

# Source Removal- Policy and Practice in the FDEP

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## Distinction Between Policy and Practice

- Policy- Address Source of Contamination as Primary Remedial Target
- Practice is Limited by Numerous Constraints
  - Lithology- Heterogeneity, Impermeability
  - Access- Many Sites Still Active, Little Space
  - Cost-Need to Strike Balance
  - Safety- Fire/Explosion; Stray Voltage

The Trick is Determining  
(in Advance)  
When Source Removal is  
Achievable Under the Existing  
Constraints

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The Florida Drycleaning Solvent  
Cleanup Rule Gives the FDEP  
the Authority to Focus on Source  
Area Contamination and Allow  
Natural Attenuation to Address  
Peripheral Contamination

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## Natural Attenuation

- Natural Attenuation Default Concentrations
- Evidence of Natural Attenuation
- Focus on Biological Attenuation
- Time Limit to Achieve Site Cleanup Target Levels

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## Source Removal Strategy

- Begins During Assessment
  - DNAPL Assessment is Much more Detailed and Intensive
  - Focus on Suspect Areas
    - DC Machine
    - PCE Storage Areas
    - Septic Tank/ Drainfield
    - “Out Back” (A Perennial Favorite)

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# High Density Sampling

Provides an Accurate Picture of  
Contaminant Distribution

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## High Density Sampling

- Cluster Wells
- Multi-Level Samplers
- High-Frequency Soil Sampling
- Tracer Tests
- Remote Sensing (LIF, Raman, CPT)

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## Remedy Selection

- ISCO- Losing Favor
- Cosolvent Flushing
- Co-Oxidation- New Technology
- Excavation-Vadose and Saturated Zones

## Pilot Testing

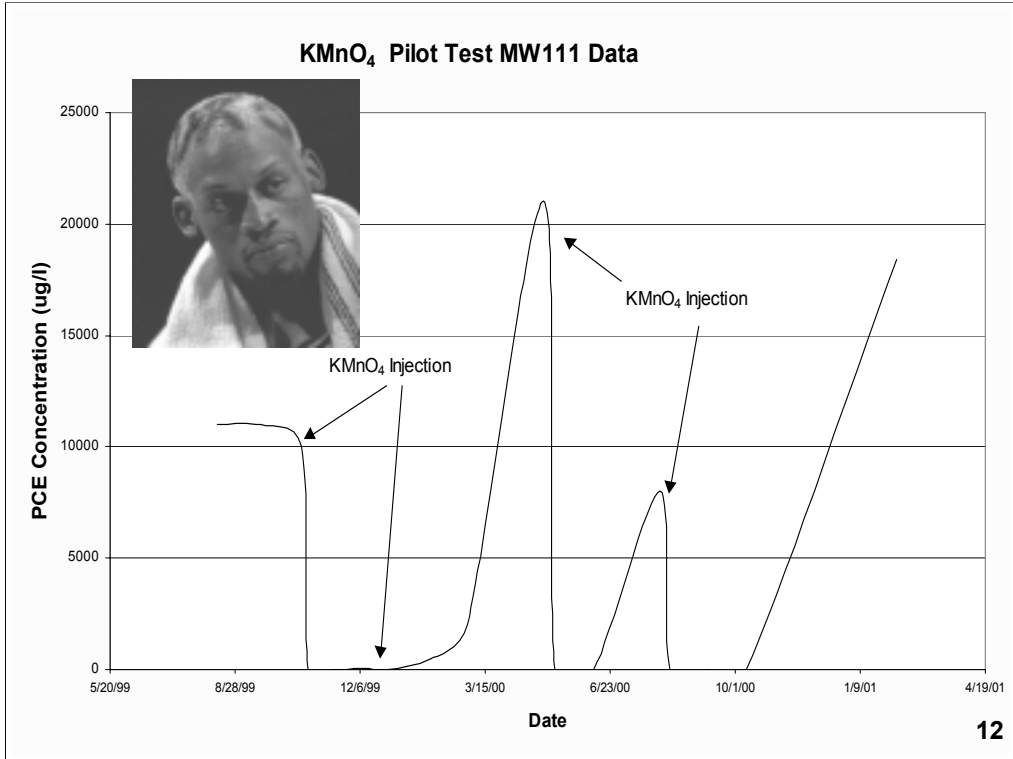
- Cosolvent Flushing
  - Containment of Cosolvent
  - Remedy Effectiveness
  - Effectiveness of Fluid Treatment

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## Pilot Testing

- ISCO
  - Rebound...and Rebound...and Rebound....
  - Soil Oxidant Demand
  - Plume Displacement
  - Trace Metal Contamination

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## Pilot Testing

- Co-Oxidation
  - Promising Technology, but Untested
  - May Still Suffer Rebound
  - Improves Contact Between Oxidant and PCE

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## Co- Oxidation

- Hybrid of ISCO and Cosolvent Flushing
- Mixture of Permanganate and Cosolvent (tert-Butyl Alcohol)
- Improves Mass Transfer and Solubility of PCE
- Gets PCE into Aqueous Phase for Oxidation
- Patented Technology Still Under Development

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## Co- Oxidation

- Faster than Permanganate Alone
- Less Infrastructure Required Than Cosolvent Flushing
- Less Space Required Than Cosolvent Flushing
- Contaminant Destroyed In-Situ-No Aboveground Treatment
- Extraction of Co-Oxidant Typically Required
- Safety Issues- Combination of a Strong Oxidizer and an Organic Molecule

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## Many Sites are Not Suitable for Source Removal at This Time

- Heavy Soils/ Fractured Limestone
- Limited Space/Access
- Areas Beneath Operating Facilities

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## Source Containment

- Hydraulic Containment- It's Hard to Like
  - Cost
  - Space Requirements
  - Infrastructure and Logistics
  - OM&M
  - Disposal of Treated Water

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## Biological Containment

- Lower Cost
- Small Footprint
- No O&M, Reduced Monitoring
- No Extracted Water to Treat/ Dispose

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## Biological Containment

- Intent is to Isolate the Source from Surrounding Groundwater
- Goal is to Establish a Biological Barrier That Can be maintained for a Long Time
  - Low Capital and O&M Costs
  - Monitoring for Effectiveness, not Source Reduction

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## Areas of Potential Savings

- Design and Installation- Cut Off the Plume
- Substrate Injection based on Site-Specific Criteria
- O&M- Milk Run Approach to Substrate Injection
- Monitoring- LIMITED number of Wells, Less Frequently
- Emphasis on Indicators of Biological Activity, Not Contaminant Reduction

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## Areas of Potential Savings

- Semi-Annual or Annual Monitoring
- Indicators of Biological Activity (ORP, pH, Chloride)
- Wells in Barrier and Downgradient, not in Source Area
- 8021 Analysis to Track Barrier Effectiveness, not “Remediation”

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Adopting Biological  
Containment is not Conceding  
Defeat

You are Just Waiting for a Bigger  
and Stronger Opponent to Die of  
Old Age

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## Major Source Removals in 2002-2003

- Butler Cleaners- Co-Oxidation
- Sages Cleaners- Cosolvent Flushing
- Johnson's Cleaners- KMnO<sub>4</sub> Reinjection
- One-Stop Cleaners- KMnO<sub>4</sub> Reinjection

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