Finding the Sources and the Extent of Groundwater Contamination

The Morse Chain Company was one of the major industrial businesses in Ithaca, NY. In the 1960's and 1970's their manufacturing processes involved the use of trichloroethylene (TCE), whose toxic and cancerogenic effects were unknown at the time. The company was later purchased by Emerson, which found evidence that TCE was present in a large fire reservoir on the plant site. Further tests showed that TCE entered the groundwater near the reservoir and the contamination later spread to affect a significant portion of South Hill area of Ithaca. In addition, multiple other spills on the Morse Chain Company premises were deemed likely, but there is no credible information about the exact locations or amounts of contamination. A number of groundwater monitoring wells (GMW) and solid vapor monitoring sites (SVMS) are currently used to collect data. Their locations (and a large amount of other relevant information) can be found here: http://www.ithaca-ship.org/maps.htm

As you will quickly discover after searching the web, this problem is a subject of extensive ongoing research, but two key issues still remain largely unknown and contentious:

- the original location of additional spills (if any) and
- the current/future level of TCE contamination in much of South Hill neighborhood & surrounding downtown areas

1. Build a model, which uses data collected by the *already existing* GMWs and SVMSs to predict the likely level of contamination in different parts of South Hill neighborhood (+ the adjacent parts of Ithaca).
2. Use your model to test hypotheses about various possible locations/amounts of additional spills on the Morse Chain Company premises.
3. Help state agencies in developing criteria to add a limited number of GMWs and SVMSs (to maximally improve the reliability of your predictions).
4. Suppose that the conclusions of your study were leaked and appeared in local newspapers in a redacted and simplified form. Write a (non-technical) letter to the editor discussing the predictive power of your modeling approach and its limitations.