



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

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Ref: 8WM-DW

MEMORANDUM

SUBJECT: Aspen Park - Removal Action Level for Carbon Tetrachloride

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TO: Peter Stevenson, 8HWM-ER
OSC

The purpose of this memorandum is to establish a site specific removal action level (RAL) of 5 $\mu\text{g/l}$ for carbon tetrachloride in the drinking water wells in Aspen Park. The RAL in OSWER Directive 9360.1-02 is 30 $\mu\text{g/l}$. For the reasons discussed below, we believe that this lower level is required to protect adequately the health of the residents of Aspen Park.

OSWER Directive 9360.1-02, Final Guidance on Numeric Removal Action Levels for Contaminated Drinking Water, October 25, 1993, with attached table dated May 1993, establishes a RAL for carbon tetrachloride of 30 $\mu\text{g/l}$. This value does not account for exposures from sources other than ingestion of the water. Page 7 of the Directive allows for the establishment of RALs below that level based on site specific conditions. We believe site specific conditions in Aspen Park require a level of 5 $\mu\text{g/l}$. The primary reason is that because carbon tetrachloride is a volatile chemical and will also penetrate the skin, there will be significant exposure to residents from breathing air in the home contaminated with carbon tetrachloride and from using the contaminated water for bathing.

Because carbon tetrachloride is volatile, providing alternative drinking water alone is not adequate to protect the residents from exposure to carbon tetrachloride. The residents need an alternative source of water for their total domestic needs, either from point-of-entry treatment, a new well into an uncontaminated aquifer, or a central water supply that is free of volatile organic chemicals.

Carbon tetrachloride is a volatile chemical.

Because carbon tetrachloride is a volatile chemical, the air in the homes will be contaminated with carbon tetrachloride from other uses of water in the home. Showering/bathing, using an automatic dishwasher, using a home humidifier or vaporizer,



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and using a washing machine will release substantial quantities of carbon tetrachloride to indoor air. Residents will be continuously exposed to carbon tetrachloride via inhalation while present in the home. Data from studies with another volatile chemical show that showering/bathing results in exposure that is approximately equivalent to drinking two liters of water per day. Additional uses of water in the home will add to that exposure.

Many of the homes contain families with small children. These residents will spend large amount of time in the home and will be continually exposed to the contaminated air. In addition the approaching winter season precludes substantial ventilation of the home.

Carbon tetrachloride penetrates the skin.

Carbon tetrachloride is known to penetrate the skin. Therefore dermal exposure to water containing carbon tetrachloride will increase the daily dose. Data with another volatile organic chemical show that showering/bathing contributes a dose approximately equal to that from drinking two liters of water per day.

Children will receive a higher dose of the chemicals.

Children drink more water and breath more air in relation to their body weight than do adults. The RAL is based on exposure to an adult weighing 70 kilograms and drinking two liters of water per day. A 10 kilogram child normally drinks one liter of water per day. Therefore a child will receive a dose approximately 3.5 times the adult dose.

Multiple contaminants are present that have the same toxic effects.

The majority of the wells that contains carbon tetrachloride also contain chloroform and trichloroethylene. Each of these chemicals shows the same toxic effects (liver and kidney damage and cancer). When multiple chemicals are present that cause similar toxic injury, EPA policy treats the chemicals as additive toxicants. Finally there is documented evidence showing that carbon tetrachloride will act synergistically with a number of other chemicals, including chlorinated pesticides, alcohols, and ketones. It is likely that at least some residents are also exposed to these chemicals.

Exposure to carbon tetrachloride has probably occurred for a long period of time.

The area of contamination is residential with no obvious industrial sources of contamination. Before 1970 carbon tetrachloride was widely used in common household products and as a fire extinguisher. These household uses and other commercial uses were banned or severely restricted in the early 1970s. It is likely, therefore, that the plume of carbon tetrachloride has been present for a long period of time and that at least some residents have been exposed to carbon tetrachloride for the total time they have lived in the homes. I have spoken to several residents who have lived in their home for five to 17 years. The toxic effects of carbon tetrachloride (liver and kidney damage and liver cancer) are dependent, in part, on the duration of exposure.

There are wells in the vicinity that greatly exceed the RAL of 30 $\mu\text{g/l}$.

There are a substantial number of wells in the area that have a concentration of carbon tetrachloride in excess of 30 $\mu\text{g/l}$. The highest concentration found to date is 26,000 $\mu\text{g/l}$.

The carbon tetrachloride plume is likely to move rapidly.

Some information suggests that the ground water flow in the area is complex and is determined by fractures in the bed rock. There are domestic wells that have contamination greatly exceeding the existing RAL. Therefore, the concentration of carbon tetrachloride in wells at the edge of the plume is likely to increase dramatically.