Case Study: Lessons Learned on Perfluorinated Compounds and Groundwater Issues during Construction

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Background/Objectives. Austin-Bergstrom International Airport (ABIA) is undergoing a major terminal expansion project that started in 2015. Groundwater containing perfluorinated compounds (PFCs) was unexpectedly encountered. This case study examines the technical approach and solution that resulted in a successfully completed project.

Approach/Activities. ABIA was formerly occupied by Bergstrom Air Force Base, which operated on this site from 1942 to 1993. The base was closed and the Austin municipal airport was relocated to the site in 1999. Site-wide remediation resulted in the cleanup of several hundred, mostly minor, environmental sites during the base closure.

The initial phase of the terminal expansion project was the relocation of the ramp's stormwater/deicing treatment ponds to a new location occupied by a former Air Force hangar and aircraft painting facility. An investigation to determine the presence of perfluorinated compounds (PFCs) in the soil prior to the new treatment pond construction indicated no contamination present. Contact with groundwater was initially anticipated to be minimal. The hangar was demolished and work began on the pond in early 2016.

As pond construction progressed, it was determined that a confined aquifer was present and the aquitard undulated throughout the pond's construction footprint. The deeper sections of the pond's slab slightly penetrated the aquitard which jeopardized the pond's initial design. A 20-well dewatering system was installed around the perimeter of the pond to alleviate the groundwater intrusion during excavation. Prior to initiating pumping, groundwater samples were collected from the dewatering system and PFCs, specifically PFOA and PFOS, were detected.

A groundwater treatment system (zeolite and granular activated carbon) was designed and installed to treat the extracted groundwater at a rate of 175 gallons per minute (gpm). Initial dewatering attempts were unsuccessful in lowering the water table; thus, the aquifer was further evaluated. Targeted vacuum extraction well points were added and the dewatering system was redesigned to handle 500 gpm. Subsequent efforts to lower the water table with the larger dewatering system were also unsuccessful. Additionally, soils excavated near the aquitard were discovered to be contaminated and required appropriate management throughout the project.

An alternative approach was proposed-instead of lowering the water table, the pond bottom would be over-excavated and flowable fill used to seal the aquifer and support pond foundation construction. The alternative approach was ultimately successful.

Results/Lessons Learned.A total of 58 million gallons of water was treated and discharged to the sanitary sewer system. Approximately 4,000 cubic yards of contaminated soil was managed and retained on-site. The project resulted in a $2.5 million dollar change order. In summary, the project team did not anticipate ground water quality or quantity issues. An in-depth evaluation of the aquifer conditions, as well as groundwater sampling during design, may have better prepared the project team.