

# **Health Consultation**

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**THE TOWNS OF TROY AND FITZWILLIAM  
(a/k/a TROY MILLS LANDFILL SITE)**

**CHESHIRE COUNTY, NEW HAMPSHIRE**

**EPA FACILITY ID: NHD980520217**

**SEPTEMBER 26, 2005**

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

## **Health Consultation: A Note of Explanation**

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

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

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HEALTH CONSULTATION

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Prepared by:

New Hampshire Department of Environmental Services  
Environmental Health Program  
Under a Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

## **Purpose**

A public health assessment (PHA) completed for the Troy Mills Landfill (TML) site in 2004 [1] reported that no adverse health effects, including cancer, were expected from exposures to site-related chemicals. The New Hampshire Department of Environmental Services (DES) initially determined that a review of health outcome data would not be necessary. In response to subsequent concerns from community members about cancer rates, DES analyzed cancer incidence data for Troy and Fitzwilliam, the two towns closest to TML. The findings and conclusions from the evaluation of those data are reported in this health consultation.

## **Introduction**

The TML is located in a mostly wooded, 270-acre property about 1.5 miles south from the town center of Troy, New Hampshire. The landfill owner, Troy Mills, Inc., is a local fabric manufacturer. The company used the 10-acre landfill from 1967-2001 as an industrial waste disposal area. The U.S. Environmental Protection Agency (EPA) and the DES identified elevated levels of metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs) leaking from containerized waste at the landfill. Troy Mills, Inc., filed for bankruptcy protection in 2001, and was unable to implement a planned remedial design previously approved by DES in 2000. The TML was added to the National Priorities List (NPL) on 26 September 2003. Later that year, EPA began a removal action at the site to reduce the migration of chemical contaminants from the landfill to a nearby wetlands area. This removal action was completed in the summer of 2005 [2].

Concurrent with the removal action, the Environmental Health Program within DES prepared a public health assessment for the TML [1]. The PHA was finalized on 17 November 2004, and concluded, in part, that trespassers to adjacent wetlands areas may have been exposed to site-related contaminants, including bis(2-ethylhexyl)phthalate (DEPH), in surface water and sediments. The PHA further concluded that adverse health effects were not expected given the generally low levels of contaminants and the limited opportunities for exposure [1].

## **Methods**

### Data Sources

The New Hampshire State Cancer Registry (NHSCR) provided incident cancer cases for the years 1987-2001. The NHCSR is operated by Dartmouth-Hitchcock Medical Center and is a population-based cancer registry covering the entire state of New Hampshire. The registry has been in operation since 1986, and by law, every health care provider is required to report newly diagnosed cancers.

The time period from 1987-2001 was selected for evaluation of cancer incidence data because it was the most recent data available for this analysis. An incident case was defined as an individual residing within the towns of Troy or Fitzwilliam (the “TML area”) who was diagnosed with a new primary malignant cancer during the evaluation period. The variables analyzed included: town of residence at time of diagnosis, primary cancer site, stage at diagnosis, date of diagnosis, age at diagnosis, and sex. Information on other risk factors, such as

occupational exposures or personal lifestyle habits, was not available in the abstracted medical data used in this review.

Population estimates for 1987-2001 were calculated by combining the 1990 and 2000 US Census for the towns of Troy and Fitzwilliam. Comparison data for the State of New Hampshire were derived from the same source.

### Data Analysis

A descriptive epidemiological analysis of cancer incidence for the towns of Troy and Fitzwilliam was conducted using the Standardized Incidence Ratio (SIR) technique. The SIR compares the actual number of cancer cases in the study population (residents of Troy and Fitzwilliam) to the number that would be expected if the towns had the same cancer incidence rates as the comparison population (State of New Hampshire). An SIR is the ratio of the observed number of cases to the expected number of cases in the study population. These ratios were calculated for all major cancer sites by gender (20 for males, 22 for females).

The SIR tells us how much higher or lower the TML area cancer rate is than that of the comparison population (State of New Hampshire). If the observed number of cases is the same as the expected number, the SIR will equal 1. If there are more observed cases than would be expected, then the SIR will be greater than 1. If there are fewer observed cases than expected, the SIR will be less than 1. For example, if 10 cases are observed in the study population, but 5 cases were expected, then the  $SIR = 10/5 = 2.0$  and the area has twice number of cancer cases as expected. But if 20 cases were expected, then the  $SIR = 10/20 = 0.5$ , meaning that the area has half the expected number.

Caution should be exercised 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 ratio, but represent very different scenarios. For example, a SIR of 1.5 could mean 3 cases were observed and 2 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 1 excess cancer case 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 5 percent chance ( $p$ -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.

New Hampshire's average annual age-sex specific cancer incidence rates were used to derive the expected number of cancer cases for the TML area. SIRs were calculated for each cancer site and reported when 4 cases or more were observed in the TML area within the 15-year period. Cells with three or fewer cases are not reported, in accordance with the confidentiality rules of the NHSCR.

## Results

Table 1 depicts cancer incidence statistics based on the SIR analysis for the towns of Troy and Fitzwilliam. The data are presented by gender for each cancer type. Statistics include:

- 1) **Observed** number of cancer cases in the two towns for the 1987-2001 period;
- 2) **Expected** number of cases based on the State average;
- 3) Ratio of Observed-to-Expected cases (**SIR**) for each cancer type; and
- 4) 95% **confidence intervals** for each SIR.

Only uterine cancer was found to be higher than expected by a statistically significant margin (SIR 1.88; N=14). Based on the age distribution of the female population of Troy and Fitzwilliam, about 7 cases of uterine cancer would have been expected over the 15 year period from 1987-2001. The actual (observed) number of cases during that period was 14. A more detailed analysis (not reported in the table) indicated that these cases were spread fairly evenly across the 40-84 year age group.

Two other female-specific cancer types for the TML area exhibited elevated SIRs that approached statistical significance. Breast cancer incidence for Troy and Fitzwilliam was 16% higher than expected (SIR=1.16; N=47), while cervical cancer incidence, a mostly preventable form of invasive cancer, was more than two times higher than expected (SIR=2.33; N=7). Analysis of specific age groups within these two cancer types (Table 2) shows that the SIR for breast cancer incidence of women age 65 and older is significantly elevated (SIR=1.62; N=29), as is the cervical cancer SIR for women age 25-54 years (SIR=3.17; N=6).

For males in the TML area, none of the elevated SIRs came close to approaching statistical significance. A detailed analysis of Total Cancer Incidence for males (Table 2), showed that total cancer incidence was significantly *lower* than expected for men age 65-84 (SIR 0.72; N=55).

## Discussion

In general, the towns of Troy and Fitzwilliam compared favorably to New Hampshire as a whole in terms of cancer incidence. For males, the total number of observed cancers for the 1987-2001 period (N=118) was considerably less than the expected number based on the state average (N=138). The observed number of all cancer cases for males age 65-84 was significantly lower than expected.

For females, observed cancer cases (N=135) exceeded the expected number by about seven percent (N=126). Excess cancer in females was almost entirely attributable to higher incidences of uterine, breast and cervical cancers. Only uterine cancer incidence was significantly elevated.

It is not known why some rates for these cancer types are significantly elevated. They have no known environmentally-related causes, risk factors or prevention strategies. They do, however, have varying levels of preventability and risk reduction from non-environmental factors.

The causes of most uterine sarcomas are unknown. Risk factors include: 1) prior pelvic radiation therapy; 2) race (African-American); 3) age (middle and older age); and 4) endometrial cancer risk factors related to levels of estrogen and progesterone [3]. Uterine cancer is not considered to be preventable, and its early detection is difficult, especially among asymptomatic individuals. Women with symptoms such as vaginal bleeding or spotting (especially postmenopausal), other discharge without any visible blood, or pelvic pain and/or mass should consult a physician. It is important to note that these symptoms do not specifically indicate that a woman has uterine cancer. These symptoms are more often due to non-cancerous changes in the uterus. It is nonetheless important to have these symptoms checked by a physician for general health reasons, and because uterine cancer is otherwise usually undetectable.

Breast cancer has many known risk factors, but the mechanisms by which they “cause” cells to become cancerous are not yet known [4]. Breast cancer is not considered preventable, but it can be detected early with appropriate screening. The American Cancer Society recommends that women age 40 and older should have a mammogram annually, and that women in their 20s and 30s should have a clinical breast exam (CBE) as part of a periodic (regular) health exam by a health professional, preferably every 3 years.

Most invasive cervical cancers are preventable [5]. The most common form of cervical cancer starts with pre-cancerous changes associated with the human papilloma virus (HPV). These pre-cancers can be prevented by avoiding HPV infections through delaying sexual intercourse, limiting the number of sexual partners, and avoiding sex with people who have had multiple sexual partners. Most importantly, cervical cancer can also be prevented by regularly having a Pap test. This test can detect pre-cancerous cells which can be treated to prevent invasive cancer from developing. Most invasive cervical cancers are found in women who have not had Pap tests on a regular basis.

## **Conclusions**

- A standard incidence ratio (SIR) analysis for the towns of Troy and Fitzwilliam for the years 1987-2001 found that 43 of 44 rates by cancer type and gender were within expected ranges based on corresponding rates for New Hampshire as a whole.
- During the period 1987-2001, the incidence of uterine cancer occurred more often than expected in these two towns and was not likely to be due to chance alone.
- Incidences of breast and cervix cancer were elevated and evaluated further. A more detailed analysis revealed 1) that breast cancer rates were higher than expected for females age 65 and older, and 2) cervical cancer rates were elevated for females age 35-64. Differences between these two cancer rates and the corresponding statewide rates were not likely due to chance alone.
- It is unlikely that these elevated cancer rates are linked to environmental exposures in general, or to the chemical pollutants from the TML site in particular. The PHA completed for this site found that trespassers may have been exposed to bis (2-ethylhexyl) phthalate (DEPH) and other contaminants in wetlands areas near the site, but

that the low frequency of exposure and levels of contaminants did not constitute a health concern. None of these three cancer types carry any known environmentally-related causes, risk factors or prevention strategies.

- These three cancer types do have varying levels of preventability and risk reduction from non-environmental factors.

## **Recommendations**

Early detection of uterine cancer is difficult, especially among asymptomatic individuals. Women with specific symptoms should consult a physician. Regular medical exams/check-ups by a physician are encouraged.

Women are encouraged to use early detection procedures for breast cancer, such as regular self breast exams and regular clinical breast exams. Women should also have regular mammograms to screen for detection of breast cancer. Women with specific symptoms/concerns should consult a physician.

Most invasive cervical cancers are preventable by avoiding the known risk factors discussed previously and by receiving regular Pap tests. Women with specific symptoms/concerns should consult a physician.

Community members can find more information on the cancers or prevention recommendations discussed in this consultation by contacting the following organizations:

National Cancer Institute (<http://cancer.net.nci.nih.gov>)

American Cancer Society ([www.cancer.org](http://www.cancer.org))  
800-ACS-2345

Division of Cancer Prevention and Control  
Centers of Disease Control and Prevention (<http://www.cdc.gov/cancer>)  
888-842-6355

## **Public Health Action Plan**

The findings of this health consultation will be forwarded to the New Hampshire Department of Health and Human Services for follow up on women's health care access and utilization issues in the TML area.

## **Preparers of Health Consultation**

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## References

1. Agency for Toxic Substances and Disease Registry (2004). Public Health Assessment for Troy Mills Landfill; Troy, Cheshire County, New Hampshire; EPA Facility ID: NHD980520217. Atlanta: US Department of Health and Human Services; November 17, 2004.
2. US Environmental Protection Agency (2005). Press Release for Troy Mills Landfill Superfund Site. Boston MA: Environmental Protection Agency, New England Region. August 11, 2005.
3. American Cancer Society (2005). Detailed Guide: Uterine Sarcoma. [www.cancer.org](http://www.cancer.org).
4. American Cancer Society (2005). Detailed Guide: Breast Cancer. [www.cancer.org](http://www.cancer.org).
5. American Cancer Society (2005). Detailed Guide: Cervical Cancer. [www.cancer.org](http://www.cancer.org).

**CERTIFICATION**

This health consultation on the evaluation of cancer data for the Troy Mills Landfill NPL Site was prepared by the New Hampshire Department of Environmental Services, Environmental Health Program, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was prepared in accordance with methods and procedures approved at the time the consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

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Technical Project Officer, Cooperative Agreement Team, SPAB, DHAC, ATSDR

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

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Cooperative Agreement Team Leader, SPAB,

**Table 1. Cancer incidence by site and gender, Troy and Fitzwilliam population, 1987- 2001.**

	<b>CANCER SITE</b>	<b>OBSERVED CASES</b>	<b>EXPECTED CASES</b>	<b>SIR (OBS/EXP)</b>	<b>95% CI LOWER</b>	<b>95% CI UPPER</b>
<b>Male</b>	Bladder	8	11	0.73	<b>0.31</b>	<b>1.44</b>
	Brain & other CNS					
	Colorectal	13	17	0.78	<b>0.42</b>	<b>1.33</b>
	Esophagus					
	Hodgkins Disease					
	Kidney & Renal Pelvis	5	3	1.44	<b>0.46</b>	<b>3.36</b>
	Larynx					
	Leukemia	5	3	1.43	<b>0.46</b>	<b>3.35</b>
	Liver					
	Lung & Bronchus	24	23	1.05	<b>0.68</b>	<b>1.57</b>
	Melanoma of the Skin	4	5	0.74	<b>0.20</b>	<b>1.88</b>
	Multiple Myeloma					
	Non-Hodgkins Lymphoma	5	5	0.94	<b>0.30</b>	<b>2.19</b>
	Oral Cavity & Pharynx	4	4	0.90	<b>0.24</b>	<b>2.29</b>
	Other	5	9	0.53	<b>0.17</b>	<b>1.23</b>
	Pancreas					
	Prostate	29	36	0.80	<b>0.53</b>	<b>1.14</b>
	Stomach					
	Testis					
	Thyroid					
	<b>MALE TOTAL</b>	<b>118</b>	<b>138</b>	<b>0.86</b>	<b>0.71</b>	<b>1.03</b>
<b>Female</b>	Bladder	5	4	1.40	<b>0.45</b>	<b>3.26</b>
	Brain & other CNS					
	Breast (female)	47	40	1.16	<b>0.85</b>	<b>1.54</b>
	Cervical	7	3	2.33	<b>0.94</b>	<b>4.81</b>
	Colorectal	16	15	1.04	<b>0.59</b>	<b>1.69</b>
	Esophagus					
	Hodgkins Disease					
	Kidney & Renal Pelvis					
	Larynx					
	Leukemia					
	Liver					
	Lung & Bronchus	12	16	0.74	<b>0.38</b>	<b>1.30</b>
	Melanoma of the Skin					
	Multiple Myeloma					
	Non-Hodgkins Lymphoma	5	4	1.19	<b>0.38</b>	<b>2.78</b>
	Oral Cavity & Pharynx					
	Other	5	9	0.58	<b>0.19</b>	<b>1.36</b>
	Ovary	7	5	1.38	<b>0.55</b>	<b>2.83</b>
	Pancreas					
	Stomach					
Thyroid						
	Uterine	14	7	1.88***	<b>1.03</b>	<b>3.15</b>
	<b>FEMALE TOTAL</b>	<b>135</b>	<b>126</b>	<b>1.07</b>	<b>0.90</b>	<b>1.26</b>

\*\*\* Denotes statistically significant difference (uterine cancer only).

- 1) Gray shaded area indicates cancer site with fewer than 4 observed cases.
- 2) Expected cases have been rounded to whole numbers for presentation only.

**Table 2. Cancer incidence for selected sites and age groups by gender, Troy and Fitzwilliam population, 1987- 2001.**

	<b>CANCER SITE</b>	<b>OBSERVED CASES</b>	<b>EXPECTED CASES</b>	<b>SIR (OBS/EXP)</b>	<b>95% CI LOWER</b>	<b>95% CI UPPER</b>
<b>Male</b>	MALE TOTAL Age 65-84	55	77	0.72***	<b>0.54</b>	<b>0.93</b>
<b>Female</b>	Breast Age 65+	29	18	1.62***	<b>1.09</b>	<b>2.33</b>
	Cervical Age 25-54	6	2	3.17***	<b>1.16</b>	<b>6.89</b>

\*\*\* Denotes statistically significant difference (Male Total **Lower**, Female Breast and Cervical **Higher than expected**).

Note: Expected cases have been rounded to whole numbers for presentation only.