

**EVALUATION OF DEPARTMENT OF ENVIRONMENTAL PROTECTION
(DEP) SAMPLING RESULTS
SELINGROVE, PENNSYLVANIA**

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I am an environmental health scientist with over 30 years experience in evaluating the potential impact of environmental chemicals on human health. I have an M.S. in environmental science with environmental health and environmental chemistry specializations from Drexel University in addition to a Ph.D. in environmental engineering and science from Drexel. I am a registered Qualified Environmental Professional (QEP) and a Fellow of the Royal Society of Health (FRSH). Currently I am affiliated with an environmental health practice located near Washington, DC. Susquehanna University has asked me to review the results of the environmental sampling and analysis program undertaken by the Pennsylvania Department of Environmental Protection (DEP) in Selingsrove and on the Susquehanna campus.

Over the past two months, the DEP has undertaken a comprehensive environmental sampling program in air, surface water, ground water, and soils around Selingsrove. The objective of this program was to identify any environmental chemicals that could be associated with the cases of human cancer that were reported in the March 4, 2007 *Patriot-News*.

The DEP used state-of-the-art sampling and analytical equipment to detect a broad range of chemicals of potential concern in the various environmental media. In addition to general environmental sampling, the DEP focused on several areas that had been associated with contamination in the past or locations that had been associated in the media with cancer cases. The sampling results of this program were compared to Pennsylvania Act 2 residential standards and background levels. Act 2 standards are environmental concentrations of chemicals that are designed to be protective of public health by serving as remediation guidelines; background levels are concentrations that occur naturally or as a result of normal human activities. Act 2 provides for both residential and non-residential statewide health standards. The residential standards are more conservative from the standpoint of health protectiveness. For example, many of the residential standards are based on the assumption that a young child inadvertently eats 100 mg of contaminated soil for 250 days each year for a total of six years. The DEP has opted to use the residential standards; however, the non-residential standards are fully protective of public health for situations not involving long-term residential exposure. The full detailed report is available at <http://www.depweb.state.pa.us/ncregion/cwp/view.asp?a=3&Q=519676>

The sampling program undertaken by DEP in Selingsrove is virtually unprecedented in the United States with respect to both number of samples and the sophisticated analytical equipment employed. Typically this level of detail is reserved for communities adjacent to federal Superfund sites where there is a long history of known contamination, which is not the case with Selingsrove.

The DEP concluded that there was no evidence of environmental contamination that could cause an imminent health risk to the public and also no evidence that a significant unknown source of exposure was present in the past that could have resulted in an unacceptable level of risk.

At Susquehanna University's request, I undertook an independent analysis of the DEP's results. In addition to the Pennsylvania Act 2 standards, I used standards available from the US Environmental Protection Agency (EPA), the Agency for Toxic Substances and Disease Registry (ATSDR) and the toxicological literature. I also reviewed documentation from the underground storage tank removal at the Theta Chi fraternity house and the use of pesticides and fertilizers at Susquehanna's playing fields. The remainder of this report will address each of the areas sampled by the DEP.

Ambient Air and Soil Vapor Sampling for Volatile Organic Compounds

This analysis found sporadic detections of a group of airborne chemicals including carbon monoxide, ethanol, methanol, methyl mercaptan and sulfur dioxide. The levels were all below those of health concern. These chemicals are often found in indoor air from burning of fuels including natural gas, propane, or heating oil. In addition, they are found in consumer products.

The DEP found evidence of benzene, toluene, xylenes, trichloroethylene, and perchloroethylene in some soil vapor samples. These materials were also present at levels below those of health concern. Benzene, toluene, and xylenes are found in gasoline. Perchloroethylene and trichloroethylene are used by drycleaners and machine shops in addition to being present in consumer products.

None of the chemicals found in ambient air or soil vapor samples has been associated with the cancers reported in the *Patriot-News*.

Geoprobe Borings/wells.

DEP detected acetone, which is a very common lab contaminant and component of household products, at a level below that of health concern.

DEP also found elevated levels of manganese, iron, and aluminum in groundwater. Selinsgrove obtains its drinking water from a different groundwater zone (aquifer) that is physically isolated from the zone where these contaminants were found. Selinsgrove drinking water meets all federal and state standards for health protection and water quality.

Rhoads Mills wells

These wells contained several contaminants. Trace levels of chloromethane and bromomethane as well as chlorine are suggestive of the introduction of treated tap water into one of these wells or the use of chlorine (sodium or calcium hypochlorite) as a well

disinfectant. In rural areas, privately owned drinking water wells are often disinfected with chlorine and contain these chemicals.

Additional contaminants found in the Rhoads Mill site wells include iron, manganese, nitrate, nitrite, chloride, sulfate, metolachlor, and alachlor. These contaminants may be associated with former operations at this site. Alachlor is the most widely used herbicide in the United States. There is no evidence linking either alachlor or metolachlor with human cancer, although some studies in laboratory animals have shown tumors at high doses.

This water is definitely not potable and is probably so unpalatable that it would not be inadvertently ingested. The high concentrations of iron, chloride and sulfate will impart a bad taste to this water.

Further investigation at this location should be able to identify the exact source of the contamination. It is important to note, however, that this water has not been used for drinking and the contaminants found in this water are not associated with the cancers found in the neighborhood.

Weiser Run Transects

DEP found several polycyclic aromatic hydrocarbons (PAHs) at low levels in the sediments and soils around Weiser Run. One of these compounds, benzo(a)pyrene was found to be slightly above the Act 2 standard.

PAHs are ubiquitous products of combustion that are found in emissions of everything from vehicular exhaust to home heating to backyard grills to cigarettes. In urbanized areas, it is not unusual to have concentrations of total PAHs up to 12 ppm, higher than those found by the DEP.

The benzo(a)pyrene levels of 2.82 and 2.89 ppm are also well below the non-residential Act 2 standard of 11 ppm. Since this is partially submerged stream sediment, the non-residential standard is probably more appropriate than the residential standard.

In addition, DEP found low levels of some herbicides including ametryn, terbutryn, simetryn, and prometryn. There are no Act 2 standards for these materials; however, review of other published standards and toxicological information leads to the conclusion that these chemicals are present at levels below those that could cause health problems.

Susquehanna University Sampling Locations

The DEP analysis found low levels of PAHs, herbicides, and arsenic. The levels of PAHs were below the Act 2 standards. Levels of herbicides for which there are no Act 2 standards were well below additional standards and toxicological benchmarks. I also reviewed the usage of commercial fertilizers and lawn treatment chemicals by the University and found that both the products and their application are safe as far as human health is concerned.

Although two of the arsenic measurements were elevated above the Act 2 standards, the levels were well within naturally occurring background in Pennsylvania as determined by the DEP and also below the background levels in the Middle Atlantic States as determined by my independent investigations. The levels are much lower than the Act 2 non-residential standard of 53 ppm which is more appropriate given the activities that take place at these locations. This testing shows that a student athlete who contacted soil during his or her time at the University would be safe with respect to soil contamination.

In 2000, an underground heating oil storage tank at the Theta Chi fraternity house was removed due to a change in the heating fuel used. At the time the tank was removed, it was inspected and found to be properly protected and not leaking. Several groundwater monitoring wells were installed in 2000 following the removal and cleanup of the tank. During the tank removal in 2000, soils were removed and disposed of until the relevant standards were met. There has been no additional evidence of contamination of either groundwater or soil since that time. The University brought this location to the attention of the DEP who included it in their recent sampling program. The DEP also failed to find contamination at the site where the tank had been located. Because of limitations in the DEP sampling they recommended further investigation. Susquehanna University is currently making plans to complete this further investigation to ensure that this location remains safe in the future.

Conclusions

The initial news reports in the *Patriot-News* alleged that environmental contamination with chemicals was associated with an excess incidence of human cancer in Selinsgrove. In particular, the articles focused on a group of former students who had suffered from a variety of cancers including osteosarcoma, adrenal cancer, melanoma, colon cancer, and testicular cancer. From a public health standpoint, there was no scientific rationale that would support these associations; however, the DEP undertook a comprehensive evaluation of chemicals in the Selinsgrove environment in an attempt to further evaluate the allegations. The DEP study failed to uncover any chemicals that have been associated with osteosarcoma, adrenal cancer, melanoma, colon cancer, or testicular cancer in the toxicological or public health literature. Further, the levels of chemicals that DEP did uncover were well below standards that have been developed by DEP and EPA to be protective of public health. The only exception was the Rhoads Mills site groundwater which no one is using as a water supply, therefore, no one is exposed to these chemicals. In conclusion, the DEP investigation has shown that the cancers did not have an environmental cause, and even more, that the Selinsgrove environment is safe from the standpoint of chemical contamination and public health.