Former Asphalt Testing Lab
420 Sugar Lake Road
Pittsboro, North Carolina

April 2013

Prepared by: Chris Niver, P.G., CHMM
North Carolina Department of Transportation

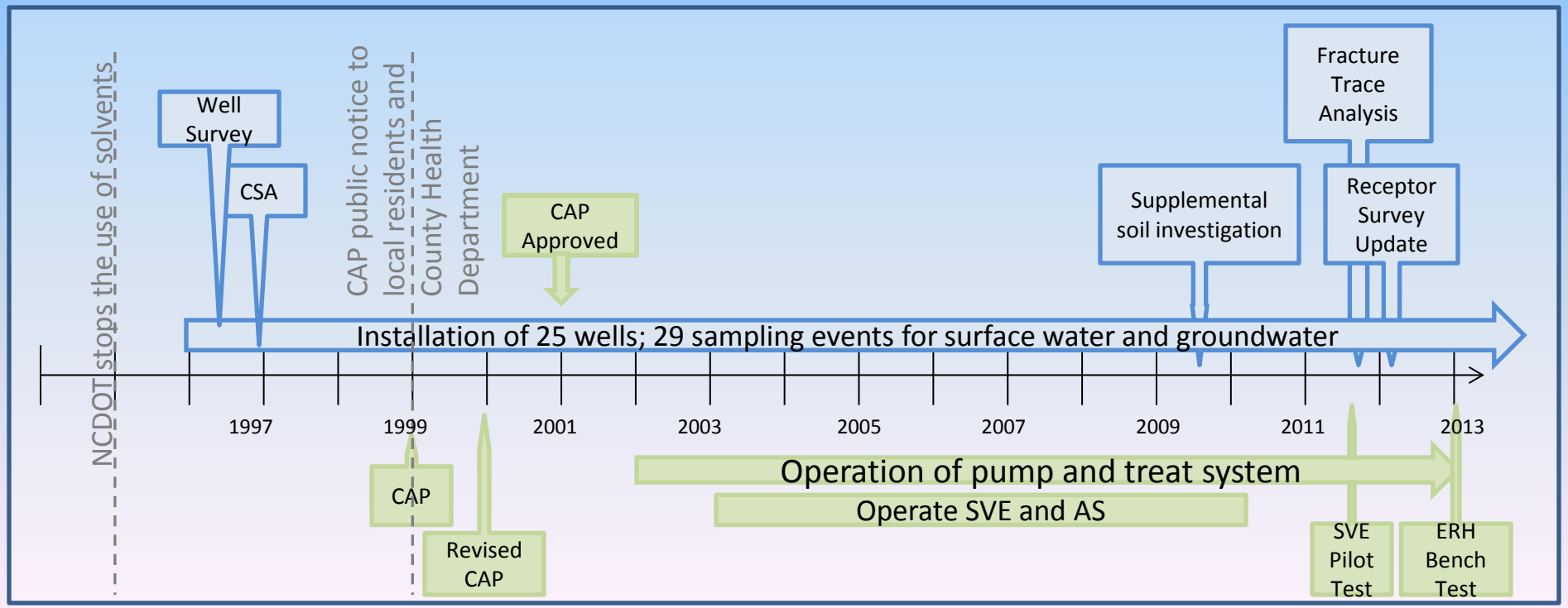
Presentation Topics

- Site History
- Site Status
- Remediation
- Path Forward

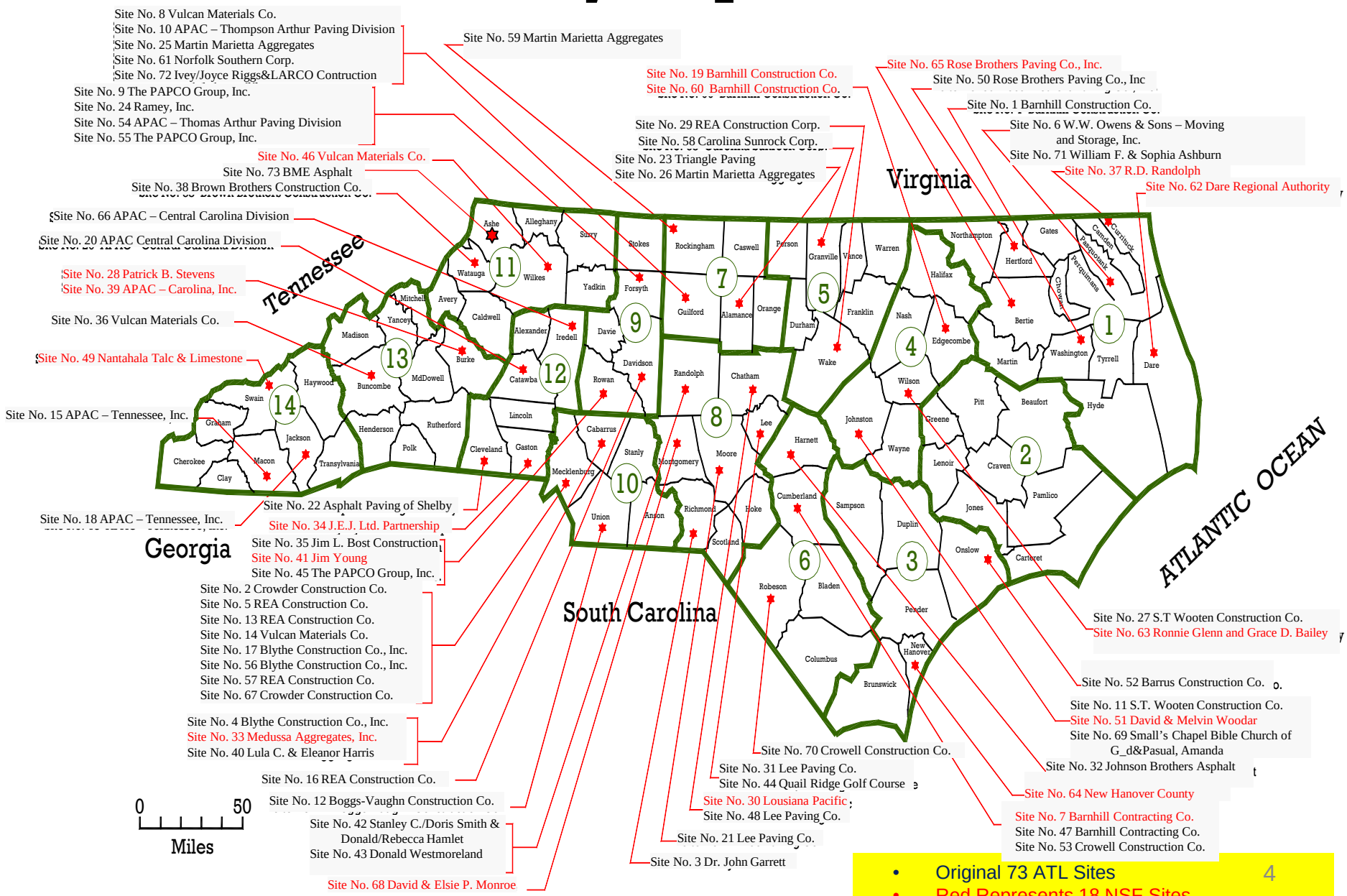
Site History

- Chronology
- Work to Date
- Target Compounds

- 1968 – present — Site operation for asphalt production
  - 1968 – 2000 — Lee Paving – site owner and operator
  - 2000 – present — ST Wooten – site owner and operator
- 1968 – 1995 — Solvents used in asphalt testing by NCDOT
  - *Solvent usage may have continued by other third parties*
- 1989 – present — Environmental assessment and remediation by NCDOT



Priority Asphalt Sites



- Original 73 ATL Sites
- Red Represents 18 NSF Sites

Site History

- Chronology
- Work to Date
- Target Compounds

Memorandum of Agreement Summary – NCDOT and NCDENR

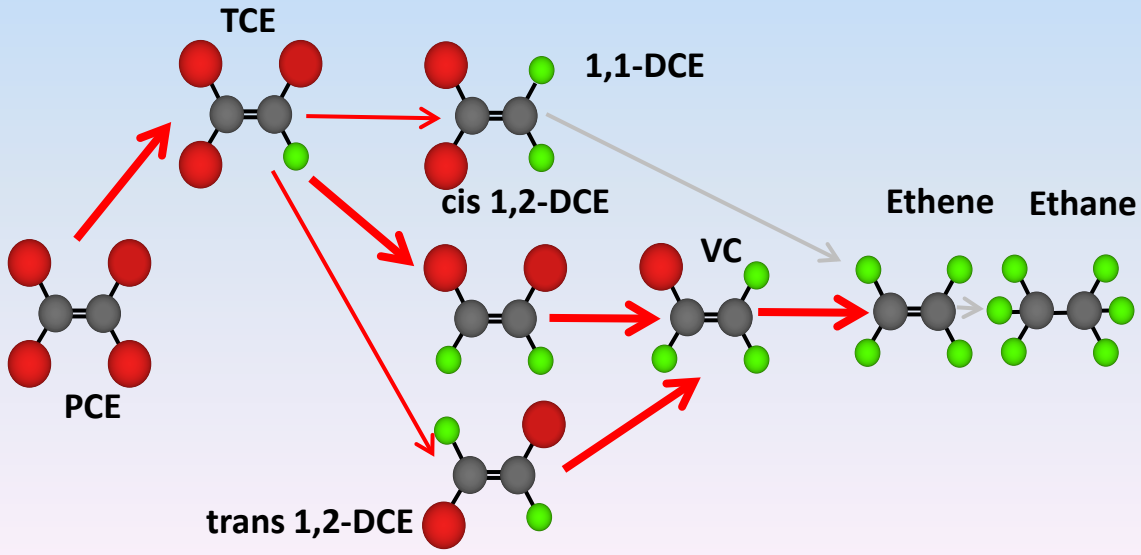
- 1989: primary MOA to address sites
  - Sites not owned or controlled by NCDOT
- 1995: Legislative Mandate to NCDENR and NCDOT
- 1996: additional MOA
  - Testing methods, scope, and target list
  - CSA process
  - target compound list established
- 1999: CAP process

Investigation (1997-present)	Remediation (2002-present)
100+ soil samples analyzed	P&T started in 2002 and provide hydraulic control
25 groundwater monitoring wells installed	AS/VE System installed in 2003
29 groundwater monitoring events conducted	Treated six million+ gallons of groundwater
450 + groundwater samples analyzed	Removed ~13 lbs of TCE from groundwater
Thermal imaging to assess surface water	SVE pilot test conducted in April 2012
Fracture trace analysis and borehole geophysics	Electrical Resistance Heating (ERH) Bench test completed February 2013

Site History

- Chronology
- Work to Date
- Target Compounds

NCDOT Target Compounds		
carbon tetrachloride	*chloroform* *methyl chloride*	*methylene chloride*
trichloroethene	**cis,** trans**, 1,1-dichloroethene**	**vinyl chloride**
1,1,1-trichloroethane	**1,1-dichloroethane**	**chloroethane**



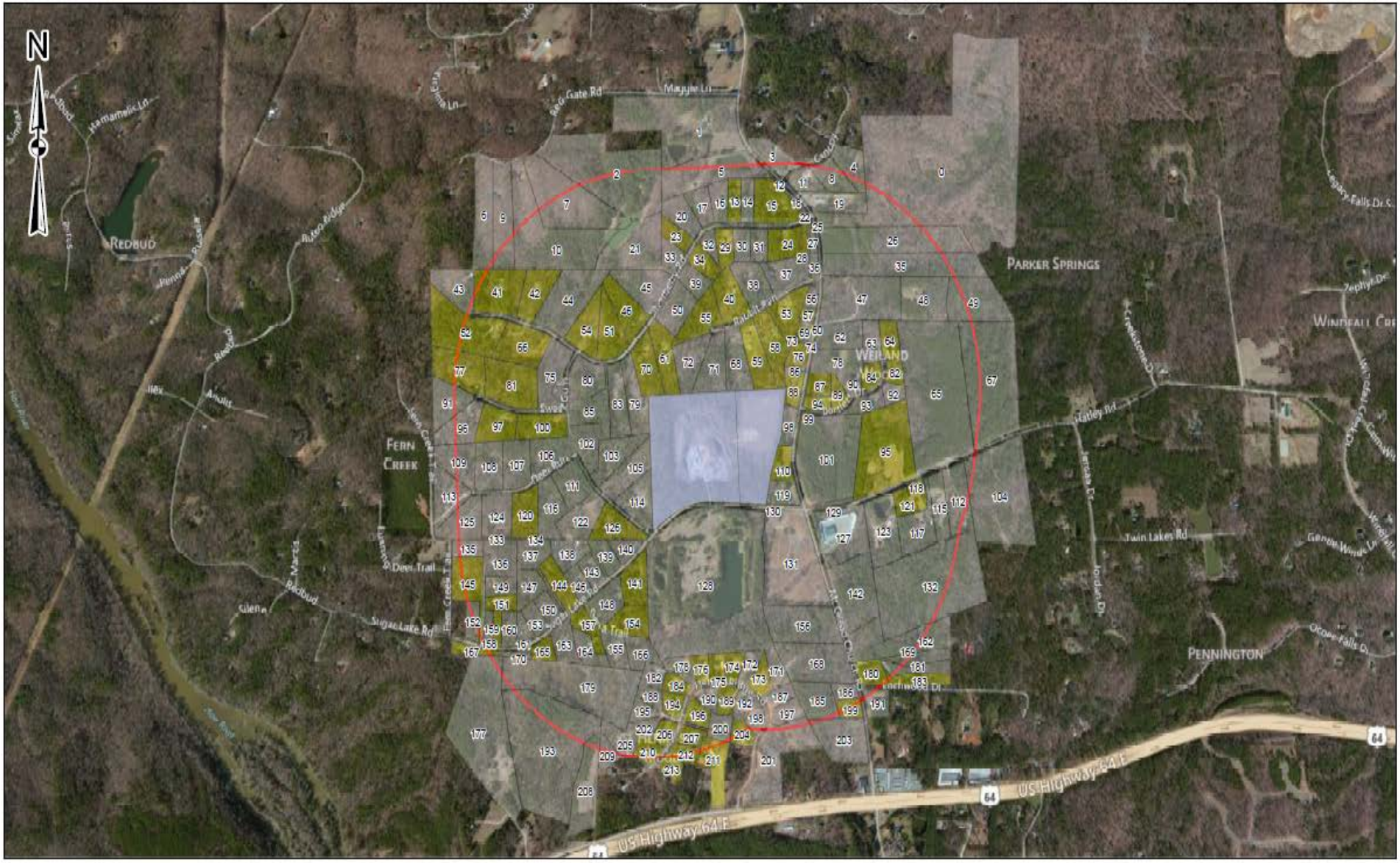
Solvent Users
Lee Paving
Private Testing Firms in Lab
Air Stack Testing
NCDOT Inspectors

Non-Target Compounds	
1,1,2-Trichloroethane	Chlorobenzene
1,2,3-Trichloropropane	Chloroethane
1,2,4-Trimethylbenzene	Isopropylbenzene
1,3,5-Trimethylbenzene	m,p-Xylene
Acetone	Methyl ether ketone
Benzene	Naphthalene
Bromobenzene	n-Butylbenzene
Bromochloromethane	o-Xylene
Bromodichloromethane	sec-Butylbenzene
Bromoform	tert-Butylbenzene
Bromomethane	Tetrachloroethene
Carbon disulfide	Toluene
1, 4-Dioxane	Trichlorofluoromethane

Site Status

- Receptors
- Soil
- Groundwater
- Surface Water

Potable Wells	Vapor Intrusion	Surface Water
1996 – first well survey completed	No structures above impacted soil	30 surface water samples collected for analysis
2012 – most recent update of well survey	Nearest structure 100 feet from impacts	2003-2011: no 2B exceedances during continuous system operation
52 wells w/in 1500 feet	No vapor intrusion pathways	10 detects of target compounds in surface water (Historically when groundwater system not operating)
97 wells w/in ½ mile		Dry in Summer
2 wells closest to site are sampled regularly		
No compounds detected (Installing 2 POE Carbon Systems)		



Properties within Half-Mile Radius
Former Asphalt Testing Site No. 6-48
North Carolina Department of Transportation
Pittsboro, North Carolina

0 0.125 0.25 0.5 0.75 1
Miles

Legend

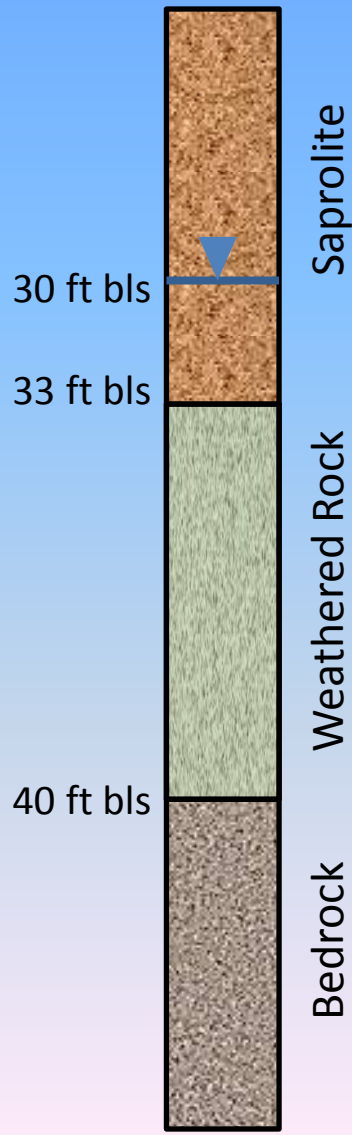
- Parcel without Suspected Well
- Parcel with Suspected Well
- 0.5 Mile Radius from Site
- NC DOT Site

AECOM

Site Status

- Receptors
- Soil
- Groundwater
- Surface Water

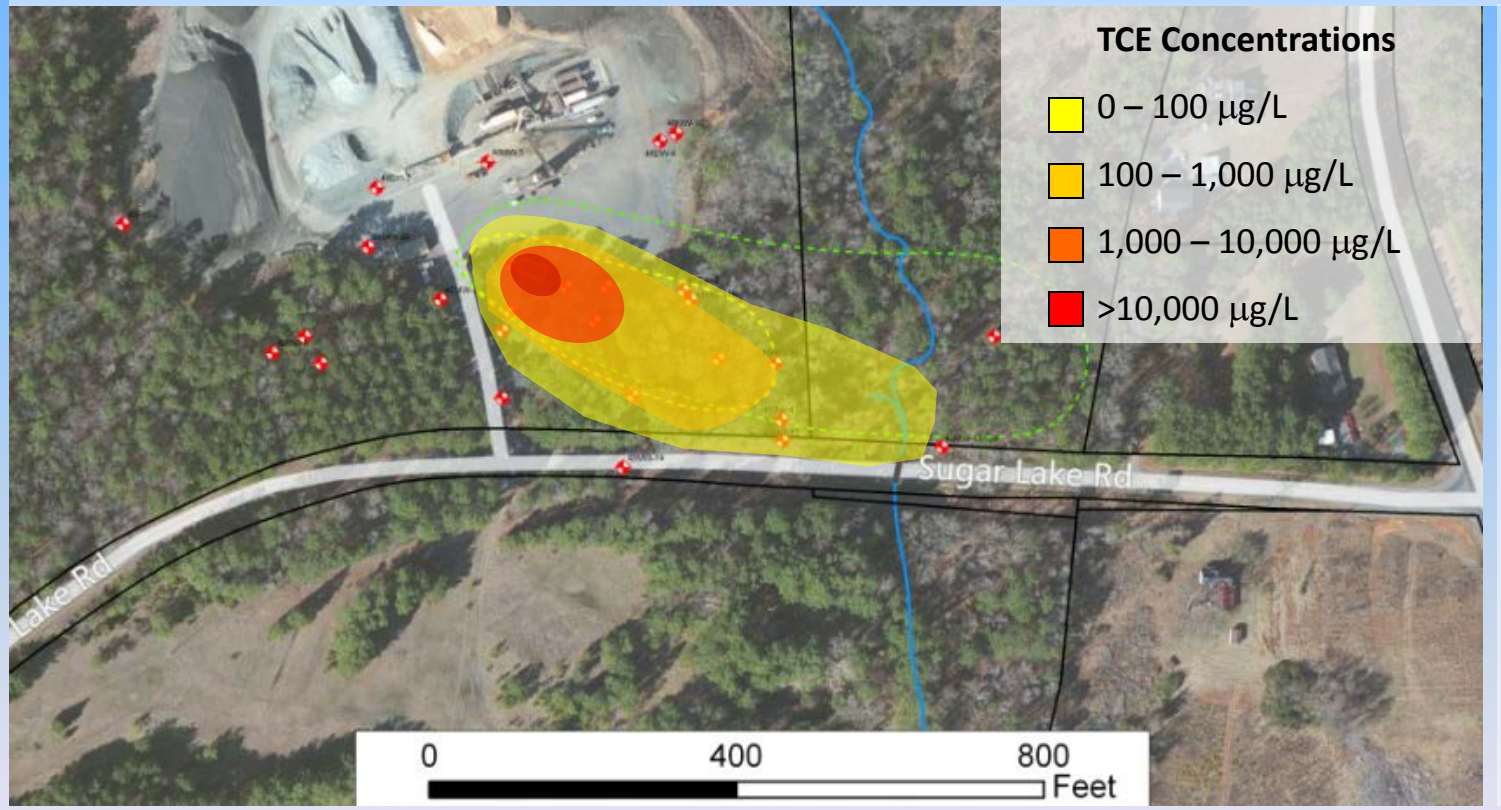
Target	1,1,1-trichloroethane	carbon tetrachloride	trichloroethene	vinyl chloride
Non-DOT Compounds	1,1,2-Trichloroethane	Bromobenzene	Chlorobenzene	n-Butylbenzene
	1,2,3-Trichloropropane	Bromochloromethane	Chloroethane	o-Xylene
	1,2,4-Trimethylbenzene	Bromodichloromethane	Isopropylbenzene	sec-Butylbenzene
	1,3,5-Trimethylbenzene	Bromoform	m,p-Xylene	tert-Butylbenzene
	Acetone, Benzene	Bromomethane	Methyl ether ketone	Tetrachloroethene
	1,4-Dioxane	Carbon disulfide	Naphthalene	Toluene



Site Status

- Receptors
- Soil
- Groundwater
- Surface Water

Saprolite Groundwater Results – October 2012



Target Compounds

- TCE
- 1,1-DCE
- Cis-1,2-DCE
- 1,1,1-TCA
- 1,1-DCA

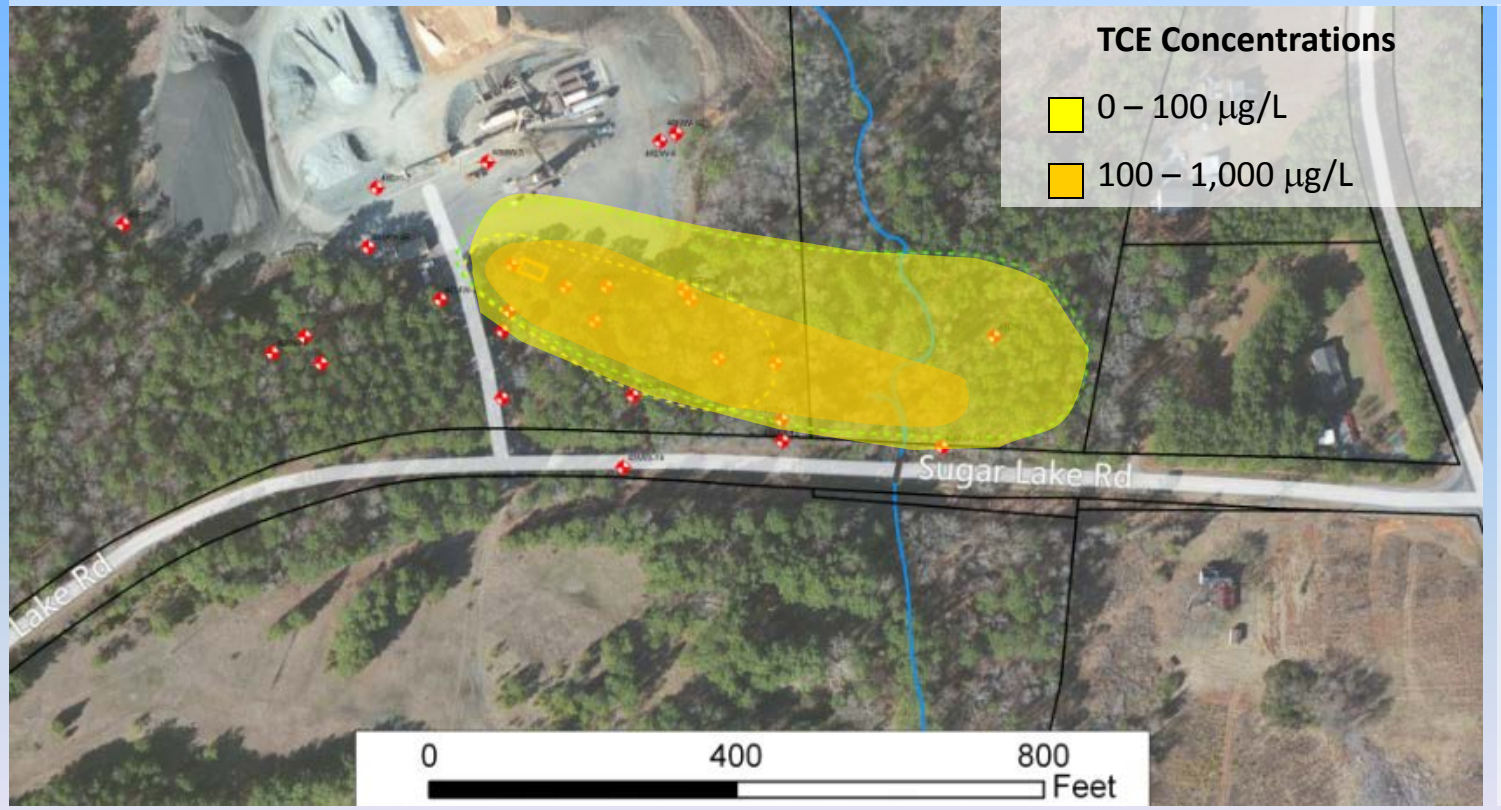
Non Target

- PCE
- 1,1,2-TCA
- 1,2-DCA
- Toluene

Site Status

- Receptors
- Soil
- Groundwater
- Surface Water

Bedrock Groundwater Results – October 2012

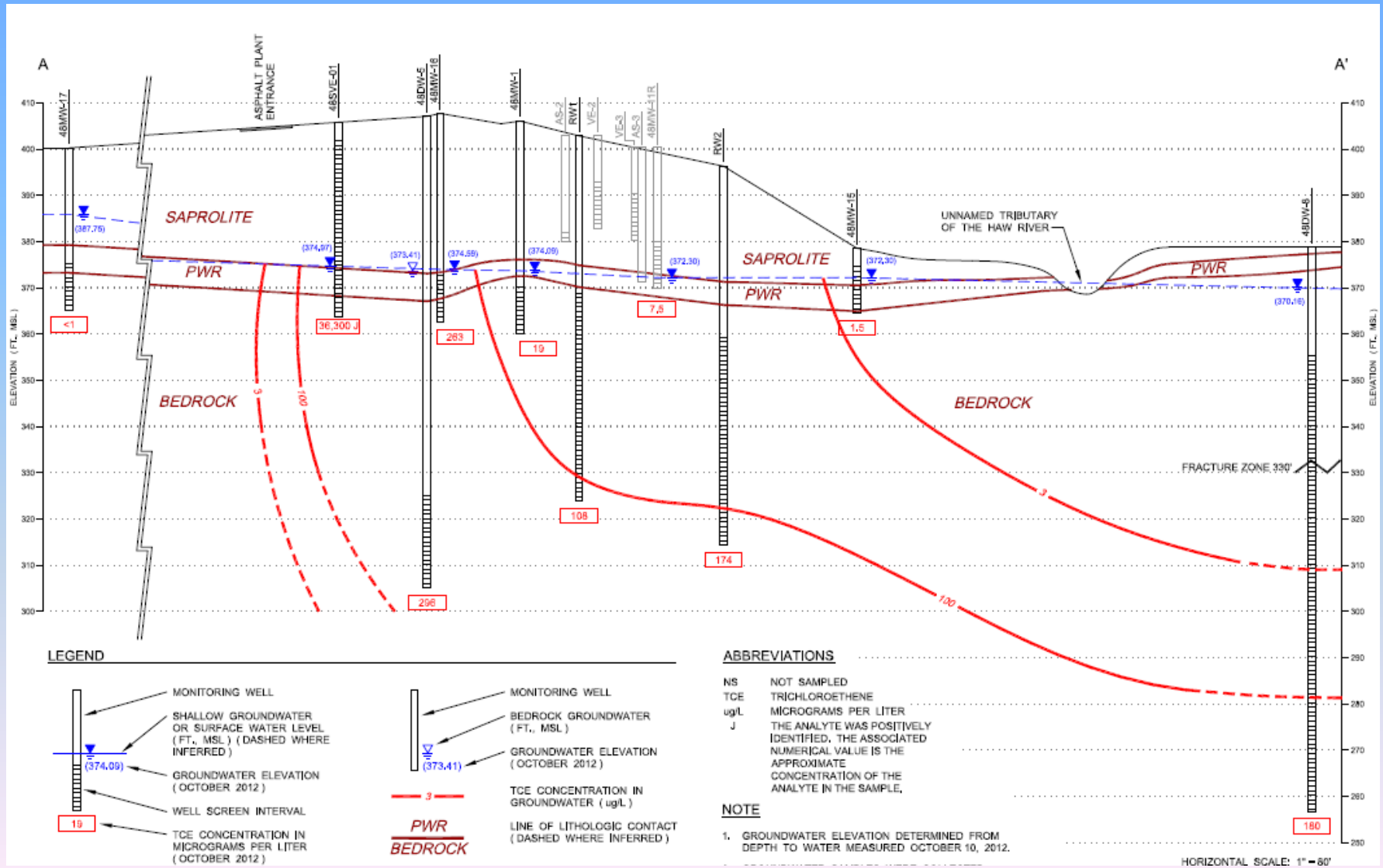


Target Compounds
- TCE
- 1,1-DCE
- Cis-1,2-DCE
- 1,1,1-TCA
- 1,1-DCA

Non Target
- PCE
- 1,1,2-TCA
- 1,2-DCA
- Toluene

Site Status

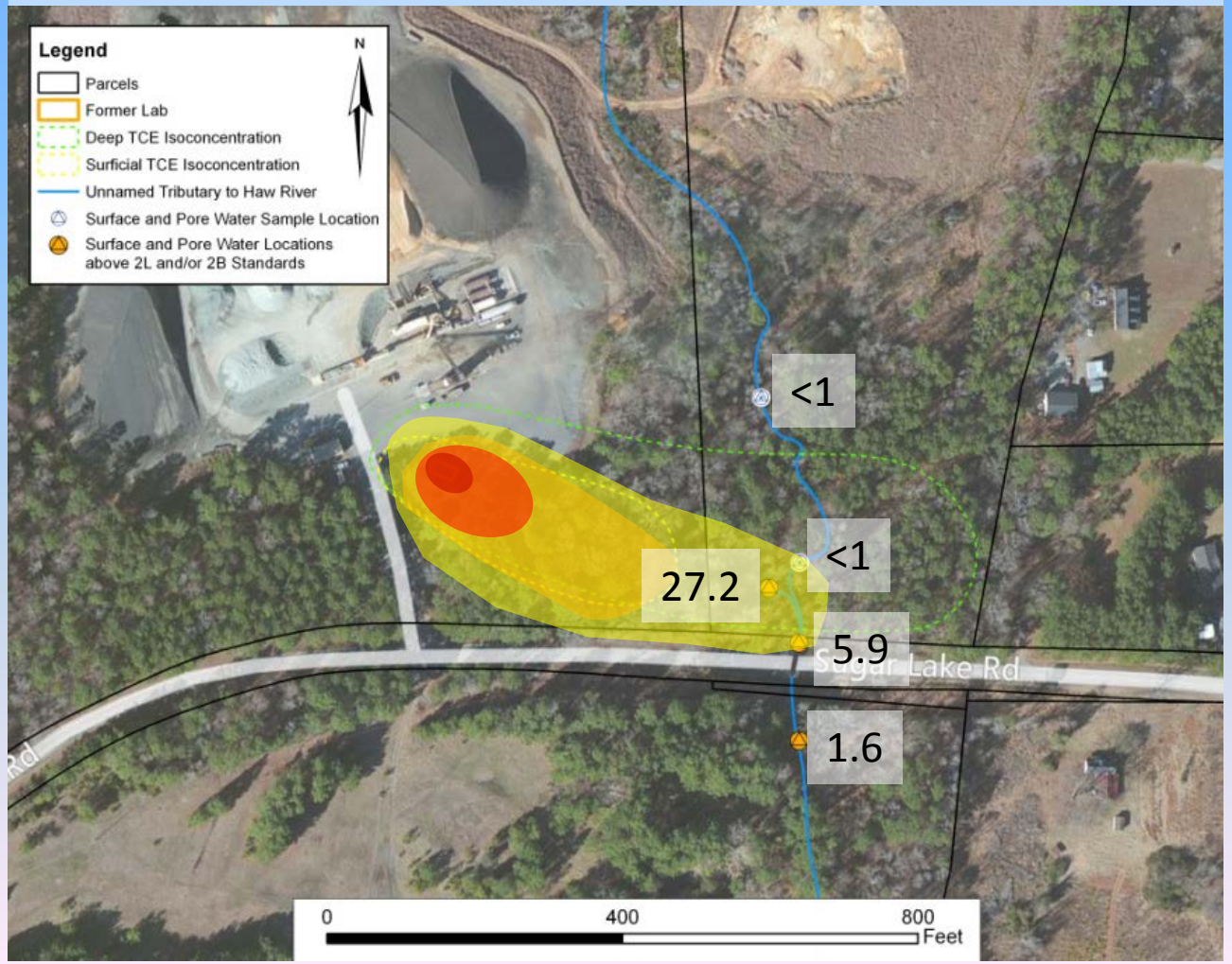
- Receptors
- Soil
- Groundwater
- Surface Water



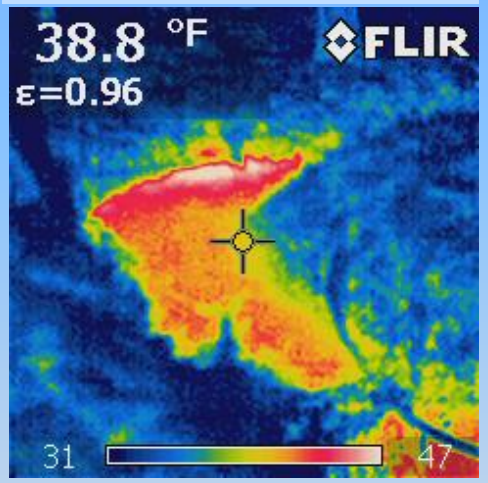
Site Status

- Receptors
- Soil
- Groundwater
- Surface Water

TCE Surface Water Results – November 2012



Thermal Imaging Camera



Remediation

- Groundwater
- Soil
- Surface Water

- Continue operation of pump and treat system

- Remediate source area soils
  - Electrical Resistance Heating (ERH)

- Evaluate groundwater and surface water trends
  - monitor sentinel wells
  - monitor potable wells

- Groundwater Feasibility Study
  - optimize pump and treat
  - supplemental in-situ (bioremediation)
  - monitored natural attenuation

Remediation

- Groundwater
- Soil
- Surface Water

- 7,000 CY requires treatment
  - 1,000 CY Hazardous
    - ~600 ft^2 area
    - near former lab
  - 6,000 CY Non-hazardous
    - ~4,800 ft^2 area
    - extends to water table

Remedy	ERH	Excavate	SVE	Blend
Overall Protection Human/Environment				
Long-Term Effectiveness				
Mass Reduction				
Implementability				
Cost				
Community Acceptance				

Remediation

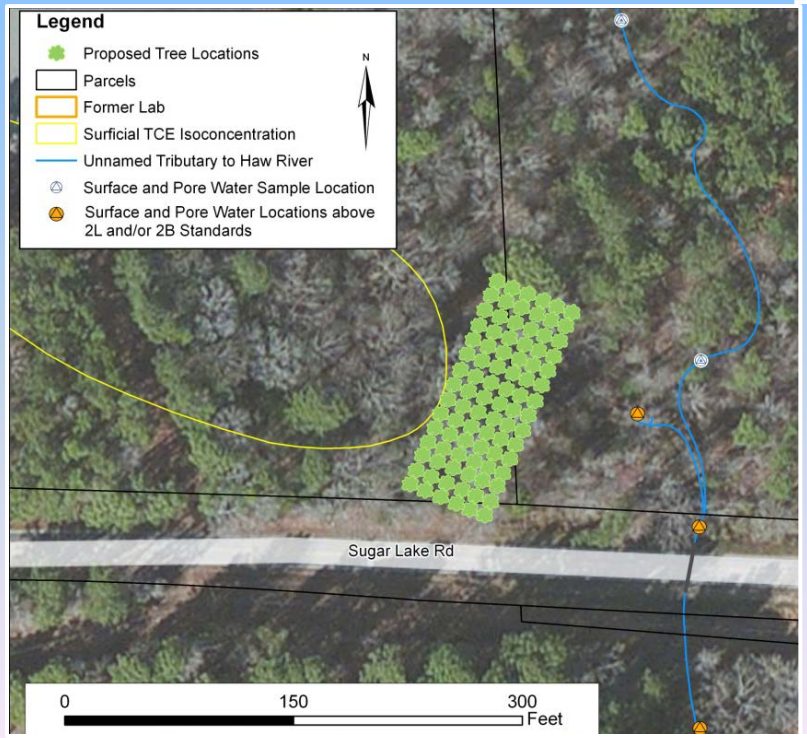
- Groundwater
- Soil
- Surface Water

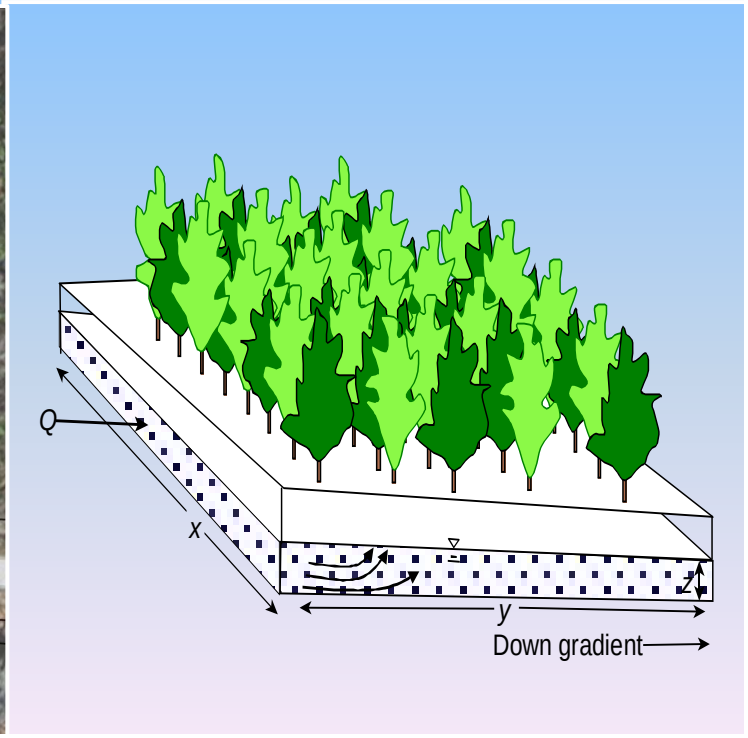
INTERIM MEASURE

- evaluate remedies
- design remedy – phytoremediation
- intercept groundwater in riparian areas

LONG TERM

- Source area soil treatment
- evaluate need for source area groundwater treatment





Remediation

- Groundwater
- Soil
- Surface Water

Path Forward

Task	Activity	Schedule
Potable Wells	Update Survey	Annually
	Sample Select Wells	Quarterly
	County coordination	Semi-annual report submittal
Soil	Bench Test ERH	Completed
	Complete CAP	03/13 – 05/13
	Implement ERH	07/13 – 07/14
Groundwater	~3 Proposed Shallow Wells	Spring 2013
	~7 Proposed Deep Wells	Spring 2013
	Monitoring Frequency	Semi-annual
	Continue P&T System	Weekly system checks Monthly effluent sampling
Surface Water	Remedy Evaluation	On-going
	Remedy Design	12/12 – 02/13
	Remedy Implementation - Phytoremediation	03/13 – 05/13

FACT SHEET

North Carolina Department of Transportation's Commitment to the Environment & Public Health

Former Asphalt Testing Lab ▪ 420 Sugar Lake Road, Pittsboro, North Carolina

NCDOT Contacts: Chris Niver, PG, CHMM, 919.707.2972 ▪ Ethan Caldwell, LG, PE, 919.835.8481

Asphalt Testing Laboratories in N.C.

The North Carolina Department of Transportation (NCDOT) is charged with the responsibility of constructing and sustaining North Carolina's roads. To accomplish this, NCDOT obtains asphaltic paving products from private companies. These companies operate plants on property that NCDOT neither owns nor controls.

By the 1960s, NCDOT implemented a Quality Assurance/Quality Control (QA/QC) program requiring certification of the privately owned asphalt plants. To accommodate the QA/QC program, asphalt suppliers built and maintained on-site asphalt testing laboratories. On-site laboratory testing was done in accordance with applicable American Society for Testing and Materials (ASTM) Standards using various chlorinated compounds to test the asphalt composition.

Because parties other than NCDOT purchased asphalt for non-NCDOT projects (e.g., city paving projects, private paving projects, projects for the federal government, etc.) the asphalt plant operators and private testing firms also performed asphalt testing independent of NCDOT. The independent testers used the same chlorinated compounds and ASTM methods.

The solvent properties of chlorinated compounds had great utility in other asphalt plant applications including use as an asphalt release compound for truck beds and for miscellaneous equipment cleaning. Chlorinated solvents were also used for ASTM stack testing requirements for air permit compliance. NCDOT ceased the use of solvents in asphalt testing in 1995.

Regulatory Status of Asphalt Testing Laboratories

Under the instruction of the North Carolina General Assembly, NCDOT and NCDENR entered into a Memoranda of Agreement (MOA) beginning in 1989 to conduct site assessments at former asphalt testing laboratories. Additional MOAs were agreed to in 1996 and 1999 to establish a target list of compounds and prepare Corrective Action Plans (CAP) at a select number of sites, including the testing laboratory in Pittsboro. Initially, oversight of site investigation and remediation activities were completed by NCDENR, Division of Water Quality, Aquifer Protection Section. NCDENR reorganized in 2007 and NCDOT is currently coordinating with NCDENR regarding their regulatory responsibility with respect to future site investigation and remediation. Notwithstanding, NCDOT has continued site investigation and remediation activities in accordance with the NCDENR approved CAP and the MOAs.

Pittsboro History and Highlights

Site History

- 1968 – present: site operation for asphalt production
  - 1968 – 2000: Lee Paving – site owner and operator
  - 2000 – present: ST Wooten – site owner and operator
- 1968 – 1995: solvents used in asphalt testing by NCDOT
  - *Solvent usage may have continued after 1995 by other parties*
- 1989 – present: environmental assessment and remediation by NCDOT

Solvent Users

- Lee Paving
- Private Testing Firms
  - S&ME
  - Law Engineering (now AMEC)
  - F&R
- Army Corp of Engineers
- NCDOT Inspectors

Protection of Receptors

- Completed first well survey in 1996
- Most recent update was completed in 2012
- Confirmed no private water supply wells are impacted
- Currently assessing groundwater to surface water interactions

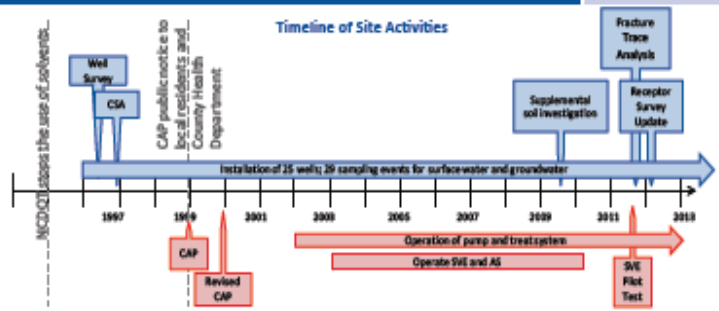
NCDOT Investigation (1997-present)

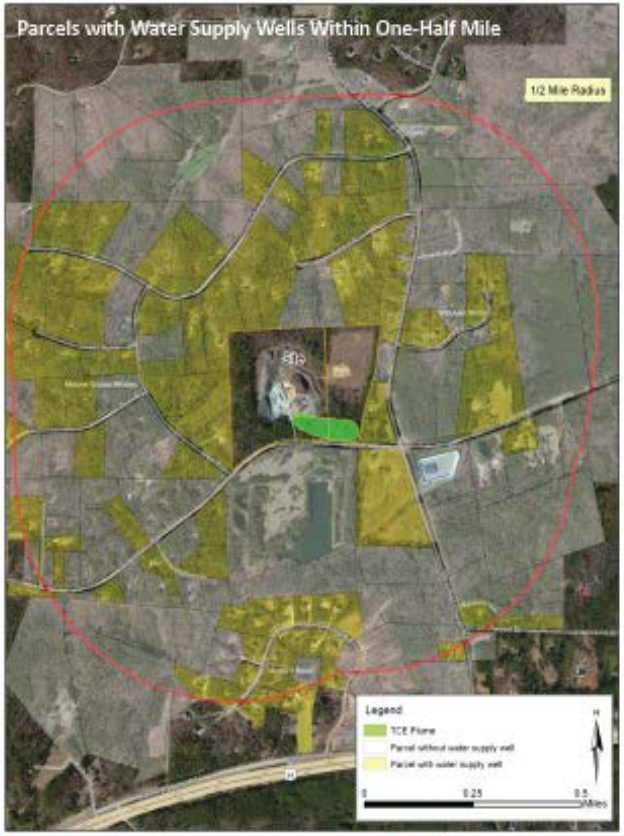
- 100+ soil samples analyzed
- 25 groundwater monitoring wells installed
- 29 groundwater monitoring events conducted
- 450+ groundwater samples analyzed
- Thermal imaging to assess surface water
- Fracture trace analysis and borehole geophysics

NCDOT Remediation Activities

- Air Sparge/Soil Vapor Extraction (AS/SVE) System installed 2002
- Pump & Treat system started in 2003 to provide hydraulic control
- Treated six million+ gallons of groundwater
- Removed ~13 lbs of TCE from groundwater
- SVE pilot test conducted in April 2012
- Electrical Resistance Heating bench-scale test planned for winter 2012-2013

Timeline of Site Activities





Non-Target Compounds -

Compounds found on-site not associated with NCDOT use:

- 1,1,2-Trichloroethane
- 1,2,3-Trichloropropane
- Tetrachloroethene
- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene
- 1,4-Dioxane
- acetone
- benzene
- Bromobenzene
- Bromochloromethane
- Bromodichloromethane
- Bromoform
- Bromomethane
- Carbon disulfide
- Chlorobenzene
- Chloroethane
- Isopropylbenzene
- m,p-Xylene
- Methyl ether ketone
- Naphthalene
- n-Butylbenzene
- o-Xylene
- sec-Butylbenzene
- tert-Butylbenzene
- Toluene

Target Compounds Detected On-Site

- 1,1,1-TCA (trichloroethane)
- cis-1,2-DCE (dichloroethene)
- 1,1-DCA (dichloroethane)
- carbon tetrachloride
- chloroethane
- TCE (trichloroethene)
- vinyl chloride

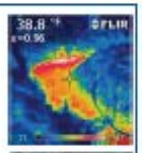
PATH FORWARD

Supplementation Investigation and Delineation

- 10 additional wells planned (Winter-Spring 2013)
- Continue semi-annual groundwater sampling
- Evaluation of groundwater and surface water interaction (On-going)
- Sample potable wells quarterly and update well survey annually

Evaluation of Alternative Remedies

- Source area soils
  - Pilot test ERH (Winter 2012-2013)
- Continue operation of pump and treat system
- Evaluate groundwater remediation in riparian areas
  - Design of Phytoremediation (Spring 2013)



TARGET COMPOUNDS -

Solvents Used by NCDOT for Asphalt Testing

Trichloroethene (TCE)

Breakdown Products

- 1,1-dichloroethene
- 1,2-trans-dichloroethene
- 1,2-cis-dichloroethene
- Vinyl chloride

1,1,1-Trichloroethene (1,1,1-TCA)

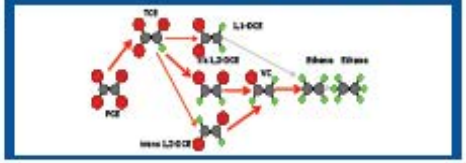
Breakdown Products

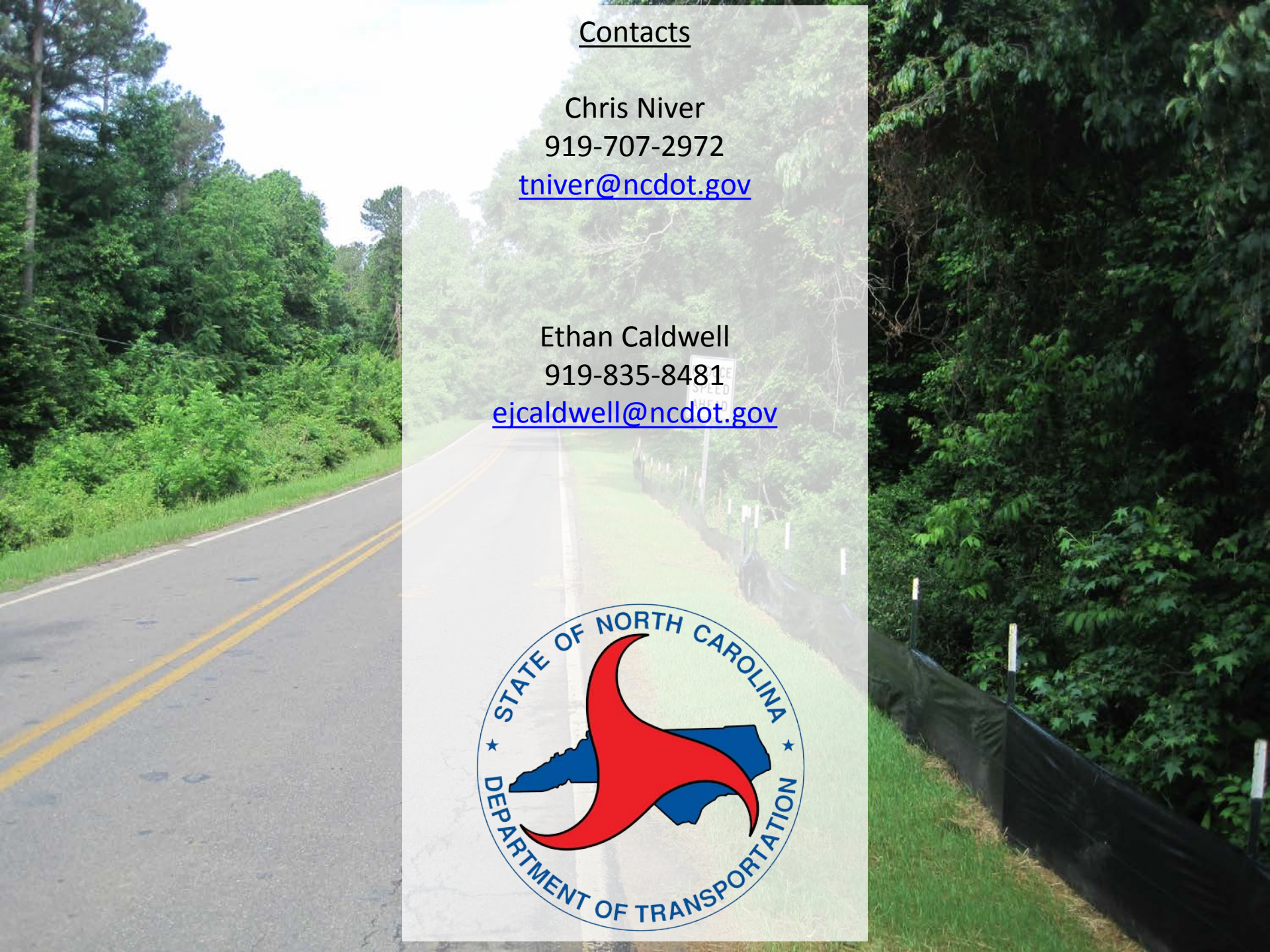
- 1,1-dichloroethane
- chloroethane

Carbon Tetrachloride

Breakdown Products

- chloroform
- dichloromethane (methylene chloride)
- chloromethane (methyl chloride)





Contacts

Chris Niver
919-707-2972
tniver@ncdot.gov

Ethan Caldwell
919-835-8481
ejcaldwell@ncdot.gov