



# **Texas Environmental Health Institute**

# **Progress Report**

**Prepared January 2013**

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## **BACKGROUND**

In 2001, in response to citizen concerns about the potential impact of environmental pollutants on their health, the Texas Legislature passed legislation establishing the Texas Environmental Health Institute (TEHI or Institute) as a joint venture between the Texas Department of Health, predecessor agency to the Texas Department of State Health Services (DSHS), and the Texas Natural Resources Conservation Commission, predecessor agency to the Texas Commission on Environmental Quality (TCEQ), the State environmental agency. Section 19.01, Title 5, Subtitle G, Chapter 427, of the Texas Health and Safety Code, directs the TCEQ to enter into an agreement with the DSHS, to jointly establish the Texas Environmental Health Institute *to examine ways to identify, treat, manage, prevent, and reduce health problems associated with environmental contamination.*

In September 2007, DSHS prepared a Progress Report that described the establishment of the Institute, its purposes and objectives, and TEHI accomplishments as of that date. This Progress Report summarizes background information on the Institute and describes TEHI activities since then. A complete listing of TEHI accomplishments to date is included in the Appendix.

### **Establishment of the Institute**

On December 6, 2001, an Interagency Memorandum of Agreement (MOA) was entered into by and between the Texas Natural Resources Conservation Commission (predecessor of the TCEQ) and the Texas Department of Health (predecessor of the DSHS). The purpose of the Agreement was to establish the Institute and to describe the tasks to be performed and the duties and responsibilities of each of the agencies in enabling the Institute to accomplish its purposes.

The Institute was established as a virtual entity with its functions assigned to existing staff in the Texas Department of Health Environmental Epidemiology Division (currently the Environmental & Injury Epidemiology and Toxicology Unit or EIET within DSHS). Currently, DSHS and TCEQ share joint responsibility for management of TEHI activities.

## VISION AND MISSION STATEMENTS

### Institute Vision Statement

**To have healthy informed communities**

This vision statement describes what the Institute strives to achieve. Individuals often have to make choices about their lifestyles that can affect their health. They frequently need to rely on public authorities to provide them with reliable information so that they may make informed decisions. Often they also rely on government to protect them from threats which are beyond their control.

### Institute Mission Statement

**To examine ways to identify, treat, manage, prevent, and reduce health problems associated with environmental contamination**

This mission statement identifies the overall purpose of the Institute and describes the Legislative mandate that it must fulfill.

## PROGRESS

### TEHI Activities

In the September 2007 Progress Report TEHI planned to utilize the Toxic Substances Coordinating Committee (TSCC) meetings as a means of notifying other state agencies of Institute functions and making the information available to the public. TCEQ and DSHS staff regularly attend TSCC meetings and discuss TEHI activities. In addition, DSHS hosts a webpage on behalf of TEHI. The webpage (<http://www.dshs.state.tx.us/epitox/tehi.shtm>) contains background information about TEHI and summaries and reports for projects funded by TEHI.

During the 2008-2009 biennium, DSHS and TCEQ worked together to streamline the process of funding projects using TEHI appropriations. This resulted in the funding of eight individual projects during the 2008-2009 biennium, two projects for the 2010-2011 biennium, and one project for the 2012-2013 biennium. DSHS and TCEQ work closely with TEHI grantees to provide support and to ensure TEHI-funded projects fulfill the mission of the Institute. Below are summaries of the projects that were funded during 2008-2013. A list of all TEHI funded projects to date is included in the Appendix. Reports and presentations, as available, are posted on the TEHI website (<http://www.dshs.state.tx.us/epitox/tehi.shtm>) or can be requested by e-mailing [tehi@dshs.state.tx.us](mailto:tehi@dshs.state.tx.us) or calling (800) 588-1248.

To carry out the purposes of TEHI the Institute has funded projects related to its mission. Specific research areas have included:

- Research on Priority Health Conditions Potentially Associated with Exposure to Environmental Contaminants
- Development and Use of Biological Markers of Exposure Relatable to Sources of Exposure and the Potential for Adverse Health Effects
- Assessment and Increased Understanding of Potential Risks to the Citizens Living Near Superfund and Other Hazardous Waste Sites
- Public Access to Information about Potential Environmental Health Risks
- Geocoding of Environmental and Disease Data

### Projects Completed During 2008-2013

#### **Survey of the Trace Element Geochemistry of Texas Soils (August 2007-August 2009)**

TEHI provided the Bureau of Economic Geology (BEG), who has been working with the United States Geologic Survey (USGS), with approximately \$159,800 to collect samples to complete coverage of the Geochemical Survey of Texas in order to create a new higher precision survey of the trace element geochemistry of Texas soils. These data will provide state agencies and others with information needed to assess whether metal contaminants at a site (e.g., state and federal superfund sites) have impacted the soil. These types of assessments are needed when identifying populations potentially exposed to environmental metals in the areas immediately surrounding such sites. BEG collected soil samples from the approximately 600 sample “cells” remaining to complete the Geochemical Survey of Texas, following the sampling plan generated by the USGS. The samples were shipped to the USGS for metal analysis. Per an agreement with BEG, these data will be supplied to TEHI as soon as they are available.

**Proximity to Hazardous Waste Sites and Industrial Facilities and Selected Pregnancy Outcomes Among Residents of Dallas, Denton, and Tarrant Counties (October 2007-March 2008)**

TEHI provided Texas State University and Texas A&M University Health Science Center with approximately \$38,400 to conduct an epidemiological sub-analysis utilizing the Texas State and Federal Superfund (Hazardous Waste Site) Database, 2004, and the Reported Air Emissions from the Toxic Release Inventory in Texas, 1996-2001. The relationship between residential proximity to state and federal superfund sites and industries reporting air emissions of chemicals and selected birth defects, low birth weight, and preterm birth was determined. Additional geographic information system (GIS) functions were added to the GIS-EpiLink and linked with environmental and birth data in the Dallas area from 1996 through 2003. Race/ethnicity and other measures of socioeconomic status and their association with maternal residential proximity to waste sites and industrial facilities for Dallas, Denton, and Tarrant counties also were explored. Overall, the study found no convincing evidence that residents who lived in close proximity to state or federal superfund sites in Dallas, Denton, or Tarrant counties were more likely to have the adverse pregnancy outcomes studied. However, Dallas, Denton, and Tarrant county residents were more likely to give birth to babies with neural tube defects during the study period of 1997 – 2000 if they lived near industrial facilities with reported air emissions of chemicals. This finding should be interpreted with caution as no exposure analyses for ambient or personal exposures were conducted and information regarding folic acid and vitamin intake (known to reduce risk of neural tube defects) and other risk factors was not available.

**GIS-Augmented Environmental Health Research in Texas: Maternal Residential Proximity to Superfund Sites and Low Birth Weight in Offspring (March 2008-August 2009)**

TEHI provided Texas State University with approximately \$87,900 to determine if low birth weight (less than 2,500 grams) could be potentially related to environmental exposures of Texas mothers who lived near federal or state superfund sites at the time children were born. The case-control study looked at the distances between each possible pair of a mother's residence location at the time of delivery of a case/control and a superfund site from 1996 through 2004. These distances were used as a proxy for exposure. After obtaining data about potential environmental exposure and linking the birth data and environmental data, logistic regression was used to conduct the epidemiologic analysis. Odds ratios were adjusted for a number of variables including maternal age, race/ethnicity, education, parity, multiple births, and proximity to Toxic Release Inventory sites. Residential proximity was defined as a maternal residence distance within 1 mile or closer distances from active superfund sites. The referent (unexposed) group consisted of women who lived one or more miles away from superfund sites. Overall, the study did not find any compelling evidence that a maternal residence near hazardous waste sites at delivery was associated with low birth weight in offspring.

**Bayesian Risk Mapping of Childhood Cancer Around Texas Superfund Sites (March 2008-August 2009)**

TEHI provided Texas A&M University with approximately \$150,000 to model the small scale spatial patterns of childhood cancer risks around the 47 federal superfund sites in Texas. These modeling results enable focused investigation of potential high risk locations. The risk modeling was performed using a cancer database collected and linked with birth records. All childhood cancer diagnoses with incidence from January 1, 1990 to December 31, 2003 were grouped into 19 groups based on the most recent International Classification of Childhood Cancers (ICCC-3). Some pooling of very rare cancer types was performed. The spatial mapping divides the target areas into many very small segments called pixels. For each pixel the risk for each cancer histotype was estimated, adjusted for race. Detailed risk surfaces capable of demonstrating risk patterns and risk clusters were created in this project.

**Pilot Project - Assessing the Role of Prenatal Lead Exposure on Infant Blood Lead Levels (March 2008-August 2009)**

TEHI provided the Texas Department of State Health Services (DSHS) Chemical Threat Lab with approximately \$11,000 to conduct a pilot project with dried blood spot (DBS) specimens. The purpose of this study was to evaluate the association between blood lead levels (BLLs) in infants and prenatal exposure to lead (as measured by newborn DBS results), using public health registry data for infants born in Texas from July 2002 through July 2006. The Childhood Lead Poisoning Prevention Program (CLPPP) database was used to identify infants 0-6 months of age who had elevated blood lead levels greater than 10 µg/dL, as well as infants of the same age who had blood lead levels as close to 0 as possible. The DSHS lab analyzed DBS specimens for these infants. Correlation coefficients were calculated to compare CLPPP infant BLL results and newborn DBS lead levels. Although an association was seen between elevated newborn DBS lead levels and elevated BLLs in infants tested between 0-6 months of age, the findings suggest that prenatal exposure does not appear to be the only source of significant lead exposure for infants  $\leq$  6 months of age.

**Characterization of Airborne Contaminants around the Texarkana Wood Preserving Site in Texarkana, Texas (October 2008-August 2011)**

TEHI provided The Institute of Environmental and Human Health at Texas Tech University with approximately \$250,000 for an air monitoring project around the Texarkana Wood Preserving Federal Superfund Site in Texarkana, Texas. The overall goal of this project was to identify and characterize airborne contaminants in and around this former creosote and pentachlorophenol wood preserving site to help assess potential exposures. Air samples were taken quarterly over a one-year period. Samples were collected both upwind and downwind of the site as well as at a leeward location on-site. Samples were analyzed for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), dioxins, and furans. Data from these analyses provide information regarding potential exposure to air contaminants to those living near and working at the Texarkana Wood Preserving Site. With the exception of PAHs, air pollutant concentrations were low near the Texarkana Wood Preserving Site. Based upon the data collected in this study, the nearby rail line was most likely the primary source of PAHs.

**Grand Prairie Vapor Intrusion Investigation (January 2009-August 2009)**

TEHI provided the University of Texas and the Texas Department of State Health Services (DSHS) with approximately \$250,000 to conduct air sampling and an exposure investigation in Grand Prairie. Trichloroethylene (TCE) groundwater plumes had been identified in three areas in Grand Prairie, Texas. The purpose of this investigation was to determine whether residents living above these TCE plumes had higher levels of TCE in their bodies as compared to residents not living above a TCE plume (comparison area), and to provide information on the relationship between human exposures and the vapor intrusion pathway. This was a multi-agency project that involved the collection and measurement of TCE in groundwater, soil vapor, indoor air, and biological specimens. Additional exposure related information - time spent indoors, body weight, occupational information, etc. - was collected through the use of a survey. Residents living above one of the groundwater plumes had significantly higher levels of TCE in their blood, as well as a higher percentage of people with detectable levels of TCE in their blood, than residents living in the comparison area. Together, the biological and environmental data suggest that vapor intrusion and human exposure was occurring in one of the groundwater plume areas. It did not appear that vapor intrusion was occurring in the other two areas.

### **Characterization of Airborne Contaminants at the Ballard Pits State Superfund Site in Nueces County, Texas (April 2009-August 2011)**

TEHI provided the University of Texas-Pan American with approximately \$66,500 for an air sampling project on the Ballard Pits State Superfund Site near Robstown, Texas. The overall goal of this project was to identify and characterize airborne contaminants in and around this petroleum waste site prior to any additional removal activities. Passive air sampling techniques were used at 20 locations surrounding the North Pit to establish time-averaged concentrations of airborne volatile organic compounds (VOCs) and semi-volatile organic compounds including polychlorinated biphenyls (PCBs). Data from these analyses provide information regarding potential exposure to air contaminants to those living near and working at Ballard Pits. PCBs were not detected in air samples collected at the site. However, some VOCs including toluene, ethylbenzene, xylenes, and trimethylbenzenes were found at somewhat elevated concentrations, but below those of health concern.

### **Defining Biota-Sediment Accumulation Factors for the San Jacinto River Waste Pits, Texas (September 2009-August 2012)**

TEHI provided approximately \$250,000 to Baylor University to study biota-sediment accumulation factors (BSAFs) at the San Jacinto Waste Pits Federal Superfund site in Channelview, Texas. Waste from a former paper manufacturing plant was dumped near the San Jacinto River from the 1960s to the 1980s. Studies recently conducted to evaluate dioxin levels in the Houston Ship Channel identified this site as a significant source of polychlorinated dibenzo-p-dioxins and -furans. Measurements of these chemicals in fish and shellfish have resulted in consumption advisories near this site. The current project characterized the capacity of dioxins, furans, and dioxin-like polychlorinated biphenyls (PCBs) to bioaccumulate in edible fish and shellfish on or near the site. Results from this provide information necessary to calculate a BSAF to better estimate fish/shellfish uptake and subsequent risks to human health associated with eating fish. The capacity for bioaccumulation of dioxins, furans, and PCBs at the site was also modeled using the TrophicTrace tool, and further characterized chemical concentrations throughout the food chain. The chemical properties associated with bioaccumulation also were examined using quantitative structure-activity relationship (QSAR) modeling. Further, a novel extraction method for dioxins, furans, and PCBs was developed in this project. Although analysis of dioxin, furan, and PCBs at the San Jacinto Waste Pits site revealed significant contamination, calculated biota-sediment accumulation factors were lower than expected. The scientific outcomes of this project enable site managers and local public health officials to better understand potential human health risks posed by the consuming fish from the Houston Ship Channel and provided a methodology that can be applied to similar sites.

### **Prevalence Estimates of Asthma in Texas (September 2010-August 2012)**

TEHI provided the University of North Texas with approximately \$250,000 to determine the prevalence of asthma among children living near selected Superfund sites in Texas and to obtain data on Texas asthma prevalence for comparison. The relationship between child asthma and environmental pollutants has been hypothesized and previous research has found elevated rates of asthma in children who lived near hazardous waste sites. Certain areas of Texas have been purported to have higher asthma prevalence rates than others. Parents of children living near the selected Texas Superfund sites and other areas in the State were interviewed to determine if children in the home have asthma or asthma-like symptoms. All data have been collected for this project and the researchers are preparing a report of their findings.

### **Lavaca-Matagorda Bay System Seafood Tissue Contaminant Monitoring and Risk Assessment (September 2012-August 2013)**

TEHI provided the Texas Department of State Health Services (DSHS) with approximately \$65,000 to characterize the human health risks associated with consumption of select seafood from the Lavaca-Matagorda Bay System potentially due to mercury-impacted sediments related to the Alcoa-Lavaca Bay Superfund Site. Between 1966 and 1970, wastewater from the Alcoa-Lavaca Bay chlor-alkali plant that contained mercury was transported to an offshore gypsum lagoon located on Dredge Island. After a settling period, the overflow from the gypsum lagoon was discharged to Lavaca Bay from two outfalls on Dredge Island. This resulted in unacceptable levels of mercury in fish and crab in Lavaca Bay and DSHS issued a fishing ban for Lavaca Bay. Prior to this project, DSHS had not conducted any seafood contaminant monitoring in the Lavaca-Matagorda Bay System since 2001. For this project, the DSHS Seafood and Aquatic Life Group collected seafood from the Lavaca-Matagorda Bay Estuary and will prepare a report to quantify current mercury related human health risks associated with consumption of seafood from the Lavaca-Matagorda Bay Estuary and compare historical mercury data.

### **TEHI-Related Agency Activities**

DSHS and TCEQ continue their work to protect and promote the health of Texas residents and provide medical, epidemiological, toxicological, and laboratory support to state and federal agencies in all areas of environmental public health. More information about DSHS- and TCEQ-specific activities that are related to the mission of TEHI can be found on each agency's respective website at <http://www.dshs.state.tx.us/epitox/> and <http://www.tceq.state.tx.us/implementation/tox/>.

DSHS' EIET has established a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), a federal agency within the Department of Health and Human Services, to develop the capacity to collect, integrate, analyze, and interpret data about environmental hazards, exposure to environmental hazards, and health effects potentially related to environmental hazards. EIET evaluates and responds to public health concerns as they relate to human exposure to hazardous substances around Superfund sites or other areas of concern. EIET also conducts biological testing and exposure investigations to obtain exposure information for the completion of an investigation. Community involvement and health education are integral parts of EIET activities. Since September 29, 2001, EIET has received approximately \$3,700,000 in federal funds through a Cooperative Agreement with ATSDR to identify pathways of exposure to contaminants from hazardous waste sites and releases and identify, implement, and coordinate public health interventions to reduce exposures to hazardous substances at levels of health concern.

EIET also has been awarded funding to conduct amyotrophic lateral sclerosis (ALS) surveillance in Texas. In order to evaluate a newly-created national ALS registry/surveillance system for completeness, the ATSDR is in the process of developing limited ALS state-based surveillance. State-based surveillance largely entails asking neurologists' offices to abstract medical records of ALS patients seen during a specific time period. This pilot project began January 1, 2010 and will continue through June 30, 2012, with \$135,850 awarded for the project. All data have been collected for this project and the researchers are preparing a report of their findings.

Numerous TCEQ activities complement the mission of TEHI. For example, the agency has been involved with numerous studies investigating human exposure to airborne toxic chemicals and the potential of these exposures to cause adverse health effects. Studies have been completed in Houston, Midlothian, the Dallas-Fort Worth area, and Corpus Christi.

## APPENDIX

### Complete List of TEHI-Funded Projects

The following is a complete list of projects that have been funded by TEHI as of January 2013. Project descriptions, reports, and presentations, as available, are posted on the TEHI website (<http://www.dshs.state.tx.us/epitox/tehi.shtm>) or can be requested by e-mailing [tehi@dshs.state.tx.us](mailto:tehi@dshs.state.tx.us) or calling (800) 588-1248.

Project	County	Project Period	Approximate Funding
Lead Exposure - West Dallas Area & Cadillac Heights	Dallas	September 2002- August 2006	\$545,000
Screening for Asbestos - Related Lung Diseases Associated with W.R. Grace & Co./Texas Vermiculite	Dallas	June 2006- August 2007	\$192,900
Toxic Release Inventory (TRI) & Superfund Site Map Layers & GeoDatabase	Statewide	July 2007- August 2007	\$37,000
Database of Environmental Hazards	Statewide	July 2007- August 2007	\$112,300
Survey of the Trace Element Geochemistry of Texas Soils	Statewide	August 2007- August 2009	\$159,800
Proximity to Hazardous Waste Sites and Industrial Facilities and Selected Pregnancy Outcomes Among Residents of Dallas, Denton, and Tarrant Counties	Dallas Denton Tarrant	October 2007- March 2008	\$38,400
GIS-Augmented Environmental Health Research in Texas: Maternal Residential Proximity to Superfund Sites and Low Birth Weight in Offspring	Statewide	March 2008- August 2009	\$87,900
Bayesian Risk Mapping of Childhood Cancer Around Texas Superfund Sites	Statewide	March 2008- August 2009	\$150,000
Pilot Project - Assessing the Role of Prenatal Lead Exposure on Infant Blood Lead Levels	Statewide	March 2008- August 2009	\$11,000
Characterization of Airborne Contaminants around the Texarkana Wood Preserving Site in Texarkana, Texas	Bowie	October 2008- August 2011	\$250,000
Grand Prairie Vapor Intrusion Investigation	Dallas	January 2009- August 2009	\$250,000
Characterization of Airborne Contaminants at the Ballard Pits State Superfund Site in Nueces County, Texas	Nueces	April 2009- August 2011	\$66,500
Defining Biota-Sediment Accumulation Factors for the San Jacinto River Waste Pits, Texas	Harris	September 2009- August 2012	\$250,000
Prevalence Estimates of Asthma in Texas	Statewide	September 2010- August 2012	\$250,000
Lavaca-Matagorda Bay System Seafood Tissue Contaminant Monitoring and Risk Assessment	Calhoun	September 2012- August 2013	\$65,000