

Remedial Process Optimization of a Groundwater Extraction and Recharge System at a Superfund Site in New Jersey

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Background/Objectives. The 1,200-acre Site was a chemical manufacturing facility from 1952 to 1990. The activities included manufacturing, waste treatment, and waste disposal; as a result, soil and groundwater at the Site became impacted. The Site received an NPL designation in 1983. The remedial approach included two operable units (OUS): OU1 to address groundwater, and OU2 to address source areas. The selected OU1 remedy is hydraulic containment, consisting of groundwater extraction, treatment and reinjection. This presentation focuses on the extraction element of the OU1 remedy, designated as the groundwater extraction and recharge (GERS) system. The OU1 remedy became fully operational in 1996. Nine contaminants of concern (COCs) are designated as indicator compounds, and are tracked to monitor the performance of the OU1 remedy. As of 2015, the GERS included 37 extraction wells, generating the total flow of approximately 1,000 gpm. Since the inception of the GERS in 1996, both the size and the total COC concentrations decreased significantly. Remedial process optimization (RPO) was undertaken with objective of to re-evaluate and optimize the GERS considering the current plume configurations and total COC concentrations. The regulatory basis is the OU2 Record of Decision requirement for GERS optimization following implementation of the source area remedy.

Approach/Activities. The plume is in the Cohansey aquifer: the primary Cohansey (PCOH) and the lower Cohansey (LCOH). The potential receptors include the lower Kirkwood #1 Sand aquifer and the Toms River. The evaluation was conducted with the objective of idling the GERS wells that do not provide a significant benefit while maintaining the regulatory requirements of the OU-1 ROD of protecting water quality in Toms River, protecting water quality in the Kirkwood aquifer, and restoring the Cohansey aquifer to the extent practicable. The metrics of the evaluation were the same as those used in the annual Long-Term Monitoring Plan (LTMP) Reports that evaluate the performance of the current system: 1) maintaining inward gradients between the Toms River and the areas where impacts are present in the Cohansey (protection of Toms River), 2) maintaining an upward gradient between the Kirkwood #1 Sand and the LCOH in areas where impacts are present in the LCOH (protection of Kirkwood aquifer), and 3) maintaining the TCOC mass extraction rate (aquifer restoration). Groundwater modeling and mass flux analysis were used as tools. Extraction wells were selected for idling if they were located outside or on the fringes of the current plume, or if the COC mass removal rates were very low compared to other wells. Wells located in the area where the upwards gradient needs to be maintained were not considered for idling.

Results/Lessons Learned. The RPO analysis indicated that the idling of 10 out of 37 active GERS wells would not adversely impact the performance of the OU-1 Groundwater Remedy. The recommendations of the RPO were approved by the USEPA and were implemented in 2016-2017. The monitoring of the OU-1 Remedy performance will continue to confirm that the modification will not negatively impact the plume capture. This includes the ongoing LTMP effort (hydraulic head at 300 wells, water quality at 100 wells), as well as supplemental monitoring at

locations where wells were idled. Depending on the findings, other GERS modifications will be evaluated and may be proposed in the future as part of the longer-term optimization program.