

The Woburn Trichloroethylene (TCE) Case

The Woburn TCE pollution case began when the town of Woburn realized a growth in population which required the construction of new water supply wells. Wells G and H were drilled along the Aberjona River in an industrial area. After their installation, residents began complaining about the water taste and quality. The town saw a rise in birth defects and leukemia cases, and some proposed the cause was the bad water. 10 years after the wells were constructed they were taken offline per the Mass. Department of Health's conclusion that they were indeed contaminated.

Woburn's high industry and manufacturing businesses over the years has disposed of an unmeasurable amount hazardous chemicals and waste products. Naturally, a portion of these waste products made it into the Woburn ground and water table, slowly contaminating the nearby grounds and water supplies. In May of 1979, the wells were determined to be contaminated with industrial solvents, confirming the suspicions of the neighborhoods served by the supply. Later that year, two large toxic sites were discovered in the area, creating even greater complaint. Coupled with the rise in leukemia cases and birth defects, these effects caused a momentous shift in environmental regulation and water supply and treatment procedures.

From 1964 to 1979, the wells (G and H) supplied almost 30% of the town's water. In 1979, police found drums of hazardous waste in a lot near the wells, which were subsequently tested and found to be contaminated. 5 properties in total were found responsible for the contamination, which included not only TCE, but also PERC (tetrachloroethylene), chloroform, arsenic, and several other organics and heavy metals. The concentration of PERC in the wells was more than 4 times the allowable drinking water standard of 5 micrograms/liter. The worst reading for TCE in the wells came in at over 250 micrograms/liter, an unreasonable comparison to the 5 micrograms/liter standard. Chloroform, arsenic, and other chemical levels tested were also significantly higher than the drinking water standards.

Since the Aberjona river flows directly through the site, and surface water runoff is graded towards the river, the Aberjona is responsible for the recharge of the area's aquifer. Any contamination in the Aberjona would thus effect the surrounding areas as well.

The main contaminant that the case focused on, TCE, is used mainly in the US in a scenario in which it is released into the atmosphere via evaporation, where it decays quickly (half life of just 1 week). Once the chemical has permeated the ground, it is much slower to degrade. TCE is a dense, non-aqueous liquid which moves from unsaturated to saturated soil very quickly. Contaminated water not only effects you when you drink it, but also when using it for such things as cooking, taking showers, etc. In fact, a hot shower can raise TCE levels extraordinarily, making inhalation of the gas just as potent as drinking the chemical form.

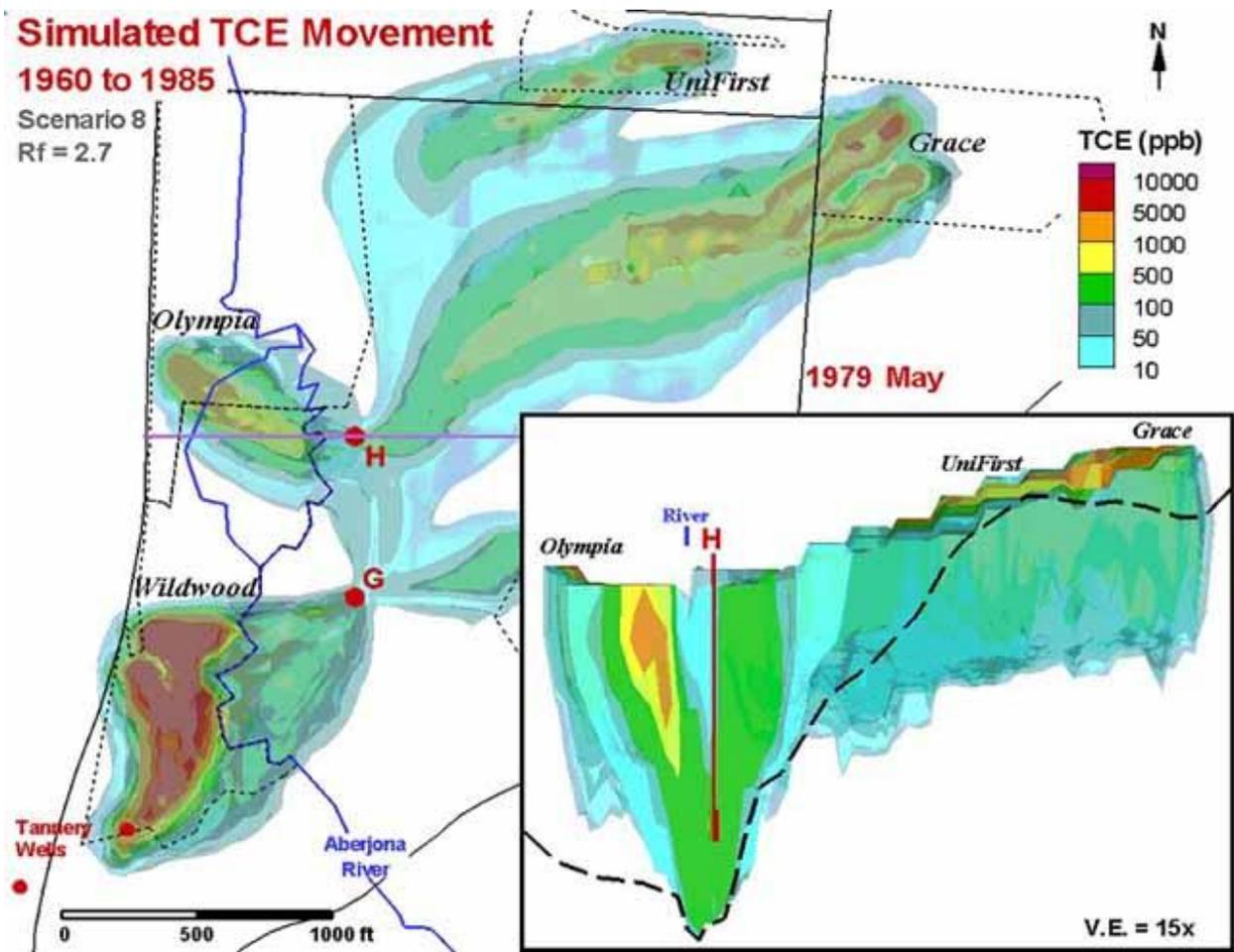
When the contamination of the groundwater drinking water supply by organic pollutants, PCE and TCE, was found, Woburn became a National Priority List site (Superfund site), and was

examined in great detail by the EPA, USGS, consultants, etc. Before the final hydro-geologic studies and assessments were completed, a civil suit against 3 companies was filed. The trial became a battle against lawyers and expert witnesses. Extensive data was presented and interpreted very differently by expert witnesses (geologists and hydrogeologists).

In court, the case came down to the residents of Woburn (defended by Schlichtmann), against W.R. Grace and Company and Beatrice Foods. The case against Grace was much stronger for two main reasons; Schlichtmann had personal testimony of a former employee of Grace who had witnessed dumping of contaminants at the site, and a river between Beatrice's tannery and the contaminated wells made their contribution to the contamination (potentially) less influential. Beatrice Foods owned the tannery on the opposite side of the Aberjona River from the drinking water wells (Wells G and H). W.R. Grace, although on the same side of the river, was further away and underlain by lower permeability material. The complaint alleged that Grace had disposed of toxic chemicals on the 15 acre tract, contaminating the well. The case against Beatrice was dismissed in what many would call a blown trial.

Over 100 wells were installed in the Aberjona aquifer and water levels monitored with and without Wells G and H pumping. Since groundwater flow lines move perpendicular to water table contour lines, the path of the pollutants from the two possible sources, Beatrice and W.R. Grace, can be mapped both with and without the effect of the well pumping stations. Without Wells G and H pumping, flowlines can be seen to bring groundwater from W. R. Grace past the wells into the Aberjona River. Groundwater from the Beatrice site flows into the Aberjona River. With Wells G and H pumping and providing drinking water to East Woburn, the flowlines are diverted from the river directly to the wells. Waters from the Beatrice and W.R. Grace sites are transported to Wells G and H; the travel time depends on the hydraulic conductivity, porosity, hydraulic gradient and travel distance for the pollution sources.

The jury found Beatrice Foods Corp. not liable for contaminating wells G and H. According to many model results, most of the TCE entering the wells from the late 1960s through the 1970s probably came from the Beatrice property and the Hemingway Trucking Co. property, which are on the west side (opposite of the wells) of the nearby Aberjona River. Lesser amounts of TCE captured by the wells probably came from the properties of UniFirst Corp., New England Plastics Corp., and W.R. Grace (on the side of the wells). From month to month, the wells typically produced water that varied from 20 percent river water content to 40 percent. If the river water was contaminated with solvents, or the riverbed contained arsenic, chromium, these contaminants also would have been captured by the well. This figure gives reason why Beatrice should not have been dismissed from the trial as it was.



Sources:

<http://www.geology.sdsu.edu/classes/geol351/woburn.htm>

http://www.agls.uidaho.edu/etox/resources/case_studies/WOBURN.PDF

<http://researchnews.osu.edu/archive/woburn.htm>