

# TCE and Fantastic Caverns

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# Underground TCE Transport

- This is cave country. **Underground transport and discharge to the surface** is through the vast 3-D maze of dissolved out openings in the limestone.
- TCE in water moves with the water.
- TCE in air moves as a very mobile underground “vapor cloud”.

# Underground TCE Vapor Cloud

- Moves toward valleys in warm weather
- Moves toward uplands in cold weather
- TCE escape to the surface and into buildings through Discrete Recharge Zones.
- Average density of Discrete Recharge Zones in Greene County about 1 for every 8,000 square feet of land surface.

# TCE in Underground Air

- EPA Target Maximum Concentration 2 micrograms per cubic meter of air in homes.
- Maximum measured in Fantastic 2,400 micrograms per cubic meter.
- Over 30 square miles of Greene County and Springfield are closer to Litton than this measurement point in Fantastic.

# Measuring TCE in Air

- If you don't measure you don't know.
- Odor threshold **500 times** greater than EPA target maximum for air in homes. Can't smell the problem.
- Values in Fantastic **50 times** greater in summer than winter. Single measurements inadequate.
- Use Summa canisters in homes; sample quarterly.
- Chance of hitting Discrete Recharge Zones with roadside borings was negligible

# Underground Extent of TCE

- Extent unknown. TCE has spread in water and/or air beneath hundreds of properties.
- DNR “Focus Area” for well testing: 21.2 square miles, population about 4,500, TCE detected in 24% of wells with 1 round of testing.
- **TCE vapors are the greatest concern.**
- Greatest concern is homes impacted by Discrete Recharge Zones.
- About \$4,000 to adequately test air in a home. Most folks can’t afford this.

# What Is Fantastic Doing?

- Using science to protect our employees, our cave, and our business. It's expensive.
- Using 7 large air shafts and fans to intercept TCE vapors before they reach toured parts of the cave. **Cave visits are safe.**
- Sharing our information so that this problem will be fixed and public health protected.

# Take Home Messages

- Fantastic Caverns is the “tip of the TCE iceberg”.
- The affected area is large and the boundaries are unknown.
- This TCE pollution will not go away on its own or with only minor actions.