



PILOT CASE STUDY: NAPL RECOVERY AT A TEST SITE AT CANADIAN FORCES BASE

BACKGROUND

- This was an experimental pilot project conducted by inVentures Technologies incorporated in conjunction with the University of Waterloo at Base Borden. The project was carried out in 3 phases and supported a Master's student in each phase. The 3 phases were:
 1. The lab experiments to verify the theory of NAPL Recovery using CO₂ saturated water through volatilization and mobilization.
 2. Field experiments to see the extent of CO₂ laden water transport in porous media under non-recovery pumping conditions (i.e. no extraction)
 3. The actual NAPL Recovery
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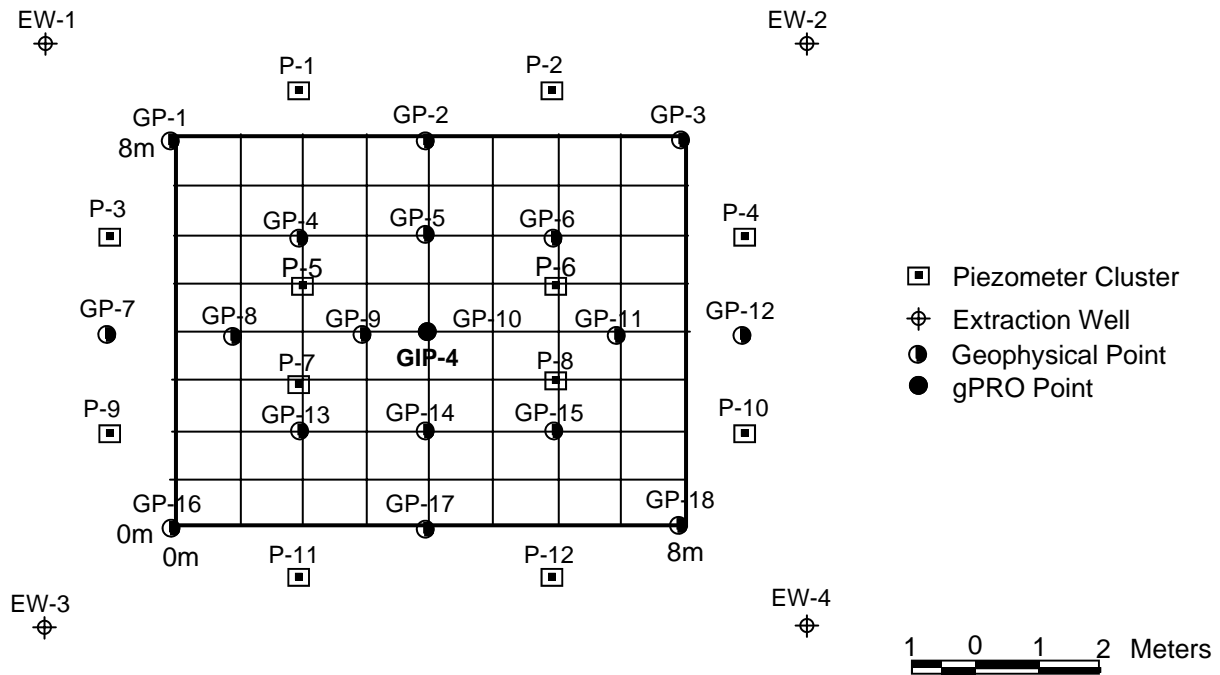
inVentures STRATEGY

- To determine the radius of influence of CO₂ saturated water at a single injection point under non-recovery pumping conditions and demonstrate gPRO[®] capability.
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CLEAN-UP STRATEGY

- gPRO[®] HP will be utilized to inject CO₂ supersaturated water into the porous medium
 - Carbonated water will be injected under pressure at a continuous flow rate until steady state conditions have been achieved.
 - The in-situ evolution of carbon dioxide in the gas phase will be determined by total gas pressure analysis
 - Hydraulic monitoring will be performed to determine if mounding occurs during injection of the carbonated water
 - The saturated water is extracted along with the volatile hydrocarbons and non volatiles using dual phase extraction
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SITE MAP



RESULTS

- CO₂ was measured 6 meters (19.7 feet) in all directions from a single injection point with no mounding – total diameter of 39.4 feet.
- The experiment revealed that the water flow path of CO₂ laden water is very important for maximizing NAPL recovery. While the experiments due to costs, did not encompass the vertical control of the CO₂ (it was injected at the tip of each well), it became very evident that vertical control of the CO₂ saturated water is a key component of the NAPL Recovery technology. The vertical control would ensure CO₂ contact.