Health Consultation

BAYOU BONFOUCA

ASSESSMENT OF CANCER INCIDENCE FROM THE LOUISIANA TUMOR REGISTRY FROM 1988 - 1997

SLIDELL, ST. TAMMANY PARISH, LOUISIANA

EPA FACILITY ID: LAD980745632

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

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In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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Prepared by:

Louisiana Department of Health and Hospitals
Office of Public Health
Section of Environmental Epidemiology & Toxicology
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

I. EXECUTIVE SUMMARY

In 1994, the Louisiana Department of Health and Hospitals, Office of Public Health, Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) prepared a public health assessment for the Bayou Bonfouca site. It was determined that the Bayou Bonfouca site, an abandoned creosote wood treating facility, posed a public health hazard because of past, and possibly present and future exposure to on-site soil, sediment, and surface water contaminated with polycyclic aromatic hydrocarbons (PAHs), pentachlorophenol (PCP), and dioxin. The exposures were estimated to be at levels that could exceed, individually or as a mixture, long-term guidelines (1). This health consultation is in response to community concerns and was developed in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR) to conduct a health statistics review to evaluate cancer statistics. A health statistics review was conducted by the LDHH/OPH/SEET in order to evaluate whether the population residing closest to the Bayou Bonfouca National Priorities List (NPL) site in St. Tammany Parish, Louisiana, had elevated cancer incidence rates. The review consisted of four census tracts and ten census block groups within one mile of the site. The size of the population in the 1-mile proximity zone was approximately 21,834 persons. A 1-mile proximity was chosen because of the limited data available, the presence of contaminated fishing areas (which are posted), and the presence of contaminated properties (recreational and residential). Incidence cancer data from the years 1988-1997 as reported in the Louisiana Tumor Registry (LTR), a population based cancer incidence registry for the state, were utilized for this review. The cancer cases included in analysis were those cases that could be geocoded to latitude and longitude coordinates within the two census tracts within 1-mile of the site. The geocoding rate for the entire data set was 92.7%.

The purpose of this health statistics review was to compare incidence rates (1988 – 1997) in the population located within 1-mile proximity zone of the Bayou Bonfouca site to those of the state of Louisiana. Cancer incidence for all cancers combined and for cancers at specific body sites associated with chemical exposure were reviewed. The specific cancer sites analyzed in this review are breast (females), colorectal, lung and bronchus, non-Hodgkin's lymphoma, ovarian (females) and prostate (males).

Results of the cancer incidence review for the census tracts and census block groups composing the 1-mile proximity zone compared to Louisiana state incidence cancer rates showed males who lived in the 1-mile proximity zone had significantly lower incidence ratios for all cancers combined, for colorectal cancer and for prostate cancer. Females who lived in the 1-mile proximity zone had significantly lower incidence ratios for all cancer combined and for breast cancer. In reviewing the cancer statistics, no association between residence within the census tracts and census block groups within 1-mile of the site and cancer incidence emerges.

II. BACKGROUND AND STATEMENT OF ISSUES

The city of Slidell is 25 miles northeast of New Orleans in St. Tammany Parish (Attachment Figure A1). The Bayou Bonfouca site is an abandoned creosote wood treating facility formerly called the American Creosote Works plant. The 55-acre site derives its name from Bayou Bonfouca, a navigable waterway that forms the southern boundary of the site proper and flows south for 7 miles into Lake Pontchartrain. The site is bounded by Western Creek to the west, the Eastern Drainage Channel to the east, and West Hall Avenue to the north.

Creosote preservation of various wood products started at this site in 1892. In 1970, the plant burned down and large amounts of creosote spilled onto the land. No records exist to quantify the amount of creosote released to the environment during 1970 (2). Contamination of soils, sediments, surface water, groundwater, and the biota of the bayou resulted from past operating methods and/or disposal practices. In 1970, approximately 1.5 miles of scenic Bayou Bonfouca became biologically sterile due to severe creosote contamination in bayou sediments and in the water column. Creosote contamination was so concentrated that it caused second-degree chemical burns to divers, injured or killed aquatic animals and waterfowl, and posed a significant hazard to recreational users (3). The main contaminants of concern were the polycyclic aromatic hydrocarbons (PAHs) that compose creosote.

The Louisiana Department of Environmental Quality (LDEQ) took over operation and maintenance activities at the site on July 11, 2001. In an effort to more accurately determine the effectiveness of the groundwater containment system, the Environmental Protection Agency (EPA) initiated a plan to install an additional five monitoring wells on and off site to monitor any movement of the creosote plume. Installation of these wells was conducted the week of August 26, 2002. Once installed, the State of Louisiana then took responsibility for monitoring the wells (2). Monitoring results are available at LDEQ. This is the most current information available regarding this site.

Before remediation, on the basis of available data at that time, the Bayou Bonfouca site was categorized as a public health hazard because of extensive soil, sediment, fish, surface water, and groundwater contamination. In 1987, the LDHH and the LDEQ issued a written advisory and posted signs warning citizens not to swim in the bayou or eat fish or shellfish taken from a 7-mile length of the bayou. Human exposure by dermal contact with bayou sediments or ingestion of contaminated shellfish may have occurred prior to the issuing of the advisories against swimming and consumption of fish and shellfish and may be occurring presently to people not heeding the advisories. A mile and half of the Bayou has been restored for aquatic life, as well as human recreational and residential use. A public boat launch was recently installed by the city of Slidell to allow public access to this restored area (2).

One of the primary concerns expressed by this community was living near a hazardous waste site and they were concerned about its effect on their health. With the help of Geographic Information System (GIS) software we were able to utilize existing data and present environmental and health outcome data in a clear manner. Latitude and longitude coordinates confirming case location within the census tracts and census block groups within 1-mile of the site were found for 2156 (92.7%) of the 2326 reported cancer cases in zip codes 70458, 70459, 70460 and 70461. Data were not adjusted by variables that might impact cancer incidence such as lifestyle factors and poverty. Residents of the 1-mile proximity zone had lower proportions of persons and families who lived below the poverty line than compared with State of Louisiana, in addition to higher median family and household annual incomes. These differences may indicate differential diagnosis of cancer due to access to care within and outside of the 1-mile proximity zone. Lifestyle factors known to play key roles in cancer outcomes, such as nutrition and smoking, may also differ based on poverty status. While no cause and effect conclusions can be drawn, public health data relevant to a specific community can provide a first step toward addressing general health concerns.

Residential proximity to the Bayou Bonfouca site was selected as an environmental indicator of exposure. This provided a clear geographically defined environmental parameter. There are obvious limitations to the use of residence at diagnosis as the prime environmental indicator. This approach assumes that proximity equals exposure and ignores the latency period of cancer. It also ignores population movement in and out of the area. For this review, limited data were available to determine completed routes of exposure, such as through air, water or other sources. It is possible that portions of the groups were exposed while others are not. Additionally, occupational exposure data were not available. However, these are the limitations to using existing data to review health effects at EPA's National Priorities List sites.

In order to characterize the population living within the census tracts and census block groups within 1-mile of the site, 1990 census data were evaluated as shown in Table 1. The racial composition of residents living within the census tracts and census block groups within 1 mile of the site differs from the state in that 19.7% of the residents were black compared were 30.8% in the state and 78.9% of the residents were white compared with 67.3% in the state. The proportion of persons living below poverty were lower within 1-mile of the site (15.0%) than the state (23.6%) and the proportion of families living below the poverty level are lower within 1-mile of the site (13.4%) compared with the state (19.4%). Income indicators for the population within 1-mile of the site were higher than the state.

It is difficult to identify the cause(s) of a chronic disease especially in a small population. Since cancer may take many years to develop, various genetic, lifestyle, and environmental factors may interact before the cancer becomes apparent.

III. METHODOLOGY

The period of time selected for evaluation of cancer incidence data was 1988-1997, which was the most recent data available for this part of the state at the time of this analysis. Cancer incidence was chosen for this review because cancer death rates are affected by multiple factors: how advanced the cancer was at the time of diagnosis, access to health care, and other factors not related to exposure. A case was defined as an individual residing in one of the selected census tracts or block groups who was diagnosed with a new primary malignant cancer during the evaluation period (4). The variables analyzed included: address at time of diagnosis, parish of residence, primary cancer site, histology type, date of diagnosis, age at diagnosis, date of birth, race, sex, census tract, census block group, and census block. Information on other risk factors such as occupational exposures or personal lifestyle habits is not available in the abstracted medical data used in this review.

In reviewing the cancer statistics, no clear association between residence within the census tracts and census block groups within 1-mile of the site and cancer incidence emerges. Residents of the census tracts and census block groups surrounding the Bayou Bonfouca site tend to be wealthier and are more likely to be white than their statewide counterparts. The investigators encountered difficulties in geocoding some of the cancer cases occurring within St. Tammany Parish (92.7%), 1988-1997, due to addresses listed as Post Office Boxes and Rural Routes. At the present time LDHH/OPH/SEET does not possess technology that would enable a more accurate geocoding system for non-street number addresses.

Advantages of conducting this type of investigation are that it examines cancer rates in a community and provides a response to community concerns about potential excess of cancer in their community. It also provides specific information about the health status of this particular community and can be used to identify areas where further public health investigations or actions may be warranted. Analyzing cancer incidence data lets us examine the number of individuals in a community who have been diagnosed with cancer thus representing a more accurate picture of cancer in a community than examining only deaths due to cancer.

Limitations in the available data make it impossible to determine the cause of disease in a population or to determine other factors that may influence the rate of disease. Also, some of the reported numbers of specific types of cancer are very small and make the rates unstable.

Table 1: Estimated 1990 Demographic Characteristics for Louisiana and Bayou		
Bonfouca 1-Mile Radius		
Demographic	**Louisiana (%)**	**Bayou**
Characteristic		**Bonfouca (%)***
Total Population	4,219,973 (100)	21,834 (100)
White	2,839,138 (67.3)	17,240 (78.9)
Black	1,299,281 (30.8)	4,295 (19.7)
Other	81,554 (1.9)	299 (1.4)
Gender		
Female	2,188,587 (51.9)	11,222 (51.4)
Male	2,031,386 (48.1)	10.612 (48.6)
No. of Families	1,098,374	5,846
No. of Households	1,498,371	7,540
Median Age (years)	31.0	33.7
Annual Income (dollars)		
Family (median)	$26,313.00	$34,404.00
Household (median)	$21,949.00	$28,818.00
Per capita	$10,635.00	$12,410.00
Poverty Level		
Persons below	23.6%	15.0%
Families below	19.4%	13.4%
Year residence	1969	1970
constructed (median)		
* The census tracts and census block groups within 1-mile of the site.		

The LTR was used to ascertain cancer cases. The LTR, operated by the Louisiana State University Health Sciences Center, is a population-based cancer registry for Louisiana. The registry has been in operation in the New Orleans metropolitan area since 1974, in South Louisiana since 1983, and in the rest of the state since 1988. By law, every health care provider is required to report newly diagnosed cancers.

A diagnosed-to-expected ratio is calculated by dividing the number of cancers diagnosed in the area by the number of expected cases. This ratio is called a standardized incidence ratio (SIR). If the SIR was greater than 1, more cancer cases than expected were diagnosed in the area. When this occurs, it is necessary to look more closely at that

relationship. It is important to know if that ratio could have been higher just by chance, so a confidence interval (CI) is calculated for the ratio. The CI has a lower number (minimum value) and a higher number (maximum value). It is common to use a 95 percent CI meaning that the true ratio is within the range between the lower and higher values calculations with 95 percent certainty. If the ratio is greater than 1, but the CI includes the number 1, then the ratio is within expected statistical limits. If the CI does not include the number 1, then the ratio is statistically significant. A statistically significant elevated ratio means there were more diagnosed cases than expected and the result probably did not happen by chance.

IV. RESULTS

Of the total 684 cancer cases in the census tracts and census block groups within 1-mile of the site over the 10-year review period, 53.2% [64 cases] were among males and 46.8% [320 cases] were among females. Among males, frequently occurring cancers were prostate [101 cases], lung and bronchus [99 cases], colorectal [36 cases] and non-Hodgkin's lymphoma [17 cases]. Among females, frequently occurring cancers were breast [94 cases], lung and bronchus [52 cases], colorectal [42 cases], non-Hodgkin's lymphoma [21 cases], and ovarian [8 cases]. SIRs were calculated for all cancers combined and specific cancer sites. These specific cancer types are among the most commonly analyzed.

SIR comparisons using Louisiana rates to calculate the expected number of cancer cases for the population living within the census tracts and census block groups within 1-mile of the site are presented in Table 2. For males, incidence rates for all cancers combined, colorectal cancer, and prostate cancer were significantly lower when compared to the state. Females had significantly lower incidence ratios for all cancers combined and for breast cancer. Table 3 presents a breakdown of the cancer case geocoding results.

Table 2: Cancer Incidence (CI) Among Residents Living Within 1 Mile of the Bayou Bonfouca Site Compared with Louisiana Rates, 1988-1997, Restrictive Estimates

		Number of Cases			CI	
Cancer Type	**Gender**	**Observed**	**Expected**	**SIR**	**upper**	**lower**
All cancers	Male	364	487	0.747	0.83	0.67
	Female	320	416	0.769	0.86	0.69
Breast	Female	94	122	0.772	0.94	0.62
Colorectal	Male	36	53	0.681	0.92	0.48
	Female	42	54	0.783	1.04	0.56
Lung/bronchus	Male	99	107	0.928	1.12	0.75
	Female	52	57	0.906	1.17	0.68
Non-Hodgkins lymphoma	Male	17	17	1.024	1.57	0.60
	Female	21	15	1.385	2.04	0.86
Ovarian	Female	8	14	0.572	1.04	0.24
Prostate	Male	101	132	0.765	0.92	0.62

Table 3: Numbers of Cancers of Cancer Cases Geocoded for the Bayou Bonfouca Site, 1988-1997, for Zip codes 70458, 70459, 70460 & 70461

Number of cancer cases total	2,326
Total cases geocoded	2,156
In 1-mile radius	684
Not in 1-mile radius	1,472
Non-geocodable cases	170

IV. CONCLUSIONS

The objective of this investigation was to determine whether elevated rates of cancer exist in the community living around Bayou Bonfouca, an abandoned creosote wood treating facility as compared with cancer incidence to the state of Louisiana. The main findings from this investigation are as follows:

- For males incidence rates for all cancers were combined; colorectal and prostate cancer were significantly lower when compared to Louisiana rates. Females had significantly lower incidence ratios for all cancers combined and for breast cancer.

- No elevated rates were found.

V. RECOMMENDATIONS

None.

VI. PUBLIC HEALTH ACTION PLAN

LDHH/OPH/SEET will place this health consultation in the local repository for the community.

REFERENCES

1. Louisiana Office of Public Health (OPH), Public Health Assessment for Bayou Bonfouca, September 6, 1994.

2. U.S. Environmental Protection Agency (EPA), "Bayou Bonfouca", February 1, 1999, www.epa.gov.

3. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Creosote. Atlanta: US Department of Health and Human Services: September 2002.

4. National Institutes of Health, National Cancer Institute, Cancer Rates and Risks. 4th Edition, 1996.

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CERTIFICATION

This Bayou Bonfouca site, assessment of cancer incidence, health consultation was prepared by the Louisiana Department of Health and Hospitals under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedures existing at the time the health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

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The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this public health consultation and occurs with the findings.

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ATTACHMENT: FIGURE 1