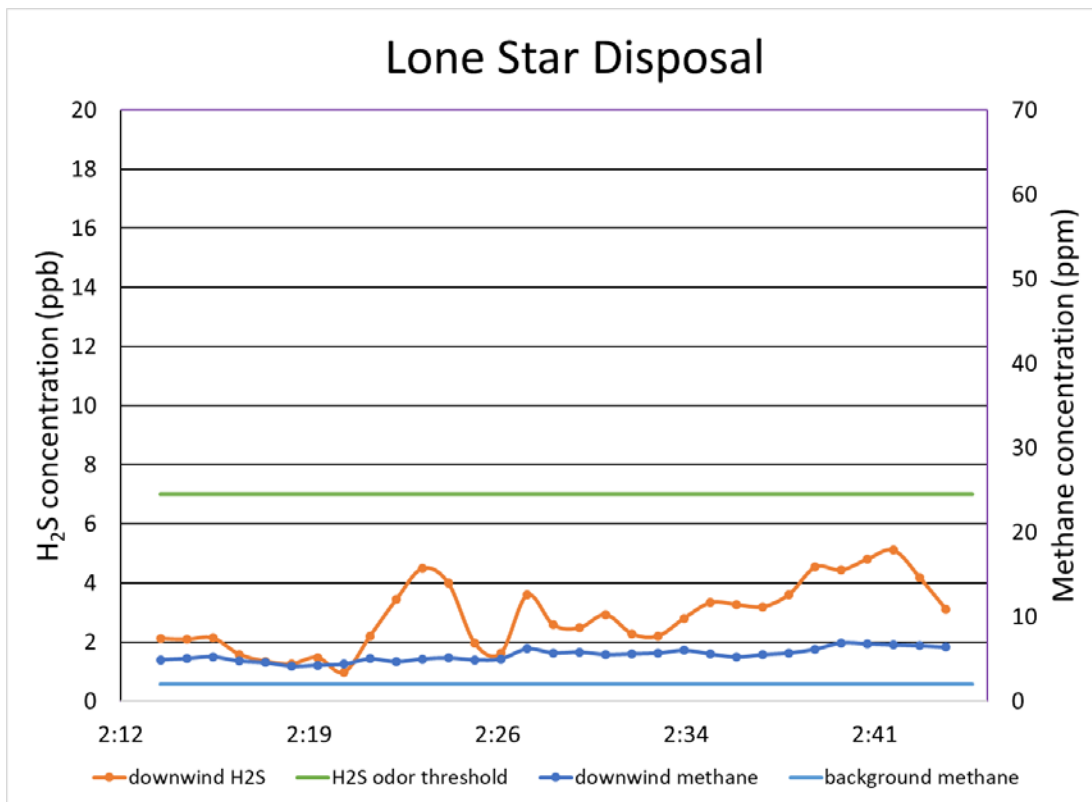
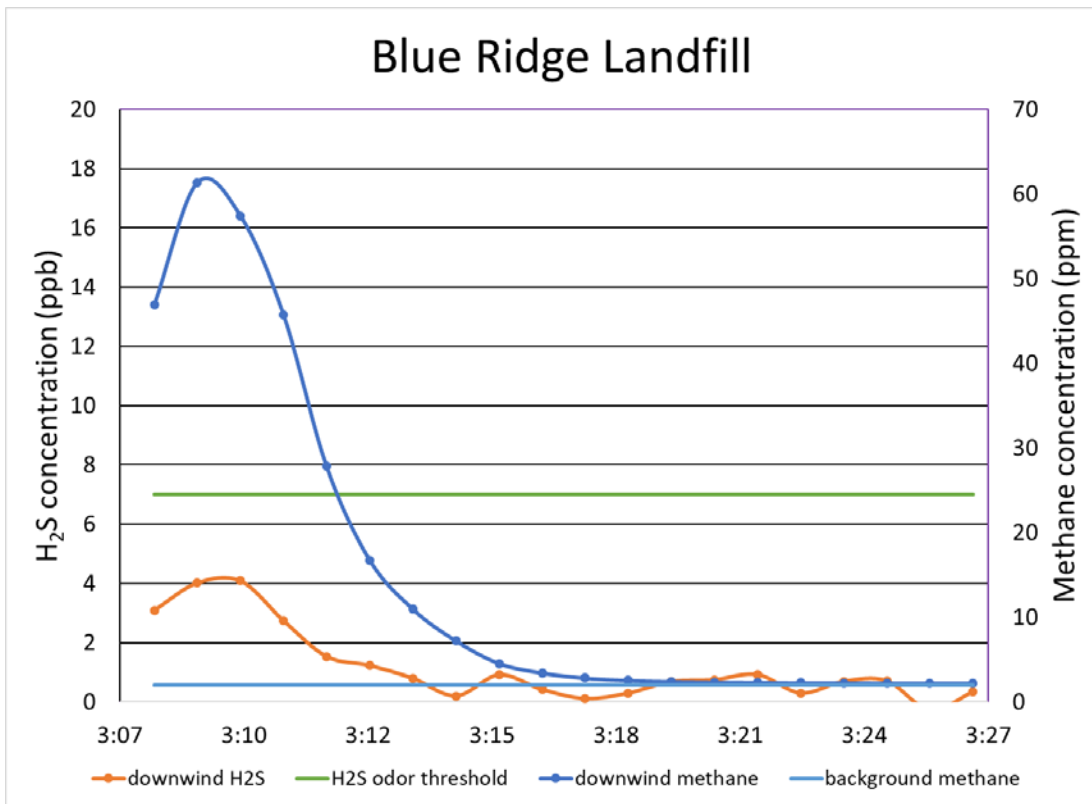


Figure 3: Lone Star Disposal showed only slightly elevated concentrations of methane in association with 3-5 ppb H₂S, whereas Blue Ridge Landfill produced similar H₂S concentrations when methane levels were 6 times as high at 60 ppm.

- **Syntech Chemicals Inc.**

No methane or H₂S concentrations were measured above the background level for methane or the odor threshold for H₂S at Syntech Chemicals Inc. indicating this is not a source of the odorous methane cloud. Fishy amine odors were observed downwind of Syntech and were not consistent with odors observed in the Shadow Creek Ranch neighborhood.

- **Brenntag Southwest Chemical Wholesaler**

No odor profile was characterized downwind of Brenntag Southwest Chemical Wholesaler. No concentrations above the background level for methane or the odor threshold for H₂S were recorded. No odors were detected by FIDO upwind or downwind of Brenntag. Including the 2016 monitoring data and two recent monitoring trips, no odors have been documented around Brenntag.

- **City of Pearland Wastewater Treatment Plant**

Odors around this facility were described as raw sewage and sulfur. These odors were different than those observed in the Shadow Creek Ranch neighborhood. Measurements indicate near-background methane concentrations with no correlation between odor and concentration. Part per billion levels of H₂S were measured near this facility; however, these concentrations were below the regulatory limit of 80 ppb for this compound and not likely to contribute to the moldy, soured garbage odors observed at Shadow Creek Ranch neighborhood.

- **Akzo Nobel Surface Chemistry Plant**

Minimal odors described as a sweet chemical smell were not consistent with the odors observed in the Shadow Creek Ranch neighborhood. The near-background levels of methane indicate this facility is not a methane source. No concentrations above the background level for methane or the odor threshold for H₂S were recorded.

- **Shadow Creek Lift Station**

Light odors observed in FIDO surveys near the lift station were described as a chemical, "port-a-potty" smell and were not consistent with the odors observed in other areas of the Shadow Creek Ranch neighborhood. Near-background methane concentrations near the lift station were recorded. No concentrations above the background level for methane or the odor threshold for H₂S were recorded.

NEXT STEPS:

- Most complaints do not include specific odor characterizations that could be used to help identify the source(s). Since local sources have distinct odor characterizations, a complaint reporting system that provides a selection of odor descriptions would provide more useful information to allow for source identification.
- Because of the similarity in odor characterization between observations downwind of the Blue Ridge Landfill and Lone Star Disposal, a meteorological assessment

should be used to determine how often complainant odors can be attributed to each facility.

- A closely coordinated monitoring effort should be scheduled to coincide with the next Surface Emissions Monitoring investigation at the Blue Ridge Landfill to assess plume movement and dilution over distance from leaking monitoring wells.
- Monitoring should also focus on downwind assessment of Blue Ridge Landfill between midnight and 4:00 a.m. during daily face opening activities to determine potential contributions to odor complaints.