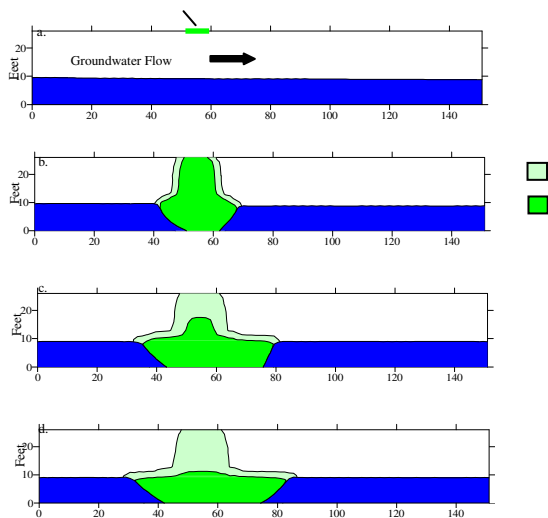
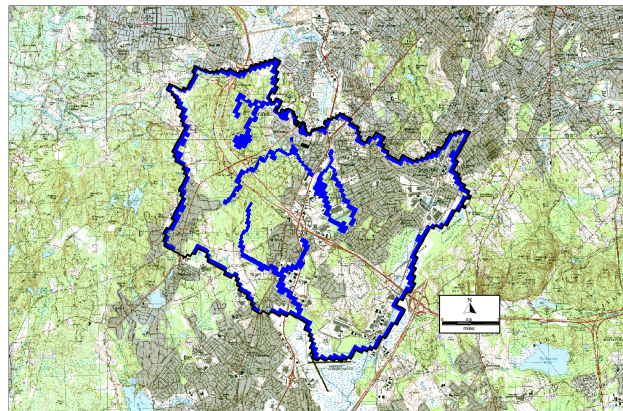


Multiphase and 3-D Numerical Models

Dedham County

Overview

Leakage of fuel oil into the subsurface from an underground storage tank at the Dedham County Municipal Jail has led to a concern over the possible migration of the fuel oil off-property. A multiphase flow and transport model was developed to investigate the migration pathway and if the municipal well in the area were at risk of becoming contaminated.



Groundwater Flow Modelling

The three-dimensional numerical groundwater model was developed in MODFLOW to simulate groundwater flow in the study area. After completion of the groundwater model, MODPATH was used to delineate the capture zones of the municipal wells located northwest of the Site. MOFAT, was used to determine the amount of solute partitioning from the heating oil free product into the water phase.

Project Results

The modelling results demonstrated that no significant amount of solute was partitioned into the water phase. This was due in part to the fact that the heating oil was comprised of mainly of heavy relatively insoluble carbon chains. The other contributing factor is that the light end chains, that originally exist, have likely volatilized during the 40 year time frame the oil was in the subsurface.

The 2nd phase of the study included the development of capture zones for the municipal wells to the northwest. The modelling results indicated that the contaminated site was outside the capture zone of the municipal wells even when model parameter uncertainty was considered.

