



Syntex Landfill Water Quality Monitoring Program

Water Quality Department

The following describes Northern Water's Syntex Landfill Water Quality Program. The objective of this program is to monitor the possible migration of the plume of hazardous material from the Syntex Chemicals landfill site in Boulder County.

BACKGROUND

The Syntex Landfill is located northwest of Longmont near the Saint Vrain Supply Canal. Arapaho Chemicals of Boulder used the landfill for disposal of hazardous waste including spent solvents and off-spec chemicals used for manufacturing pharmaceuticals during the 1960s and 1970s. The wastes were transported via tanker and dumped into unlined trenches in the shale bedrock. Syntex investigated residual soil and groundwater impacts associated with the landfill in the 1980s and identified a groundwater plume emanating from the landfill and extending down valley toward the Saint Vrain Supply Canal. Both state and local health officials and Syntex discussed ways to contain the contamination and clean it up. In 1988, Syntex spent approximately \$10 million ridding the area of volatile organic compounds such as benzene, acetone, ethylene, dichloride, and tetrachloroethylene. Due in part to EPA's "land ban" and pressure from Northern Water, the cities of Boulder, Longmont, and others, Syntex agreed to re-excavate the trenches and dispose of the material at the Grassy Mountain Landfill in Utah. Not all material was removed however, and some remained on the site. To help remediate this, Syntex installed a groundwater extraction system to intercept the plume and an on-site treatment plant.

Historically, chloride and total dissolved solids (TDS) concentrations in ground water increased in advance of the arrival of the organic contaminant plume. Tetrahydrofuran and diethyl-ether are typically the first organic compounds to be detected at the leading edge of the plume.



Figure 1. Syntex Monitoring Locations



Figure 2. Syntex Monitoring Well

MONITORING LOCATIONS

To provide early warning should the plume reach the Saint Vrain Supply Canal, Northern Water installed five monitoring wells on its right-of-way. One of these wells, however, has remained dry since its installation. For changes to monitoring locations throughout program history see Appendix 1 - Summary of Program Changes and Sampling Frequency.

Table 1. Well Monitoring Locations

Well ID	Latitude	Longitude	Last Known Depth (ft below toc)	Last Known Water Level (ft below toc)	Remark
DM1	40.24634	-105.23228	11.45	15.0	Depth from 2024
DM2	40.24651	-105.23144	15.97	20.0	Depth from 2024
DM4	40.24714	-105.23217	13.43	15.0	Depth from 2024
DM5	40.24712	-105.23155	14.32	19.0	Depth from 2024

Map of Monitoring Locations

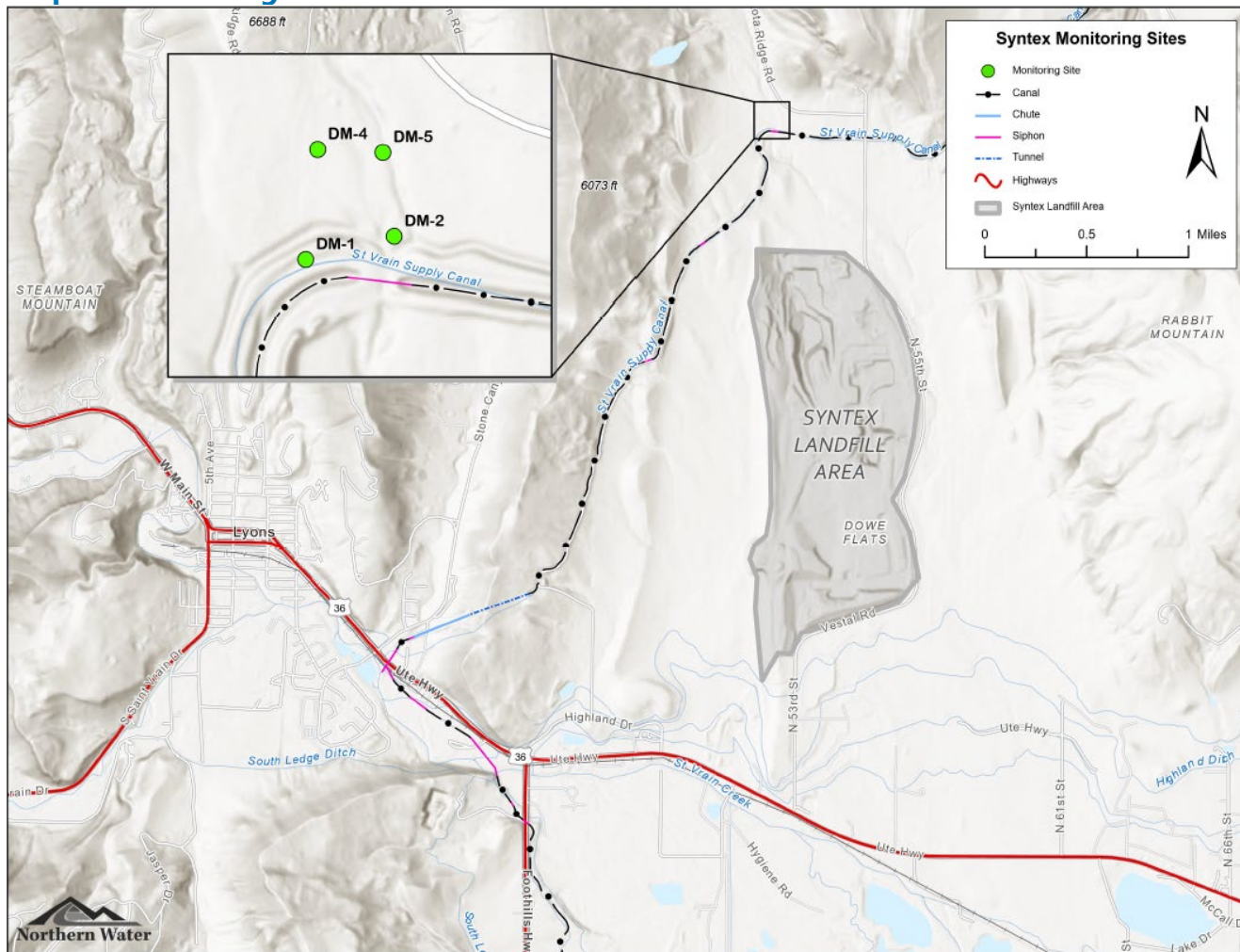


Figure 2. Syntex Monitoring Locations

MONITORING FREQUENCY

Monitoring from 1980 to present has shown no evidence that the plume is nearing the Saint Vrain Supply Canal. Detailed historical sampling frequency can be found in Appendix 1.

Sampling in 2018 showed an increase in the concentrations of TDS and chloride compared to 2013. TDS and chloride can be precursor compounds indicating the advancement of an organic contaminant plume. Initially, increases were suspected to be due to a change in the sampling entity, sampling method, and/or the change in the lab used to analyze the samples between 2013 and 2018. However, using a consistent sampling entity, sampling methods, and lab methods in 2019, 2020, and 2021, continued to show consistently high TDS and chloride, but there was still no evidence of an organic contaminant plume. Due to a lack of significant changes in the results following four consecutive years of sampling, annual sampling was suspended for the next three years and resumed in 2024. Results from 2024 sampling remained consistent with previous sampling events.

PARAMETERS AND ANALYSIS

Analysis is done on a suite of 70 volatile organic compounds (including diethyl-ether and tetrahydrofuran), chloride and total dissolved solids. Analysis is done at SGS Accutest in Wheat Ridge, Colorado.

Physical parameters are collected at the time of sampling and include dissolved oxygen, pH, specific conductivity, temperature, and oxidation-reduction potential.

SAMPLE COLLECTION AND DATA PROCESSING

Samples are collected by WSP USA (WSP) according to their standard operating procedure for groundwater sampling by low flow purging. WSP adheres to a site-specific Health and Safety Plan during sampling activities.

WSP prepares data files and a report that summarizes changes in concentrations or indications that the plume may be advancing.

APPENDIX 1 – HISTORY OF PROGRAM CHANGES

Changes to Sampling Schedule, Monitoring Frequency and Sample Collection

Year	Description of Change
1960s-1970s	Arapaho Chemicals of Boulder used the Syntex Landfill for disposal of hazardous waste including spent solvents and off-spec chemicals used for manufacturing pharmaceuticals during the 1960s and 1970s.
1980s	Groundwater plume is identified
1980	Northern Water installs five wells on its right-of-way to provide early warning should the plume reach the Saint Vrain Supply Canal
1988	Syntex re-excavated the trenches to rid the area of volatile organic compounds
1980-2000	Monitoring occurs at Northern Water wells annually. No evidence indicating that the plume was reaching the canal right-of-way and so monitoring was recommended to decrease to once every two to three years.
2000-2004	Monitoring occurs at Northern Water wells in 2002 and 2004. In further discussions, monitoring was reduced to once every three to five years.
2009	The dedicated bailer at DM-4 was found to be lodged in the bottom of the well and samples were unable to be collected. It wasn't until 2018 that the bailer was retrieved, and DM-4 was able to be sampled again.
2004-2018	Following previous guidance, the wells were sampled in 2009, 2013 and 2018.
2018	Annual sampling was reestablished due to increased concentrations in TDS and chloride compared to the 2013 sampling event. The dedicated bailer in DM-4 was retrieved and sampling resumed at this site.
2019	TDS and Chloride concentrations were similar to 2018 results, exceeding the Colorado TDS/Chloride Water Quality Standards but there was no presence of diethyl ether and tetrahydrofuran.
2020	On 1/30/2020, WSP USA acquires LTE Environmental, Inc. Contacts remain the same between organizations. TDS and Chloride concentrations were similar to 2019 results and still exceeding the Colorado TDS/Chloride Water Quality Standards but there was no presence of diethyl ether and tetrahydrofuran.
2021	TDS and Chloride concentrations were similar to 2020 results and continue to exceed the Colorado TDS/Chloride Water Quality Standards but there was no presence of diethyl ether and tetrahydrofuran. Following 4 years (2018, 2019, 2020, and 2021) of little change and no presence of diethyl ether or tetrahydrofuran, sampling is suspended until 2024.
2024	TDS and Chloride concentrations were similar to 2021 results and continue to exceed the Colorado TDS/Chloride Water Quality Standards but there was no presence of diethyl ether and tetrahydrofuran. With little change to TDS and Chloride results and a continued no presence of diethyl ether or tetrahydrofuran, sampling is suspended until 2027.

