WorleyParsons Komex
resources & energy

Environment & Water Resources
Suite 100, 4500 - 16 Avenue NW
Calgary, AB T3B 0M6 CANADA
Telephone: +1 403 247 0200
Toll-Free: 1 800 668 6772
Facsimile: +1 403 247 4811
worleyparsons.com

WaterTech 2008 Abstract

Remediation of Sulfolane Impacted Groundwater – Characterization, Treatment and Disposal

Jamie Fairles (B.A.Sc., E.I.T.), Stacy Gibb (M.Sc.) WorleyParsons Komex, Calgary, Alberta

Roy Hunt (B.Sc., PEng), WorleyParsons Komex, Abu Dhabi, UAE.

A mixture of Sulfolane and diisopropanolamine (DIPA) are used in the Sulfinol® process at many sour gas plants all around Alberta. The Sulfinol® process is used to remove high concentrations of hydrogen sulphide (H_2S) from sour natural gas. Sulfolane and DIPA are both highly water soluble compounds that disperse quickly in water.

Shell Canada Energy has operated a Complex in the foothills of Alberta since 1961 which included the addition of the Sulfinol® process in 1963. Process waste products (liquids and solids) were stored in on-site storage basins which eventually lead to impacted groundwater. Sulfolane and DIPA were first detected in the groundwater during 1980's and detailed monitoring began in 1994. As these compounds were identified, Shell undertook a program to eliminate the sources. A program to remove ponds and landfills was initiated in 1997 and completed in 2002. The primary sources of these contaminants were removed during this time.

Late in 1998, sulfolane was detected in an off-site water well. Shell initiated a program of observation well installation and sampling to characterize and delineate the Sulfolane plume in groundwater. A total of 56 monitoring wells were installed in 1999 and 2000, providing groundwater monitoring points in overburden materials, at the bedrock contact, and three intervals within the bedrock.

Analysis of various treatment/remediation options was performed, and the goal of mitigating off-site migration of sulfolane impacted groundwater was identified as a priority. Over 2001 and 2002, eight extraction wells were installed along with a further 14 observation wells. Long- and short-term pumping tests were completed to provide data pursuant to determining sustainable pumping rates.

A pilot biological treatment system was installed at the site in 2003 and seasonally tested for two years. At this time, five extraction wells were commissioned and pumped to a common treatment location. The results from the pilot testing indicated good removal of sulfolane from the source water and the project was advanced to develop a full-scale remediation system. The groundwater extraction system was winterized and permanent well houses were put in place. In 2006, a year-round treatment system was commissioned and began full time operation in the spring of 2007.

This presentation will discuss the results of the pilot testing, the design and installation of the groundwater treatment facility and the preliminary results of the full-scale operation.

Stacy Gibb, M.Sc.

Stacy Gibb is a Process Specialist with WorleyParsons Infrastructure with emphasis on water/wastewater treatment. Mr. Gibb obtained his M.Sc. in Civil Engineering from the University of Calgary. Mr. Gibb has been involved in water/wastewater consulting for 5 years with project locations from the Canadian arctic to the Middle East. Mr. Gibb has a range of experience ranging from contaminated sites remediation of hydrocarbon impacted groundwater to potable water treatment. More recently Mr. Gibb has been focused on water and wastewater treatment system design and operation of systems for industrial applications.

Jamie Fairles, B.A.Sc., EIT

Jamie Fairles is a Project Engineer focusing on the field of water and wastewater treatment within WorleyParsons Infrastructure. Mr. Fariles is a Chemical Engineer who obtained his B.A.Sc in Chemical /Environmental Process Engineering from the University of Waterloo. Most recently Mr. Fairles has been involved in design and project / site management associated with water/wastewater systems studies, retrofits and greenfield installations. He has 4 years of consulting experience in various projects focusing on water/wastewater treatment and environmental improvement projects.

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