

Wood Preservation and Treatment Sites Demonstration Project (Louisiana, 2007)

In September 2003, the Section of Environmental Epidemiology & Toxicology (SEET) received funding from the Centers for Disease Control & Prevention (CDC) to develop a statewide environmental public health tracking program. A portion of that funding was used to complete a demonstration data linkage project focused on wood preservation and treatment (WPT) sites. The primary goal of the project was to demonstrate the feasibility of standardizing and linking data from multiple sources for public health surveillance.

Methods

SEET reviewed WPT site information, conducted a literature search and inventoried available environmental databases. SEET attempted to identify ground water contamination and any associated health outcomes linked with Louisiana's WPT sites. Available ground water data was evaluated for the presence of five chemicals of concern (COC) that are historically associated with WPT activities: arsenic, benzo(a)pyrene, copper, chromium and pentachlorophenol.

On-site ground water monitoring data associated with 22 abandoned or inactive WPT facilities were provided by the Louisiana Department of Environmental Quality (LDEQ). Analytical results were compiled, converted to an electronic format, and evaluated for relevant COCs. In addition, data on ground water (that feeds municipal drinking water systems) collected by the Office of Public Health's (OPH) Safe Drinking Water (SDWP) was compiled and evaluated for the same COCs. SDWP-monitored wells were geo-referenced using latitude/longitude and included in the analysis if they fell within a half-mile radius of an on-site LDEQ ground water monitoring well.

A literature search indicated that there were possible associations between exposure to the COCs and skin, lung and bladder cancer. Although there is an association between non-melanoma skin cancers and arsenic, non-melanoma skin cancers are not reported to the National Cancer Institute and the Louisiana Tumor Registry (LTR). As a result, the project focused on bladder and lung cancer. Average Annual Cancer Incidences for 1999-2003 were calculated. Age-adjusted rates for lung, bladder and all cancer incidences combined were presented for each gender/race group in each of the 13 parishes that contained an abandoned or inactive WPT site.

Demographic data of interest which included gender, susceptible populations, race and individuals living below the poverty level, were obtained from the United States Census Bureau and evaluated.

Private well location data provided by the Louisiana Department of Transportation and Development (LDOTD) was used to identify wells located near the selected WPT sites and to estimate private well use. The LDOTD maintained the state's Private Well Water Registration Program which consists of statewide latitude/longitude point data on well location, depth and static water level of all existing and newly-drilled water and monitoring wells.

Results

The following data sets were evaluated:

1. WPT On-site Ground water Monitoring (1987-2005)
2. Municipal Drinking Water Well Monitoring (1991-2004)
3. Cancer Incidence (Lung, Bladder, All Sites) (1999-2003)
4. Registered Private Well Locations (2005)
5. Demographic Information (US Census 2000)

The contaminants in ground water chosen for study were arsenic, benzo(a)pyrene, chromium, copper and pentachlorophenol. The health outcome evaluated as part of this demonstration project is incidence of lung, bladder and all sites combined cancer.

WPT On-site Ground water Monitoring Results:

On-site ground water monitoring was conducted at 21 of the 22 study sites between 1987 and 2005. The oldest site opened in 1872 and the last site to cease operations did so in 1991. Fifty-three percent of samples (445/843) had detection limits above the Maximum Contaminant Level (MCL), the drinking water comparison value used in this project, making interpretation of the data difficult. For the sites at which ground water monitoring was conducted, the number of samples taken at each site during the study period ranged from 1 to 143. At some sites, only one contaminant of concern was monitored and at others all 5 were evaluated. Thirteen of 22 sites (59%) had at least one chemical at levels exceeding the MCL. Eight sites had levels exceeding MCLs for multiple chemicals.

Municipal Drinking Water Well Monitoring Results:

Only 5 (Bayou Bonfuca, LaSalle Creosoting, Marion Pressure Treating, Pearl River Wood Preserving and Tullos Lumber) of 22 WPT sites had a municipal drinking water monitoring well within a ½ mile of the site. Between 1991 and 2004, the contaminants of concern, were not detected in public water supply wells near four of the five sites. At LaSalle Creosoting Company, copper at levels above the MCL were detected in 1998 and, although it was not at a level above the MCL, chromium was detected in 2000. In 63% of the arsenic samples at these 5 sites, the detection limit was above the MCL. However, it is important to note that the drinking water standard for arsenic was lowered by U.S. Environmental Protection Agency from 0.05 mg/L to 0.01 mg/L in 2006.

Cancer Incidence (Lung, Bladder, All Sites) Results:

Incidence data from 2002 revealed an overall (all races, both sexes) age-adjusted cancer incidence rate for all cancer sites of 474.5 (cases per 100,000 population) for Louisiana, compared to the US rate of 462.2, giving Louisiana a ranking of 17th among states for incidence of all cancers. The lung cancer incidence rate for Louisiana is 78.4, the 6th highest rate among states, compared to the US rate of 67.5. The bladder cancer incidence rate for Louisiana, ranked 31st among states, is 19.2, compared to the US rate of 21.0. Parish-level average annual incidence rates (1999-2003) for sex/race subgroups and were calculated and compared to the State.

Supplemental information from the LDOTD's database of registered private wells (2005) and zip-code level demographic information (US Census 2000) was also reviewed and compiled to provide additional tools for the characterization of populations living near WPT sites and the identification of susceptible groups of residents within these populations.

Limitations

On-site ground water monitoring data was collected by LDEQ for regulatory purposes; consequently, there was considerable variability in the amount of samples collected among the study sites. Site classification (National Priority List (NPL) vs. non-NPL sites) influences the frequency of monitoring events.

Ground water used for municipal drinking water is monitored by OPH's Safe Drinking Water Program. The monitoring data lacks information on usage (i.e. which households and how many are served by a particular municipal water well) thus making it difficult to describe exposure risk via the drinking water pathway. Variability in testing frequency exists in the SDWP database as well. Factors such as population density, analyte, and site testing history influence the monitoring schedule.

Private well location data available from LDOTD only allows for the quantification of privately-owned wells in proximity of WPT sites. There is no contaminant monitoring data or information on well usage for drinking water.

Linking cancer incidence with environmental exposure has significant limitations. Cancer is a group of diseases with many risk factors, including genetics and lifestyle (e.g. smoking, diet, physical activity and sun exposure). According to the American Cancer Society, smoking is the primary cause of lung disease and smokers were twice as likely to develop bladder cancer than non-smokers. Two of the COCs associated with WPT activities, arsenic and benzo (a) pyrene, are present in tobacco products. Other environmental and occupational exposures may also increase one's risk of developing lung or bladder cancer. Without complete medical and occupational histories, other contributing risk factors cannot be taken into consideration. Furthermore, geographically linking cancer cases to environmental contamination presents additional problems. Case locations are identified using residence at time of diagnosis. The case's residential history and disease latencies are not considered.

Discussion

The WPT Demonstration Project highlights the many challenges associated with identifying, obtaining, analyzing and linking disparate data from multiple sources. Although this was initially designed as a linkage project, given the limitations of the project design and of the data sets themselves and the inability to confirm a completed exposure pathway, the Louisiana Tracking staff could not link the environmental data with the health outcome data. Instead, the data from each source was cleaned, compiled, analyzed and presented in site data summaries. The site-associated data was geographically linked, presented in

tabular format, and accompanied by a map. This format can be used to provide valuable information to the agency, other state agencies, policy makers, and the public.

Outcome:

The WPT Demonstration Project emphasized the need for education and outreach surrounding the use of unregulated privately-owned wells for drinking water. The Private Well Initiative was established to promote privately-owned well testing in Louisiana. The DHH brochure entitled, "Private Water Well Testing in Louisiana: What You Need to Know to Protect Your Water" was updated, reprinted and disseminated to program stakeholders and well owners. A partnership with LDOTD was established to ensure the brochure was distributed to new well owners registering their well with LDOTD. This partnership continues with the Louisiana Department of Natural Resources who, in 2008, assumed management responsibilities for the well water registry. After winning CDC funding in 2012 and again in 2014, DHH has expanded its Private Well Initiative to include surveillance, targeting monitoring and interventions.