

June 5, 2013



This letter summarizes the results of an investigation by the Kansas Department of Health and Environment (KDHE) in response to your concerns regarding environmental hazards and the number of persons associated with the City of McPherson and McPherson County who have developed cancers.

Background and Initial Assessment

On April 3, 2013, you contacted the KDHE Office of Communications regarding your concerns about potential environmental hazards and cancer in the City of McPherson and McPherson County. You mentioned a landfill in the City of McPherson where you believe chromic acid waste may have been disposed and that the landfill may have been built over an aquifer.

In response to these concerns, KDHE developed an investigation design that entailed: 1) gathering information on the history of two closed municipal solid waste (MSW) landfills in McPherson County, 2) gathering current and historical information on remediation projects in the City of McPherson, 3) gathering information on current and historical industries in the City of McPherson, 4) determining if similar health concerns had previously been reported to KDHE and 5) analysis of pertinent cancer incidence rates in the City of McPherson and McPherson County.

History of Landfills in McPherson County

KDHE Bureau of Waste Management (KDHE BWM) records indicate that there are two closed municipal solid waste (MSW) landfills in McPherson County, both of which have groundwater monitoring systems. One of the landfills is a county-owned landfill north of the city and is the site of an active construction and demolition landfill and a portion of the site will be developed into a new county-owned MSW landfill in the near future. KDHE Bureau of Environmental Remediation (KDHE BER) records indicate that there was a concern that barrels of chromic acid were buried at the landfill many years ago but that information was unconfirmed. Groundwater monitoring at this site has demonstrated that no off-site contamination has occurred and any detected chromium contamination in the on-site wells appears related to naturally occurring suspended solids rather than impacts resulting from landfilled waste. The second landfill was initially a private landfill owned by Refuse Services, Inc. However, in 1991 accusations against the owner regarding the disposal of hazardous waste in the landfill resulted in a change of ownership and ultimately the assumption of responsibility by the City of McPherson in 1992. The city presently administers the landfill groundwater monitoring system. Some off-site migration of contamination has been documented, but the contamination does not appear to have impacted public water supply wells.

Current and Historical Remediation Projects in the City of McPherson

The KDHE Bureau of Environmental Remediation (KDHE BER) responds to environmental emergencies and manages environmental contamination through pollution source control, containment, and/or remediation activities at contaminated sites. There are several KDHE BER sites in the City of McPherson, including many petrochemical, chrome plating, dry cleaning and other industrial sites with various contaminants. The sites include many contaminant types, including: nitrates, arsenic, lead, tetrachloroethene (PCE), chromium, 1,2-dichloroethene, ethylene dibromide, trichloroethene (TCE), 1,2-dichloroethane, benzene, naphthalene, trimethylbenzene, toluene, carbon tetrachloride, chloroform, ethylbenzene and xylene as the more common contaminants. Many of these contaminants have been encountered in drinking water and soil throughout the city and the KDHE BER has worked to eliminate the point of exposure as quickly as possible as each contaminant has been discovered.

Cancer Incidence Analysis

The City of McPherson and McPherson County are home to a number of industries. Over the years, there have been several chrome plating companies, petrochemical operations, plastics manufacturing companies and other industries which have potentially contaminated soil and groundwater sites, as well as created air releases, which may impact public health.

Several years prior to your inquiry, KDHE received a report from a citizen about the perceived increase in breast cancer among City of McPherson residents. This report was thoroughly investigated by KDHE Bureau of Health Promotion and Kansas Cancer Registry staff, who determined that the number and type of breast cancer cases in the area was not unusual at that time.

Based on the history of environmental contamination, the most common industries, and previous health concerns related to breast cancer in the area, cancer incidence rates were determined for the following cancers: stomach, lung and bronchus, bladder (including in situ), Hodgkin's lymphoma, non-Hodgkin's lymphoma, leukemia, acute myeloid leukemia and female breast cancer.

An incidence rate is the rate of occurrence of new cases diagnosed within a specific time period. Age adjustment is a statistical process applied to rates of disease, death, injuries or other health outcomes that allows communities with different age structures to be compared. Age-adjusted incidence rates are presented here for the City of McPherson, McPherson County, Region 5 (which includes Harvey, Reno, McPherson, and Sedgwick counties) and Kansas. Incidence rates for Iowa are also presented for comparison because of its demographic and geographic similarity to Kansas. In addition to the age-adjusted incidence rates, 95% confidence intervals are provided for the rates. A confidence interval is the range around a measurement that conveys how precise the measurement is. If the confidence intervals for the rates overlap, the rates are said to be similar and not statistically significantly different.

Between 2000 and 2009, for the City of McPherson, the age-adjusted incidence rate of lung and bronchus cancer was 61.7 cases per 100,000 population (95% CI: 50.0-75.7/100,000 population) (Table 1). For McPherson County, the incidence rate of lung and bronchus cancer was 50.2 cases per 100,000 population (95% CI: 43.1-58.4/100,000 population). The rate for the City of McPherson was similar to the rates for Region 5, Kansas and Iowa during the same time period. The rate for McPherson County was statistically significantly lower than the rates for Region 5, Kansas and Iowa.

For the City of McPherson, the age-adjusted incidence rate of bladder cancer was 20.2 cases per 100,000 population (95% CI: 13.9-28.8/100,000 population) (Table 2). For McPherson County, the age-adjusted incidence rate of bladder cancer was 20.6 cases per 100,000 population (95% CI: 16.2-26.0/100,000 population). The incidence rates of bladder cancer for the City of McPherson and McPherson County were similar to the rates for Region 5, Kansas and Iowa.

For the City of McPherson, the age-adjusted incidence rate of non-Hodgkin's lymphoma was 22.3 cases per 100,000 population (95% CI: 15.6-31.5/100,000 population) (Table 3). For McPherson County, the age-adjusted incidence rate of non-Hodgkin's lymphoma was 19.6 cases per 100,000 population (95% CI: 15.2-25.1/100,000 population). The incidence

rates of non-Hodgkin's lymphoma for the City of McPherson and McPherson County were similar to the rates for Region 5, Kansas and Iowa.

For the City of McPherson, the age-adjusted incidence rate of leukemia was 12.7 cases per 100,000 population (95% CI: 7.8-20.1/100,000 population) (Table 4). For McPherson County, the age-adjusted incidence rate of leukemia was 12.6 cases per 100,000 population (95% CI: 9.2-17.2/100,000 population). The incidence rates of leukemia for the City of McPherson and McPherson County were similar to the rates for Region 5, Kansas, and Iowa.

A statistically stable rate for stomach cancer for the City of McPherson could not be calculated due to a small number of cases. For McPherson County, the age-adjusted incidence rate of stomach cancer was 5.3 cases per 100,000 population (95% CI: 3.2-8.7/100,000 population) (Table 5). The incidence rate of stomach cancer for McPherson County was similar to the rates for Region 5, Kansas, and Iowa.

For the City of McPherson, the age-adjusted incidence rate of female breast cancer was 158.7 cases per 100,000 population (95% CI: 131.8-190.2/100,000 population) (Table 6). For McPherson County, the age-adjusted incidence rate of female breast cancer was 144.7 cases per 100,000 population (95% CI: 127.3-164.3/100,000 population). The incidence rates of female breast cancer for the City of McPherson and McPherson County were similar to the rate for Region 5. The rate for the City of McPherson was statistically significantly higher than the rates for Kansas and Iowa. The rate for McPherson County was similar to the rate for Kansas and almost statistically significantly higher than the rate for Iowa.

Statistically stable rates for Hodgkin's lymphoma and acute myeloid leukemia could not be calculated due to a small number of cases in the City of McPherson and in McPherson County.

The previous analysis presented the age-adjusted incidence rates, which are useful for comparing the City of McPherson and McPherson County to Region 5, Kansas, and Iowa. Because this analysis showed a comparative increase in female breast cancer in the City of McPherson and McPherson County, an additional analysis was conducted. A Standardized Incidence Ratio (SIR) was used to determine if the observed number of female breast cancer cases in the City of McPherson and McPherson County was higher or lower than expected, given the population and age distribution of those communities. This additional analysis also showed the expected number of cases by specific age groups, which is important for assessing whether there was an excess of female breast cancer in younger women. A 95% confidence interval was calculated around the ratios to determine how likely it is that the number of observed cases is high or low by chance. If the confidence interval includes 1.0, then the difference between the observed and expected number of cases is likely to have occurred by chance. For this analysis, the most recent incidence rates from the Iowa Surveillance, Epidemiology and End Results (SEER) Program were used to determine the expected number of cases by age group.

The observed number of cases in the City of McPherson was 35% greater than the expected number of cases (SIR: 1.35, 95% CI: 1.13-1.61, 128 observed cases versus 94.7 expected cases). The observed number of cases in McPherson County was 18% greater than the expected number of cases (SIR: 1.18, 95% CI: 1.04-1.32, 271 observed cases versus 230.4 expected cases). The observed number of cases did not significantly differ from the expected number in the younger age groups.

Impressions

Thus far, the investigation has used data available through the Kansas Cancer Registry. Although the registry data is a very reliable source for capturing cancer cases throughout the state, the data available on cancer risk factors is sparse. Known risk factors for breast cancer include family history, late age at menopause, hormone replacement therapy, early age at menarche, age at first childbirth, alcohol consumption, and obesity.

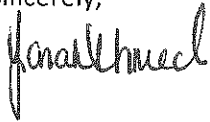
Although there are examples of scientifically documented links between chemical exposure and cancer in humans, most of these have been from high-level industrial exposures. Cases where the occurrence of cancer has been linked to

environmental contaminants in a community setting have only rarely been validated by scientific investigation. On average, approximately one out of every eight American women develops breast cancer at some point in life and breast cancer is the second leading cause of cancer death among women. Although most women have some risk factors for breast cancer, most women do not develop breast cancer.

At this time, given the increased incidence of female breast cancer in the City of McPherson and McPherson County, KDHE is assessing the benefits of further investigation. Further investigation would entail gathering detailed information from as many of the 271 female breast cancer cases diagnosed throughout McPherson County between 2000 and 2009, or their proxies in situations where the cases are deceased, as possible. Data collected would include information on known risk factors, as well as a number of other factors including, diet, exercise, occupational history, residential history, family history of cancer, smoking history, exposure to second hand smoke, and exposure to radiation. The collection of this data would no doubt be intrusive and may even be perceived of as burdensome by some respondents. And even if data on potential risk factors was collected for enough of the cases, more than likely we would only be able to make generalized conclusions about shared risk factors among the cases and would probably not be able to make definitive conclusions about specific exposures.

We share your concern for the health of the City of McPherson and McPherson County communities. We recognize that every case of cancer is significant for the person affected and his or her family. Within the limits of available resources, KDHE is extensively involved in efforts to reduce the occurrence of cancer in Kansas and improve the care for those in whom it does occur. Staff from our Bureau of Health Promotion can provide resources for members in your community who want information on how they can reduce the risk of cancer. We at KDHE are committed to monitoring, and helping improve, the health of our communities. If you have any questions about this report, please contact the Bureau of Epidemiology and Public Health Informatics at 785-296-1415. For more information about cancer prevention, please contact the Bureau of Health Promotion at 785-296-1207.

Sincerely,



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Table 1: Incidence Rates for Lung and Bronchus Cancer, 2000-2009

Geographical Area	Number of Cases	Age adjusted rate [§] (per 100,000 population)	95% Confidence Interval (per 100,000 population)
City of McPherson	98	61.7	50.0 - 75.7
McPherson County	184	50.2	43.1 - 58.4
Region 5	3,805	63.8	61.8 - 65.9
Kansas	18,146	63.9	63.0 - 64.8
Iowa [†]	23,305	68.8	67.9 - 69.7

[§] Rates are age-adjusted to the 2000 US standard population with 19 age groups

* Rates are suppressed if the population of the specific category is less than 20,000 or case counts are fewer than 16

[†] Iowa Cancer Registry data available at <http://www.cancer-rates.info/ia/index.php>

Table 2: Incidence Rates for Bladder (including in situ) Cancer, 2000-2009

Geographical Area	Number of Cases	Age adjusted rate [§] (per 100,000 population)	95% Confidence Interval (per 100,000 population)
City of McPherson	34	20.2	13.9 - 28.8
McPherson County	81	20.6	16.2 - 26.0
Region 5	1,261	20.9	19.8 - 22.1
Kansas	5,996	20.8	20.2 - 21.3
Iowa [†]	7,971	23.1	22.6 - 23.6

[§] Rates are age-adjusted to the 2000 US standard population with 19 age groups

* Rates are suppressed if the population of the specific category is less than 20,000 or case counts are fewer than 16

[†] Iowa Cancer Registry data available at <http://www.cancer-rates.info/ia/index.php>. The query system lists Urinary Bladder but does not specify in situ.

Table 3: Incidence Rates for Non-Hodgkin's Lymphoma, 2000-2009

Geographical Area	Number of Cases	Age adjusted rate [§] (per 100,000 population)	95% Confidence Interval (per 100,000 population)
City of McPherson	36	22.3	15.6 - 31.5
McPherson County	72	19.6	15.2 - 25.1
Region 5	1,222	20.4	19.3 - 21.6
Kansas	5,673	19.9	19.4 - 20.4
Iowa [†]	7,130	21.2	20.7 - 21.7

[§] Rates are age-adjusted to the 2000 US standard population with 19 age groups

* Rates are suppressed if the population of the specific category is less than 20,000 or case counts are fewer than 16

[†] Iowa Cancer Registry data available at <http://www.cancer-rates.info/ia/index.php>

Table 4: Incidence Rates for Leukemia, 2000-2009			
Geographical Area	Number of Cases	Age adjusted rate [§] (per 100,000 population)	95% Confidence Interval (per 100,000 population)
City of McPherson	21	12.7	7.8 - 20.1
McPherson County	47	12.6	9.2 - 17.2
Region 5	808	13.3	12.4 - 14.3
Kansas	3,643	12.7	12.3 - 13.2
Iowa [†]	5,144	15.3	14.8 - 15.7

[§] Rates are age-adjusted to the 2000 US standard population with 19 age groups

* Rates are suppressed if the population of the specific category is less than 20,000 or case counts are fewer than 16

[†]Iowa Cancer Registry data available at <http://www.cancer-rates.info/ia/index.php>

Table 5: Incidence Rates for Stomach Cancer, 2000-2009			
Geographical Area	Number of Cases	Age adjusted rate [§] (per 100,000 population)	95% Confidence Interval (per 100,000 population)
City of McPherson	12	*	*
McPherson County	20	5.3	3.2 - 8.7
Region 5	356	5.9	5.3 - 6.6
Kansas	1,487	5.2	4.9 - 5.4
Iowa [†]	1,870	5.5	5.2 - 5.7

[§] Rates are age-adjusted to the 2000 US standard population with 19 age groups

* Rates are suppressed if the population of the specific category is less than 20,000 or case counts are fewer than 16

[†]Iowa Cancer Registry data available at <http://www.cancer-rates.info/ia/index.php>

Table 6: Incidence Rates for Female Breast Cancer, 2000-2009			
Geographical Area	Number of Cases	Age adjusted rate [§] (per 100,000 population)	95% Confidence Interval (per 100,000 population)
City of McPherson	128	158.7	131.8 - 190.2
McPherson County	269	144.7	127.3 - 164.3
Region 5	4,180	130.8	126.8 - 134.9
Kansas	19,126	126.2	124.4 - 128.1
Iowa [†]	22,108	125.6	124.0 - 127.4

[§] Rates are age-adjusted to the 2000 US standard population with 19 age groups

* Rates are suppressed if the population of the specific category is less than 20,000 or case counts are fewer than 16

[†]Iowa Cancer Registry data available at <http://www.cancer-rates.info/ia/index.php>