

Dense, Non-Aqueous Phase Liquids (DNAPLs)

What are DNAPLs?

Dense, Non-Aqueous Phase Liquids, or DNAPLs (pronounced dee-napple) are chemicals that are more dense than water and generally do not dissolve readily in water, but remain as a separate phase liquid in surface or ground waters. If spilled, they tend to sink into the ground and can contaminate the deepest groundwater resources (and those in between). These chemicals are also quite toxic to humans and/or the environment, even at low levels which means that even if only a little dissolves into the water, it would be harmful to consume. Some compounds are persistent in the environment for decades (polychlorinated biphenyls [PCBs], mercury). Others can become more toxic as they break down (chlorinated ethenes). DNAPLs of greatest interest tend to be those products that have been used extensively in commercial and industrial applications. The *Clean Water Act* stipulates that we pay extra attention to DNAPLs because if they get into the water they are very difficult to get out. DNAPL contaminants may very well be the most difficult groundwater contaminant to deal with.

What are the commonly used DNAPLs?

DCM (dichloromethane)	Paint stripper, metal cleaning, pharmaceuticals, aerosols.
TCM (chloroform)	Pharmaceuticals, fats, oils, rubber, resins.
TCA (trichloroethane)	Metal/plastic cleaning, adhesives, aerosols, inks, fats, waxes.
CTC (carbontetrachloride)	Fats, oils, laquers, varnishes, waxes, resins, seed oil.
TCE (trichloroethylene)	Metal cleaning, dry cleaning, paint removers, adhesives.
PCE (perchloroethylene)	Dry cleaning, metal cleaning, intermediates in processes.



Why are DNAPLs so dangerous?

DNAPLs' density means that it only takes a small amount to travel deep into the water table. DNAPLs don't dissolve readily, which means they sink into the ground and create pools which may remain for decades to centuries. You must recover 99.999% of DNAPL in the ground to successfully clean a spill or release.

Even a small amount of DNAPL can cause a toxic level of contamination for human health. DNAPLs are relatively heavy which means they get into aquifers (where we draw our drinking water) quickly and even get into small fractures and spaces underground where they are difficult to find. DNAPLs are sometimes also called "sinkers" or "toxic blobs" because of these characteristics.

How will this affect me?

DNAPLs can contaminate groundwater over large areas and for a long time (decades to centuries). They can form insoluble and highly mobile pools that defy all conventional cleanup methods ultimately getting into our drinking water and causing a number of serious health issues in humans and the environment. The best way to protect water is make sure that DNAPLs don't get there in the first place. That is what Source Water Protection is all about.

Landowners who own property near sources of drinking water and handle or store DNAPLs, or have handled or stored DNAPLs in the past, may pose a significant threat to drinking water. Source Protection Plans are being developed which will have implications for those landowners on whose property activities or conditions have been identified as a threat to municipal drinking water. The *Clean Water Act* mandates that the risk associated with all significant threat activities must be reduced. We invite you to join the Source Protection Process at www.ourwatershed.ca.