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Memorandum

To	Ethan Caldwell, PE, LG (NCDOT)	Page	1
CC	File		
Subject	Former Lee Paving Asphalt Testing Site No. 6-48 (34613.3.13) – Evaluation of Human Health Risks Posed by Surface Water TCE Concentrations		
From	Kristen Durocher (AECOM); Chris Mason (AECOM)		
Date	September 13, 2013	Project Number	60297531.9

Per your request, surface water data collected from the intermittent stream located adjacent to the Former Lee Paving Asphalt Testing Site No. 6-48 in Pittsboro, Chatham County, North Carolina (the Site) were reviewed for potential contamination of fish that may be caught by anglers in off-site, downgradient ponds. The intermittent stream is an unnamed tributary of the Haw River, which flows south across the eastern portion of the property. The off-site ponds are located on an abandoned property formerly occupied by a quarry. The ponds are located approximately 500 feet to the south and downgradient of the Site. Based on discussions with the current quarry property owner (Sugar Lake Land Company, Inc.), it is not uncommon for people to fish in these ponds, catching a variety of warmwater fish including catfish, carp, and bass. Representatives of the Sugar Lake Land Company have expressed concerns that contamination from the Site may be impacting fish in the ponds, potentially causing harm to the anglers who consume the fish.

Based on the estimated groundwater flow direction at the Site, it is likely that groundwater is discharging to the stream which flows adjacent to the Site in a north to south direction and may be discharging to the quarry ponds as well. In November 2012 and April 2013, five surface water locations were sampled in the stream. These locations, ordered from upstream to downstream, are:

- 48HS-4-SW: upstream of the site
- 48HS-3-SW: adjacent to the site
- 48HS-2-SW: adjacent to the site
- 48HS-1-SW: adjacent to the site
- 48HS-5-SW: downstream of the site

Concentrations of cancer-causing compounds, including trichloroethylene (TCE), were detected in surface water collected from the stream adjacent to and immediately downstream of the Site. Detected compounds are summarized in Table 1.

Both the United States Environmental Protection Agency (USEPA) and the North Carolina Department of Environment and Natural Resources (NCDENR) have established criteria that are used to determine if concentrations of contaminants in surface water may be harmful to human health through either drinking the water (Water Supply Standard) or through eating fish that may have

bioaccumulated the contaminants into their tissues (Human Health Standard). Since these ponds are being used for fishing and not as a drinking water source, the Water Supply Standard criteria are not applicable to the ponds. TCE is not very bioaccumulative, meaning that fish exposed to TCE in water do not accumulate a lot of TCE into their tissues. USEPA considers bioaccumulation to be very important when determining if waters are safe for human use. TCE is not on the USEPA's list of bioaccumulative compounds, but EPA has developed a criterion for protecting humans from ingesting too much TCE from the consumption of fish living in water that is contaminated with TCE.

TCE measured in the November 2012 sample collected at 48HS-2-SW exceeded the Human Health Standard for TCE. However, no exceedances were detected in the downstream off-site sampling location (48HS-5-SW).

Surface water samples have not been collected from the quarry. However, based on the proximity of the stream to the quarry, it is likely that TCE concentrations in the quarry would be similar to or lower than the concentrations detected at 48HS-5-SW, which were lower than the Human Health Standard.

It is important to note four things:

1) The North Carolina Department of Transportation has installed and is operating a groundwater treatment system at the Site to capture and remove TCE from the groundwater before it discharges to the surface water. The treated groundwater is discharged to the stream under a National Pollution Discharge Elimination System Permit.
2) The intermittent stream is not a source of drinking water and is not likely to be able to support a fish community that would be sought after by anglers for consumption.
3) The concentrations of TCE downstream of the Site are much lower than the TCE criterion, indicating the concentration of TCE in water downstream of the Site is low enough to not cause risk to human health.
4) Due to dilution, discharge of groundwater to the quarry ponds will likely result in concentrations lower than those detected in the small intermittent stream adjacent to the quarry. While TCE concentration data are not available for the ponds, it is highly unlikely that TCE would be detected in these larger water bodies.

Overall, while TCE has been detected in the intermittent stream, concentrations decrease with distance from the Site. The concentrations of TCE detected in the stream are generally well below the criterion protective of fish consumption (Human Health Standard). Furthermore, since TCE is not generally considered to be bioaccumulative and the quarry ponds serve as a dilution for any TCE that may migrate downstream, it is highly unlikely that fish caught and consumed in the quarry ponds would pose any risk to humans from TCE.

Table 1
Summary of Surface Water Analytical Results
Former Lee Paving Asphalt Testing Site
NCDOT Priority Testing Site No. 6-48 (34613.3.13)
Pittsboro, North Carolina

Location ID	Date	1,1,1-TCA	1,1-DCA	1,1-DCE	TCE	cis-1,2-DCE
48HS-1-SW	11/01/12	< 1.0	< 1.0	< 1.0	**11**	**3.1**
	04/24/13	<1.0	<1.0	<1.0	**2.9**	**0.73 J**
48HS-2-SW	11/01/12	< 1.0	**1.5**	**3.4**	**33.8**	**26.7**
	04/24/13	<1.0	**1.0**	**1.8**	**15**	**31**
48HS-3-SW	11/01/12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	04/24/13	<1.0	<1.0	<1.0	<1.0	<1.0
48HS-4-SW	11/01/12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	04/24/13	<1.0	<1.0	<1.0	<1.0	<1.0
48HS-5-SW	11/16/12	< 1.0	< 1.0	< 1.0	**1.6**	< 1.0
	04/24/13	<1.0	<1.0	<1.0	**1.6**	<1.0
2B Standards	Human Health[1]	NS	100	7100	30	720

Notes

1,1,1-TCA = 1,1,1-trichloroethane

1,1-DCA = 1,1,-dichloroethane

1,1,-DCE = 1,1-dichloroethene

TCE = trichloroethene

cis-1,2-DCE = cis-1,2-dichloroethene

Results are in micrograms per liter (µg/L)

2B Standard - Title 15A North Carolina Administrative Code (NCAC) Subchapter 2B Surface Water Quality Standards (August 2012)

< - constituent was not detected above the quantitation limit

J - The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample

Constituents detected above the laboratory detection limit are **bold**

Constituents detected above NCAC 2B Standard are shaded

NCDOT - North Carolina Department of Transportation

No other EPA Method 8260B Target Compound List VOCs were detected

NS - no standard

[1] Human Health Standards are based on the consumption of fish only unless dermal contact studies are available. See 2B .0208 for equations.