

Health Effects Evaluation of Part I of Phase II data for the Hillcrest Community Environmental Investigation (HCEI)

1.0 Background

1.1 About the Hillcrest Community Environmental Investigation

Texas A&M University Health Science Center scientists and the Citizens for Environmental Justice (CFEJ) conducted a pilot study in 2008 that detected benzene in the blood of some Hillcrest community residents. In response to the results of this study and at the request of the Hillcrest community at the December 1, 2009, neighborhood meeting, the TCEQ initiated the Hillcrest Community Environmental Investigation (HCEI). The HCEI is attempting to determine whether there are environmental impacts from volatile organic compounds (VOCs) to soil, groundwater, or ambient air.

1.1 Phase I Summary

The initial phase (Phase I) of the HCEI was a passive soil gas (PSG) survey to obtain passive soil gas data to screen the Hillcrest Community and areas adjacent to the refinery sector for potential VOC impacts to groundwater. The TCEQ contracted with Geo Strata to assist with the Phase I activities. Geo Strata team members completed the passive soil gas survey between April 28 and April 30, 2010. The PSG sampler grid GPS coordinates were provided to Geo Strata by TCEQ and consisted of a fine sampler grid within the HCEI areas adjacent to the refinery sector to the west, north, and east, and a coarser grid in the interior of the Hillcrest Community.

Results of the Beacon laboratory analysis of 208 PSG samplers, 22 field duplicates, 11 matrix spike/matrix spike duplicates (MS/MSDs), and two ambient field blanks were reported by Beacon in laboratory report #2315. According to the Beacon report:

Naphthalene mass greater than the standard reporting limit of 25 nanograms (ng) was observed in four PSG samplers, AW-41 (1,574 ng), I-50 (64 ng), I-35 (606 ng), and AE-29 (300 ng); A cumulative BTEX (benzene, toluene, xylene, and ethylbenzene) mass greater than 25 ng was observed in one PSG sampler, AW-10 (37 ng); and total petroleum hydrocarbon (TPH) mass, comprised of C₅ to C₉ aliphatic hydrocarbons and specifically not including BTEX compounds, was identified above the standard reporting limit of 2,500 ng primarily in the northwestern and western portions of the project area. The highest mass was observed in PSG sampler AW-50 (12,834 ng).

The soil gas data collected during Phase I was utilized during Phase II to select suitable locations for installation of monitor wells and soil borings, and collection and analysis of soil and groundwater samples.

In summary, based on Phase I results, no significant widespread masses of chemicals of concern were observed via this screening methodology. Additional information about the Phase I is available online at:

<http://www.tceq.state.tx.us/implementation/tox/research/hillcrest-community-environmental-investigation/hillcrest-community-environmental-investigation-phase-i/>

2.0 Health Assessment

2.1 Chemicals of Potential Concern (COPCs)

Based on the results of the Phase I investigation, as well as the 2008 Texas A&M University Health Science Center/CFEJ study, the primary COPCs are considered to be benzene, toluene, ethylbenzene, xylene, naphthalene, and TPH. Nonetheless, out of an abundance of caution, the TCEQ analyzed the full suite of VOCs, polycyclic aromatic hydrocarbons (PAHs), and TPHs. Additional information on the target analyte list, procedures for sample collection, data validation, and laboratory analysis is available in the Final Field Sampling Plan for Phase II of the HCEI and is also available online at

at:<http://www.tceq.state.tx.us/assets/public/implementation/tox/hcei/phase2/final%20fsp.pdf>

Detailed definitions of the terms used in the evaluation are available at:

<http://www.tceq.texas.gov/implementation/tox/research/hillcrest-community-environmental-investigation/hillcrest-community-environmental-investigation-phase-i#facts>

2.2 Sampling Events

The Phase II of the HCEI includes two (2) groundwater monitoring events and one (1) subsurface soil sampling event. At this point, the first groundwater and subsurface soil sampling events have been conducted and will hereafter be referred to as Part I of Phase II. The second ground water sampling event (Part II of Phase II) is slated to be conducted in April 2011. In this report, the Toxicology Division (TD) reviewed groundwater and soil data for Part I of Phase II of the HCEI from a health effects perspective to identify potential health concerns. The TCEQ analyzed data from thirty-six (36) subsurface soil borings and eight (8) permanent ground water monitor well installations. The US Environmental Protection Agency (EPA) conducted split samples of the groundwater and subsurface soil borings. Specifically, the EPA collected and analyzed ten percent (10%) of the subsurface soil borings and hundred percent (100%) of the groundwater samples in Part I of Phase II of the HCEI. Figure 1 shows the groundwater and subsurface soil boring locations.

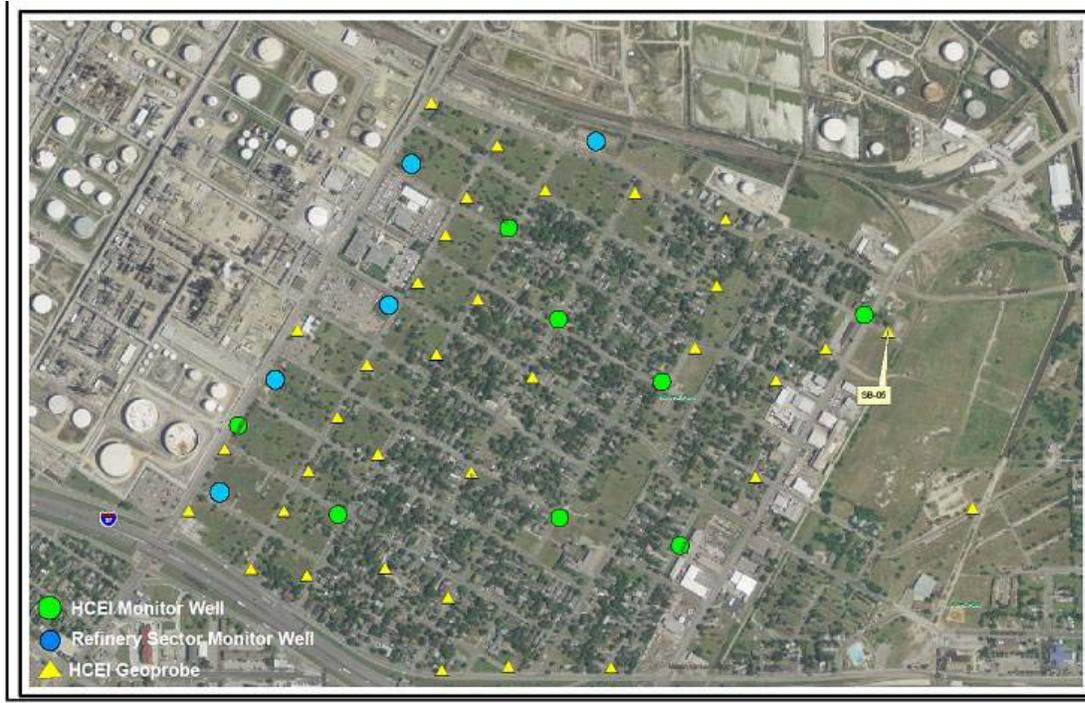


Figure 1: Phase II Sampling Locations

2.2 Texas Risk Reduction Program Protective Concentration Levels

The TCEQ follows the Texas Risk Reduction Program rule (TRRP) to find out if concentrations of Chemicals of Potential Concern (COPCs) are high enough in soil or groundwater that adverse effects could potentially occur. Additional information on the TRRP PCLs can be accessed online at <http://www.tceq.texas.gov/remediation/trrp/trrppcls.html>

The TCEQ identifies safe levels in water and soil called Protective Concentration Levels (PCLs) for many chemicals. These PCLs are for specific chemicals and set below levels where adverse health effects would be expected to occur. The TRRP is a very cautious, conservative approach to evaluate if adverse health effects could potentially occur from long-term exposure to COPCs in groundwater and soil and are set to protect children and other sensitive members of the populations. The TRRP assumes that you are exposed to many pathways at the same time, daily, over a long period of time. Actual exposure may be much less than what the PCLs assume. If the concentration of a chemical is detected at or below the PCL, adverse health effects are not expected to occur. If a chemical is above the PCL, it does not necessarily mean that adverse health effects would occur, but we would take a closer look at what action is required under the rule. All the groundwater and subsurface soil boring sample results with their respective PCLs are available on the HCEI Phase II webpage with this report.

More information about phase II of the HCEI is available online at:
http://www.tceq.texas.gov/implementation/tox/research/hillcrest.html#phase2*

For more detailed explanation of some of the terms used in the health effects, please refer to the fact sheets at <http://www.tceq.state.tx.us/implementation/tox/research/hillcrest-community-environmental-investigation/hillcrest-community-environmental-investigation-phase-ii#facts>

2.2 Evaluation

2.2.1 Ground water

The Hillcrest community gets its drinking water from the City of Corpus Christi - O.N. Stephens Water Treatment Plant. The drinking water is monitored by the city, who reports to the TCEQ on a regular basis. The water supplied to the Hillcrest community is suitable for drinking and household use. Therefore, there is no possibility of oral exposure to the groundwater under the community via drinking water for the Hillcrest community. Some chemicals, depending on their chemical/physical characteristics, can potentially move from groundwater into ambient air where a person could breathe their vapors. For that reason, the TD used groundwater-to-air PCLs to evaluate the possibility that potential pathway of exposure could be of health concern. These levels are referred to as TRRP Residential Tier 1 ^{Air}GW_{Inh-v} PCLs.

The measured levels of all the VOCs, PAHs, and TPH from both TCEQ and EPA groundwater samples were below their respective TRRP Residential Tier 1 ^{Air}GW_{Inh-v} PCLs. The reported levels of VOCs, PAHs, and TPH in the groundwater are not expected to result in adverse health effects. In summary, for Part I of Phase II of the HCEI, no significant groundwater contamination was found under any residential property.

2.2.2 Soil Data

The sampling locations included residences and locations adjacent to the Hillcrest community and within the vicinity of industrial sector. Soil sample concentrations were compared to Tier 1 TCEQ Texas TRRP total-soil-combined (^{Tot}Soil_{Comb}) PCLs for residences. To be conservative (i.e., health-protective), the TD chose source area PCLs for 30 acres for comparison. The Residential ^{Tot}Soil_{Comb} PCLs represent safe levels for compounds in residential surface soils, and are designed to be health-protective considering long-term (e.g., 30-year), daily exposure of children and adults through: the incidental ingestion of soil, dermal contact with soil, the inhalation of vapor/particulate emanating from soil, and the consumption of vegetables homegrown in the soil. Concentrations of a contaminant in soil that are at or below the residential PCL would not be expected to cause adverse health effects, even in sensitive members of the population such as children.

Long-term exposure to contaminant levels above the PCL have the potential to result in adverse effects, but will not necessarily cause adverse effects to occur as PCLs are designed to be conservative compared to likely real-world exposures (e.g., residential PCLs consider simultaneous, long-term (30-year) reasonable worst-case exposure through four pathways on a daily basis).

The measured levels of VOCs, PAHs, and TPH from both TCEQ and EPA soil boring locations were below their respective Residential ^{Tot}Soil_{Comb} except for one soil sample at soil boring location SB-5 that will be discussed below in more detail. Exposure to the reported levels of

VOCs, PAHs, and TPH in all soil borings samples is not expected to result in adverse health effects.

The concentration of C₆ to C₁₂ aliphatic hydrocarbon (TPH) (5440 mg/kg) in the soil sample at SB-5 exceeded the Residential ^{Tot}Soil_{Comb} PCL for C₆ to C₁₂ (TPH) (1100 mg/kg) by five times. The actual health risk for a resident from exposure to soil from this particular sample location is minimal because the sample location is not within the Hillcrest community but located within the light industrial sector adjacent to the former Old Tank farm Site (Figure 2). Further, the site is also apparently deserted and vacant (Personal Communication with TCEQ Remediation staff and TCEQ Corpus Christi Regional staff) and it further mitigates the possibility of exposure to the chemical via dermal route at the site. This observation further supports the assumption of minimal exposure of human residential receptors to the COPC.

The sample depth location (10-13 feet) also eliminates the possibility of even occasional residential exposure. Even though the possibility of exposure to the COPC in the soil sample is minimal, TRRP requires that actions be taken when representative concentration exceeds an applicable PCL. The TCEQ remediation staff has requested that the potential responsible entities include this area as part of their subsurface soil and groundwater assessment and cleanup efforts are already in progress. For the above cited reasons, exposure to the reported level of the C₆ to C₁₂ aliphatic hydrocarbon TPH in the soil sample is not expected to result in adverse health effects.

Hillcrest Neighborhood and Surrounding Industry, Nueces County, Texas



Texas Commission on Environmental Quality
Map created on January 26, 2011



This map was generated by the Toxicology Division (TD) of the Texas Commission on Environmental Quality. No claims are made to the accuracy or completeness of the data, or to the suitability of the map for a particular use. This area may contain facilities which have not been identified by the TD. For more information regarding this map, please contact the TD at (512) 239-1795.

Figure 2: SB-5 Subsurface Soil Locations

3.0 Conclusions

Exposures to the reported levels of the VOCs, PAHs, and TPH from Part I of the Phase II groundwater and subsurface soil sampling HCEI are not expected to cause adverse health effects, even in potentially sensitive populations such as children.