

## 2010 Oral Presentation Scenario

### **“Protection of Groundwater through Urban, Agricultural, and Environmental Planning”**

A small town in north-central Iowa has discovered that nitrate levels in two of the town’s municipal alluvium wells have nitrate levels that are elevated above the state drinking water quality standard of 10 mg/liter. In addition to the municipal wells, there are several businesses and a mobile home park that have shown increasing nitrate levels although those wells have not yet exceeded the drinking water standard.

The soils in the area are primarily glacial till with high water holding capacity and moderate to poor drainage.

In this part of the state the groundwater supply can come within a few feet of soil surface meaning there is much less filtration by the soil and a great risk of contamination.

In Iowa, 80 percent of Iowans depend on groundwater for their drinking water, and more than 97 percent of all rural Americans, including rural Iowans, depend on groundwater for their drinking water supplies.

Monitoring conducted over the last several years has indicated that nitrate levels have been rising slowly but steadily causing the Department of Health to require that water quality monitoring be conducted on a quarterly basis rather than the standard annual testing regimen.

There is a variety of land use within the well capture zone including substantial acreage devoted to agriculture, residential housing, some light industry, a large cemetery and the municipal airport. A mix of wetlands, pastures and a bit of hardwood and deciduous forest make up the balance of the land cover.

On the outskirts of the city there is a large 18-hole golf course that was recently built. The golf course is complete with a pool, clubhouse, cart storage buildings, and a maintenance shed. The golf course tries to limit the amount of irrigation on the course but the last couple of summers have been dry.

The city’s largest employer is a plastic manufacturing /molding company. This industry employees nearly 300 full-time employees with about 30 additional part-time employees. The second largest is a metal fabrication company that just added an additional building for more storage space and capacity.

The city council has initiated informal discussions with local well drillers to help them determine a course of action. The well drillers have informed the council that they have drilled bedrock wells nearby. These wells generally produce adequate water supply, but have very different concentrations of minerals such as iron and manganese. While generally non-toxic, these minerals can affect the taste of water and contribute to aesthetic problems such as staining clothes and water fixtures in the home. It may be necessary to treat the water from these deeper wells to remove iron and manganese.

You and your team have been hired by the City Council to provide them with a set of alternative solutions to the nitrate pollution problem. Your presentation will be given at the beginning of a special public meeting of the Council to discuss the issue on April 19, 2010.

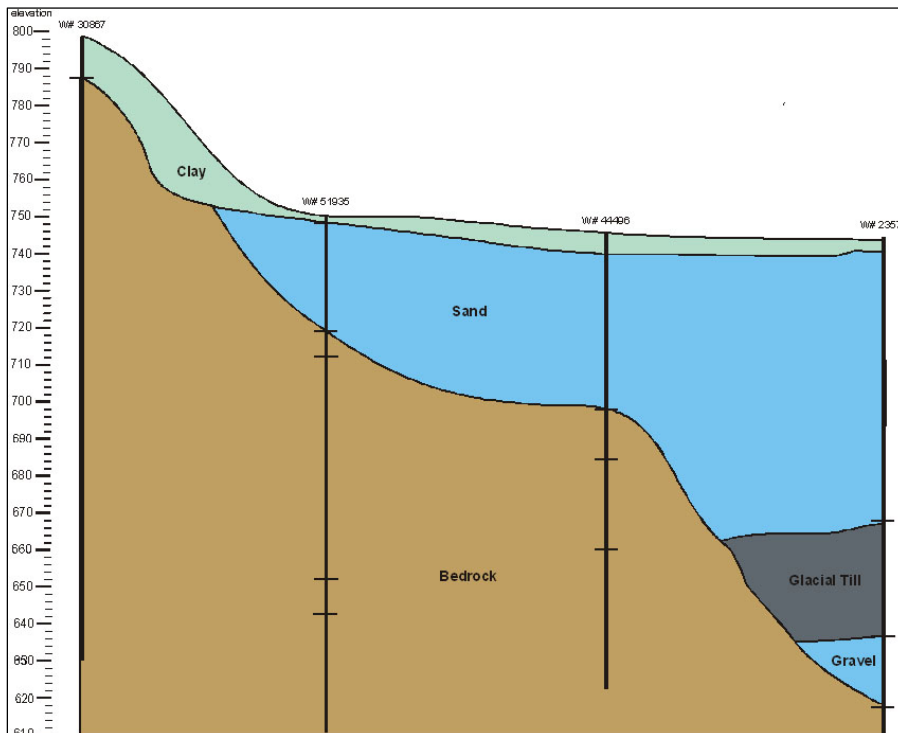
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To prepare for your presentation you will need to decide what the alternatives are, if you can solve the problem at the source; if you opt for treatment, what costs are involved, and what is the long-term maintenance.

Some of the topics your presentation should address include:

- Given the land cover and land use in the area, can you draw any conclusions about potential contributors to the high nitrate levels?
- What options may exist for mitigating the nitrate contribution from these potential contributors?
- What options may exist for treating the existing water supply to remove nitrates?
- What would be involved with drilling a new municipal well?
- What treatment options may be necessary to remove excess minerals from a new, deeper well?
- What may be the long-term effects on the other shallow municipal wells of growth in city population and industrial capacity?
- What are the potential effects of increasing or decreasing groundwater withdrawals on the nearby lakes and streams?
- How does the city council's decision potentially affect the other businesses and residences that use the surficial aquifer?
- What potential effect could the alternatives have on the city government, city residents, farmers, major industrial employer, and the residents outside the municipal well supply system?
- Will any of the alternatives affect aquatics, forestry, soils or wildlife?

How do you balance the cost between the benefitting parties and those who may have caused the problem? [Type a quote from the document or the summary of an interesting point. You can position the text box anywhere in the document. Use the Text Box Tools tab to change the formatting of the pull quote text box.]



Geologic cross-section of the city.