



**STEPHEN FOSTER NEIGHBORHOOD CANCER REVIEW
ALACHUA COUNTY**

June 2011

**Florida Department of Health
Division of Environmental Health
Bureau of Environmental Public Health Medicine**



TABLE OF CONTENTS

Executive Summary	3
Background	4
Environmental Contamination Issues and Chronology	4
Florida Cancer Data System (FCDS) Review	5
Other Facts about FCDS and Cancer Rates	6
Cancers of Concern	7
Determination of the Geographic Area	7
Population Data	8
FCDS Data Search	8
Stephen Foster (Alachua County, Census Tract 3) Analysis	8
Results: General	9
Results: Specific Cancers	9
Limitations	11
Conclusions	13
Recommendations	13
References	13
Appendix A: Tables and Graphs	16
Attachment I: Maps	20

Executive Summary

In response to residents' concerns and a request from the Alachua County Health Department (ACHD), the Florida Department of Health (DOH) concluded a review of cancer rates in Alachua County, the Stephen Foster neighborhood and surrounding area that constitutes census tract 3. Contamination of the community has occurred over many decades as a result of the activities of two facilities, Cabot Carbon and Koppers Corporation, both operating since the early 1900s.

The Cabot site was formerly a pine-stump processing plant currently housing redeveloped retail facilities. The Koppers site was a wood treatment facility that ceased operations beginning in 2010. Arsenic, polycyclic aromatic hydrocarbons (PAHs) and dioxins/furans are the prime contaminants identified in surface soil and suspected in neighborhood indoor dust. Primary routes of exposure are incidental ingestion of contaminated surface soil and inhalation of contaminated dust (including historical). Environmental sampling efforts are ongoing and historical contamination levels are unknown.

This inquiry was designed to determine if DOH could find evidence of elevated cancer rates in the community surrounding the Cabot Koppers site. In other words, whether the number of observed cancer cases in the community was higher than the number of expected cases based on cancer rates found within the state as a whole (the comparison population). The Florida Cancer Data System (FCDS) was the source for cancer data and the 1980, 1990 and 2000 Census provided the available published population data. The time period examined was 1981 to 2000, based on the first availability of FCDS data in 1981; statewide cancer incidence is not available prior to that date. This study focused on cancers most linked to dioxins/furans, PAHs and arsenic; the contaminants most often measured in this community. Dioxin is a general cancer promoter; analysis was not restricted to specific cancer types and results for the most frequently reported cancers are provided. These include cancers of the lung and bronchus, breast, prostate, colorectal, cervical, myeloma, esophageal, oral, ovarian, pancreatic, uterine, liver, kidney, leukemias, non-Hodgkin's lymphoma, and bladder as well as miscellaneous cancers and skin melanomas.

A search of FCDS records for 1981 through 2000 identified 447 cancer cases of all types among all age groups in this census tract. Of these, six cases were among children (0-19 years). From 1981-2000, 441 cases among adults were noted. Most cases were among older adults, the mean and median age of diagnosis was slightly above 65 years of age. Analyses of cancer rates were restricted to the years 1981-2000, representing 20 years of follow-up. Analyses were restricted to five year periods and rates were age adjusted. The analyses did not show increased rates for any of these 18 cancers in any of the five year periods encompassing 1981-2000. Some cancers were shown to have occurred at less than expected rates in these time periods.

As the site has been active since the early 1900s, and assuming that exposure to the community was occurring from the beginning of site activity, related cancers could theoretically have appeared during 1920-1980 which is in the years prior to cancer incidence data being routinely available (prior to 1981). Nevertheless, few environmental regulatory safeguards were in effect even in the 1950s and 1960s. Since cancer latency often is 20 or more years, one could expect that cancer cases related to these time periods would appear in the 1980s (when cancer data are available). The finding of no excess rates within 18 cancer types, particularly in the earlier years of analyses (closest to time period of assumed

greater exposures) provides evidence for limited exposures to dioxins/furans, arsenic and PAHs to the community.

This site is undergoing environmental remediation; the Hazardous Waste Site Health Risk Assessment Program and the ACHD are actively involved in providing public health interpretation of ongoing environmental sampling data to the community. Data for 2001-2008 will be provided in a follow-up report due later in 2011 when detailed 2010 census information becomes available.

Background:

The ACHD requested assistance from the Florida DOH, Bureau of Environmental Public Health Medicine (EPHM) in investigating a possible increase in cancers associated with contamination of the neighborhood surrounding the Cabot Koppers site in Gainesville, the Stephen Foster neighborhood. Concerned individuals from the community had also requested a review of cancer incidence in their community given the assumption of decades of potential exposure of the neighborhood to contaminated soils and dust.

Additional information and clarification was sought through consultation with the DOH State Toxicologist, the DOH Hazardous Waste Site Health Risk Assessment Program, and the ACHD. For this inquiry, EPHM began an initial investigation and utilized existing published data to accomplish the review for the period 1981-2000. The Florida Cancer Data System (FCDS) and available census data (both available electronically to the DOH) were the primary data sources for this cancer review.

The purpose of the cancer review was to determine whether there was an increased rate of cancer types known to be related to exposure to the chemicals of concern in the Stephen Foster neighborhood and immediately surrounding areas over what may be expected based on FCDS data during the time period 1981-2000. Although this includes a review of cancer rates for the area, this type of assessment by itself cannot be used to link a specific exposure to a health outcome such as cancer. In other words, causality cannot be established. Studies or reviews such as this cancer review presented here for the community are not able to show a link between specific individual cancers and specific causes such as environmental contaminants.

Environmental Contamination Issues and Chronology:

The Cabot Carbon/Koppers Superfund site is located near the intersection of Northwest 23rd Avenue and North Main Street in Gainesville, Florida (Alachua County). The 181 acre site consists of 50 acres of marsh land, 82 acres associated with the former Koppers Corporation and 49 acres associated with the former Cabot Carbon facility. The Cabot site was formerly a pine-stump processing plant but was redeveloped during the mid 1970s and contains retail facilities. The Koppers portion was an active wood treatment facility until 2009; utility poles and other timbers were treated with a variety of chemicals at this site to retard decay. The Koppers site is currently undergoing remediation. In 1984, the United States Environmental Protection Agency (EPA) added the Cabot/Koppers site to their Superfund National Priorities List based on extensive on-site contamination. Residential communities are both west and south of the site, and both facilities have been in place since the early 1900s whereas the Stephen Foster community was developed beginning in the 1920s through 1950.

Environmental monitoring of ground water and soil began in the 1960s at the site. Regulatory agencies as well as private engineering and environmental firms have found evidence of pine tars, naphthalenes, pentachlorophenol (PCP), phenols and other aromatics, arsenic, copper, chromium, PAHs, dense nonaqueous phase liquids (DNAPLs), oil, and dioxins on site. Recent environmental sampling and risk assessments have focused on risks associated with arsenic, dioxins/furans and PAHs off site including in residential contaminated soils. See <http://www.myfloridaeh.com/medicine/superfund/pha.htm> for historical reports by the DOH on this site.

The vast majority of residents have been long-term users of municipal water for both drinking and household purposes. Those households that use potable wells were identified by the ACHD. Annual and semi-annual sampling results from 1984 forward have not indicated any maximum contaminant level (MCL) violations and therefore ground water is not currently considered an exposure pathway at this site. Dioxins/furans, arsenic and PAHs are primarily found in offsite contaminated surface soil which has been most likely transported via dust through wind. Incidental ingestion of very small amounts of these soil contaminants may occur in adults when they eat or drink without washing their hands and through inhalation. Infants and young children are more likely than adults to incur incidental ingestion of contaminants due to their more common oral behaviors (placing dirty finger or objects in their mouth). Although inhalation of contaminated dust was most likely a major route of exposure for residents living near the site in the past, no air monitoring data are available for historical years. There is no reliable methodology to model and quantify past exposure levels of the contaminants in air samples. Current concerns are primarily related to fugitive dust and surface soil contamination (incidental ingestion).

Since 1989, the DOH Hazardous Waste Site Health Risk Assessment Program and the ACHD have been involved in numerous activities: potable well sampling, reviewing the ongoing environmental sampling data, assessing potential health risks associated with the site, recommendation of warning signs, requesting further environmental testing, providing updates and restriction of site access. Soil samples taken in the city easement just west of the Koppers site have yielded higher concentrations of soil contaminants than other off-site sampling sites. The highest off-site surface soil contaminant concentrations have been found in the 30-foot wide City of Gainesville easement just west of the chain-link fence marking the boundary of the Koppers site. The highest concentrations were: arsenic at 15.8 milligrams per kilogram (mg/kg), PAHs at 6.4 mg/kg (measured as BaP-TEQ), and dioxins at 1,302 nanograms per kilogram (measured as TCDD-TEQ). Assessment of potential health risk associated with these levels has identified a low level of theoretical increased risk for cancers.

Resident concerns relate to possible health effects associated with contamination of soils in the neighborhood and surrounding common areas around the site, potential presence of contaminated dust in their indoor environment and contamination of neighboring creek sediments. Recommendations for additional neighborhood soil samples and for neighborhood indoor dust sampling have been made by DOH Hazardous Waste Site Health Risk Assessment Program.

Florida Cancer Data System (FCDS) Review:

The Florida Cancer Data System (FCDS) was established in 1981 and contains information on cancers diagnosed since then through 2008 (at the time of this report the 2008 data are

the most current non-provisional data available). The FCDS has been collecting statewide cancer incidence from hospitals since 1981 and from ambulatory surgical centers, radiation therapy centers, private physicians, and pathology laboratories since 1997. The FCDS is an award-winning cancer registry, receiving the highest level of national certifications possible which reflects meeting or exceeding national standards for data accuracy, completeness and timeliness of reporting. The FCDS serves as the repository of cancer data for Florida residents. Over the years, numerous steps have been taken to improve the completeness of the dataset, the timeliness of the reporting, the number of facilities required to report, and the types of cancers reported. Hospital discharge data, ambulatory surgical center data and death certificate data are also linked with FCDS on an annual basis in order to identify any possible missing cases.

There are a few exceptions to the broad reporting requirements for cancer in Florida; a few of these may have some relevance in this investigation and are listed below:

- a) Data on non-melanoma skin cancers are generally not reported to FCDS. For this reason, for those analyses labeled as 'all cancer,' non-melanoma skin cancers would not be included.
- b) Reporting of some early stage in-situ cancers, such as early stage cervical cancer, is also not thought to be complete and thus early stage cervical cancers are not included in this analysis. For this reason, for those analyses labeled 'all cancer,' early stage cervical cancers would not be included.
- c) Veterans Affairs hospitals (VAs) are not required to report to FCDS. FDOH routinely receives records from military facilities (bases). Residents who received health care solely through a VA facility (not military base care) may not be represented in FCDS records (<http://www.fcds.med.miami.edu/inc/lawsrules.shtml>).

Other Facts about FCDS and Cancer Rates:

FCDS contains data on Florida residents only and thus former Florida residents who move out of state (former residents) and are then diagnosed with cancer after they are considered residents of other states may not be present in the registry. Some states do reciprocate and provide data to FCDS on Florida residents who are diagnosed with cancer and receiving care in other states. Conversely, individuals who move into the area with a subclinical cancer already in place (not yet diagnosed) are counted as incident cases related to their new residence.

Persons with multiple primary cancer diagnoses contribute multiple records to the data base, meaning there is an individual record for each instance of primary cancer diagnosis and one individual may contribute more than one record. As an example, an individual diagnosed with primary liver cancer and with primary lung cancer would contribute two separate records to FCDS. Some cancers are known to metastasize to other parts of the body. In these situations, the cancers are recorded by FCDS based on the primary site of cancer only and are not counted as a case of cancer based on the anatomical site the cancer has spread to.

All records list the date of the initial diagnosis for the primary cancer and all records contain the address at the time of diagnosis as well as the current or last known address. Residence history (time lived in a community or at a particular address) is not found in FCDS or in any other vital statistics record.

In addition, records are unduplicated thus there exists only one record for each individual primary cancer, regardless of the number of sources (such as laboratories, physician offices, hospitals) that report the case.

Cancers of Concern:

Overall, the four most common types of cancer in the United States are lung/bronchus, prostate, breast and colorectal cancers. Florida shares this same pattern. Cancer rates, stage at diagnosis, survival rates, and types of cancer vary by age, by sex and by race and all of these components have changed over the last decades along with changes in medical practices, diagnoses, and treatments.

This report provides results on numerous cancer types as dioxins/furans are general cancer promoters and may produce an increase in numerous cancer types. Exposure to dioxins/furans, arsenic and PAHs at the levels found in the community for decades may have produced a very low increased theoretical risk of all cancers. Results for cancers of the lung/bronchus, breast, prostate, colon and rectum, cervix, esophagus, mouth, ovaries, pancreas, uterus, liver, kidney and bladder are provided as well as the number of total cancers. Results for leukemias, non-Hodgkin's lymphoma, myeloma, skin melanomas and miscellaneous cancers are provided as well. Other cancer types occurred in the community but case numbers from 1981 to 2000 were less than eight total cases over the 20 year period and these less frequent cancer types were not included in the individual cancer analyses. (These cancer types where less than eight cases but more than one case were noted in the 20 years of review include cancer of the bones and joint, of the eye and orbit, of the intrahepatic bile duct, Kaposi sarcoma, of the larynx, of other female genital organs, small intestine, soft tissue of the heart, testes, thyroid, ureter, vulva, stomach, brain cancer and Hodgkin lymphoma) The exception is liver cancer which was included given that it is a cancer type commonly associated with chemical contamination.

The contamination situation described in this report involved review of limited sampling results and few historical data. EPHM reviewed information from a number of sources, including animal toxicological studies, and the decision to report on a number of cancers represents best available scientific knowledge of the carcinogenic potential of these contaminants to date.

Determination of the Geographic Area:

For the EPHM review of the cancer data for the Stephen Foster neighborhood, a determination of the geographical areas and boundaries was first reviewed based upon established census boundaries and zip codes involved. The corresponding zip codes (32609, 32605, 32601) explored were determined to encompass an area much larger than the actual neighborhood. Census designations for the community were also viewed (1980, 1990, 2000 census data) and census tract 3 was found to correspond most closely to the community boundaries. The census tract boundaries remained unchanged since 1980. Census tract 3 contained approximately 6,000 individuals (2010 census) which correspond to a sufficient population number for analyses. Map 1 and 2 graphically illustrates census tract 3 and surrounding areas.

Population Data:

Population by age group, race, and gender were pulled from the 1980, 1990, and 2000 US census data. Linear interpolation was used to calculate intercensal years. The total population of the study area was 6,080 for 1980, 6,016 for 1990, and 5,623 for 2000 (**Table 1**) The community racial make-up has changed somewhat since 1980 as 87.1 percent of the population was White and 9.9 percent was Black in 1980 whereas in 2000 72.9 percent of the community was White and 20.3 percent was Black. Residents of Hispanic ethnicity have increased from 3.5 percent of the census tract in 1980 to 5.0 percent in 2000. Mobility is also reflected in census information where 33.8 percent of the census tract in 1990 indicated they were in the same house in 1985 (compared to 44.9 percent statewide) and 35 percent reported in the 2000 census being in the same house in 1995 (compared to 48.9 percent statewide) (1990 and 2000 census).

Census data for 2010 for census tract 3 that contains breakdowns by age, race, ethnicity and gender are expected out by fall of 2011. Total numbers for the census tract (2010) are currently available and indicate 6,078 individuals residing in the community; details for age and gender are not available at this time.

FCDS Data Search:

The FCDS was searched for cancer cases occurring among residents of the census tract 3 for Alachua County and also searched on resident zip codes. FCDS was also searched by place name for residence including Gainesville, G'ville and possible misspellings. All cases of cancer having any patient address within these parameters were pulled and then further geocoded to the census tract.

Once cancer cases for the period 1981-2000 were selected from FCDS based on the general area (zip codes, census tracts and place names), addresses were further geocoded using Arc GIS in order to be identified as being within or outside the study area census tract 3. Only those cases geocoded to be within census tract 3 were included in the analysis. Every attempt was made to geocode each record. Of note, residents whose cancers were diagnosed after leaving the community, who were diagnosed and treated solely in a Veteran's Administration facility, and those who did not seek and receive confirmed diagnoses would not be present in the dataset.

Stephen Foster (Alachua County, census tract 3) Analysis:

The primary focus of this report involves malignant cancers for the period 1981-2000 representing 20 years of follow-up and decades past theoretical exposure time. All rates were age adjusted. For purposes of comparison, rates for the state of Florida were used to produce expected counts of cancer. Analysis for years 2001 to 2008 are expected to be completed in late fall 2011 following the availability of race, age and gender specific population estimates for the census tract in the 2010 census.

In assessing whether the area had experienced an increase in certain types of cancer, Standard Incidence Ratios (SIRs) were used. This involves comparing the observed number of cancer cases to a number that would be expected if the community were experiencing the same rate of cancer as a larger comparison area (in this case the state of Florida). These Florida age specific state rates were multiplied by the population in the census tract of concern. Population estimates for the area (census tract 3, Alachua County)

were obtained from the 1980, 1990 and 2000 census and extrapolated between census years based on documented growth for each of these areas. This calculation results in the expected number of cancer cases in the community area. The observed number of cases in the census tract area was then divided by the calculated expected number of cases in the area. This ratio of observed over expected is called an SIR. All rates (and the SIRs) in this study were age-adjusted. The SIR is considered elevated when it is over 1.0. It is considered statistically significant if the 95 percent interval between the lower and higher confidence limits of the observed number does not include 1.0.

As an example using a cancer occurring at an incidence rate of approximately 21 cases per year per 100,000 individuals (similar to bladder cancer), in a community of roughly 6,000 individuals over a 20 year period, if 100 cases are observed and 25 cases would be expected based on comparison rates, the SIR would be 4 (100/25) with a lower confidence limit of 3.25 and an upper limit of 4.86. This elevation would be considered statistically significant because the lower confidence limit surrounding the estimate is at least 1.1 (does not include 1.0) (Breslow and Day, 1993).

Results: General

An FCDS search for cancers in the Stephen Foster area (census tract 3, Alachua County) found 447 cases of all cancers in the period 1981-2000 among all age groups. The majority of cancer cases occurred among adults 19 years of age or older (n=441), the mean and median age of diagnoses for all cancer types among adults was 67 and 69 years respectively (range 21 to 97 years of age). The majority of cases occurred among females (n=251). Only six cases of cancers of concern occurred among children age 0-19 in these years. As expected the majority of pediatric cases were leukemias (n=2).

Comparisons were made to state rates in five-year periods for each of the cancer types presented. Those cancers most commonly appearing in the community are presented, uncommon cancer types where less than eight cases were noted in the 20-year time period under study (1981-2000) were not analyzed (except liver). Computation of the observed number of cancer cases over the expected number of cancer cases yielded a SIR for each of the five year time periods. For brevity, computations are shown in **Tables 2-5** for five-year time periods from 1981-2000 (20 years of follow-up and decades past possible start date of exposure). Analysis results are presented ending in year 2000.

Examining the category 'all cancers,' no elevation of the SIRs were observed over the summary period 1981-2000 when compared to expected rates (**Table 2**). No age group had higher than expected number of cancers. In summary, review of the overall cancer burden in the community from 1981-2000 found 447 total cancers in all age groups with 521 cancers calculated as expected. Rates for specific cancers are provided below in Tables 3-5.

Results: Specific Cancers

- Observed versus expected comparisons for **kidney** cancer for the five-year time periods did not produce elevated SIRs in the comparisons to state of Florida values (**Table 3**). Eight cases of kidney cancer were observed in the 20-year period.
- Observed versus expected comparisons for **liver** cancer for the five-year time periods did not produce elevated SIRs in the comparison to state of Florida values (**Table 3**) and in some periods no cases were seen. Only four cases of liver cancer were observed for the 20-year period.

- Observed versus expected comparisons for **leukemia** for the five-year time periods produced no periods of elevated SIRs in the comparison to state values (**Table 3**). Fifteen cases of leukemia were observed in the 20-year period.
- Observed versus expected comparisons for **non-Hodgkin lymphoma** for the five-year time periods did not produce elevated SIRs in the state of Florida comparison (**Table 3**). 21 cases of non-Hodgkin lymphoma were observed in the 20 year period.
- Observed versus expected comparisons for **pancreatic** cancer for the five year time periods did not produce elevated SIRs in the years 1981-2000 in the comparison to the state of Florida (**Table 3**). Thirteen cases of pancreatic cancer were observed in the 20 year time period.
- Observed versus expected comparisons for **bladder** cancer for the five year time periods did not produce elevated SIRs in the years 1981-2000 in the comparison to the state of Florida (**Table 3**). 24 cases of urinary bladder cancer were observed in the 20 year time period.

In summary, there appears to be no increase in overall rates for cancers of the liver, kidney, bladder, and pancreas and for non-Hodgkin lymphomas or leukemias during 1981-2000. These are cancer types most frequently associated with exposure and contamination of communities.

- Observed versus expected comparisons for **breast** cancer among women for the five year time periods did not produce elevated SIRs in the comparison to state of Florida values (**Table 4**). Seventy-one cases of breast cancer were observed for the 20 year period.
- Observed versus expected comparisons for **cervical** cancer among women for the five year time periods did not produce elevated SIRs in the comparisons to state of Florida values (**Table 4**). Nine cases of cervical cancer were observed in the 20 year period.
- Observed versus expected comparisons for **prostate** cancer among men for the five year time periods produced no periods of elevated SIRs in the comparison to state values (**Table 4**). Forty-nine cases of prostate cancer were observed in the 20 year period.
- Observed versus expected comparisons for **ovarian** cancer among women for the five year time periods did not produce elevated SIRs in the state of Florida comparison (**Table 4**). Nine cases of ovarian cancer were observed in the 20 year period.
- Observed versus expected comparisons for **uterine** cancer among women for the five year time periods did not produce elevated SIRs in the years 1981-2000 in the comparison to the state of Florida (**Table 4**). Sixteen cases of uterine cancer were observed in the 20 year time period.

In summary, there appears to be no increase in overall rates for cancers of the breast, cervix, uterus, ovaries or prostate during 1981-2000. Some periods had statistically significant lower than expected rates for breast and prostate cancers.

- Observed versus expected comparisons for **colorectal** cancers for the five year time periods did not produce elevated SIRs in the comparison to state of Florida values (**Table 5**). Forty-four cases of colorectal cancers were observed for the 20 year period.
- Observed versus expected comparisons for **lung and bronchus** cancers for the five year time periods did not produce elevated SIRs in the comparisons to state of Florida values (**Table 5**). Sixty-one cases of lung and bronchus cancer were observed in the 20 year period.

- Observed versus expected comparisons for **miscellaneous cancers** for the five year time periods did not produce elevated SIRs in the state of Florida comparison (**Table 5**). Thirteen cases of miscellaneous cancers were observed in the 20 year period.
- Observed versus expected comparisons for **myeloma** for the five year time periods produced no periods of elevated SIRs in the comparison to state values (**Table 5**). Eight cases of myeloma were observed in the 20 year period.
- Observed versus expected comparisons for **esophageal** cancer for the five year time periods did not produce elevated SIRs in the years 1981-2000 in the comparison to the state of Florida (**Table 5**). Eight cases of esophageal cancer were observed in the 20 year time period and in one time period no cases were seen.
- Observed versus expected comparisons for **oral** cancer for the five year time periods did not produce elevated SIRs in the years 1981-2000 in the comparison to the state of Florida (**Table 5**). Nine cases of oral cancer were observed in the 20 year time period.
- Observed versus expected comparisons for **skin melanoma** did not produce elevated SIRs in the five year time periods in the comparison to state values. Eleven cases of skin melanoma were noted in this time period.

In summary, there appears to be no increase in overall rates for cancers of the lung and bronchus, colorectal cancers, skin melanomas, miscellaneous cancers, esophageal, oral or myeloma during 1981-2000.

Limitations:

This analysis was conducted as an investigation of cancer incidence data associated with a possible increase in cancer in the Stephen Foster area in response to resident concerns over community exposures related to the adjacent Cabot Koppers NPL site.

Some of the cancers explored actually comprise a group of diseases with many specific types diagnosed in the community (such as leukemia). Lumping of these different types for analysis purposes may not make sense from a medical/ biological perspective and it is likely that the risk factors for one type of cancer are not the same as risk factors for another.

Although all of the cancers of concern were chosen based on toxicological and epidemiological evidence suggesting possible associations with dioxin/furans, PAHs and arsenic exposure, there are many other known and hypothesized risk factors for cancers. Other risk factors include family history and genetics, ionizing radiation, exposure to other chemicals, occupational exposures, smoking, alcohol use, and diet and lifestyle issues whose impact cannot be addressed in this type of review.

Residence history is also not determined at this level of investigation which is limited to review of existing databases. Therefore, long-term residents who have moved away and are then diagnosed with cancer will be missed from this type of analysis. Residents new to the Stephen Foster area who are then diagnosed with cancer will be counted as resident cases, regardless of the time that they have been living in the area and in spite of the fact that any relevant exposures were most likely from outside of the area. Seasonal/college residents who may have had intermittent exposure and who maintain residences in another area or state would most likely be missing from the case counts of cancer as well as denominator data. Given the very long time period under review and the amount of in- and out-migration that may have occurred in the area since the late 1980s, the inability to assume a stable population is a major limitation. Although the area has maintained a similar

total population as evidenced in census tract 3 totals, the community may have had in- and out-migration of specific members and changes in the ages, races and ethnicities of those migrating (all demographic characteristics which are in turn linked to cancer risk).

Few environmental sampling points for soil and for air exist during the long time period that the Cabot Koppers facilities were in operation and many assumptions about contamination and exposure have been made. The entire population adjacent to the site was assumed to be exposed at equal levels, contamination is assumed to have been present from the start up time of these facilities and contamination is assumed to be ongoing at some level through fugitive dust, contaminated soils and contaminated indoor dust. Contamination may have been at similar or higher levels in decades past but given that the FCDS is only able to provide data from 1981 on, prior cancer incidence associated with historical exposure and contamination in the early part of the 20th century is not able to be assessed.

Cancer is a disease that takes a number of years to develop between initial exposure time or initial trigger and the diagnosis, including signs and symptoms. This latency period may be affected by the type of cancer in question, the age, sex and race of the individual and other contributing factors, such as smoking status. Many cancers have a latency period of 15-20 years and in some cases latency may be 25 to 30 years. Again, population movements during this time greatly impact the ability to interpret any findings.

Personal interviews, surveys, questionnaires and any other method of gathering exposure or other risk factor information specific to each case or to residents in general are not recommended in a preliminary investigation. These types of questionnaires are also not recommended when the investigation does not find consistent increases in cancer rates.

Limiting the study area to the census tract area that generally comprises the neighborhood may have somewhat inexact boundaries for this concern. Although the census tract chosen generally corresponded to the neighborhood, the need to have a large enough population for analysis may have resulted in including some areas and population which have limited to no contamination/exposure from this site.

A serious limitation to this finding is the inability to determine that the population in which the cancers were observed (in other words residents of the Stephen Foster neighborhood in 1981-2000) represents the same group of individuals who were in fact exposed to the contaminants through the 1900s. Given the changes related to growth and development, including building of apartment complexes and changes in the general surrounding neighborhoods over this long time period, it is not possible to say with confidence that the local residents exposed to the contaminants and those with cancer documented in FCDS are in fact the same group of individuals. The finding of no increases in selected cancer rates (18 different cancer types) during 20 years of follow-up are suggestive that the levels of exposure to the population may have been low enough to result in no detectable increase in cancer rates. The finding of no increases, particularly in the early period of analysis (1980's) which would reflect 20 to 30 years of latency past the higher exposures possible in the 1950s and 1960s supports the conclusion that exposures in this community have not been high enough to cause detectable increases in cancer rates.

Conclusions:

In conclusion, no increases in rates for 18 types of cancers were seen for the Stephen Foster neighborhood (census tract 3, Alachua County) for five year periods encompassing 1981-2000. The finding of no increases, particularly in the early period of analysis (1980s) which would reflect 20 to 30 years of latency past the higher community exposures to contaminants possible in the 1950s and 1960s suggests that any exposures in this community have not been great enough to cause increased cancer rates.

Recommendations:

Limited exposure may be occurring in this community through indoor dust, fugitive dust and contaminated soils. Further analysis of cancer records for the period 2000-2008 is recommended once detailed census tract data becomes available later in 2011.

Based on the information available, additional review of health and disease data would not provide any additional data that would more conclusively associate dioxin/furans, arsenic and PAHs contamination of the community soils and increases in cancer. Detailed historical information related to disease or environmental sampling data is not available.

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Mobility data source Florida: http://factfinder.census.gov/servlet/DTTable?_bm=y&-context=dt&-ds_name=DEC_1990_STF3_&-CONTEXT=dt&-mt_name=DEC_1990_STF3_P043&-tree_id=101&-redoLog=true&-all_geo_types=N&-_caller=geoselect&-geo_id=04000US12&-search_results=01000US&-format=&-_lang=en

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Mobility data source Florida: http://factfinder.census.gov/servlet/DTTable?_bm=y&-context=dt&-ds_name=DEC_2000_SF3_U&-CONTEXT=dt&-mt_name=DEC_2000_SF3_U_P024&-tree_id=403&-redoLog=true&-all_geo_types=N&-_caller=geoselect&-geo_id=04000US12&-search_results=01000US&-format=&-_lang=en

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Table 1. Census Tract 3 Alachua County (Stephen Foster Neighborhood) for 1980, 1990, and 2000

	1980	1990	2000
White-All Ethnicities	5296 (87.1%)	4774 (79.4%)	4101 (72.9%)
Black-All Ethnicities	603 (9.9%)	1083 (18.0%)	1140 (20.3%)
Other-All Ethnicities	181 (2.9%)	159 (2.6%)	382 (6.8%)
TOTAL	6080	6016	5623
Hispanic –Any Race	214 (3.5%)	211 (3.5%)	283 (5.0%)

Table 2: Age adjusted SIR and confidence interval for all cancers in residents of Census Tract 3, Alachua County, compared to state of Florida, 1981-2000*

All Cancers (1981-2000)	Age group	Expected	Observed	SIR	Conf. interval
	<=19 y	3.59	6	1.673	(0.611 - 3.642)
	20-44 y	64.50	42	0.651	(0.469 - 0.880)
	45- 64 y	122.99	120	0.976	(0.809 - 1.167)
	65 + y	330.12	279	0.845	(0.749 - 0.950)
	All	521.20	447	0.858	(0.780 - 0.941)

** Cancer data obtained from the FCDS website and the abshist file. Population data obtained from 1980, 1990 & 2000 censuses. Data for intercensal years were estimated by linear interpolation*

Table 3: Age adjusted SIRs for five year periods with 95% CL for Select Cancers (Liver, Kidney, Pancreatic, Bladder, Non-Hodgkin Lymphoma and Leukemias) in residents of Census Tract 3, Alachua County, compared to state of Florida, 1981-2000*

Cancer type	1981-1985				1986-1990				1991-1995				1996-2000				
	Age group	Expected	Observed	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval
Kidney	<=19 y	0.04	1	26.884	(0.351 - 149.577)	0.05	0	NA	NA	0.05	0	NA	NA	0.04	0	NA	NA
	20-44 y	0.22	0	NA	NA	0.25	0	NA	NA	0.27	0	NA	NA	0.33	0	NA	NA
	45- 64 y	0.66	0	NA	NA	0.68	2	2.951	(0.331 - 10.656)	0.77	0	NA	NA	0.94	2	2.132	(0.239 - 7.698)
	65 + y	1.4	1	0.713	(0.009 - 3.964)	1.77	1	0.565	(0.007 - 3.144)	1.9	1	0.525	(0.007 - 2.923)	1.8	0	NA	NA
	All	2.32	2	0.861	(0.097 - 3.108)	2.74	3	1.094	(0.220 - 3.196)	3	1	0.333	(0.004 - 1.854)	3.1	2	0.645	(0.072 - 2.327)
Liver	<=19 y	NA	0	NA	NA	NA	0	NA	NA	0.01	0	NA	NA	0.01	0	NA	NA
	20-44 y	NA	0	NA	NA	NA	0	NA	NA	0.1	0	NA	NA	0.13	0	NA	NA
	45- 64 y	NA	0	NA	NA	NA	0	NA	NA	0.18	0	NA	NA	0.33	1	3.065	(0.040 - 17.054)
	65 + y	NA	0	NA	NA	NA	0	NA	NA	0.6	1	1.678	(0.022 - 9.337)	0.61	2	3.293	(0.370 - 11.889)
	All	NA	0	NA	NA	NA	0	NA	NA	0.89	1	1.123	(0.015 - 6.251)	1.07	3	2.798	(0.562 - 8.176)
Leukemia (except Aleukemic, subleukemic & NOS)	<=19 y	0.21	1	4.666	(0.061 - 25.962)	0.25	0	NA	NA	0.28	0	NA	NA	0.23	1	4.276	(0.056 - 23.791)
	20-44 y	0.45	1	2.211	(0.029 - 12.301)	0.46	0	NA	NA	0.49	1	2.039	(0.027 - 11.346)	0.51	0	NA	NA
	45- 64 y	0.54	0	NA	NA	0.55	1	1.829	(0.024 - 10.175)	0.61	1	1.642	(0.021 - 9.139)	0.72	1	1.397	(0.018 - 7.771)
	65 + y	1.52	1	0.656	(0.009 - 3.648)	1.9	2	1.05	(0.118 - 3.792)	2.06	3	1.455	(0.292 - 4.252)	2	2	1	(0.112 - 3.609)
	All	2.73	3	1.099	(0.221 - 3.211)	3.16	3	0.95	(0.191 - 2.774)	3.44	5	1.453	(0.468 - 3.391)	3.46	4	1.157	(0.311 - 2.961)
Non-Hodgkin's Lymphoma	<=19 y	0.06	1	17.788	(0.232 - 98.968)	0.08	0	NA	NA	0.06	0	NA	NA	0.08	0	NA	NA
	20-44 y	0.6	1	1.671	(0.022 - 9.298)	0.86	1	1.163	(0.015 - 6.471)	1.25	4	3.205	(0.862 - 8.204)	1.19	1	0.839	(0.011 - 4.669)
	45- 64 y	0.82	0	NA	NA	0.88	0	NA	NA	1.03	1	0.966	(0.013 - 5.377)	1.33	3	2.259	(0.454 - 6.599)
	65 + y	2	1	0.5	(0.007 - 2.782)	2.55	1	0.392	(0.005 - 2.183)	2.94	5	1.702	(0.548 - 3.972)	2.84	2	0.703	(0.079 - 2.539)
	All	3.48	3	0.863	(0.173 - 2.521)	4.37	2	0.458	(0.051 - 1.654)	5.28	10	1.893	(0.906 - 3.481)	5.44	6	1.103	(0.403 - 2.400)
Pancreas	<=19 y	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	0.11	0	NA	NA	0.1	0	NA	NA	0.14	0	NA	NA	0.15	0	NA	NA
	45- 64 y	0.55	1	1.812	(0.024 - 10.080)	0.51	0	NA	NA	0.61	1	1.635	(0.021 - 9.096)	0.69	0	NA	NA
	65 + y	1.94	1	0.515	(0.007 - 2.865)	2.09	2	0.955	(0.107 - 3.448)	2.42	5	2.07	(0.667 - 4.830)	2.11	3	1.424	(0.286 - 4.160)
	All	2.6	2	0.768	(0.086 - 2.772)	2.7	2	0.74	(0.083 - 2.670)	3.16	6	1.896	(0.692 - 4.127)	2.95	3	1.018	(0.205 - 2.975)
Urinary bladder	<=19 y	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	0.27	0	NA	NA	0.27	0	NA	NA	0.25	0	NA	NA	0.28	0	NA	NA
	45- 64 y	1.32	1	0.755	(0.010 - 4.202)	1.2	2	1.662	(0.187 - 6.002)	1.13	1	0.881	(0.012 - 4.903)	1.31	0	NA	NA
	65 + y	5.16	3	0.581	(0.117 - 1.699)	5.33	6	1.125	(0.411 - 2.449)	5.22	7	1.34	(0.537 - 2.761)	4.95	4	0.807	(0.217 - 2.067)
	All	6.75	4	0.592	(0.159 - 1.517)	6.81	8	1.174	(0.506 - 2.314)	6.61	8	1.209	(0.521 - 2.383)	6.54	4	0.611	(0.164 - 1.565)

* Cancer data obtained from the FCDS website and the abshist file. Population data obtained from 1980, 1990 & 2000 censuses. Data for intercensal years were estimated by linear interpolation

Table 4: Age adjusted SIRs for five year periods with 95% CL for Select Cancers (Breast, Cervix, Prostrate, Ovary, Uterus) in residents of Census Tract 3, Alachua County, compared to state of Florida, 1981-2000*

Cancer type	1981-1985					1986-1990				1991-1995				1996-2000			
	Age group	Expected	Observed	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval
Breast (Females)	<=19 y	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	3.08	1	0.325	0.004 - 1.808	3.34	3	0.897	0.180 - 2.621	3.36	2	0.595	0.067 - 2.149	3.45	2	0.579	0.065 - 2.090
	45- 64 y	5.27	7	1.328	0.532 - 2.735	5.2	6	1.154	0.421 - 2.511	5.12	3	0.586	0.118 - 1.713	6.23	8	1.283	0.552 - 2.528
	65 + y	8.91	11	1.235	0.615 - 2.209	11.48	14	1.219	0.666 - 2.046	11.37	6	0.528	0.193 - 1.149	9.74	8	0.821	0.354 - 1.618
	All	17.26	19	1.101	0.662 - 1.719	20.03	23	1.148	0.728 - 1.723	19.85	11	0.554	0.276 - 0.992	19.43	18	0.926	0.549 - 1.464
Cervix	<=19 y	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	1.26	0	NA	NA	1.3	0	NA	NA	1.18	1	0.847	0.011 - 4.712	1.06	0	NA	NA
	45- 64 y	0.53	0	NA	NA	0.45	1	2.213	0.029 - 12.315	0.46	2	4.392	0.493 - 15.859	0.48	2	4.128	0.464 - 14.904
	65 + y	0.59	2	3.413	0.383 - 12.323	0.58	1	1.73	0.023 - 9.627	0.53	0	NA	NA	0.36	0	NA	NA
	All	2.37	2	0.843	0.095 - 3.043	2.33	2	0.858	0.096 - 3.099	2.17	3	1.385	0.278 - 4.046	1.91	2	1.047	0.118 - 3.781
Prostrate	<=19 y	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	0.02	0	NA	NA	0.02	0	NA	NA	0.05	0	NA	NA	0.11	0	NA	NA
	45- 64 y	1.42	1	0.704	(0.009 - 3.917)	1.74	3	1.725	(0.347 - 5.041)	3.88	0	NA	NA	5.4	3	0.556	(0.112 - 1.623)
	65 + y	8.17	7	0.857	(0.343 - 1.765)	11.21	8	0.714	(0.307 - 1.407)	15.03	22	1.463	(0.917 - 2.216)	11.08	5	0.451	(0.145 - 1.053)
	All	9.61	8	0.832	(0.358 - 1.640)	12.97	11	0.848	(0.423 - 1.518)	18.97	22	1.16	(0.727 - 1.756)	16.58	8	0.482	(0.208 - 0.951)
Ovary	<=19 y	0.02	0	NA	NA	0.02	0	NA	NA	0.02	0	NA	NA	0.02	0	NA	NA
	20-44 y	0.45	0	NA	NA	0.49	0	NA	NA	0.56	0	NA	NA	0.5	1	1.996	(0.026 - 11.105)
	45- 64 y	0.77	1	1.302	(0.017 - 7.244)	0.7	0	NA	NA	0.68	0	NA	NA	0.76	2	2.64	(0.297 - 9.533)
	65 + y	1.33	0	NA	NA	1.55	3	1.93	(0.388 - 5.638)	1.6	2	1.249	(0.140 - 4.511)	1.31	0	NA	NA
	All	2.56	1	0.39	(0.005 - 2.171)	2.76	3	1.085	(0.218 - 3.171)	2.86	2	0.699	(0.079 - 2.525)	2.59	3	1.158	(0.233 - 3.384)
Uterus	<=19 y	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	0.31	0	NA	NA	0.27	1	3.722	(0.049 - 20.710)	0.3	0	NA	NA	0.31	0	NA	NA
	45- 64 y	1.08	3	2.777	(0.558 - 8.113)	0.85	1	1.173	(0.015 - 6.525)	0.82	3	3.648	(0.733 - 10.66)	1	2	1.997	(0.224 - 7.211)
	65 + y	2.11	3	1.42	(0.285 - 4.148)	2.27	1	0.44	(0.006 - 2.448)	2.13	1	0.47	(0.006 - 2.612)	1.8	1	0.557	(0.007 - 3.097)
	All	3.5	6	1.714	(0.626 - 3.732)	3.39	3	0.884	(0.178 - 2.582)	3.25	4	1.23	(0.331 - 3.148)	3.11	3	0.965	(0.194 - 2.820)

* Cancer data obtained from the FCDS website and the abshist file. Population data obtained from 1980, 1990 & 2000 censuses. Data for intercensal years were estimated by linear interpolation

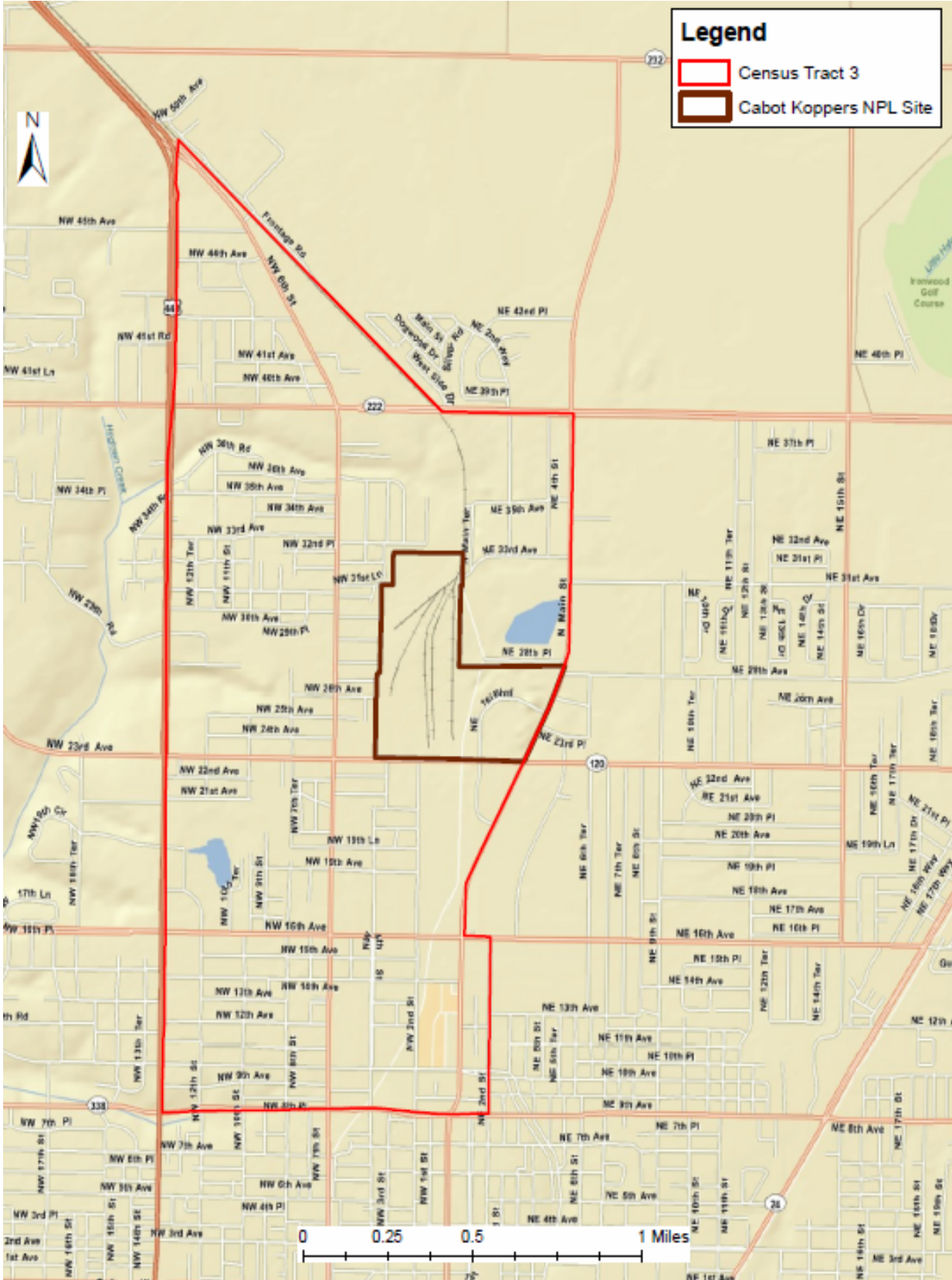
Table 5: Age adjusted SIRs for five-year periods with 95% confidence intervals for select cancers (Colorectal, Lung and Bronchus, Miscellaneous cancers, Myeloma, Oral cancers, Skin melanoma) in residents of Census Tract 3, Alachua County, compared to state of Florida, 1981-2000*

Cancer type	1981-1985					1986-1990				1991-1995				1996-2000			
	Age group	Expected	Observed	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval	Exp	Obs	SIR	Conf. Interval
Colorectal	<=19 y	0.01	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	0.76	0	NA	NA	0.74	0	NA	NA	0.82	0	NA	NA	1.01	0	NA	NA
	45- 64 y	3.39	1	0.295	(0.004 - 1.642)	3.08	4	1.297	(0.349 - 3.320)	3	4	1.333	(0.359 - 3.412)	3.6	2	0.555	(0.062 - 2.004)
	65 + y	13.17	6	0.455	(0.166 - 0.991)	13.61	8	0.588	(0.253 - 1.159)	12.62	7	0.555	(0.222 - 1.143)	10.85	12	1.106	(0.571 - 1.933)
	All	17.33	7	0.404	(0.162 - 0.832)	17.43	12	0.688	(0.355 - 1.203)	16.44	11	0.669	(0.333 - 1.197)	15.46	14	0.906	(0.495 - 1.520)
Lung & Bronchus	<=19 y	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	0.95	0	NA	NA	0.88	0	NA	NA	0.86	0	NA	NA	0.95	1	1.053	(0.014 - 5.860)
	45- 64 y	5.72	6	1.05	(0.383 - 2.285)	5.35	6	1.121	(0.409 - 2.440)	5.58	7	1.255	(0.503 - 2.587)	5.93	2	0.337	(0.038 - 1.217)
	65 + y	11.77	12	1.02	(0.526 - 1.782)	13.53	8	0.591	(0.255 - 1.165)	15.45	10	0.647	(0.310 - 1.191)	13.8	9	0.652	(0.298 - 1.238)
	All	18.44	18	0.976	(0.578 - 1.543)	19.77	14	0.708	(0.387 - 1.188)	21.89	17	0.777	(0.452 - 1.244)	20.68	12	0.58	(0.299 - 1.013)
Miscellaneous	<=19 y	0.01	0	NA	NA	0.02	0	NA	NA	0.02	0	NA	NA	0.01	0	NA	NA
	20-44 y	0.32	0	NA	NA	0.27	1	3.639	(0.048 - 20.245)	0.36	0	NA	NA	0.37	0	NA	NA
	45- 64 y	0.86	0	NA	NA	0.79	1	1.261	(0.016 - 7.017)	0.88	0	NA	NA	1.06	0	NA	NA
	65 + y	2.5	1	0.4	(0.005 - 2.228)	2.68	5	1.866	(0.601 - 4.354)	3.11	2	0.643	(0.072 - 2.322)	2.79	3	1.075	(0.216 - 3.142)
	All	3.69	1	0.271	(0.004 - 1.509)	3.77	7	1.857	(0.744 - 3.826)	4.37	2	0.458	(0.051 - 1.654)	4.23	3	0.709	(0.142 - 2.070)
Myeloma	<=19 y	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
	20-44 y	0.06	0	NA	NA	0.07	0	NA	NA	0.08	1	12.13	(0.159 - 67.489)	0.1	0	NA	NA
	45- 64 y	0.31	0	NA	NA	0.29	0	NA	NA	0.33	0	NA	NA	0.38	0	NA	NA
	65 + y	0.83	2	2.404	(0.270 - 8.679)	1.01	2	1.982	(0.223 - 7.157)	1.13	1	0.883	(0.012 - 4.914)	0.93	2	2.157	(0.242 - 7.786)
	All	1.2	2	1.668	(0.187 - 6.022)	1.36	2	1.467	(0.165 - 5.296)	1.54	2	1.298	(0.146 - 4.685)	1.41	2	1.42	(0.159 - 5.126)
Esophagus	<=19 y	0	0	NA	NA	0	0	NA	NA	NA	0	NA	NA	0	0	NA	NA
	20-44 y	0.06	0	NA	NA	0.06	0	NA	NA	NA	0	NA	NA	0.07	0	NA	NA
	45- 64 y	0.38	0	NA	NA	0.34	0	NA	NA	NA	0	NA	NA	0.43	0	NA	NA
	65 + y	0.7	4	5.695	(1.532 - 14.581)	0.77	2	2.59	(0.291 - 9.350)	NA	0	NA	NA	0.84	2	2.373	(0.266 - 8.566)
	All	1.14	4	3.504	(0.943 - 8.971)	1.17	2	1.703	(0.191 - 6.148)	NA	0	NA	NA	1.35	2	1.484	(0.167 - 5.358)
Oral cancers	<=19 y	0.01	0	NA	NA	0.01	0	NA	NA	0.02	0	NA	NA	0.01	0	NA	NA
	20-44 y	0.45	0	NA	NA	0.44	0	NA	NA	0.46	0	NA	NA	0.49	0	NA	NA
	45- 64 y	1.33	0	NA	NA	1.16	0	NA	NA	1.22	1	0.818	(0.011 - 4.551)	1.39	2	1.435	(0.161 - 5.181)
	65 + y	1.88	3	1.593	(0.320 - 4.653)	1.86	2	1.074	(0.121 - 3.879)	1.82	1	0.548	(0.007 - 3.050)	1.59	0	NA	NA
	All	3.68	3	0.816	(0.164 - 2.383)	3.49	2	0.574	(0.064 - 2.072)	3.52	2	0.568	(0.064 - 2.049)	3.49	2	0.574	(0.064 - 2.072)
Skin-Melanoma	<=19 y	0.01	0	NA	NA	0.02	0	NA	NA	0.01	0	NA	NA	0.02	0	NA	NA
	20-44 y	1.23	0	NA	NA	1.24	1	0.808	(0.011 - 4.495)	1.12	2	1.779	(0.200 - 6.423)	1.32	1	0.759	(0.010 - 4.224)
	45- 64 y	0.82	0	NA	NA	0.84	1	1.195	(0.016 - 6.647)	0.86	1	1.157	(0.015 - 6.437)	1.28	0	NA	NA
	65 + y	1.08	2	1.854	(0.208 - 6.692)	1.4	0	NA	NA	1.66	1	0.603	(0.008 - 3.352)	2.02	2	0.993	(0.111 - 3.584)
	All	3.14	2	0.636	(0.071 - 2.298)	3.5	2	0.572	(0.064 - 2.065)	3.66	4	1.092	(0.294 - 2.797)	4.64	3	0.647	(0.130 - 1.891)

* Cancer data obtained from the FCDS website and the abshist file. Population data obtained from 1980, 1990 & 2000 censuses. Data for intercensal years were estimated by linear interpolation



Map 1. Aerial view of the Stephen Foster Neighborhood (Census Tract 3) Alachua County with Cabot Koppers site Highlighted



Map 2. Street Map of Stephen Foster Neighborhood (Census Tract 3), Alachua County