

 Agency for Toxic Substances & Disease Registry Public Health Assessments & Health Consultations

HEALTH CONSULTATION

Review of Louisiana Tumor Registry Cancer Incidence Data

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I. INTRODUCTION

As a follow-up activity to recommendations outlined in a prior health consultation regarding the Agriculture Street Landfill Superfund (ASL) site in New Orleans, the Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) reviewed available health outcome data on additional years of cancer incidence data for the Agriculture Street Landfill community. These additional years include 1994-1997, and are the most current data available. Prior health consultations reviewed health outcome data from 1983-1993. The health outcome data examined in this health consultation include cancer incidence rates (from the Louisiana Tumor Registry (LTR)). This health consultation serves to provide the residents with a way to compare the health effects in their area with a similar, but larger population. No cause-and-effect relationship with site related contaminants can be determined by this type of review.

II. BACKGROUND AND STATEMENT OF ISSUES

A. Site History

The ASL site is a 95-acre site located in New Orleans, Orleans Parish, Louisiana. The site was used as a municipal landfill receiving municipal waste and construction debris for more than 50 years prior to being developed for housing and businesses. The landfill was closed in 1965. During the 1970s and 1980s, Gordon Plaza Subdivision, Housing Authority of New Orleans (HANO) residences, Gordon Plaza Apartments, the Moton School, the Press Park residential area and community center were constructed over part of the landfill. Forty-eight acres of the landfill remain undeveloped and fenced. Metals, pesticides, and polycyclic aromatic hydrocarbons (PAHs) have been found in surface and subsurface soils throughout the site during environmental studies.

In December of 1994, the U.S. Environmental Protection Agency (EPA) placed the ASL site on the National Priorities List (also called the Superfund list). EPA conducted a Remedial/Removal Integrated Investigation (RRII) of the entire site and released their results in 1995. During this investigation, surface soil, subsurface soil, groundwater, tap water, air, and indoor dust samples were analyzed for chemicals found at the site [1]. Based on those environmental results and health data, OPH/SEET in conjunction with the Agency for Toxic Substances and Disease Registry (ATSDR), released a Public Health Assessment.

B. Findings of the Public Health Assessment [1]

The conclusions of the Public Health Assessment were:

- The **undeveloped area** of the site was classified as a **public health hazard**. The highest levels of contaminants have been found in the undeveloped area. Although entry to this area has been limited by a fence, individuals continue to access this area and may come in contact with the elevated levels of lead and arsenic in the soil. If this area was developed for future residential use as is, exposure to lead, arsenic, and polycyclic aromatic hydrocarbons (PAHs) in the soil could pose an unacceptable health risk to residents.
- The majority of the **residential area and the Press Park Community Center** has been classified as **no apparent public health hazard** since the levels of contaminants in the soil are generally below levels that may cause health problems. There are scattered pockets of lead, arsenic, and PAHs in soil that need to be addressed to limit any possibility of exposure to levels of health concern.
- The contamination presented at the **Moton School** poses **no public health hazard** since the levels of chemicals in the soil, air, and water were well below levels that may cause health problems.

The remedy for the site is completed and no further action is planned. During the removal action, two feet of soil was removed prior to grading and a semi-permeable geotextile liner was installed and clean soil was backfilled. The first five-year review is ongoing. The integrity of the cap was inspected by EPA and its contractor, and the Louisiana Department of Environmental Quality on October 17, 2002. Permanent relocation is an issue which continues to polarize the community since many prefer redevelopment. The Superfund law was examined by EPA who concluded that relocation is not possible because the redevelopment remedy is attainable and protective.

Previous health outcome investigations concerning the ASL site include a review of blood lead levels and a health survey conducted by Xavier University. Both were addressed in the 1996 Public Health Assessment [1]. The blood lead data were evaluated because lead is one of the most prevalent contaminants at the site and children are especially sensitive to the toxic effects of lead. The results of the 1993 and 1994 blood lead screens, conducted by the city of New Orleans, indicated that the children tested who live on the ASL site had a lower percentage of elevated blood lead levels as compared to other children in New Orleans (18% and 44%, respectively).

The Deep South Center for Environmental Justice at Xavier University of Louisiana conducted a health survey of 328 adults and children (approximately one third of the residents of ASL) who live in Gordon Plaza and Press Park [2]. The survey did not include a comparison group of individuals living outside the ASL area. Even though the findings indicated that there are reported illnesses in the community, the lack of a comparison group makes it impossible to determine if the illnesses at the ASL site are occurring more often than is expected for a community not living on a Superfund site.

C. Office of Public Health Activities Conducted

The Office of Public Health has taken a very active role in the activities occurring at the ASL site. Initially, Louisiana Tumor Registry (LTR) data was examined in 1997. Also examined at this time, were birth weights of children born in the area. A follow-up examination of this information occurred in 2001. Results of both these examinations

showed similar elevations in breast cancer incidence for the area that includes the ASL site. To follow-up to those results, we are once again examining cancer incidence for the most recent time period for which it exists.

III. DATA REVIEW

Health outcome data reviewed for a site are generally based upon (1) possible health effects that could be caused by exposure to site contaminants and (2) the availability of data. That is why in the initial Public Health Assessment, information on blood lead levels of the ASL children was reviewed. Lead has been a contaminant of concern at the ASL site and blood lead data were available.

For this report, OPH reviewed additional years of cancer incidence not included in the prior review. The period of time selected for this recent evaluation of the cancer incidence data was 1994-1997, which is the most recent health data available. The smallest geographic area for which we can calculate rates of disease is the census tract.

A. Census Data

In order to compare the ratios of cancer incidence around the ASL site with parish or regional rates, it is necessary to have specific population data. Population data, categorized by age, and health outcome data are both available at the census tract level. Census tracts are subdivisions of parishes. They usually have between 2,500 and 8,000 persons and are designed to be relatively homogeneous or similar with respect to population characteristics, economic status, and living conditions [3].

The ASL site lies within Census Tract 1703 of Orleans Parish and covers about 1/5 of the census tract area. The total population for Census Tract 1703 is 4,506 persons, according to the 1990 census data [4]. The population for the ASL site was estimated to be 1,137 persons, based on the number of housing units [5]. Thus, the population on the ASL site is estimated to be about 1/4 of the census tract population.

Table 1 summarizes the 1990 Census information for Louisiana, Orleans Parish, and Census Tract 1703, which contains the ASL site. Review of the census data suggests that Orleans Parish and Census Tract 1703 have a higher percentage of African Americans than the state as a whole. Results occurring in the white demographic strata would need to be examined closely as the numbers comprising this strata are small, and small numbers sometimes yield unstable results. Orleans Parish and Census Tract 1703 also have a higher percentage of persons and families living below the poverty level. Census Tract 1703 has a lower per capita income than Louisiana and Orleans Parish. Median family and household incomes are also lower for the census tract than Orleans Parish and Louisiana.

Table 1.

Summary of Demographic Information for Agriculture Street Landfill (Census Tract 1703)

1990 CENSUS DATA			
	LOUISIANA	ORLEANS PARISH	CENSUS TRACT 1703 ASL
	Population(%)	Population(%)	Population(%)
All Persons	4,219,973	496,938	4,506
Black	1,299,281 (30.8)	307,728 (61.9)	4,163 (92.4)

White	2,839,138 (67.3)	173,554 (34.9)	309 (6.9)
Other	81,554 (1.9)	15,656 (3.2)	34 (0.7)
Gender	Population	Population	Population
Female	2,188,587	266,055	2,444
Male	2,031,386	230,883	2,062
Age Group	Population(%)	Population(%)	Population(%)
<7 Years	476,687 (11.3)	54,365 (10.9)	510 (11.3)
7-14 Years	558,783 (13.2)	59,871 (12.1)	659 (14.6)
15-24 Years	656,310 (15.6)	79,019 (15.9)	813 (18.0)
25-44 Years	1,309,858 (31.0)	155,207 (31.2)	1,260 (28.0)
45-64 Years	749,344 (17.8)	83,818 (16.9)	716 (15.9)
>64 Years	468,991 (11.1)	64,658 (13.0)	548 (12.2)
Median Age	31.0	31.6	29.2
Number of Families	1,098,374	119,516	1,062
Number of Households	1,498,371	187,662	1,543
Income	\$	\$	\$
Median Family	26,313	22,182	15,417
Median Household	21,949	18,477	11,279
Per Capita	10,635	11,372	5,216
Poverty	%	%	%
Persons Below	23.6	31.6	41.0
Families Below	19.4	27.3	38.3
Median Year Housing Built	1969	1951	1963

B. Cancer Incidence Rates

1. Method for analyzing cancer incidence data

Cancer incidence data were obtained for the 10-year period of 1988-1997 from the Louisiana Tumor Registry. These are the most recent cancer data that are available by census tract levels. Because the community has expressed concern about cancer in general and because the current level of contaminants would not be expected to cause an increase in any particular cancer, OPH reviewed all types of cancers that were diagnosed in the census tract. Cancer *incidence* (occurrence of cancer) was chosen for this review because cancer *mortality* (death) rates are affected by how advanced the cancer was at the time of diagnosis, access to health care, and other factors not related to exposure.

In order to evaluate whether the Census Tract 1703, which contains the ASL site, has an elevated level of cancer incidence, the region was chosen as a comparison population. In general, the comparison population should be large enough so that its cancer rates are stable (that is, the rates do not fluctuate greatly). Furthermore, the comparison population should be similar to the population being studied in factors which could affect disease rates, such as socioeconomic factors and racial distribution, other than the study exposure factors of interest. Therefore, the Louisiana Tumor Registry's Region I, which includes Jefferson, Orleans, and St. Bernard Parishes, was chosen as the comparison population.

Because different groups of people have different rates of cancer, the cancer incidence data were calculated separately by age group, sex, and race. For example, as we get older, our chance of getting cancer increases. Therefore, an older population would be expected to have a higher rate of cancer than a younger one. In making our comparisons, the number of cancers for a certain age group is compared to the number of cancers expected for that same age group.

Once the rates are calculated for specific age groups, sexes, and races, the standardized incidence ratios (SIRs) are calculated. The SIR estimates the occurrence of cancer in the study population (in this case, Census Tract 1703) relative to what might be expected if the census tract had the same cancer rate as the comparison population (Region I). An SIR is the ratio of the observed number of cases to the expected number of cases.

The SIR tells us how much higher or lower the census tract's cancer rate is compared to that in the other population. If the observed number of cases equals the expected number of cases, the SIR will equal 1. If there are more observed cases than one would expect, then the SIR will be greater than 1. If there are less observed cases than one would expect, then the SIR will be less than 1. For example, if 10 cases are observed in the study population, but five cases were expected, then the $SIR = 10/5 = 2$, and the area has two times the cancer rate than expected. But if 20 cases were expected, then the $SIR = 10/20 = 0.5$, and the area has half the rate than expected.

Caution should be exercised, however, when interpreting the SIR. The interpretation must take into account the actual number of cases observed and expected, not just the ratio. Two SIRs can have the same number, but represent very different scenarios. For example, a SIR of 1.5 could mean three cases were observed and two were expected ($3/2 = 1.5$). Or it could mean 300 cases were observed and 200 were expected ($300/200 = 1.5$). In the first instance, only one excess cancer occurred, which could easily have been due to chance. But, in the second instance, 100 excess cancers occurred and it would be less likely that this would occur by chance alone.

To help interpret the SIR, the statistical significance of the difference can be calculated. In other words, the number of observed cases can be determined to be significantly different from the expected number of cases or the difference can be due to chance alone. "Statistical significance" for this review means that there is less than five percent chance ($p\text{-value} < 0.05$) that the observed difference is merely the result of random fluctuation in the number of observed cancer cases. If the SIR is found to be statistically significant, then the difference between the expected and observed cases is probably due to some set of factors that influences the rate of that disease. Because cancer is, unfortunately, so common (more than one in three of us will develop cancer in our lifetime), every community will experience a certain number of cancers. Through the years, you would expect some fluctuation in the numbers. One year, there may be a few more cases of cancer A and the next year a few less. This occurs by chance. There is no specific cause. Just like flipping a coin, although you expect that you will get heads half the time and tails half the time, it doesn't always come up even. Out of 10 coin tosses, you may get seven heads and three tails or four heads and six tails. The more tosses you make, the closer you will probably come to getting a 50-50 mix. This is why, in order to determine if cancer rates are elevated, the statistical significance must be considered.

2. Standardized Incidence Ratios for Census Tract 1703 for the years, 1988-1997.

For Census Tract 1703, all major groupings of cancer were evaluated: esophageal, stomach, colon, rectal, liver, other biliary, pancreatic, lung, soft tissue, brain, breast, cervix uteri, corpus uteri, ovarian, prostate, bladder, kidney, thyroid, Hodgkin's lymphoma, Non-Hodgkin's lymphoma, multiple myeloma, leukemia, and all cancers combined. [Table 2](#) shows the number of cancers that were observed in the census tract for the 10-year period of 1988-97. A prior health consultation reviewed cancer incidence from 1988-1993, however, this was combined with the new data, to produce more stable results.

Standardized incidence ratios (SIRs) were calculated for each type of cancer when five cases or more were observed in the census tract in the 10-year period. Calculating SIRs with fewer cases leads to statistical instability. The New Orleans Region (Jefferson, Orleans, & St. Bernard Parishes) was used as the comparison population. The census tract calculations were based on the 1990 population data and the regional rates are also based on 1990 census data plus estimates from years between census surveys.

Table 2.

Summary of Standardized Incidence Ratios (SIR) for Agriculture Street Landfill Census Tract 1703, 1988-1997.

Only cancers that had five or more observed cases during the study period are listed.

Site	Observed	Expected	SIR	Significant
All	163	152.85	1.07	No
All, whites	28	11.21	2.50	Yes
All, blacks	135	130.33	1.04	No
All, males	78	76.34	1.02	No
All, females	85	76.47	1.11	No
All, white males	18	7.09	2.54	Yes
All, white females	10	4.20	2.38	Yes
All, black males	60	67.60	0.89	No
All, black females	75	62.73	1.20	No
Colon	10	15.55	0.64	No
Colon, males	5	6.83	0.73	No
Colon, females	5	8.72	0.57	No
Colon, blacks	7	11.88	0.59	No
Colon, black females	5	6.54	0.76	No
Rectum	6	4.90	1.22	No
Rectum, blacks	6	3.27	1.84	No
Lung & bronchus	28	30.37	0.92	No
Lung & bronchus, whites	5	2.26	2.21	No
Lung & bronchus, blacks	23	25.14	0.92	No

Lung & bronchus, males	16	18.70	0.86	No
Lung & bronchus, females	12	11.62	1.03	No
Lung & bronchus, black males	13	16.77	0.77	No
Lung & bronchus, black females	10	8.36	1.20	No
Breast	36	24.04	1.50	Yes
Breast, whites	6	1.83	3.27	Yes
Breast, blacks	30	19.08	1.57	Yes
Breast, females	36	23.94	1.50	Yes
Breast, white females	6	1.34	4.47	Yes
Breast, black females	30	18.86	1.59	Yes
Prostate (males only)	24	16.47	1.46	No
Prostate (males only), black males	21	16.80	1.25	No
Urinary Bladder	6	4.51	1.33	No
Other, Ill-defined & Unknown	7	3.82	1.83	No
Other, Ill-defined & Unknown, blacks	6	4.21	1.42	No

From Table 2, one can see that the observed number of lung, colon, prostate, and total cancersites combined are not statistically different than what was expected. However, there was a statistically significant excess of breast cancer in Census Tract 1703 from the years 1988-1997. This excess was seen in white males and white females.

3. Breast Cancers for Census Tract 1703 for 1983-87 and 1988-97

Adding the 1983-87 data with the 1988-97 data provides a 15-year span of breast cancer incidence in this census tract. The population used for the census tract calculations was based on the estimated 1985 and the 1990 census data. For this time period, 1983-97, no statistically significant excess was seen for all females combined or black females. However, a statistically significant excess of breast cancer did occur in white women (three cases expected and 10 cases observed) in Census Tract 1703. Table 3 is a summary of the observed breast cancer cases, the expected cases, and the SIRs for the three time periods.

Table 3.

Standardized Incidence Ratios for Breast Cancers (Invasive) in Census Tract 1703 as Compared to New Orleans Region I.

	All Females			Black Females			White Females		
	Observed	Expected	SIR	Observed	Expected	SIR	Observed	Expected	SIR
1983-87	10	10.92	0.92	6	7.93	0.76	4	1.61	2.49
1988-97	36	24.04	1.50*	30	19.08	1.57*	6	1.34	4.47*
1983-97	46	34.96	1.32	36	27.01	1.33	10	2.95	3.39*

* Statistically significant at p=0.05 level.

4. Discussion of Excess Cancers

Observations about the breast cancer rates for Census Tract 1703 are summarized as follows: A statistically significant increase for all women is seen in the 1988-1997 period, but is not observed for the entire 15-year period, 1983-97. White women in this census tract do not show a statistically significant elevation in breast cancer for either 1983-87, but show a statistically significant elevation in breast cancer for the 1988-97 period. The SIRs for all three periods were elevated. Small numbers makes it more difficult to achieve statistical significance. When the small numbers are combined, the 15 year rate is statistically significant.

The review of cancer incidence data in this document is only a screening mechanism to alert us to unusual rates. No cause or reason for the excess cancer in Census Tract 1703 can be determined at this point. A possible factor in the breast cancer elevation in white women is the low percentage of whites in the area coupled with the small numbers of cancer.

A number of factors are known to be associated with a higher risk of developing breast cancer. These include: older age, family history of breast cancer, early menstruation, late menopause, recent use of oral birth control pills, never having children, or having your first child at a late age. Other non-reproductive factors include radiation exposure, consumption of dietary fat, and body size. In addition to these, physical activity, alcohol consumption, and pesticide and chemical exposure are suspected risk factors, and are currently being studied to determine their impact on breast cancer risk [1,2,3]. No survey has been conducted in this census tract of the above risk factors. Therefore, we do not know if any of these have influenced the excess rate of breast cancers seen in Census Tract 1703 for some of the population groups.

Although some environmental contaminants have the potential to affect breast cancer risk, clear environmental links to breast cancer are limited, with the exception of radiation exposure and alcohol intake. Some studies have suggested links with certain pesticides, such as DDT. However, more research is needed to establish these chemicals as possible risk factors for breast cancer [9].

The current environmental data for the ASL site, that was collected by EPA, did not show pesticides in the soil at levels that are known to cause health effects. In fact, the EPA RRII report states that for surface soils, "pesticides found on site are not significantly different in type and concentration than those found in the background" [10]. Other chemicals found at the ASL site, such as metals and PAHs, have not been associated with breast cancer. In addition, removal and remedial activity at the site has further reduced the amount of site contaminants.

It is extremely difficult to identify the cause or causes of elevated rates of a chronic disease, such as breast cancer, especially in a small population. Since cancers may take many years to develop, various genetic, lifestyle, and environmental factors may interact before the disease becomes apparent. Also, it may be difficult to clearly identify those risk factors when they occurred years earlier. Another problem is that a factor may be related differently to the initial development of the disease than to its later course [11].

IV. CONCLUSIONS

LDHH/OPH/SEET reviewed cancer incidence data from 1983-1997. The following conclusions can be made based on the data reviewed:

1. The census data suggests that the Census Tract 1703 (which includes the ASL site) has a higher percentage of African Americans, a higher percentage of persons and families living below the poverty level, and a lower income (per person) than Orleans Parish and Louisiana.
2. A review of the cancer incidence data for Census Tract 1703 from 1983-1997 showed the following:

From 1988-1997, the observed number of lung, colon, prostate, and total cancer sites combined for Census Tract 1703 are not statistically different from what is expected as compared with the regional rates.

3. A review of breast cancer data showed that:

For the 5-year period, 1983-87, in Census Tract 1703, no statistically significant differences between the breast cancers observed and the cancers expected were found. For all females and black females, the SIRs were less than 1 and for white females the SIR was approximately 2.5.

For the 10-year period, 1988-97, there was a statistically significant 50% excess of breast cancer for all females combined and black females. There was a statistically significant 400% excess of breast cancer observed in white females for Census Tract 1703. The excess in this rate is contributed by the small percentage of white females in the census tract and the small numbers that were used to determine cancer incidence.

For the 15-year period, 1983-97, in Census Tract 1703, no statistically significant excess of breast cancer was found for all females combined or black females. However, a statistically significant 300% excess of breast cancer did occur in white women. Again, the excess in this rate is contributed by the small percentage of white females in the census tract and the small numbers that were used to determine cancer incidence.

4. No cause or reason for the excess breast cancers in Census Tract 1703 can be determined from this review. The extent of the influence of the established risk factors for breast cancer is not known at this time and no connection with environmental contamination has been made.

V. PUBLIC HEALTH ACTION PLAN

Actions Taken

1. OPH initially examined the Louisiana Tumor Registry (LTR) data in 1997. Also examined at this time, were birth weights of children born in the area. Follow-up examination of this information occurred in 2001.
2. OPH attended all community meetings to assess community concerns, disseminate requested information, and answer questions. Explanations of the increase

breast cancer rates were explained to the public during these initial meetings. The importance of early breast cancer screening was also discussed.

3. OPH worked with ATSDR and the Association of Occupation and Environmental Clinicians to provide environmental medical monitoring to participating residents.

Action Planned

1. OPH/SEET will continue to monitor the rates of cancer every five years in Census Tract 1703.
2. OPH/SEET will provide health education to the community on risk factors associated with breast cancer if requested. Health education will also be provided on the importance of early breast cancer screening.
3. This health consultation will be placed in the previously established ASL site repository so that residents and stakeholders will have access to the information contained in it.

VI. REFERENCES

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CERTIFICATION

This Agriculture Street Landfill site, Review of Cancer Incidence Data, 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 is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

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The Division of Health Assessment and Consultation, ATSDR has reviewed this public health consultation and concurs with the findings.

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