HARRIS COUNTY POLLUTION CONTROL SERVICES AND
HARRIS COUNTY PUBLIC HEALTH

RESIDENTIAL DRINKING WATER WELL SAMPLING PROJECT

Crosby, Texas

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1.0 Introduction and Background

In late August 2017, storms resulting from Hurricane Harvey swept through Harris County dumping 40-50 inches of rain over a 4-day period. Harris County normally receives about 50 inches of rainfall per year. The large amount of rainfall over a short period of time caused devastating flooding throughout Harris County.

Arkema Inc. Crosby Plant (Arkema) is located at 18000 Crosby Eastgate Road in northeast Harris County. The facility manufactures and distributes organic peroxides, which must be kept at low temperatures to prevent them from decomposing and subsequently combusting. According to Arkema, plant flooding caused the refrigeration systems for the organic peroxides to be disabled. The organic peroxides decomposed as temperatures increased in the refrigeration trailers causing an initial fire at the facility on August 31, 2017. On September 1, 2017, two more refrigeration trailers spontaneously combusted. A controlled burn was conducted on the remaining refrigeration trailers on September 3, 2017. The residences on drinking water wells near the facility also flooded. Public concerns were raised about potential water well contamination as a result of both flooding and the explosions at the Arkema facility.

Harris County Pollution Control Services (HCPCS) along with Harris County Public Health (HCPH) sampled residential drinking water wells near the facility. Eight water wells were sampled located within a mile radius of the plant. The water wells sampled are located at residences on Janacek Road, Sherri Lane, Harvey Road, and Crosby Eastgate Road. These wells were previously sampled by Arkema at the request of the residents. Arkema's laboratory results did not indicate that private wells were impacted by runoff from the facility. Jason Ling, Investigator II-Public Water Supplies/Pools for HCPH, and I sampled the selected water wells on January 31, 2018. The property owners provided signed consent forms authorizing Harris County to enter their property and collect a water well sample. The objective of the project was to confirm Arkema's findings that nearby drinking water wells were not impacted by runoff during the flooding and explosions at the Arkema facility.

2.0 Sampling and Analysis

The following sampling procedure was conducted at each residence:

- Upon arrival, we introduced ourselves to the resident (if present) and acquired the consent form signature if not previously provided.
- Prior to sampling, I took field notes that contained the following information at a minimum:
    - meteorological data
    - location of well

- well depth (obtained from resident if known)
- nearest sampling tap and any treatment systems in place between the well and the sampling tap
- GPS coordinates
- pH
- temperature
- photos of well and sampling location

Well photos and field notes are included in Appendix I.

- If construction allowed, Investigator Ling wiped the sampling spigot with alcohol and flamed away the alcohol to thoroughly clean the faucet.
- Investigator Ling flushed the sampling spigot for 2-3 minutes to allow fresh water from the aquifer to reach the faucet.
- Investigator Ling filled the sample bottles appropriately. For analysis of volatile organic compounds (VOC), he filled three 40 ml glass vials preserved with hydrochloric acid per site. He left no air space in the vials. For the analysis of semi-volatile organic compounds (SVOC), Investigator Ling filled two 250 ml amber glass bottles to the neck per site. For analysis of metals, he filled a 500 ml plastic bottle preserved with nitric acid to the neck per site. Duplicate, matrix spike, and matrix spike duplicate samples were collected at one residence for quality assurance purposes.
- I labeled the sample bottles with the date and time of collection, sample location, property address, assigned identification number, and sampler's initials.
- I logged the samples on the chain of custody (COC) sheet while Investigator Ling placed the samples on ice immediately after collection.
- Michael Cantu, HCPCS Laboratory Manager, included a COC sheet in the cooler that was shipped to the laboratory. The samples were received intact and within the appropriate temperature range.

Eurofins Lancaster Laboratories Environmental (Eurofins) located at 2425 New Holland Pike in Lancaster, Pennsylvania performed the VOC and SVOC analysis using EPA methods SW-846 8260C and SW-846 8270D, respectively. HCPCS laboratory located at 101 S. Richey Street in Pasadena, TX performed the metals analysis using EPA method 200.7. Eurofins is National Environmental Laboratory Accreditation Certified (NELAC) by the state of Texas.

3.0 Laboratory Analytical Results

The well sampling results are summarized in the attached Tables. The laboratory analytical reports are included in Appendix II.

The sampling results were compared to the EPA primary and secondary drinking water standards referred to as maximum contaminant level (MCL). Primary MCLs are the highest concentration of a contaminant that is allowed in drinking water based on risk to public

health. Primary MCLs are enforceable only to public water systems. Secondary MCLs are non-health based guidelines for contaminants that may have aesthetic effects on drinking water (such as taste, color, and odor). The EPA does not regulate or have set standards for private drinking water wells. Primary and secondary MCLs were used in this project for reference purposes.

3.1 VOC/SVOC

Chloroform and methylene chloride (VOCs) were detected in a sample from Sherri Lane at estimated concentrations of 0.7 ug/L and 0.9 ug/L, respectively. Chloroform was also detected in the sample from Janacek Road at an estimated concentration of 0.5 ug/L. There were no other VOC or SVOC detections.

Chloroform does not have an established primary MCL. However the EPA has set the maximum contaminant level goal (MCLG) for chloroform at 0.07 mg/L or 70 ug/L. The MCLG is the concentration of a contaminant in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. The estimated concentrations of chloroform detected in the two samples mentioned above are well below the MCLG.

Methlyene chloride is also known as dichloromethane. The primary MCL for dichloromethane is 0.005 mg/L or 5 ug/L. The estimated concentration of methylene chloride detected in the sample mentioned above is well below the primary MCL.

The duplicate sample had no detections for VOCs and SVOCs as in the original sample.

Chloroform and methylene chloride are produced when chlorine or other disinfectants are used to treat drinking water. As noted in public water systems, chlorinated drinking water has higher concentrations and frequency of detections of these VOCs.

3.2 Metals

Barium was detected in one sample at a concentration of 0.342 mg/L, which is well below the primary MCL of 2 mg/L.

Manganese was detected in all the well samples at concentrations that range from 0.015 mg/L to 0.4 mg/L. The secondary MCL for manganese is 0.05 mg/L. Four samples (0.329 mg/L, 0.075 mg/L, 0.109 mg/L, 0.4 mg/L) exceeded the secondary MCL for manganese.

Zinc was detected in five of the samples at concentrations that range from 0.044 mg/L to 0.561 mg/L. The zinc concentrations detected did not exceed the secondary MCL of 5 mg/L.

Iron was detected in two of the samples at concentrations of 0.135 mg/L and 1.19 mg/L. The secondary MCL for iron is 0.3 mg/L. One of the samples had an iron concentration above the secondary MCL.

Barium and zinc detections can be traced to industrial activity and erosion of natural deposits. High levels of iron are usually traced to iron cast well components (well casings, pipes, pumps, storage tanks). Barium, iron, manganese, and zinc are elements normally detected in local groundwater from natural sources. Since these metals were detected at low concentrations, they likely originated from natural sources.

3.3 Comparison to Arkema's Analytical Results

Harris County's analytical results are fairly similar to Arkema's analytical results. Arkema's analytical results had slightly higher values than Harris County's. This could have been caused by differing detection values or a later sampling date by Harris County providing time for chemical breakdown to occur. For the most part, no SVOCs were detected in both analytical results and the VOCs detected during Arkema's sampling event were either not detected or were detected at lower concentrations during Harris County's sampling event. Most of the secondary metals detected during Harris County's sampling event were not tested for during Arkema's sampling event (manganese, iron, zinc). With the exception of one sample, Arkema's results indicated low detections of barium while Harris County's results had no detections for barium.

4.0 Data Verification and Usability

Data usability summaries for the metals, VOC, and SVOC analysis's are included in Appendix III. Debra Burney, QA/QC Officer for HCPCS, conducted the analytical data review received by HCPCS and Eurofins. All samples were received in the appropriate containers and in good condition with the paperwork filled out properly. Sample receipt temperatures were within the acceptance criteria of >0-6°C. Samples were preserved in the field as specified by each method. All samples were prepared and analyzed within method specific holding times. The data is considered usable, as qualified by the laboratory.

5.0 Conclusion

HCPCS and HCPH conducted a project consisting of sampling drinking water wells at residences near the Arkema Inc. Crosby plant. The lab results indicate that there were no VOC and SVOC detections that exceeded the EPA primary drinking water standards. With the exception of manganese and iron, no other metals were detected above primary and secondary drinking water standards. Manganese and iron concentrations exceeded the secondary MCLs in some of the samples. The constituents detected likely were produced either during the water disinfection process or from natural sources. The minor concentrations of VOCs and metals detected do not pose a health risk to the residents since primary MCLs were not exceeded and secondary MCLs are not health based standards.

Harris County's and Arkema's analytical results are fairly similar. Overall, Harris County's analytical results indicated lower constituent concentrations. Harris County's analytical results confirmed Arkema's findings that private drinking water wells were not impacted by runoff during the flooding and explosions at the Arkema facility.

In March 2018, HCPCS mailed each property owner a copy of their analytical results along with a brief explanation.

Tables

Table 1.
Summary of Analytical Results for VOCs
Residential Drinking Water Well Sampling Project
Crosby, TX
Sample Date: 1/31/2018

Sample ID		171886-A	171886-B	171886-C	171886-D	171886-E	171886-F	171886-G	171886-H
Analyte	**Units**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Acetone	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bromobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bromochloromethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bromodichloromethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bromoform	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bromomethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Butanone	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
n-Butylbenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
sec-Butylbenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
tert-Butylbenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Carbon Disulfide	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Carbon Tetrachloride	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chloroethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chloroform	ug/L	N.D.	N.D.	N.D.	0.7 J	N.D.	N.D.	N.D.	0.5 J
Chloromethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Chlorotoluene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4-Chlorotoluene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2-Dibromo-3-chloropropane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dibromochloromethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2-Dibromoethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dibromomethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2-Dichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3-Dichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,4-Dichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dichlorodifluoromethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,1-Dichloroethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2-Dichloroethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,1-Dichloroethene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
cis-1,2-Dichloroethene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
trans-1,2-Dichloroethene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2-Dichloropropane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3-Dichloropropane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,2-Dichloropropane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,1-Dichloropropene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
cis-1,3-Dichloropropene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
trans-1,3-Dichloropropene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Ethylbenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Hexachlorobutadiene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Hexanone	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Isopropylbenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
p-Isopropyltoluene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Methyl Tertiary Butyl Ether	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

Table 1.
Summary of Analytical Results for VOCs
Residential Drinking Water Well Sampling Project
Crosby, TX
Sample Date: 1/31/2018

Sample ID		171886-A	171886-B	171886-C	171886-D	171886-E	171886-F	171886-G	171886-H
Analyte	**Units**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
4-Methyl-2-pentanone	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Methylene Chloride	ug/L	N.D.	N.D.	N.D.	0.9 J	N.D.	N.D.	N.D.	N.D.
Naphthalene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
n-Propylbenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Styrene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,1,1,2-Tetrachloroethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,1,2,2-Tetrachloroethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Tetrachloroethene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toluene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3-Trichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,4-Trichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,1,1-Trichloroethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,1,2-Trichloroethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Trichloroethene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Trichlorofluoromethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3-Trichloropropane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,4-Trimethylbenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3,5-Trimethylbenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Vinyl Chloride	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
m+p-Xylene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
o-Xylene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Xylene (Total)	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D = Not Detected
J = Estimated Value
ug/L = Micrograms per liter

Table 2.
Summary of Analytical Results for SVOCs
Residential Drinking Water Well Sampling Project
Crosby, TX
Sample Date: 1/31/2018

Sample ID		171886-A	171886-B	171886-C	171886-D	171886-E	171886-F	171886-G	171886-H
Analyte	**Units**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Acenaphthene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Acenaphthylene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Aniline	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Anthracene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzidine	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzo(a)anthracene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzo(a)pyrene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzo(b)fluoranthene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzo(g,h,i)perylene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzo(k)fluoranthene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzoic acid	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzyl alcohol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4-Bromophenyl-phenylether	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Butylbenzylphthalate	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Di-n-butylphthalate	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Carbazole	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4-Chloro-3-methylphenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4-Chloroaniline	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
bis(2-Chloroethoxy)methane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
bis(2-Chloroethyl)ether	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
bis(2-Chloroisopropyl)ether	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Chloronaphthalene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Chlorophenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4-Chlorophenyl-phenylether	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chrysene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dibenz(a,h)anthracene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dibenzofuran	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2-Dichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3-Dichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,4-Dichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3,3'-Dichlorobenzidine	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,4-Dichlorophenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Diethylphthalate	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,4-Dimethylphenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dimethylphthalate	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4,6-Dinitro-2-methylphenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,4-Dinitrophenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,4-Dinitrotoluene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,6-Dinitrotoluene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2-Diphenylhydrazine	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

Table 2.
Summary of Analytical Results for SVOCs
Residential Drinking Water Well Sampling Project
Crosby, TX
Sample Date: 1/31/2018

Sample ID		171886-A	171886-B	171886-C	171886-D	171886-E	171886-F	171886-G	171886-H
Analyte	**Units**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
bis(2-Ethylhexyl)phthalate	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Fluoranthene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Fluorene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Hexachlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Hexachlorobutadiene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Hexachlorocyclopentadiene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Hexachloroethane	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Indeno(1,2,3-cd)pyrene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Isophorone	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1-Methylnaphthalene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Methylnaphthalene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Methylphenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4-Methylphenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Naphthalene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Nitroaniline	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3-Nitroaniline	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4-Nitroaniline	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Nitrobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Nitrophenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4-Nitrophenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
N-Nitroso-di-n-propylamine	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
N-Nitrosodimethylamine	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
N-Nitrosodiphenylamine	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Di-n-octylphthalate	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Pentachlorophenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Phenanthrene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Phenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Pyrene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Pyridine	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,4-Trichlorobenzene	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,4,5-Trichlorophenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,4,6-Trichlorophenol	ug/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D. = Not Detected
ug/L = Micrograms per liter

Table 3.
Summary of Analytical Results for Metals
Residential Drinking Water Well Sampling Project
Crosby, TX
Sample Date: 1/31/2018

Sample ID		171886-A	171886-B	171886-C	171886-D	171886-E	171886-F	171886-G	171886-H
Analyte	**Units**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Aluminum	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Antimony	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Arsenic	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Barium	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	0.342	N.D.	N.D.
Beryllium	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chromium	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cobalt	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Copper	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Iron	mg/L	N.D.	N.D.	N.D.	0.135	N.D.	1.19	N.D.	N.D.
Lead	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Manganese	mg/L	0.329	0.075	0.047	0.109	0.041	0.4	0.042	0.015
Molybdenum	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Nickel	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Selenium	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Silver	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Thallium	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Titanium	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Vanadium	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Zinc	mg/L	0.308	N.D.	N.D.	0.561	N.D.	0.339	0.142	0.044

N.D. = Not Detected
mg/L = Miligrams per liter

Appendix I

Well Photos and Field Notes

Appendix II

Laboratory Analytical Results

Appendix III

Data Usability Summaries