determined that there was free phase light and heavy end and dissolved phase light and heavy end hydrocarbon contamination of the soil and shallow groundwater. Free phase contamination extended approximately 50 m off-site and dissolved phase contamination extended greater than 125 m off-site. Using groundwater chemistry data and aquifer property test results, the contamination was divided into three separate free phase plumes and one dissolved phase plume. Using historical site data, groundwater chemistry data, and the physical locations of the plumes several probable sources of contamination were identified, including an on-site underground storage tank, an on-site dehydrator, an on-site compressor, and an off-site buried pipeline. Alternatively, however more unlikely, a lens could be channelling free phase and dissolved phase contamination, which would exclude the off-site buried pipeline as a source of contamination.

Data sets from two separate recovery and slug tests were used to estimate aquifer flow characteristics. Hydraulic conductivity and transmissivity of the unconfined aquifer was estimated using the slug and recovery test data. Estimates were indicative of a fractured sandstone aquifer. Using an estimate of porosity, a measured hydraulic gradient, and the estimate of hydraulic conductivity, linear groundwater velocity was calculated. The calculated velocity was determined to be moderate and representative of regional groundwater flow. Estimated and calculated aquifer flow characteristic data suggest that contaminant migration is in progress. Therefore, a remediation program should be implemented. To conclude that there are in fact four separate sources, and to fully enclose the dissolved phase plume, installation of additional monitoring wells may be required.

Delineation of hydrocarbon contaminant plumes in a shallow unconfined aquifer at a central Alberta compressor station

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The objective of this study was to delineate the full extent of hydrocarbon contaminant plumes and discuss possible migration in a shallow unconfined aquifer at a Central Alberta compressor station. Data sets were obtained through soil gas surveying, borehole drilling, subsequent monitoring well installation, groundwater sampling, recovery testing, and slug testing.

Soil surveying of volatile vapour diffusion, using a portable photoionization detector, revealed that contamination likely existed at this site. Direct delineation of the plumes was attempted using groundwater sampling and aquifer property testing.

Once monitoring wells were installed in the desired locations, groundwater samples were analyzed for dissolved, light and heavy end, hydrocarbons as well as other indicator parameters. It was