

DNAPL Transmissivity Reduction to Obtain Remediation Endpoint

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Union Pacific Railroad (UPRR) began operation of a creosote dense non-aqueous phase liquid (DNAPL) recovery system at The Dalles Tie Treating Plant Superfund site (site) in 1998 as part of the selected final remedy for the site. The remedial action objective for DNAPL recovery in the 1996 Record of Decision is to remove DNAPL to the extent practicable to prevent further migration into unaffected water bearing zones.

The operational objective, established during remedial design, is to remove 95 percent of the maximum potential recoverable (MPR) volume where the maximum is defined as the asymptote of the cumulative production curve. This operational objective was met for the first DNAPL recovery module (20 plus well system) in 2010 and was module was shut down with Oregon Department of Environmental Quality (ODEQ) approval. Over 12,000 gallons of DNAPL were recovered from Module 1.

Analysis of the individual well hydrographs that tracked DNAPL levels identified several instances where the DNAPL was removed from the extraction well and when discovered, the DNAPL pump was turned off and the DNAPL was allowed to recover in the well. It was recognized that these events were similar to LNAPL drawdown and recovery analysis to determine hydrocarbon transmissivity.

A total of 16 events from 6 extraction wells were analyzed to estimate DNAPL transmissivity over the 11 year operational history. The results showed up to a 95 percent reduction in DNAPL transmissivity in 2007 while the operational endpoint was not achieved until 2009. The results were presented to the ODEQ as further data that the DNAPL recovery system had met its objectives. The overall conclusion was that the reduction in DNAPL mobility occurred prior to the operational endpoint and earlier shut down is possible if the transmissivity reduction in other systems could be quantified.

This presentation overviews the methods used to estimate DNAPL transmissivity at the site and how achieving a transmissivity reduction prior to an operational endpoint is consistent with the site conceptual model and a superior method to tracking progress.