

BELLEVUE PERMEABLE REACTIVE BARRIERS

DEEP TRENCHES



Client: Landcorp
Supervisor: GHD

Consultant: Golder Associates
Specialist Contractor: Menard Bachy

THE PROJECT

A waste storage site operated a chemical/oil recycling and treatment facility in Bellevue, WA until a fire destroyed the facility in February 2001. Following the fire a series of investigations and risk assessments were undertaken at and in the vicinity of the property. Groundwater investigations confirmed the presence of a plume of hydrocarbons and halogenated organics originating from the former waste storage site. Subsequent groundwater monitoring indicated the presence of a separate off-site plume from a local source containing trichloroethene (TCE). Monitoring of data indicated that the two plumes converged beneath the escarpment prior to entering the Damplands.

A zero valent iron (ZVI) permeable reactive barrier (PRB) was proposed. As elevated concentrations of nitrate in the groundwater were confirmed during the delineation investigation, calculations showed that most of the ZVI material thickness would be consumed through nitrate passivity. Thus, a second PRB for denitrification was also designed upstream and in front of the ZVI wall.

Each PRB was designed to be 76 m long and extending down to the Leederville Formation clay layer at depth of approximately 11 m. The ZVI PRB was a mixture of ZVI and sand. The denitrification PRB was a mixture of saw dust, chips and sand.

MENARD BACHY'S ROLE

Menard Bachy was awarded the contract for the construction of the pair of PRBs based on an alternative proposal using deep trenching technology with a biopolymer slurry in lieu of execution of caissons and secant piles using a large diameter steel casing pushed into the ground and excavating the soil from within the casing. This alternative had a number of advantages including lesser cost and reduction of total and on site construction time, controlled width and continuity, control of key in depth, simplification of the environmental management plan, and lesser consumption of PRB material.

This project is the first application of a ZVI wall of industrial scale in Australia. It is also the first time a pair of PRBs have been used in the nation. Furthermore, it is also the first utilisation of a biopolymer slurry for construction of a PRB in Australia.

An excavator with a modified long arm was used to excavate trenches with widths of 0.6 m. The stability of the deep excavations was provided by the slurry.

Among the challenges of the project were the limitation of space, the presence of a flood reservoir and a steep hill on the two sides of the PRBs, and the separation of contaminated soil from the potentially acid sulphate contaminated soil.