

### SOIL PERMEABILITY



### **Fluid Transport and Pore Pressure**



#### PRESSURE NAPL must >>> PORE ENTRY PRESSURE for NAPL migration



Source:

### Hydraulic Profiling Tool (HPT) to Measure Soil Pore Pressure



# Combined Membrane Interface Probe and Hydraulic Profiling Tool





### **REPEATABILITY!**



### DYNAMIC WORK STRATEGIES NEED REAL TIME INFORMATION AND DECISION MAKING

### 

### **Real-Time Reporting**





### THE CRITICAL ROLE OF DISCRETE SATURATED SOIL SAMPLING

## Systematic Screening







### **Sealed & Preserved For Lab**







### GROUNDWATER DISSOLVED PHASE CONTAMINATION

### **Mass vs Flow**





### **Mass Transport Diagram**



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### VAPOR PHASE CONTAMINATION AND NATURAL SOURCE ZONE DEPLETION





Figure 2-1—Conceptualization of Saturated Zone NSZD Processes



### **SPATIAL ALIGNMENT**



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### **Technology Summary**

LCSM Component	"Type" of LNAPL Site	Concern	Scale Appropriate Technology
Where is the Source?			
Soil Profile	<ul><li>Residual</li><li>Mobile</li><li>Migrating</li></ul>	<ul> <li>Migration</li> <li>Vapor Intrusion</li> <li>Dissolved</li> <li>Source Reduction</li> </ul>	<ul> <li>CPT</li> <li>HPT</li> <li>Soil samples</li> </ul>
LNAPL Distribution			<ul> <li>LIF</li> <li>OIP</li> <li>Soil Samples</li> </ul>
What is the Nature of the Source?			
Composition (Volatile, Biodegradable, Soluble)	<ul><li>Residual</li><li>Mobile</li></ul>	<ul> <li>Vapor Intrusio</li> <li>Dissolved</li> <li>Source Reduction</li> </ul>	n ELIF • OIP • MIP • Soil sampling
Mobile or Residual		Source     Reduction	<ul><li>Soil sampling</li><li>LNAPL Transmissivity</li></ul>

### **Key Takeaway Points**

- **High-resolution,** i.e. scale appropriate information is critical to minimizing the uncertainty in the Site Conceptual Model
- **Remediation parameters** are not the same as risk parameters (i.e. BTEX in water does not represent TPH mass in soil)
- Multiple lines of evidence are required One technology or approach will not provide all the answers needed for remedial design selection



Partnering for Smarter Sustainable Solutions

### THINK. RESTORE, Sustainably



John Sohl, President/CEO COLUMBIA Technologies www.columbiatechnologies.com jsohl@columbiatechnologies.com +1-301-455-7644