



SUMMARY OF BOG'S LANDING CASE IN BERKLEY, MASSACHUSETTS

**Meeting with DPH, DEP, EPA and PEER
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Background

Berkley, Massachusetts has no municipal water supply; thus, everyone in town has private wells supplied by the aquifer underlying the town. In 1995, citizens alerted the Massachusetts Department of Environmental Protection (DEP) to what appeared to be a cancer cluster in town, and informed the DEP of an old tannery dumping site (known as the Bog's Landing site) that was likely contaminated. The site received waste from the Geilich Tannery in Taunton from the 1930s through the mid-1960s. DEP conducted an initial investigation, and then requested the assistance of the U.S. Environmental Protection Agency (EPA) in the spring of 1996. In July of 1996, DEP found "several heavy metals detected in the groundwater in concentrations which exceed the applicable standards as established in the Massachusetts Contingency Plan (MCP)."¹

While the site cleanup was being organized, the U.S. Army Corps of Engineers (Corps), in conjunction with the Department of Justice (DOJ) brought a civil action against Ronald J. Silveira and Silveira Cranberry Corporation for violations of Section 404 of the Clean Water Act. Specifically, Mr. Silveira was alleged to have filled and otherwise altered several acres of wetlands. The illegal work conducted by Mr. Silveira was adjacent to the Bog's Landing site. The Corps and DOJ signed a Consent Decree with Silveira in 1997. The Consent Decree required payment of a \$25,000 penalty, and restoration of the affected wetlands. Unfortunately, Silveira continued to work on the site, digging reservoirs, pumping groundwater, removing gravel, and altering the hydrology of the site.

Meanwhile, EPA discovered that approximately 6 acres of the old tannery dumping grounds had elevated levels of chromium, pentachlorophenol, antimony, lead, copper, and dioxin. In 1998, EPA began cleaning up the site, and in January of 2000, the final truckloads of contaminated soil left the site. A total of 20,450 tons of chromium contaminated soil were transported to a lined landfill. EPA spent a total of \$2,320,000 cleaning up the Bog's Landing site.

Public Health Concerns

The Department of Public Health (DPH) conducted some private well sampling prior to and during the cleanup; however, the consent form DPH required residents to sign contained the statement, "I/We also understand that there is a slight chance that discovery of hazardous materials on my/our property could potentially expose me/us to liability from neighbors whose properties or wells were contaminated from sources found on my/our property."² This warning resulted in many residents refusing to get their water tested, and ultimately, only 33 private wells were tested. DPH also examined health information from the Massachusetts Cancer Registry and concluded that "cancer incidence was not elevated for the town of Berkley compared to what would be expected based on state-wide comparisons during the 1982 to 1992 period."³

¹ September 25, 1996 letter from Richard F. Packard, DEP, to Berkley Board of Selectmen.

² Massachusetts Department of Public Health Consent Form.

³ Health Consultation, Proposed Bogs Landing Site, Berkley, Massachusetts, MADPH, October 30, 1996.

In June of 2001, DEP sent a letter to an owner of the site, stating that, “After completion of the removal action the risk of harm posed by this site has been substantially reduced, however additional actions are necessary to bring this site to a level of no significant risk.”⁴ The cancer incidents continued, and concerned citizens wrote to DEP, concerned that Silveira’s earthwork was stirring up any remaining contamination. In September of 2002, the Regional Director of DEP’s Southeast Regional Office wrote a letter stating, “The dependency of Berkley on private drinking water wells was the primary concern and a driving risk factor that allowed the allocation of significant state and federal funding as well as human resources for this cleanup project. The concerns of the groundwater pumping and gravel removal operations on the adjacent Silveira property was considered at the time of the assessment activities performed by the Commonwealth and during the EPA Removal Action. Groundwater monitoring was performed at the southern edge of the Silveira property, at the boundary of the reservoir. No contaminants were detected at that location or in other locations closer to the tannery waste source area.”⁵

Public employees and citizens alike were puzzled by this statement, and a citizen wrote to DEP for clarification. In December of 2002, the Deputy Regional Director of the Bureau of Waste Site Cleanup responded by clarifying, “...please note that no samples were collected from the Silveira property.”⁶ Berkley citizens were concerned that groundwater samples on the Silveira property were never tested. Although EPA had cleaned up the contaminated site, they believed that past or continuing contamination was leading to cancer deaths in the neighborhood. PEER was contacted by public employees and asked to look into this matter.

2003 data collection and analysis

In April of 2003, PEER was selected by Environmental Career’s Organization (ECO) to receive assistance from a summer intern. PEER selected John Healey, Masters’ candidate at Indiana University, to investigate the potential of a cancer cluster in Berkley. Specifically, John was tasked with examining death records of Berkley residents from 1960 through 2002, determining causes of death, information about each deceased person (e.g., sex, age at death, reason for death, occupation, years of exposure to the contaminated site, if any, etc.), and locations of residences of each decedent (including distance from the Bog’s Landing dump site, and whether the residences were upstream or downstream from the contaminated site). John collected information on 799 decedents, and entered all the data into an Excel spreadsheet.

Donald V. Bennett, Ph.D., M.S., a biostatistician, and John ran a number of statistical analyses. Data were analyzed using the following Poisson regression (rate of cancer deaths)⁷ and logistic regression (proportion of cancer deaths)⁸ models:

⁴ Letter from Richard F. Packard, DEP, to Douglas Cote, June 4, 2001.

⁵ Letter from Paul A. Taurasi, DEP, to Valerie V. Murray, September 26, 2002.

⁶ Letter from Millie Garcia-Surette, DEP, to Valerie V. Murray, December 20, 2002.

⁷ Rate = cancer incidence/exposure time.

⁸ Proportion = # of cancer deaths/total # of deaths.

- Death type (cancer or non-cancer) relative to position (downstream or upstream) from contaminated site;
- Death type relative to distance from contaminated site;
- Death type relative to duration of exposure to the contaminated site; and
- Death type relative to position and distance.

Results

The logistic regression model comparing cancer deaths per total deaths of people living upstream versus downstream of the Bog's Landing site indicate that the proportion of people with cancer is higher downstream than upstream ($p < 0.0549$; odds ratio = 1.564; 95% confidence limits 0.991 – 2.469). This indicates that there is a 56% higher odds of dying from cancer downstream than upstream of Bog's Landing. Although the p value is slightly higher than the commonly utilized 0.05, it is close enough to suggest a significantly higher odds of dying from cancer downstream of the Bog's Landing site.

The Poisson regression model did not generate a significant difference in rate of cancer deaths downstream versus upstream, although it trended in the same direction. Analyses of increasing distance from Bog's Landing produced inconsistent and confusing results.

Discussion

Data analyses indicate that Berkley residents living downstream of the contaminated site are more likely to die from cancer than residents living upstream of the site. The distance analyses did not show consistent and interpretable results. However, this could be due to the fact that cancer deaths are higher downstream of the Bog's Landing site, regardless of actual distance from the site. These results support the contention that the contaminant in Berkley is water borne from a point source. Although the data are not clear, the findings do give cause for concern.

Next Steps

PEER requests that DEP and DPH review and analyze the data, and let us know as soon as possible how you plan to proceed, if at all. We would value any insight you may have into the situation. Moreover, we urge you to evaluate the hydro-geology of the area in order to assess which citizens are most at risk. We believe that if these analyses are accurate, it is imperative that the citizens of Berkley - particularly those that live downstream of the Bog's Landing site - be warned of the elevated cancer rates. Even if the site is now clean, as it may well be, these citizens will benefit from the knowledge that they are at higher risk of cancer than those living upstream.