Statistically Based 3D Conceptual Site Models and Time-Lapse Animation

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3D Model of Soil Contamination



3D Groundwater Plume





Site Background

- Industry: Large-scale dry cleaner from 1965 until 1984
- **Location:** Midwestern U.S.
- Geology: Fine-grained sand from ground surface to approx.
 45' in depth, followed by dense silty clay (aquitard)
- Hydrogeology: Groundwater located approximately 20' in depth, flows to the north





Unknowns



- Location(s) of PCE spills
- Magnitude and extent of the soil contamination
- Size, orientation, and chemical composition of the groundwater plume





Why Create a 3D Soil Model?

Identified the source areas

- Useful in litigation
- Visualized the extent of the contamination
 - Identified data gaps
 - Design of the SVE remediation system
- Calculated the mass of the contamination
 - Better estimate of the remediation timeframe & costs







Why Create a 3D Groundwater Model?



Visualized the extent of the contamination

Useful in litigation - conveys plume size and depth

Assisted in the design of the remediation system

Placement of the groundwater injection wells

Calculated the mass of each contaminant

Type and amount of the injection material



Remediation





Why Create a Time-Lapse Animation?

Creates understandable results for:

- Clients
- Regulators
- Jurors
- Excellent marketing tool
- Identify data gaps and other issues





How Accurate was the 3D Soil Model?



Model Continuously Collected Data



Model Analytical Data with Geologic Units



Improve Remediation System Design





Other Applications

► ADVERTISEMENTS in Private Industry

3D model and animation is being used by TRS Group on their webpage

► FIGURES in Academic Textbooks

Several models were published in the textbook "Urban Watersheds: Geology, Contamination and Sustainable Development"

VISUAL AIDS in the Legal Community

 Several animations to be used in an upcoming trial (Deposed in February 2018)



SMA YouTube Channel

https://www.youtube.com/user/jdepa300/videos



Questions?

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