Excavation and Disposal of Soils Impacted by Dry-cleaning Solvents

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• NCDOT Mission:

• Connecting people and places safely and efficiently, with accountability and environmental sensitivity to enhance the economy, health and well-being of North Carolina.
TIP U-4422 - SR1596 (Glensford Rd) from US401B (Raeford Rd) to SR1400 (Clifftdale Rd) Fayetteville, Cumberland County, NC
40 feet

Former Dry-Cleaning Device Location

Limit of Excavation

Centerline

U-4422 Parcel 19 - 4924 Raeford Road, Fayetteville, NC
Cross Section through Dry Cleaner at U-4422 Parcel 19 at 4924 Raeford Rd

- Centerline
- ISLAND
- Former Dry-Cleaning Device Location
- Limit of Excavation
- 40 feet
Excavation and Disposal of Soils Impacted by PCE Drycleaning Solvent

- Disposal regulations
- Mobile laboratory technology
- Case studies
  - Fayetteville NCDOT Project
  - Other NC DSCA Program Projects
Disposal of Soil Contaminated by PCE Drycleaning Solvent

- Wastes generated by drycleaning operations that use PCE are listed hazardous wastes under 40 CFR 261.31 and 15A NCAC 13A .0106.
- Includes contaminated soil and groundwater.
- Why do we care? **HIGH DISPOSAL COSTS.**
- Luckily there is an exemption.
North Carolina Hazardous Waste Section’s
“Contained-in Policy”

North Carolina Hazardous Waste Section
“Contained-in” Policy for Soil Contaminated with Listed Hazardous Waste

Revised May 20, 2005
Revised March, 2004
Revised May 7, 2002
Revised December 7, 2002
Created January 24, 2001
Excavated soil must be placed in drums or roll-offs unless special approval granted.

50 tons = 3 roll-offs
Space can be a concern!

500 tons = 33 roll-offs
Application of Contained-In Policy

Analyze 2 samples per roll-off for total VOCs

- **PCE < 0.0074 mg/kg**
  - Unrestricted Use
  - $0/ton

- **PCE between 0.0074 and 14 mg/kg**
  - Dispose as Non-Hazardous Waste
  - $50 to $100/ton

- **PCE > 14 mg/kg**
  - Perform TCLP Analysis
  - **TCLP PCE < 0.7 mg/L**
    - Dispose as Non-Hazardous Waste
    - $350 to $750/ton
  - **TCLP PCE > 0.7 mg/L**
    - Dispose as Hazardous Waste
    - $350 to $750/ton

PCE between 0.0074 and 14 mg/kg

PCE < 0.0074 mg/kg

Unrestricted Use

$0/ton

$50 to $100/ton
Mobile Laboratory Details

• Fully certified lab data
• Three labs certified in NC
• 1-2 hour turnaround
• 15-30 samples per day
• Low detection limits
  o PCE 0.7 ug/L for groundwater
  o PCE 0.002 mg/kg for soil
Mobile Laboratory Costs & Analyses

- KB Labs (Cary, NC):
  - Mobilization - $300 to $1,000
  - Daily Rate - $1,500
  - Certified in NC for VOCs only
  - $1,500/20 samples = Average $75/sample

- ECCS (mobe from Wisconsin):
  - Mobilization - $1,750 to $3,500
  - Daily Rate - $1,925/day
  - Certified in NC for VOCs, SVOCs, PCBs, pesticides, explosives, metals

- New Age Landmark (mobe from Michigan):
One Hour Koretizing, Fayetteville, NC

Former Drycleaning Machine and Solvent Storage Area

Excavation Goal: Contained-In Policy Unrestricted Use Level of 0.0074 mg/kg for PCE

Prior Soil Boring Locations
- Red circle > Excavation Goal
- Green circle > Excavation Goal

NCDOT Cut
NCDOT Fill
One Hour Koretizing, Fayetteville, NC

NCDOT Cut

NCDOT Fill

Initial Excavation Area

Sidewall Sample Locations
- > Excavation Goal
- < Excavation Goal
One Hour Koretizing, Fayetteville, NC

Final Excavation Area

NCDOT Cut
NCDOT Fill

Sidewall Sample Locations
- > Excavation Goal
- < Excavation Goal

Final Excavation Volume: 45 tons
Excavated soils characterized as non-hazardous based on mobile lab results.
NC Drycleaning Solvent Cleanup Act (DSCA) Program

• Voluntary program that helps pay for cleanup of sites impacted by dry-cleaning solvents.

• Primary source of funding is a sales tax and a tax on dry-cleaning solvent purchases.

• State hires contractors to perform work.

• Proponent of Triad approach.
Ange Speed Wash, Manteo, NC

- 5-day direct-push/mobile laboratory survey
- Vertical profiling at all boring locations
Ange Speed Wash, Manteo, NC

- 13 nested well sets installed in strategic locations
- 950’ plume delineated (horizontal and vertical) and MW network installed in two field events
One Hour Koretizing, Fayetteville, NC
Phase 2 Direct-Push/Mobile Lab
Former One Hour Koretizing Cleaners

One Hour Koretizing, Fayetteville, NC
Phase 3 Direct-Push/Mobile Lab
Former One Hour Koretzing Cleaners

One Hour Koretzing, Fayetteville, NC
Phase 4 Direct-Push/Mobile Lab
Options Beyond Excavation to Address PCE Impacted Soils

• Soil vapor extraction
• Chemical amendments:
  o Enhanced reductive dechlorination (ERD)
  o Chemical oxidation
• Thermal treatment
WP Ballard, Durham, NC

- Soil partially excavated.
- Emulsified Zero Valent Iron (ZVI) placed in base of excavation for ongoing ERD.
Fuller Supply, Concord, NC

Soil blending using ABC+ for ERD
Direct-Push Injection

Distribution in unsaturated soils can be problematic.

Sodium Permanganate
Pinehurst Hotel Cleaners, Pinehurst, NC

Ex-situ soil treatment using mobile steam distillation unit.
Excavation Pros and Cons

- **Pros** – Most foolproof method to ensure contaminant removal, fast.

- **Cons** – Expensive, contamination must be accessible with excavation equipment, room needed for roll-off storage.
In-Situ Treatment Pros and Cons

- **Pros** – Often much less expensive for larger projects, some options can reach less accessible areas.

- **Cons** – Contaminant removal less reliable, longer timeframe, permitting requirements, possible geotechnical compaction issues.
Summary

- Excavation and disposal of soil impacted by PCE drycleaning solvent is strictly regulated and expensive.
- Mobile laboratories and other Triad approach technologies can save cost and time.
- Consider in-situ or ex-situ treatment options beyond traditional excavation and disposal.
Questions?