



# QUALIFICATIONS MULTI-PHASE EXTRACTION

## EXPERIENCE



InSitu Remediation Services Ltd (IRSL) is one of Canada's most experienced firm in the design, implementation, operation and optimization of multi-phase extraction (MPE) systems for the treatment of aquifers impacted by LNAPL and DNAPL.

### WE HAVE DIRECT EXPERIENCE WITH THE FOLLOWING:

GEOLOGY ADDRESSED	CONTAMINANTS TREATED
<ul style="list-style-type: none"><li>• Alluvial Deposits</li><li>• Glacial Fluvial Deposit</li><li>• Glacial Till Deposits</li><li>• Fractured Limestone</li><li>• Fractured Shale</li><li>• Fractured Igneous &amp; Metamorphic Rock</li></ul>	<ul style="list-style-type: none"><li>• Gasoline</li><li>• Diesel</li><li>• Jet Fuel</li><li>• Kerosene</li><li>• Chlorinated Ethenes</li><li>• Chlorinated Ethanes</li></ul>

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## Approach

Multi-phase extraction is an aggressive technology used for the extraction of three phases including vapour, Light Non-Aqueous Phase Liquids (LNAPLs) or Dense Non-Aqueous Phase Liquids (DNAPLs), and groundwater. The approach applies a strong vacuum to the subsurface using a network of extraction wells. The vacuum “sucks” up impacted vapour, NAPL and groundwater into an above ground treatment system for treatment prior to discharge to the environment. MPE is typically used when the impacted media is less than 10 metres below ground but can be modified to address deeper impacts.

Examples of LNAPLs include gasoline, diesel, jet fuel, etc., whereas DNAPLs include trichloroethene, tetrachloroethene, dichloroethane, etc.

## Considerations

A variety of factors should be evaluated when considering the use of multi-phase extraction systems at a site, including:

### Fluids Being Extracted

Multi-phase extraction systems are typically implemented for the treatment of volatile compounds that are present within the subsurface including vapour, NAPL and groundwater. Depending on the physical and chemical properties of the NAPL, consideration will need to be given to the type of vacuum pumps employed, as well as the location of the “slurp” tube within the well. While convention suggests that these types of systems are generally limited to 10 m or less, the systems can be configured to extract the targeted phases from greater depths by optimizing the entrainment velocity of the fluids being extracted.

### Chemical Considerations

The chemical composition of the groundwater and NAPL needs to be considered when designing a multi-phase system. In saline environments, corrosion can be a major issue and result in premature failure of treatment equipment. Other chemical factors, such as hardness, alkalinity, iron and manganese, also need to be considered as these inorganic compounds can precipitate out of solution due to oxidization, pressure and temperature changes.

### Treatment Train

In most cases, the extracted phases will require treatment prior to being released into the environment. For example, the vapour extracted by the system is typically treated using activated carbon or a catalytic oxidizer, depending on the vapour concentrations. Biofilters and thermal oxidizers may also be used depending on the configuration and design of the system. The fluid effluent is typically treated using physical separation, particle filtration, ion exchange and activated carbon filtration, prior to be discharged to the environment.



InSitu Remediation Services Ltd. (IRSL) is one of Canada’s most experienced remediation companies. Our team has designed, implemented, and optimized soil and groundwater remediation programs in diverse geological environments in North, Central, and South America, Asia, Europe and the Middle East.

We confidently implement innovative solutions, based on sound knowledge, using seasoned field staff. Our pragmatic, flexible approach reduces effort, cost to our clients, and environmental risk.