

A Standards in Trade (SIT) Workshop:
China Brownfields Remediation

Importance of Conceptual Site Model (CSM) in Site Remediation
(场地概念模型在环境污染修复中的重要性)

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1 Conceptual Site Model Introduction

2 Technical Importance

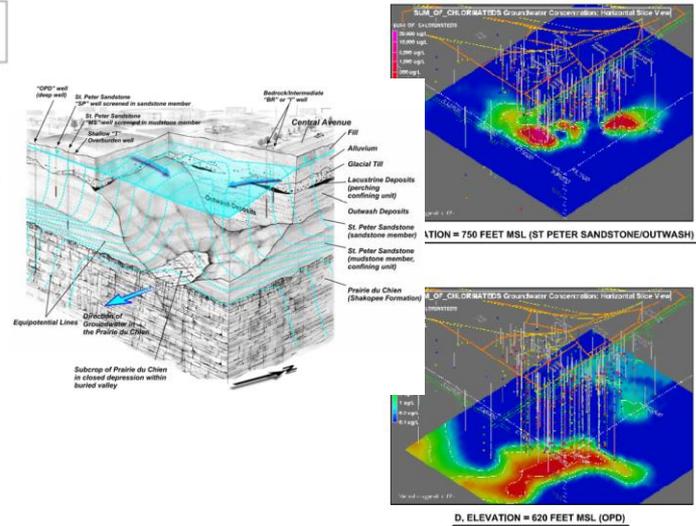
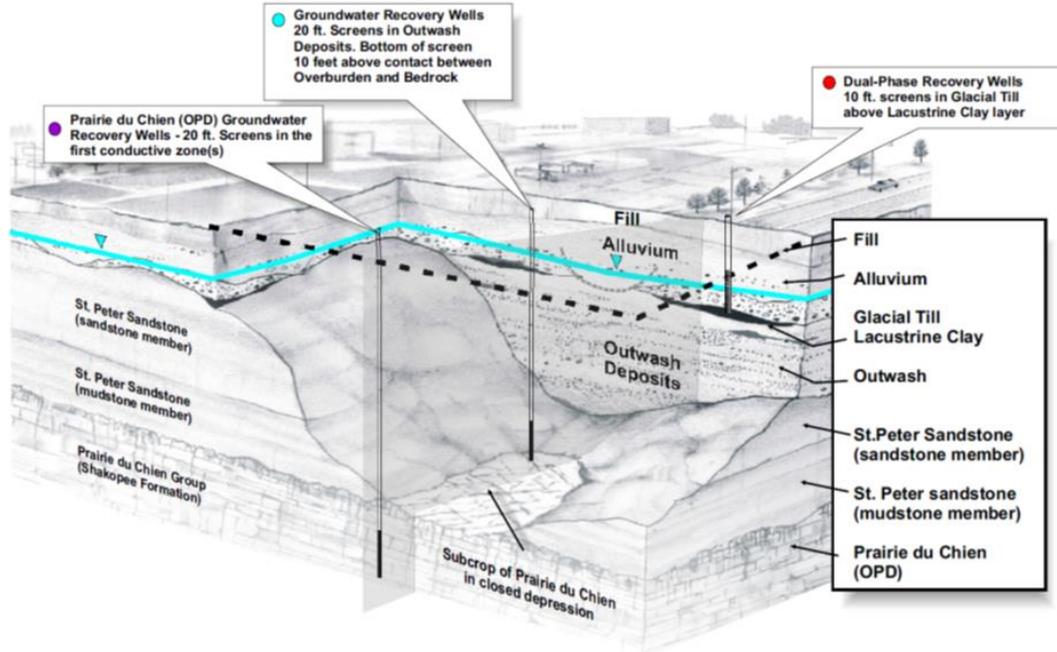
3 Regulatory Requirement

4 Market Efficiency

5 A Case Example

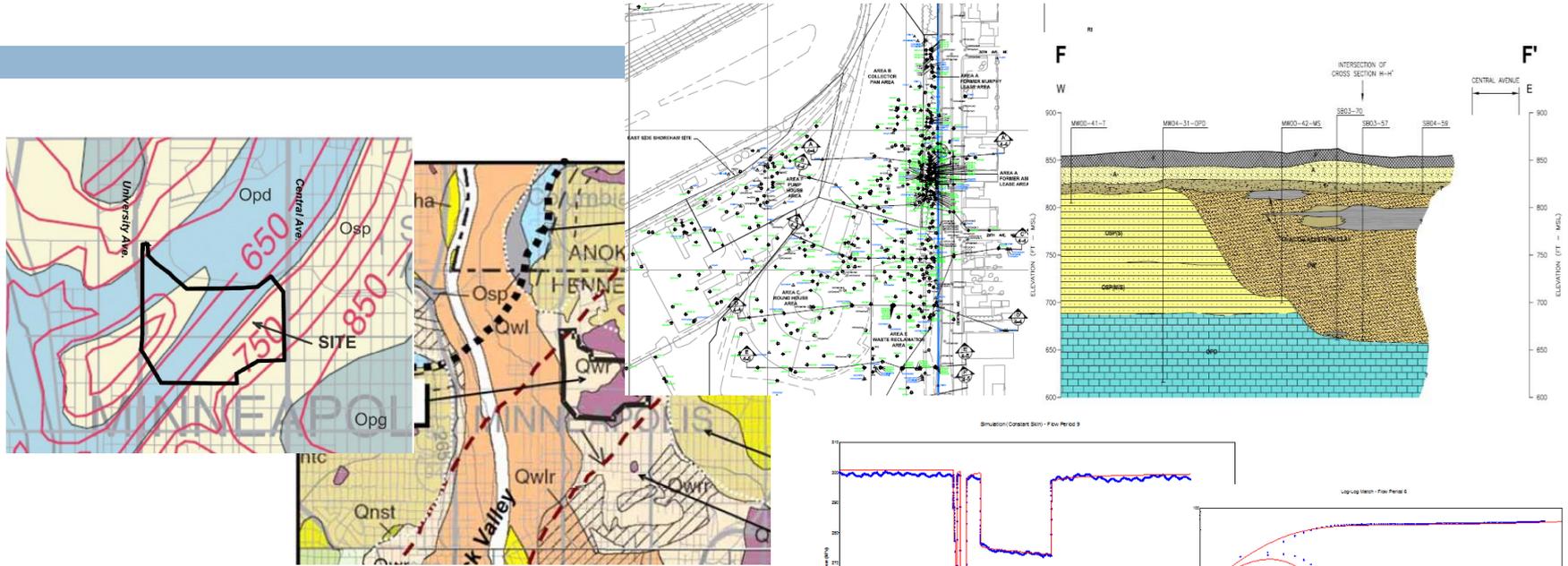
6 Conclusions

What is CSM?



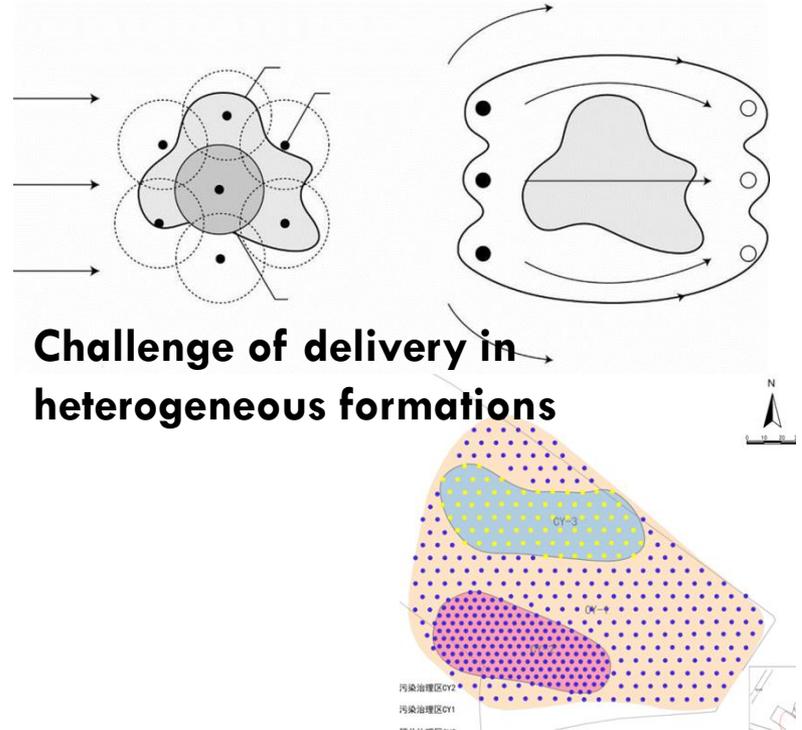
- What information is in this CSM?

How to Develop a CSM?

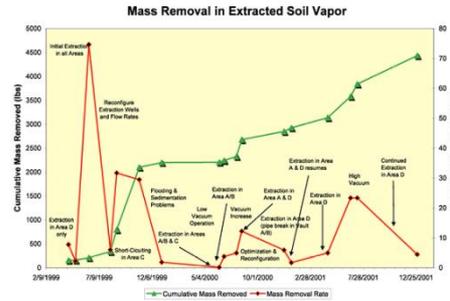
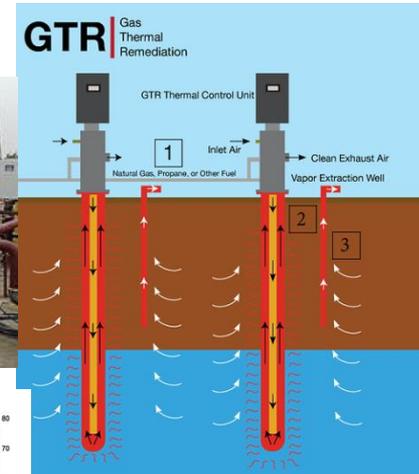


- Process to develop the SCM

- “Site specific information including the applicability of ISCO to the specific contaminants, the concentration range, and hydrogeologic conditions, must be gathered and reviewed when evaluating the appropriateness of using ISCO for a remediation strategy.” – ITRC
- Man-made Conduits, Low permeability, Metals, SOD, soil and groundwater data
- And everything else...



- Key Site conditions include:
 - Site Sitting
 - Stratigraphy and hydrogeology
 - NAPL volume estimates
 - Contamination mobility
- Organic Matter, TOC And everything else...

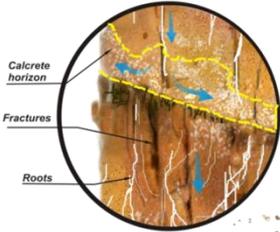


Technical Basis of Remediation – other remedies

Contaminant pathways for migration are enhanced because of in-situ vertical fractures and root zones developed in the Peoria Loess. Local perching of vertical migration may occur above "paleosol" / calcrete horizons that are characteristic of the Peorian Loess deposits

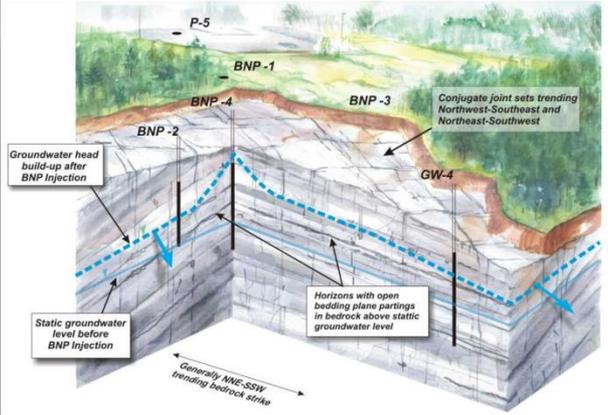
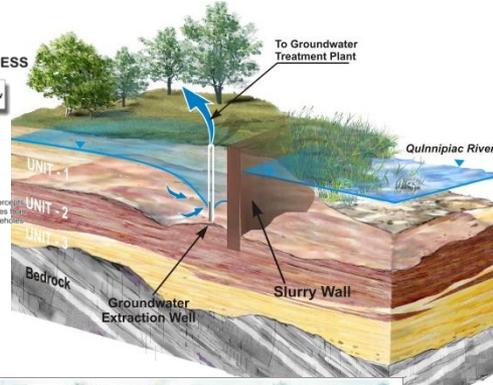
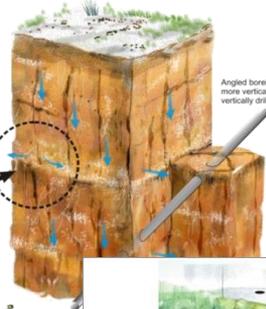
Together, in-situ fractures, root zones, paleosol horizons and calcrete horizons define the hydraulic anisotropy and likely "dual porosity" of the Peorian Loess aquifer

"Paleosol" (calcrete horizon) retard downward movement of groundwater – and allow lateral migration

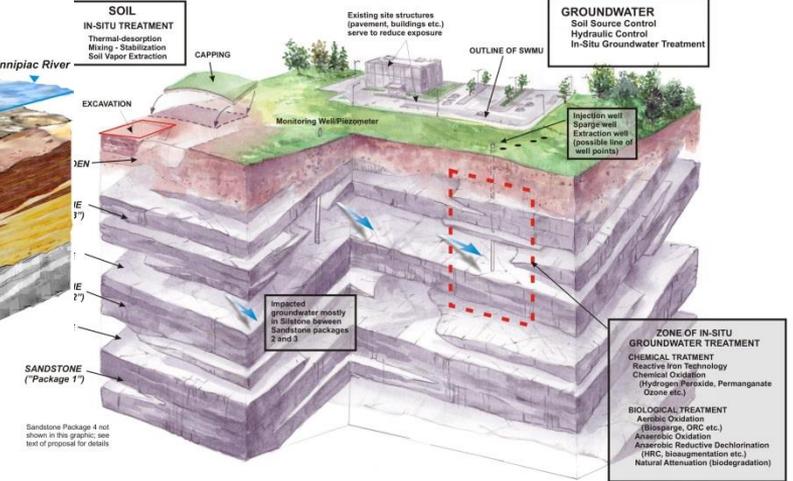


CONCEPTUAL RENDERING HYDROGEOLOGIC FABRIC OF PEORIA LOESS

Enlarged View of fractured Loess deposits both above and below dense, "paleosol" / "calcrete" horizon

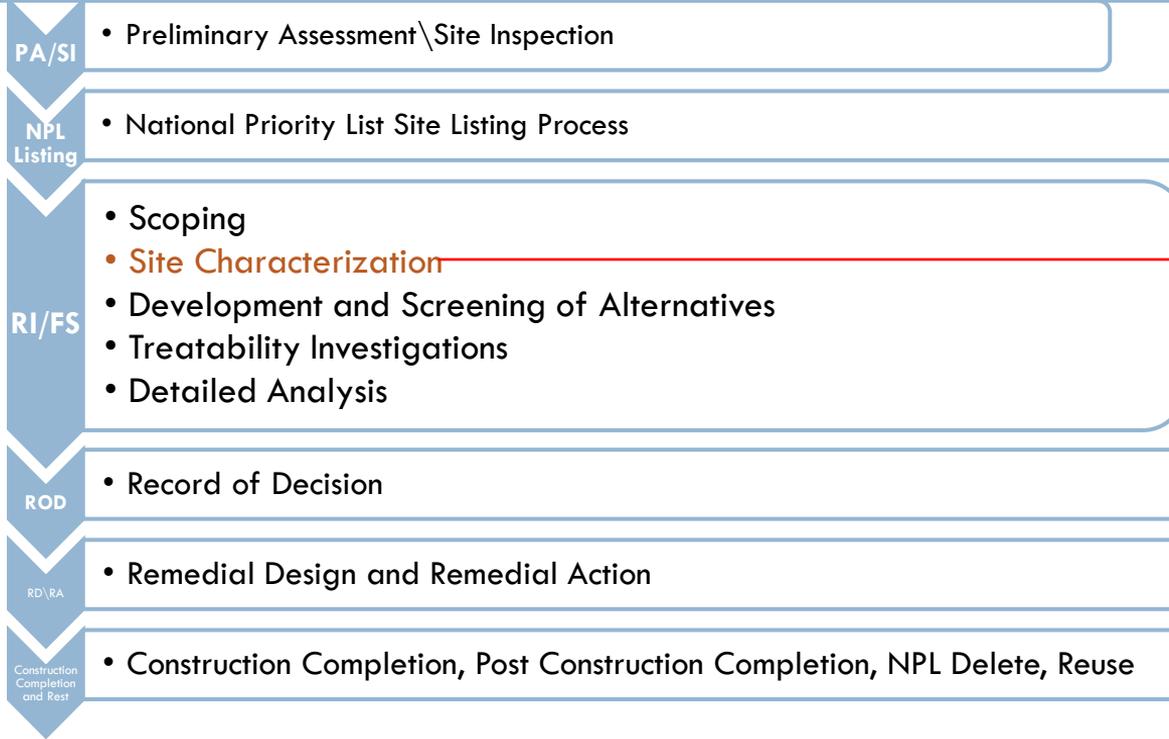


CONCEPTUAL VIEW OF POTENTIALLY APPLICABLE TECHNOLOGIES



Figures Drawn by Dr. Ramesh V.

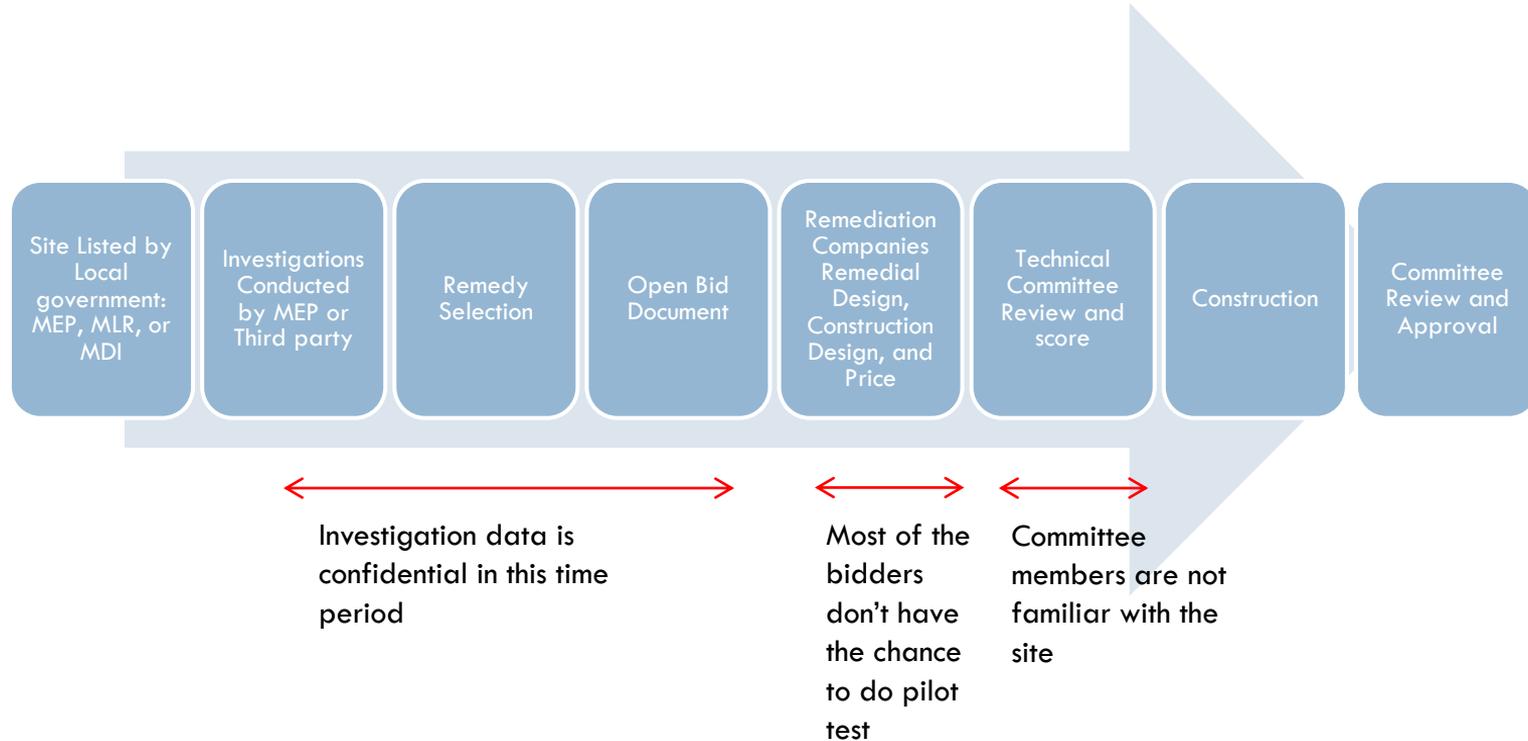
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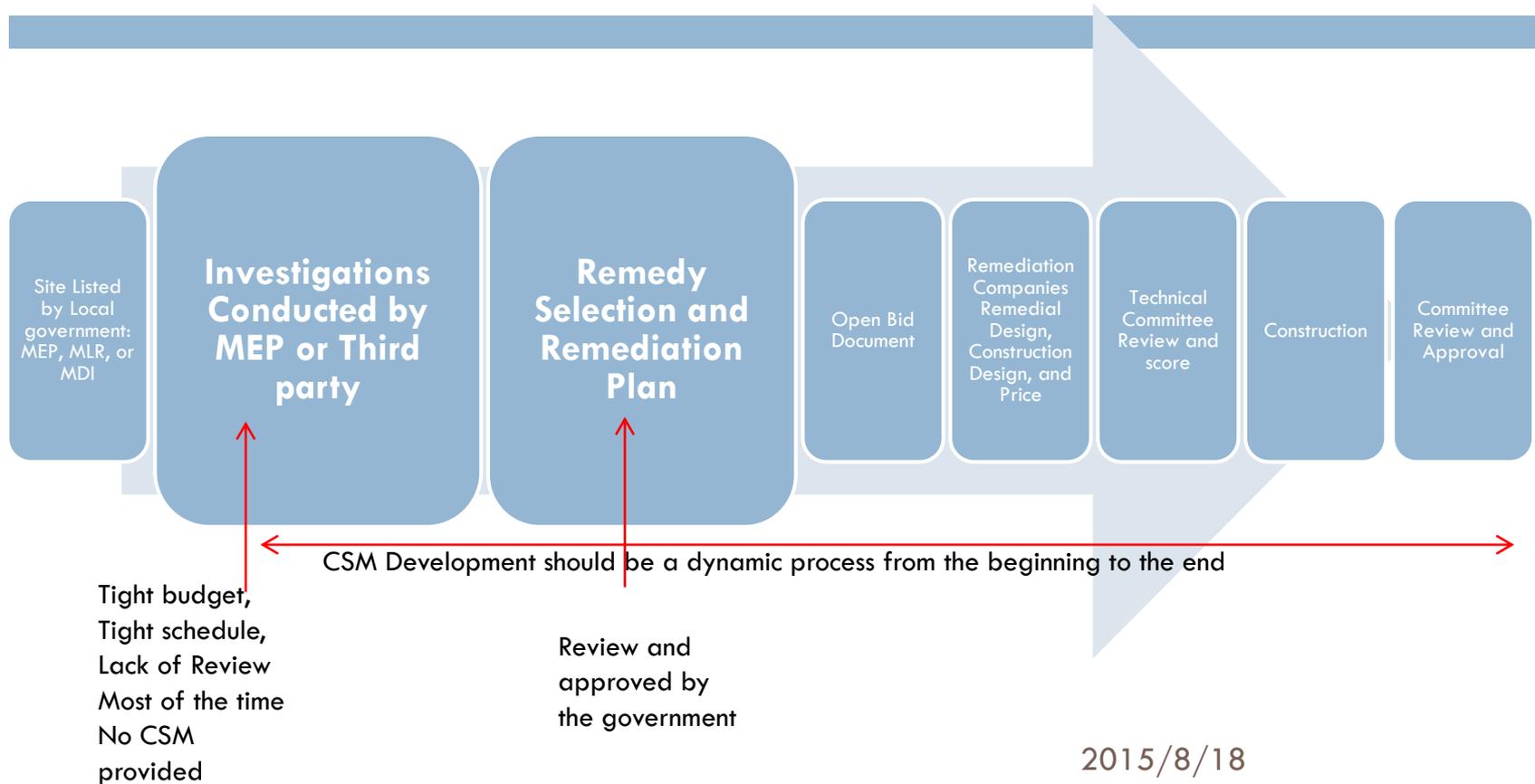


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- China ER market start in 2005, estimated at least same scale as USA
- Regulatory control to minimize Market Inefficiency is the basis to Develop a healthy Remediation Market









All the firm claim
they have the
magic bullets
And bid on price

- Remediation company in China is not a construction company
- Gaps from investigation to remediation encourage firm to focus on magic bullets, not site specific conditions (“You can make anything work in the lab!”)
- Without thorough understanding of the site, firms bid on price and take huge risks
- Clean up goals are difficult to meet
- Firms that take right approaches will not sustain under current situation
- Developers\government also take risks

Policy Makers should
design regulations to
ensure market efficiency

CSM Helps to Select Innovative Remedy and Reduce Cost

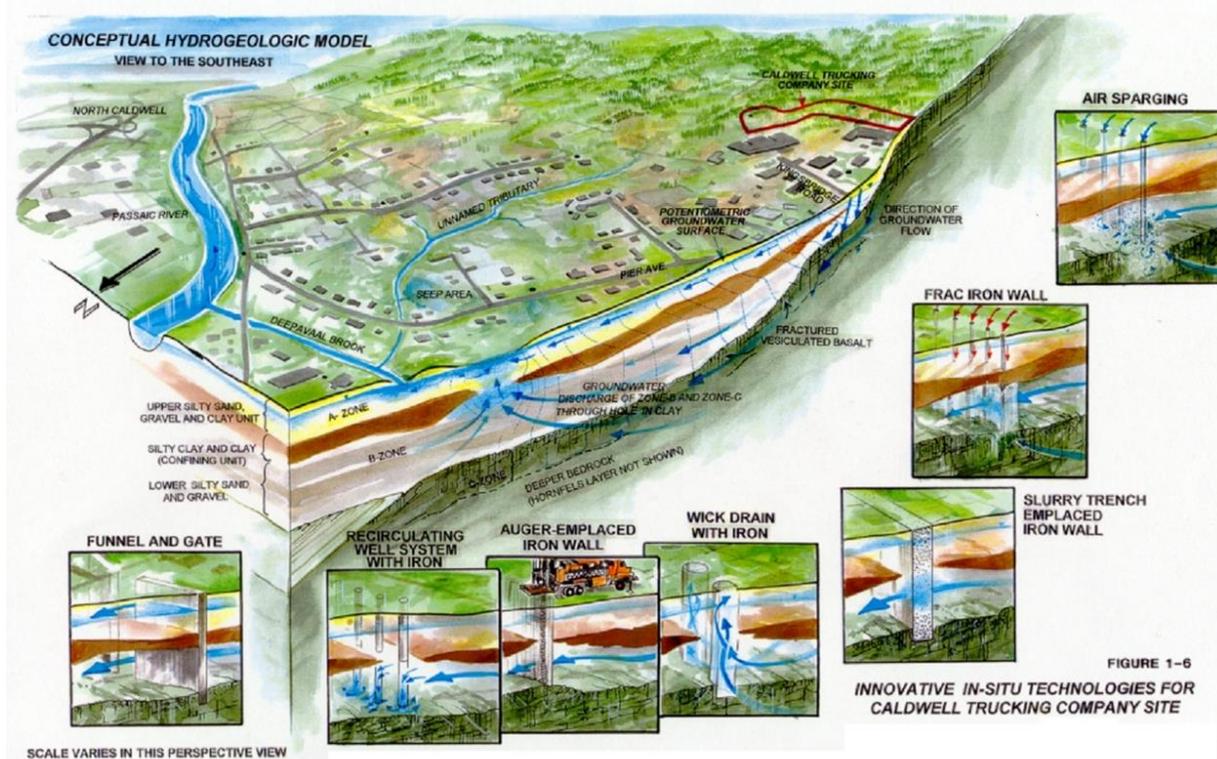
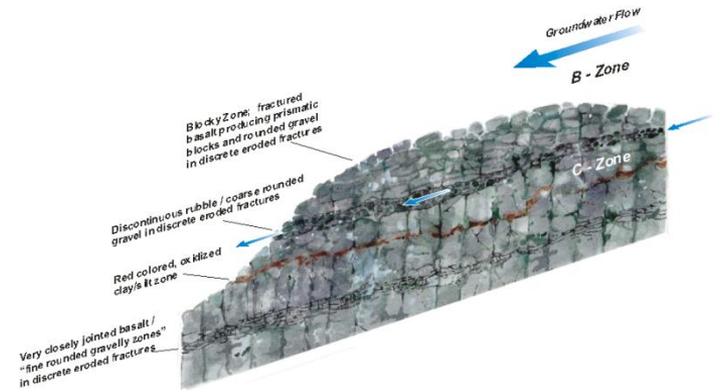
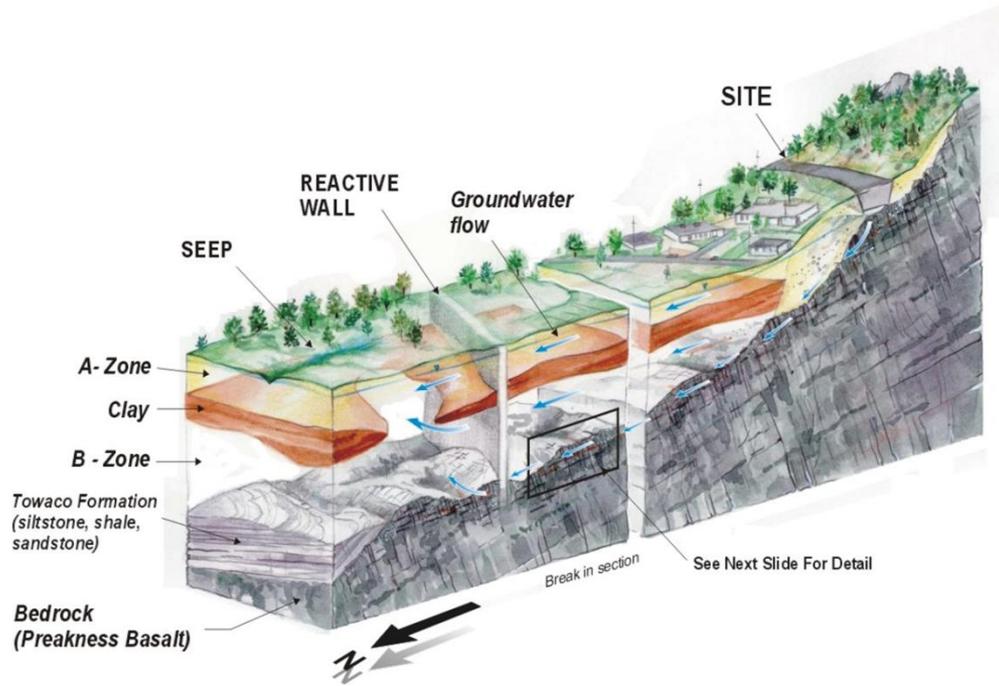


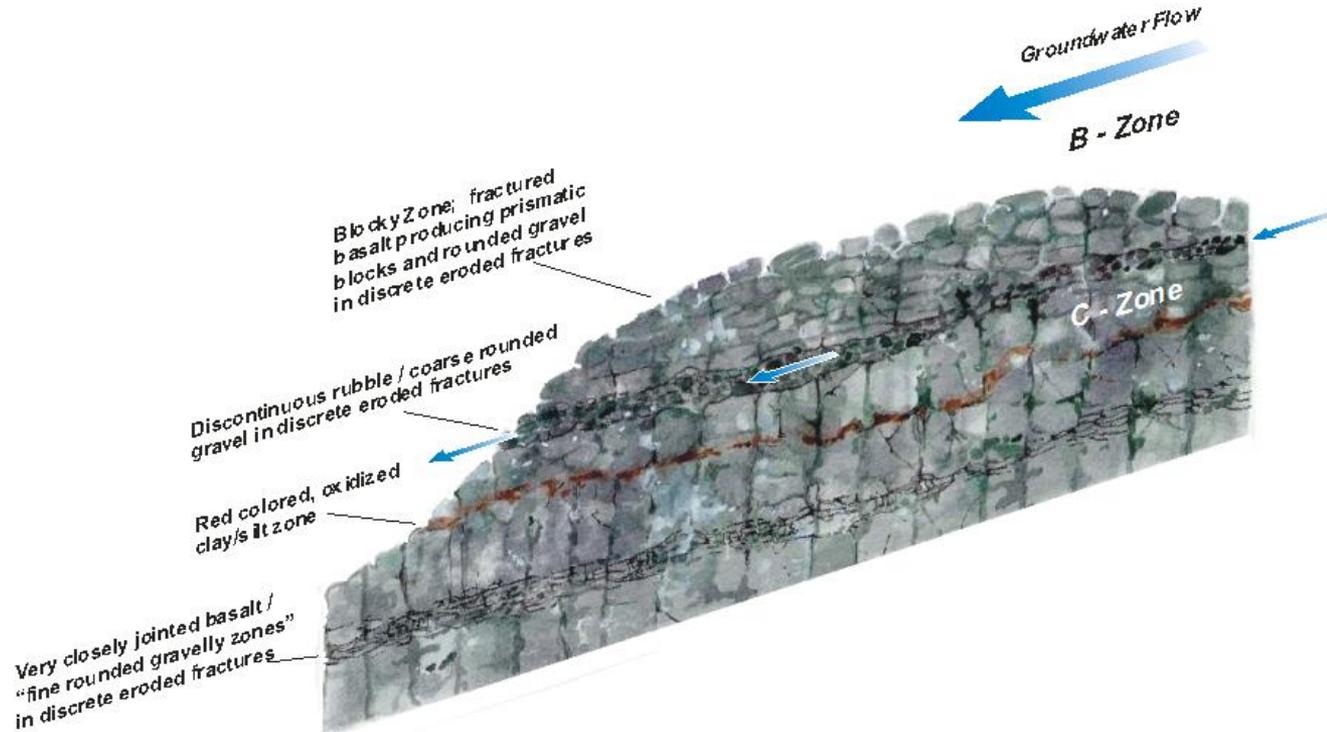
FIGURE 1-6
INNOVATIVE IN-SITU TECHNOLOGIES FOR
CALDWELL TRUCKING COMPANY SITE

CSM Helps to Select Innovative Remedy and Reduce Cost

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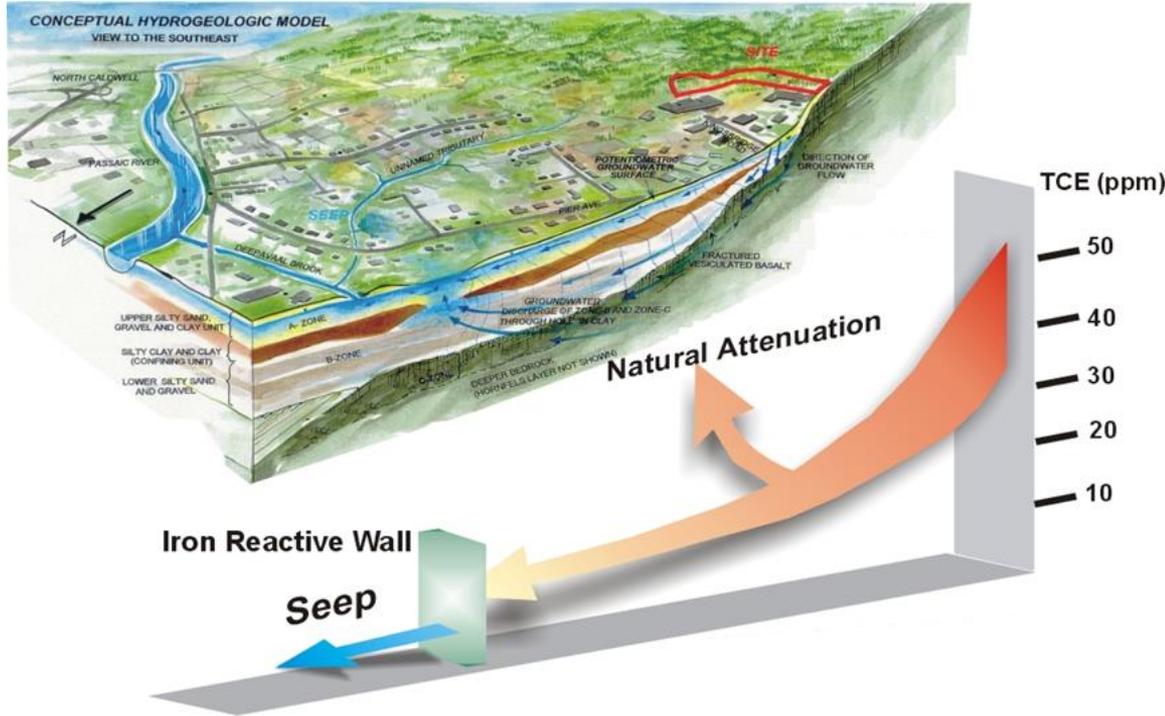


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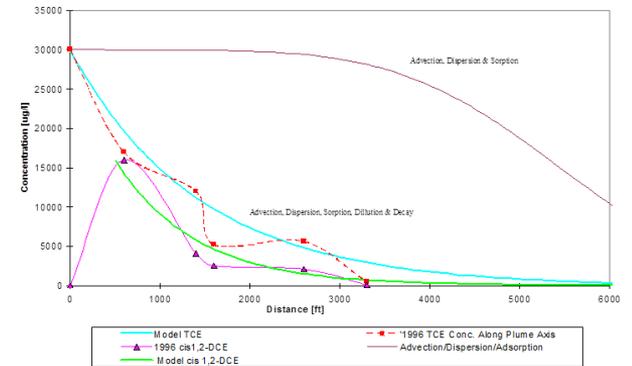


CSM Helps to Select Innovative Remedy and Reduce Cost

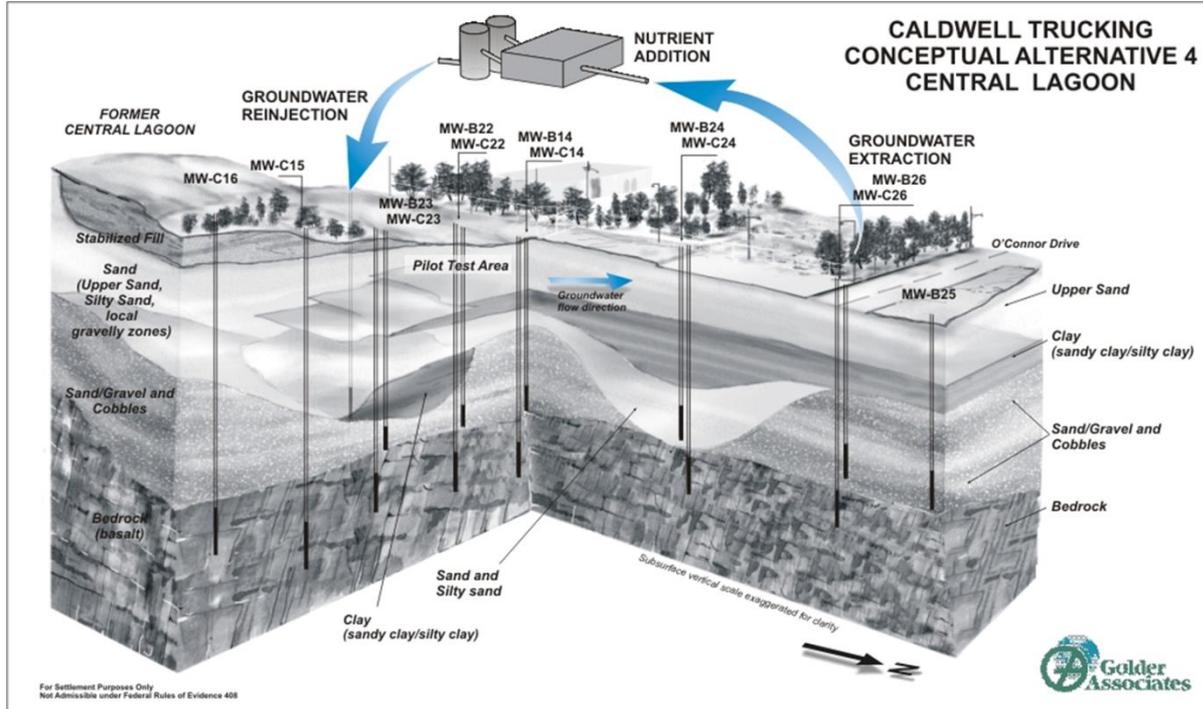
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Actual & Predicted TCE and cis 1,2-DCE Concentrations Downgradient of Central Lagoon
Steady State 1-D Advection/Dispersion with Reaction Terms



CSM Helps to Select Innovative Remedy and Reduce Cost



- **Conceptual Site Model is the fundamental component of Site Remediation**
- **Technologies are not magic bullets**
- **Technology application tend to be site specific**
- **Realistic goals should be set and achieved by application of sound science and engineering to protect environment and human health**

Thank You!