

**PRELIMINARY**  
**NATURALLY OCCURRING ASBESTOS INVESTIGATION**  
**Bridge 190 over the Johns River on SR 1328**  
**(Playmore Beach Road)**  
**Caldwell County, North Carolina**  
State Project: B-3624  
WBS Element: 33172.1.1  
S&ME Project No. 1585-07-004

**Prepared For:**

North Carolina Department of Transportation  
Geotechnical Engineering Unit  
GeoEnvironmental Section  
1589 Mail Service Center  
Raleigh, North Carolina 27699-1589

**Prepared By:**

S&ME, Inc.  
3718 Old Battleground Road  
Greensboro, North Carolina 27410

May 30, 2007



May 30, 2007

North Carolina Department of Transportation  
Geotechnical Engineering Unit  
GeoEnvironmental Section  
1589 Mail Service Center  
Raleigh, North Carolina 27699-1589

Attention: Mr. Don Moore, L.G.  
Consultant Coordinator, Geotechnical Unit

Reference: **PRELIMINARY NATURALLY OCCURRING ASBESTOS  
INVESTIGATION – FINAL REPORT**  
Bridge 190 over the Johns River on SR 1328 (Playmore Beach Road)  
Caldwell County, North Carolina  
State Project: B-3624  
WBS Element: 33172.1.1  
S&ME Project No. 1585-07-004

Dear Mr. Moore:

The North Carolina Department of Transportation (NCDOT) – Geotechnical Engineering Unit requested and authorized S&ME, Inc. (S&ME) through the acceptance of services offered in S&ME Proposal No. 1585-06-P068 dated January 5, 2007, to conduct a preliminary delineation of rock and soil Naturally Occurring Asbestos (NOA) in the roadway portion of bridge replacement project in Caldwell County, North Carolina. Asbestos was found in a sample collected from a hand auger boring conducted on the roadway site, therefore additional soil sampling was suspended through the request of the NCDOT. Asbestos air sampling was conducted during both the hand auguring and during the initial stages of the S&ME geotechnical investigation conducted at the site (Geotechnical assessment contracted by separate authorization and reported under separate cover). This report reflects the results of the Preliminary NOA investigation and asbestos air monitoring conducted during that investigation and during the initial stages of the geotechnical evaluation.

## PROJECT BACKGROUND AND SITE DESCRIPTION

The NOA investigation was conducted at the site of a planned bridge replacement project over the Johns River and associated roadway approach project for State Road 1328 in Caldwell County, North Carolina. S&ME was provided site photographs, a historical description of the former mining operation, and preliminary drawings of the proposed bridge and supporting roadway realignment project for purposes of determining likely sample locations and to portray the extent of the planned construction project. Based upon these preliminary drawings contained in the NCDOT's October 27, 2006, *Request of Technical and Cost Proposal*, the proposed roadway project was shown to begin at Station 10+00 and extend eastward to Station 21+00. Several follow-up conference calls and email exchanges between S&ME and NCDOT followed the October 27, document to convey the likely extent of the construction project scope and the NCDOT's NOA assessment request.

S&ME understands that a former asbestos mining operation known as the Johns River Mine lies in a parcel south of the existing roadway. Site reconnaissance of the area was conducted by S&ME's Mr. Connel Ware and Mr. Dennis Forbis during a short site visit to the area with Mr. Rick Locamy of NC DOT on November 6, 2006, prior to generation of a proposal for services. The purpose of this exploration was to obtain preliminary information about the proposed roadway boundaries and develop an understanding of the soils that may be disturbed by roadway grading. The proposed roadway site at the time of our preliminary visit consisted of moderately to heavily wooded areas with some low wet areas.

S&ME's proposal dated January 5, 2007, conveyed our belief that an appropriate way to determine the limits of NOA in the bridge replacement and road realignment project area was a detailed area soils investigation in the area of concern. Since the hazardous (respirable) size fraction of asbestos is relatively small, such a detailed study would ideally utilize onsite microscopy services in conjunction with the geotechnical investigation for both the roadway and bridge placement portions of the project. Such a survey would include on-site drill core analysis to identify NOA boundaries within the proposed site areas of interest. Follow-up analyses of samples exhibiting no detectable asbestos fibers (via Polarized Light Microscopy) and perhaps those exhibiting low concentrations of asbestos fibers would be made off site utilizing electron microscopy. However, due to site, schedule, and cost considerations, NCDOT directed S&ME to perform a preliminary delineation of rock and soil NOA in only the roadway portion of the project. If samples from the roadway were determined to contain NOA, then the follow-up investigation might not be warranted.

## **METHODS**

### **Soil Samples**

The preliminary NOA assessment was undertaken by collection of fifty-six (56) soil samples from the planned roadway alignment area. Hand auger borings to depths of approximately 8 feet (or to hand auger refusal - whichever was encountered first) were made in the approximate locations of S&ME's proposed roadway geotechnical investigation. At approximate depth intervals of 1 foot within the hand auger borings, soils samples were obtained from the hand auger, segregated, visually characterized for color and soil consistency, and containerized for off-site laboratory testing (please see attached boring logs).

The samples were collected by Mr. Michael Cook, a North Carolina Accredited Asbestos Inspector (NCAAI No. 12123). After noting the locations of these soil layers, samples of the materials were collected in general accordance with EPA recommendations for bulk asbestos-suspect building material samples. The site of each hand auger boring was flagged and during the S&ME geotechnical assessment the site of each flag was recorded using a Global Positioning System unit (GPS). A boring layout detailing the sample sites is likewise attached to this document.

Each sample was collected and placed in a plastic bag. Each bag was numbered and pertinent sample data was recorded. The bulk samples were submitted to a Scientific Analytical Laboratory (SAI), in Greensboro, North Carolina, for initial analysis for asbestos fibers. SAI participates in the National Voluntary Laboratory Accreditation Program (NVLAP) and has been issued a Certificate of Accreditation for Polarized Light Microscopy (and TEM Analysis - NVLAP Lab Code: 200664-0). In the SAI laboratory, each of the 56 samples was initially analyzed following the procedures found in the Environmental Protection Agency Method 600/R-93/116. This method employs Polarized Light Microscopy coupled with Dispersion Staining Techniques to visually quantify the amount of asbestos in an asbestos-suspect material. An Asbestos-Containing Material (ACM) is defined by both the Occupational Safety and Health Administration (OSHA) and EPA as a material containing greater than 1 percent by weight of any combination of the six (6) legally-recognized asbestos minerals – Chrysotile, Amosite, Crocidolite, Actinolite, Anthophyllite and Tremolite.

Although Polarized Light Microscopy (Method EPA 600/R-93/116) is the recommended method for analysis of bulk material samples for asbestos fibers, the EPA has reported that this method alone may not identify asbestos when fiber sizes are extremely small or if they are bound in a resinous material. Currently, reanalysis by Transmission Electron Microscopy (TEM) to verify results of <1% or "None Detected" for these materials is recommended by EPA (but not currently required). Therefore, after consultation with NCDOT, following PLM analysis, SAI visually segregated the samples into distinct groups based upon soil consistency, color, grain size and physical appearance. Of these, approximately ten percent (10%) were selected by SAI for follow-up TEM analysis. The samples were segregated to represent each of the basis soil types encountered and then of these six (6) were subjected to follow-up analysis via Qualitative Transmission Electron Analysis for asbestos.

### **Air Sampling**

During the course of the hand auguring, sample handling and containerization, personnel asbestos air samples were collected. The purpose of the sampling was to provide surveillance of airborne fiber concentrations during soil-handling operation on the site for comparison to OSHA and EPA standards. The air samples were collected using portable battery-powered sampling pumps and filter cassettes from within the breathing zone of subject S&ME personnel. The air sampling was conducted by a North Carolina Accredited Air Monitor in general accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 7400 for Phase Contrast Microscopy (PCM). Sampling pumps were calibrated before and after each session using a MiniBuck Calibrator™ or calibrated rotometer with the sampling media inline. S&ME provided initial analysis of the collected air samples as our North Carolina accredited air monitors have been deemed proficient by the American Board of Industrial Hygiene (AIHA) Asbestos Analyst Registry (AAR) program for the PCM samples. Following analysis of the air samples by PCM, a single sample was subjected for follow-up analysis by Transmission Electron Microscopy. The TEM analysis was performed using the TEM Yamate Level II Methodology (EPA Contract No. 68-02-3266 Method) by Scientific Analytical Laboratories in Greensboro, North Carolina.

## RESULTS AND CONCLUSIONS

S&ME daily field sheets and sampling forms as well as laboratory provided results are attached in the appendix. All of these materials are provided in a chronological order. Preliminary analysis of the fifty-six (56) soil samples determined all samples to be *None Detected* for asbestos when analyzed by Polarized Light Microscopy. As such analysis may not detect asbestos fibers in small fiber sizes, follow-up qualitative analysis via Transmission Electron Microscopy was utilized on approximately ten percent (10%) of the samples. Anthophyllite asbestos was found in a single sample of the six (6) selected for follow-up TEM analysis. Based upon this presence of asbestos minerals in at least some portion of the subject soils on the site, S&ME recommends that NCDOT make provisions adequate to protect human health and the environment during construction activities on the site. Hand auger sampling was also limited to a depth of approximately eight (8) feet. Disturbance of soils below this depth was not assessed by the S&ME investigation.

Air monitoring conducted at the subject site during both the collection/handling of soil samples and during the geotechnical evaluation for the roadway portion of the project. Airborne fiber concentration ranged from 0.006 fibers per cubic centimeter of air (f/cc) to 0.078 f/cc when analyzed by PCM. All of the samples collected during the hand auguring and geotechnical evaluation found airborne fiber concentrations below current Occupational Safety and Health Administration standards for construction-related asbestos exposure. However, detectable levels of airborne fibers were encountered during both the hand auguring work conducted during soil sampling, and during drilling activities associated with the geotechnical evaluations. For purposes of comparison, all but one of the airborne fiber concentrations observed, though lower than the current worker exposure standards for OSHA compliance were higher than the North Carolina Department of Health and Human Services maximum allowable asbestos concentration for Public Spaces in buildings. Additionally, the asbestos air sampling conducted represents personnel exposures for drilling and hand auguring, the asbestos exposure of workers engaged in more aggressive soil moving activities may be much different. A single air sample was subjected to follow-up TEM analysis. The results of the TEM analysis indicated that none of the fibers observed by PCM were asbestos fibers. This finding suggests that at least of some of the fibers observed in air samples may not in fact be asbestos.

## **RECCOMENDATIONS**

S&ME recommends NCDOT evaluate the exposures of workers assigned and contracted to perform construction activities at the subject site and to evaluate the asbestos-content off any soils removed from the site. Current OSHA asbestos standards mandate that employers protect workers who are engaged in asbestos disturbance activities. OSHA-required activities include provisions for:

- Determining workers exposures,
- Training workers who are engaged in asbestos handling/disturbance activities,
- Controlling worker exposure to the greatest extent feasible utilizing engineering and administrative controls,
- Use of personal protective equipment, and
- Specialized housekeeping, work practices, waste disposal and recordkeeping for asbestos projects.

We have attached a guidance documents derived from the Fairfax County (Virginia) - Health Department document *Basic Elements for a Naturally Occurring Asbestos Compliance Plan (Effective date March 1994)* as an example of the procedures that might be utilized by NCDOT employees and by contracted construction personnel to protect workers from asbestos exposure at the Caldwell County site. Referenced Commonwealth of Virginia and Fairfax County regulatory requirements have been amended as appropriate.

## **SOLE USE STATEMENT**

All materials and information used on this project were obtained by S&ME. The resulting report is provided for the sole use of NCDOT. Reliance on this report by any third parties will be at such party's sole risk, and S&ME disclaims liability for any use of or reliance on this report by third parties.

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## CLOSURE

S&ME appreciates the opportunity to serve NCDOT. If we can be of additional service to you, or if you have questions or comments, please feel free to contact us.

Very truly yours,

**S&ME, Inc.**



Michael Cook  
Industrial Hygiene Technician



Dennis W. Forbis, CSP  
Industrial Hygiene Department Manager

Senior Reviewed by C. Mike Cashio, Jr., CIH, Senior Consultant

Attachments

# FIELD REPORT



S&ME, Inc.  
718 Old Battleground Rd.  
Greensboro, North Carolina 27410  
(336) 288-7180  
Fax (336) 288-8980

PROJECT NC DOT - Caldwell County	
LOCATION Bridge 190	
DATE 1/12/07	JOB NO. 1585-07-00
CONTRACTOR	OWNER
WEATHER clear	TEMP 60's ° at AM ° at PM
PRESENT AT SITE	

TO file

### THE FOLLOWING WAS NOTED:

Time: 1400 - 1700

Mileage: 45

1400 - Mob toward site

1430 - @ site & start marking off locations for Hand Augers to be performed. Mark 7 sites to hand auger - 4 to West of bridge & 3 toward the East - Notice activity to West of Johns river. appears to be a road being cut into the side of the hill along west edge of river - Marker up about change in county use of Land & Public Hearings.

1700 - Have hand Augered # 7 (most west boring) to a depth of 8' & mob back home

ATTACHMENTS: \_\_\_\_\_

COPIES TO: \_\_\_\_\_

SIGNED [Signature]



# 7 (20400)

Ft.	Description	BPF	PB
1	Tan/Brown Sandy Silt		
2	Tan/Brown Sandy Silt		
3	Tan/Brown Sandy Silt		
4	Black/Brown Clay Silt - Water		
5	Black/Brown Clay Silt		
6	Black/Brown Clay Silt		
7	Black/Brown Clay Silt		
8	Black/Brown Clay Silt		

1. Boring Number # 7 (20400)  
2. Job Name NEDET Caldwell Co  
3. Date Drilled 1/12/07  
4. GS Elevation \_\_\_\_\_  
5. Water Level @ TOB -4'  
6. Engineer \_\_\_\_\_

7. Job Number 1585-07-004  
8. Job Location Bridge 190  
9. Drill Rig Hand Auger  
10. Drill Method \_\_\_\_\_  
11. Hole Cave-In \_\_\_\_\_

PB = plot blows to the nearest tenth of a foot

**FIELD REPORT**



S&ME, Inc.  
718 Old Battleground Rd.  
Greensboro, North Carolina 27410  
(336) 288-7180  
Fax (336) 288-8980

PROJECT NC DOT Caldwell County	
LOCATION Bridge 190 over Johns River	
DATE 1/15/07	JOB NO. 1585-07-
CONTRACTOR	OWNER
WEATHER clear/cloudy	TEMP 60° at _____ at _____ AM/PM
PRESENT AT SITE	

TO file

**THE FOLLOWING WAS NOTED:**

Time: 0600 - 1730

Mileage: 250

00 Mob to site

0800 on site & start prep for hand augers at Location # 6 to Location # 1

1500 - Completed all hand augers to depth of 8' - Auger refusal at # 2 @ 6 1/2' set 2' back & get all the way down to 8' - Collect samples - Wash equipment & mob back to Lab - Called & will drop off samples in the Am

ATTACHMENTS: \_\_\_\_\_

COPIES TO: \_\_\_\_\_

SIGNED [Signature]



#1 (10+50)

Ft.	Description	BPF	PB
1	Red Clay		
2	Red Clay		
3	Red Clay		
4	Red Clay		
5	Red Clay		
6	Red Clay		
7	Red Clay		
8	Red Clay		

- |                      |                           |                  |                    |
|----------------------|---------------------------|------------------|--------------------|
| 1. Boring Number     | <u>#1 (10+50)</u>         | 7. Job Number    | <u>1SB5-07-004</u> |
| 2. Job Name          | <u>NCDOT Caldwell Co.</u> | 8. Job Location  | <u>Bridge 190</u>  |
| 3. Date Drilled      | <u>1/15/07</u>            | 9. Drill Rig     | <u>Hand Auger</u>  |
| 4. GS Elevation      | _____                     | 10. Drill Method | _____              |
| 5. Water Level @ TOB | _____                     | 11. Hole Cave-In | _____              |
| 6. Engineer          | _____                     |                  |                    |
- PB = plot blows to the nearest tenth of a foot

#2 (11750)

Ft.	Description	BPF	PB
1	Red Clay		
2	Red Clay		
3	Red Clay		
4	Red Clay		
5	Red Clay		
6	Red Clay		
7	Red Clay		
8	Red Clay		

1. Boring Number #2 (11750)  
2. Job Name NCDOT Caldwell Co.  
3. Date Drilled 1/15/07  
4. GS Elevation \_\_\_\_\_  
5. Water Level @ TOB \_\_\_\_\_  
6. Engineer \_\_\_\_\_  
PB = plot blows to the nearest tenth of a foot

7. Job Number 1585-07-004  
8. Job Location Bridge 190  
9. Drill Rig Hand Auger  
10. Drill Method \_\_\_\_\_  
11. Hole Cave-In \_\_\_\_\_

#3 (12+50)

Ft.	Description	BPF	PB
1	Red Clay - Silt		
2	Red Clay - Silt		
3	Red Clay Silt		
4	Red Clay		
5	Red Clay		
6	Red Clay		
7	Red Clay		
8	Red Clay		

1. Boring Number

#3 (12+50)

2. Job Name

NCDOT Caldwell Co.

3. Date Drilled

1/15/07

4. GS Elevation

\_\_\_\_\_

5. Water Level @ TOB

\_\_\_\_\_

6. Engineer

\_\_\_\_\_

7. Job Number

1585-07-004

8. Job Location

Bridge 190

9. Drill Rig

Hand Auger

10. Drill Method

\_\_\_\_\_

11. Hole Cave-In

\_\_\_\_\_

PB = plot blows to the nearest tenth of a foot

# 4 (13+50)

Ft.	Description	BPF	PB
1	Brown/Red Silt Clay		
2	Brown/Red Silt Clay		
3	Brown/Red Silt Clay		
4	Brown/Red Silt Clay		
5	Brown/Red Silt Clay		
6	Brown/Red Silt Clay		
7	Brown/Red Silt Clay		
8	Brown/Red Silt Clay		

- 1. Boring Number #4 (13+50)
- 2. Job Name NC DOT Calwell Co
- 3. Date Drilled 1/15/07
- 4. GS Elevation \_\_\_\_\_
- 5. Water Level @ TOB \_\_\_\_\_
- 6. Engineer \_\_\_\_\_

- 7. Job Number 1585-07-004
- 8. Job Location Bridge 190
- 9. Drill Rig Hand Auger
- 10. Drill Method \_\_\_\_\_
- 11. Hole Cave-In \_\_\_\_\_

PB = plot blows to the nearest tenth of a foot

# 5 (17+50)

Ft.	Description	BPF	PB
1	Tan/Brown Sand-Silt		
2	Tan/Brown Sand-Silt		
3	Tan/Brown Sand-Silt		
4	Tan/Brown Sand-Silt		
5	Black/Brown Clay-Silt		
6	Black/Brown Clay-Silt		
7	Black/Brown Clay Silt		
8	Black/Brown Clay-Silt		

- |                      |                            |                  |                    |
|----------------------|----------------------------|------------------|--------------------|
| 1. Boring Number     | <u>#5 (17+50)</u>          | 7. Job Number    | <u>1585-07-004</u> |
| 2. Job Name          | <u>NC DOT Caldwell Co.</u> | 8. Job Location  | <u>Bridge 190</u>  |
| 3. Date Drilled      | <u>1/15/07</u>             | 9. Drill Rig     | <u>Hand Auger</u>  |
| 4. GS Elevation      | _____                      | 10. Drill Method | _____              |
| 5. Water Level @ TOB | _____                      | 11. Hole Cave-In | _____              |
| 6. Engineer          | _____                      |                  |                    |
- PB = plot blows to the nearest tenth of a foot

#6 (18+00)

Ft.	Description	BPF	PB
1	Tan/Brown Sand-Silt		
2	Tan/Brown Sand Silt		
3	Tan/Brown Silty Silt		
4	Tan/Brown Sandy Silt		
5	Tan/Brown Sand-Silt		
6	Brown Clay-silt - water		
7	Black/Brown Clay Silt		
8	Black/Brown Clay Silt		

- |                      |                            |                  |                    |
|----------------------|----------------------------|------------------|--------------------|
| 1. Boring Number     | <u>#6 (18+00)</u>          | 7. Job Number    | <u>1585-07-004</u> |
| 2. Job Name          | <u>NC DOT Caldwell Co.</u> | 8. Job Location  | <u>Bridge 190</u>  |
| 3. Date Drilled      | <u>1/15/07</u>             | 9. Drill Rig     | <u>Hand Auger</u>  |
| 4. GS Elevation      | _____                      | 10. Drill Method | _____              |
| 5. Water Level @ TOB | <u>6'</u>                  | 11. Hole Cave-In | _____              |
| 6. Engineer          | _____                      |                  |                    |
- PB = plot blows to the nearest tenth of a foot

# FIELD REPORT



S&ME, Inc.  
 3718 Old Battleground Rd.  
 Greensboro, North Carolina 27410  
 (336) 288-7180  
 Fax (336) 288-8980

PROJECT NCDOT Caldwell Co.	
LOCATION Bridge 190	
DATE 2/12/07	JOB NO. 1585-07-004
CONTRACTOR	OWNER
WEATHER Partly Cloudy	TEMP 40's ° at AM ° at PM
PRESENT AT SITE S&ME, Inc. Drillers. 2	
Geologist 1	
IH 1	

TO file

**THE FOLLOWING WAS NOTED:**

Time: ~~11:00~~ 0945

**Mileage:**

- 1330 - Drillers & Geologist on site on load Drill rig & have safety meeting. Tyvek & Respirators to be used during drilling & handling Boring material.
- 1430 - Have started Excursion Samples as They Drill Boring #7
- 1500 - Done with Hole #7 & move to #6 trade out Cassettes between holes. Pumps still pulling 2.24pm Start one more Pump on hood of Truck for background sampling during time drillers are working.
- 1530 - Read 30 min Excursion
- 1600 - Pumps continue to run
- 1700 - Chain saw used to gain access to Next Boring. 3 completed (7,6,5) Set up on River embankment & will drill to rock on East side (toward Lenor) Crew continue to use respirators during drilling & have Tyveks on until end of work. They have removed respirators ~~for~~ between boring sites.
- 1800 - Visibility is going down because of sun light - Stop Drilling @ 1830
- 1930 - Completed reading Samples and Pack up equipment to leave site

ATTACHMENTS: \_\_\_\_\_

COPIES TO: \_\_\_\_\_

SIGNED Island Cook



ASBESTOS AIR SAMPLING FORM

PROJECT NAME: NCDOT Caldwell Co.

S&ME PROJECT NUMBER: 1051-06-527

DATE: 2/12/07

SITE: Bridge 190

CALIBRATOR NUMBER: LV-5

MICROSCOPE NUMBER: Nikon 145139

SAMPLE NO.	LAB NO.	LOCATION	PUMP NO.	FLOW RATE (LPM) PRE/POST CAL.	START TIME	STOP TIME	TOTAL MINUTES	TOTAL VOLUME (L)	FIBERS / FIELDS	f/mm <sup>2</sup> /cc
21207-1A		Marshal Ray (Driller) Boring #7	G4 1	2.2 / 2.2	1428	1458	30	66	10.5 / 100	0.078
21207-2B		Seth Low (Drillers Helper) Boring #7	G4 2	2.2 / 2.2	1428	1458	30	66	7 / 100	0.052
21207-3A		Shane Johnson (Geologist) Boring #7	G4 3	2.2 / 2.2	1428	1458	30	66	10 / 100	0.074
21207-1B		Marshal Ray (Driller) Boring # 6, 5 & East River Bank	G4 1	2.2 / 2.2	1500	1841	221	4860	30 / 100	0.030
21207-2B		Seth Low (Drillers Helper) Boring # 6, 5 & East River Bank	G4 2	2.2 / 2.0	1500	1843	223	468	29 / 100	0.030
21207-3B		Shane Johnson (Geologist) Boring # 6, 5 & East River Bank	G4 3	2.2 / 2.2	1500	1846	226	497	22 / 100	0.022
21207-4		Air Monitor on site during Drilling Michael Cook	G4 4	2.4 / 2.4	1505	1848	223	535	6.5 / 100	0.006

DETAILS:

"A" - 30 min. Excursion Samples at Boring #7

"B" - TWA Samples During Borings # 6, 5 & 30' of East River Bank

TWA:

EMPLOYEE:

PPE:

TASK:

Box

RESULTS CODE:

BLANK #1 0/100

FIELD BLANK #2 0/100

RECOUNT #1 21207-1A (11.5/100)

RECOUNT #2

FOL=FILTER OVERLOADED

FTD=FILTER TAMPERING OR DAMAGED

PF=PUMP FAILURE

ANALYTICAL METHOD: NIOSH 7400, ISSUE 2

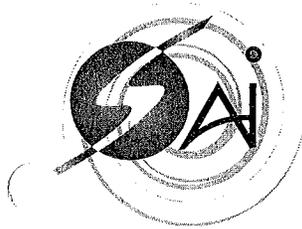
COLLECTED BY: Michael Cook

ANALYZED BY: Michael Cook

REVIEWED BY:

NC # 80723

AAR# 100610-8496



# Bulk Asbestos Analysis

Qualitative Analysis of Asbestos in Soil  
By Polarized Light Microscopy  
EPA Method: 600/R-93/116

Customer: S & ME, Inc.  
3718 Old Battleground Rd.  
Greensboro, NC 27410

Attn: Dennis Forbis

Lab Order ID: 700255

Analysis ID: 700255PSL

Date Received: 1/16/2007

Date Reported: 1/18/2007

Project: 1585-07-000 NC DOT Cauldwell Co

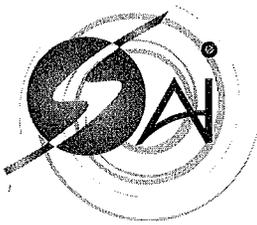
Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes					Treatment
11507-1-1	1	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_1						Crushed, Teased
11507-1-2	1	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_2						Crushed, Teased
11507-1-3	1	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_3						Crushed, Teased
11507-1-4	1	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_4						Crushed, Teased
11507-1-5	1	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_5						Crushed, Teased
11507-1-6	1	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_6						Crushed, Teased
11507-1-7	1	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_7						Crushed, Teased
11507-1-8	1	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_8						Crushed, Teased

Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommend that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government.

Sean Fitzgerald (55)

Analyst

Nathaniel Durham, MS or Approved Signatory



# Bulk Asbestos Analysis

Qualitative Analysis of Asbestos in Soil  
By Polarized Light Microscopy  
EPA Method: 600/R-93/116

Customer: S & ME, Inc.  
3718 Old Battleground Rd.  
Greensboro, NC 27410

Attn: Dennis Forbis

Lab Order ID: 700255

Analysis ID: 700255PSL

Date Received: 1/16/2007

Date Reported: 1/18/2007

Project: 1585-07-000 NC DOT Cauldwell Co

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes					Treatment
11507-2-1	2	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_9						Crushed, Teased
11507-2-2	2	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_10						Crushed, Teased
11507-2-3	2	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_11						Crushed, Teased
11507-2-4	2	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_12						Crushed, Teased
11507-2-5	2	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_13						Crushed, Teased
11507-2-6	2	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_14						Crushed, Teased
11507-2-7	2	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_15						Crushed, Teased
11507-3-1	3	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_16						Crushed, Teased

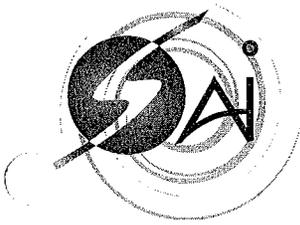
Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommend that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government.

Sean Fitzgerald (55)

Analyst

Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 (336) 292-3888

Nathaniel Durham, MS or Approved Signatory



# Bulk Asbestos Analysis

Qualitative Analysis of Asbestos in Soil  
By Polarized Light Microscopy  
EPA Method: 600/R-93/116

Customer: S & ME, Inc.  
3718 Old Battleground Rd.  
Greensboro, NC 27410

Attn: Dennis Forbis

Lab Order ID: 700255

Analysis ID: 700255PSL

Date Received: 1/16/2007

Date Reported: 1/18/2007

Project: 1585-07-000 NC DOT Caldwell Co

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes					Treatment
11507-3-2	3	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_17						Crushed, Teased
11507-3-3	3	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_18						Crushed, Teased
11507-3-4	3	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_19						Crushed, Teased
11507-3-5	3	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_20						Crushed, Teased
11507-3-6	3	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_21						Crushed, Teased
11507-3-7	3	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_22						Crushed, Teased
11507-3-8	3	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_23						Crushed, Teased
11507-4-1	4	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_24						Crushed, Teased

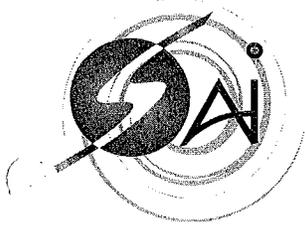
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# Bulk Asbestos Analysis

Qualitative Analysis of Asbestos in Soil  
By Polarized Light Microscopy  
EPA Method: 600/R-93/116

Customer: S & ME, Inc.  
3718 Old Battleground Rd.  
Greensboro, NC 27410

Attn: Dennis Forbis

Lab Order ID: 700255

Analysis ID: 700255PSL

Date Received: 1/16/2007

Date Reported: 1/18/2007

Project: 1585-07-000 NC DOT Cauldwell Co

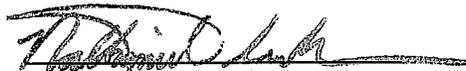
Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes					Treatment
11507-4-2	4	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_25						Crushed, Teased
11507-4-3	4	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_26						Crushed, Teased
11507-4-4	4	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_27						Crushed, Teased
11507-4-5	4	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_28						Crushed, Teased
11507-4-6	4	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_29						Crushed, Teased
11507-4-7	4	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_30						Crushed, Teased
11507-4-8	4	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_31						Crushed, Teased
11507-5-1	5	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_32						Crushed, Teased

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Nathaniel Durham, MS or Approved Signatory



# Bulk Asbestos Analysis

Qualitative Analysis of Asbestos in Soil  
By Polarized Light Microscopy  
EPA Method: 600/R-93/116

Customer: S & ME, Inc.  
3718 Old Battleground Rd.  
Greensboro, NC 27410

Attn: Dennis Forbis

Lab Order ID: 700255

Analysis ID: 700255PSL

Date Received: 1/16/2007

Date Reported: 1/18/2007

Project: 1585-07-000 NC DOT Cauldwell Co

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes					Treatment
11507-5-2	5	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_33						Crushed, Teased
11507-5-3	5	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_34						Crushed, Teased
11507-5-4	5	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_35						Crushed, Teased
11507-5-5	5	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_36						Crushed, Teased
11507-5-6	5	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_37						Crushed, Teased
11507-5-7	5	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_38						Crushed, Teased
11507-5-8	5	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_39						Crushed, Teased
11507-6-1	6	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_40						Crushed, Teased

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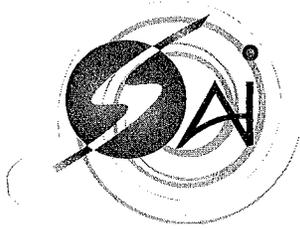
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Analyst

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Nathaniel Durham, MS or Approved Signatory

Page 5 of 7



# Bulk Asbestos Analysis

Qualitative Analysis of Asbestos in Soil  
 By Polarized Light Microscopy  
 EPA Method: 600/R-93/116

Customer: S & ME, Inc.  
 3718 Old Battleground Rd.  
 Greensboro, NC 27410

Attn: Dennis Forbis

Lab Order ID: 700255

Analysis ID: 700255PSL

Date Received: 1/16/2007

Date Reported: 1/18/2007

Project: 1585-07-000 NC DOT Cauldwell Co

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes					Treatment
11507-6-2	6	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_41						Crushed, Teased
11507-6-3	6	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_42						Crushed, Teased
11507-6-4	6	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_43						Crushed, Teased
11507-6-5	6	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_44						Crushed, Teased
11507-6-6	6	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_45						Crushed, Teased
11507-6-7	6	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_46						Crushed, Teased
11507-6-8	6	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_47						Crushed, Teased
11507-7-1	7	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_48						Crushed, Teased

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Analyst

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Nathaniel Durham, MS or Approved Signatory



# Bulk Asbestos Analysis

Qualitative Analysis of Asbestos in Soil  
 By Polarized Light Microscopy  
 EPA Method: 600/R-93/116

Customer: S & ME, Inc.  
 3718 Old Battleground Rd.  
 Greensboro, NC 27410

Attn: Dennis Forbis

Lab Order ID: 700255

Analysis ID: 700255PSL

Date Received: 1/16/2007

Date Reported: 1/18/2007

Project: 1585-07-000 NC DOT Cauldwell Co

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes					Treatment
11507-7-2	7	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_49						Crushed, Teased
11507-7-3	7	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_50						Crushed, Teased
11507-7-4	7	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_51						Crushed, Teased
11507-7-5	7	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_52						Crushed, Teased
11507-7-6	7	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_53						Crushed, Teased
11507-7-7	7	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_54						Crushed, Teased
11507-7-8	7	None Detected		100.0 %	Other	Brown Non Fibrous Heterogeneous
700255PSL_55						Crushed, Teased

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Analyst

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Nathaniel Durham, MS or Approved Signatory



**Scientific Analytical Institute**  
 302-L Pomona Dr. Greensboro, NC 27407  
 Phone: 336.292.3888 Fax: 336.292.3313  
 www.sailab.com lab@sailab.com

Lab Use Only 700255  
 Lab Order ID: \_\_\_\_\_  
 Client Code: \_\_\_\_\_

Company Contact Information	
Company: <u>S&amp;ME Inc</u>	Contact: <u>Dennis Farbis</u>
Address: <u>3718 old Battleground</u>	Phone <input checked="" type="checkbox"/> : <u>288-7180</u>
<u>Greensboro, N.C.</u>	Fax <input checked="" type="checkbox"/> : <u>288-89</u>
	Email <input checked="" type="checkbox"/> : <u>dfarbis@smeinc.com</u>

Asbestos Test Types	
PLM EPA 600/R-93/116	<input checked="" type="checkbox"/>
Positive stop	<input type="checkbox"/>
PLM Point Count	<input type="checkbox"/>
PCM NIOSH 7400	<input type="checkbox"/>
TEM AHERA	<input type="checkbox"/>
TEM Level II	<input type="checkbox"/>
TEM NIOSH 7402	<input type="checkbox"/>
TEM Bulk Qualitative	<input type="checkbox"/>
TEM Bulk Chatfield	<input type="checkbox"/>
TEM Bulk Quantitative	<input type="checkbox"/>
TEM Wipe ASTM D6480-99	<input type="checkbox"/>
TEM Microvac ASTM D5755-02	<input type="checkbox"/>
TEM Water EPA 100.2	<input type="checkbox"/>
Other: _____	<input type="checkbox"/>

Billing/Invoice Information	Turn Around Times	
Company: <u>S&amp;ME Inc</u>	90 Min. <input type="checkbox"/>	48 Hours <input checked="" type="checkbox"/>
Contact: <u>Dennis Farbis</u>	3 Hours <input type="checkbox"/>	72 Hours <input type="checkbox"/>
Address:	6 Hours <input type="checkbox"/>	96 Hours <input type="checkbox"/>
	12 Hours <input type="checkbox"/>	120 Hours <input type="checkbox"/>
	24 Hours <input type="checkbox"/>	144+ Hours <input type="checkbox"/>

PO Number: 1585-07-000  
 Project Name/Number: 1585-07-000 NC DOT Caldwell Co.

Sample ID #	Description/Location	Volume/Area	Comments
<u>11507-1-A</u>	<u>1</u>		
<u>1-B</u>			
<u>1-3</u>			
<u>1-4</u>			
<u>1-5</u>			
<u>1-6</u>			
<u>1-7</u>			
<u>1-8</u>			
<u>11507-2-1</u>	<u>2</u>		
<u>2-2</u>			
<u>2-3</u>			
<u>2-4</u>			
<u>2-5</u>			
<u>2-6</u>			
<u>2-7</u>			

Total # of Samples \_\_\_\_\_

Relinquished by	Date/Time	Received by	Date/Time
<u>[Signature]</u>		<u>[Signature]</u>	<u>1/16 7:46</u>

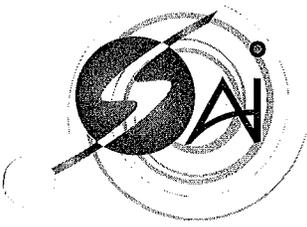
Accepted   
 Rejected



**Scientific Analytical Institute**  
302-L Pomona Dr. Greensboro, NC 27407  
Phone: 336.292.3888 Fax: 336.292.3313  
www.sailab.com lab@sailab.com

Lab Use Only  
Lab Order ID: 700255  
Client Code: \_\_\_\_\_

Sample ID #	Description/Location	Volume/Area	Comments
11507-3-1	3		
-2			
-3			
-4			
-5			
-6			
-7			
-8			
11507-4-1	4		
-2			
-3			
-4			
-5			
-6			
-7			
-8			
11507-5-1	5		
-2			
-3			
-4			
-5			
-6			
-7			
-8			
11507-6-1	6		
-2			
-3			
-4			
-5			
-6			
-7			
-8			
11507-7-1	7		
-2			
-3			
-4			
-5			
-6			
-7			
-8			



**Bulk Asbestos Analysis**  
**by Transmission Electron Microscopy**  
**Qualitative**  
EPA/600/R-93/116

**Client:** S&ME, Inc  
3718 Old Battleground Rd  
Greensboro, NC 27410

**Attn:** Dennis Forbis

**Lab Order ID:** 700556

**Date Received:** 1/24/2007

**Date Reported:** 1/26/2007

**Page:** 1/1

**Project:** 1585-07-000 NC DOT Caldwell  
Co

Sample ID	Description	Qualitative Assessment for Asbestos Presence
Lab Sample ID	Lab Notes	
11507-1-1	Soil	No Asbestos Observed
700556		
11507-2-8	Soil	No Asbestos Observed
700556		
11507-3-1	Soil	No Asbestos Observed
700556		
11507-4-7	Soil	No Asbestos Observed
700556		
11507-6-7	Soil	No Asbestos Observed
700556		
11507-7-6	Soil	Anthophyllite
700556		

Sean Fitzgerald

Analyst

Approved Signatory



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 302-L Pomona Dr. Greensboro, NC 27407  
 Phone: 336.292.3888 Fax: 336.292.3313  
 www.sailab.com lab@sailab.com

Lab Use Only <sup>100226</sup>  
 Lab Order ID: 700255  
 Client Code: \_\_\_\_\_

Company Contact Information	
Company: <u>S&amp;ME Inc</u>	Contact: <u>Dennis Forbis</u>
Address: <u>3718 Old Battleground</u>	Phone <input checked="" type="checkbox"/> : <u>288-7180</u>
<u>Greensboro, N.C.</u>	Fax <input checked="" type="checkbox"/> : <u>288-89</u>
	Email <input checked="" type="checkbox"/> : <u>dforbis@smeline.com</u>

Asbestos Test Types	
PLM EPA 600/R-93/116	<input checked="" type="checkbox"/>
Positive stop	<input type="checkbox"/>
PLM Point Count	<input type="checkbox"/>
PCM NIOSH 7400	<input type="checkbox"/>
TEM AHERA	<input type="checkbox"/>
TEM Level II	<input type="checkbox"/>
TEM NIOSH 7402	<input type="checkbox"/>
TEM Bulk Qualitative	<input type="checkbox"/>
TEM Bulk Chatfield	<input type="checkbox"/>
TEM Bulk Quantitative	<input type="checkbox"/>
TEM Wipe ASTM D6480-99	<input type="checkbox"/>
TEM Microvac ASTM D5755-02	<input type="checkbox"/>
TEM Water EPA 100.2	<input type="checkbox"/>
Other: _____	<input type="checkbox"/>

Billing/Invoice Information	Turn Around Times	
Company: <u>S&amp;ME Inc</u>	90 Min. <input type="checkbox"/>	48 Hours <input checked="" type="checkbox"/>
Contact: <u>Dennis Forbis</u>	3 Hours <input type="checkbox"/>	72 Hours <input type="checkbox"/>
Address:	6 Hours <input type="checkbox"/>	96 Hours <input type="checkbox"/>
	12 Hours <input type="checkbox"/>	120 Hours <input type="checkbox"/>
	24 Hours <input type="checkbox"/>	144+ Hours <input type="checkbox"/>

PO Number: <u>1585-07-000</u>
Project Name/Number: <u>1585-07-000 NC DOT Caldwell Co.</u>

Sample ID #	Description/Location	Volume/Area	Comments
<u>11507-1-A</u>	<u>1</u>		
<u>1-B</u>			
<u>1-3</u>			
<u>1-4</u>			
<u>1-5</u>			
<u>1-6</u>			
<u>1-7</u>			
<u>1-8</u>			
<u>11507-2-1</u>	<u>2</u>		
<u>2-2</u>			
<u>2-3</u>			
<u>2-4</u>			
<u>2-5</u>			
<u>2-6</u>			
<u>2-7</u>			

Total # of Samples \_\_\_\_\_

Relinquished by	Date/Time	Received by	Date/Time
<u>Michael Cook</u>		<u>JJH</u>	<u>1/16 7:40</u>

700556



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Phone: 336.292.3888 Fax: 336.292.3313  
www.sailab.com lab@sailab.com

Lab Use Only  
Lab Order ID: 700255  
Client Code:

Sample ID #	Description/Location	Volume/Area	Comments
11507-3-1	3		
-2			
-3			
-4			
-5			
-6			
-7			
-8			
11507-4-1	4		
-2			
-3			
-4			
-5			
-6			
-7			
-8			
11507-5-1	5		
-2			
-3			
-4			
-5			
-6			
-7			
-8			
11507-6-1	6		
-2			
-3			
-4			
-5			
-6			
-7			
-8			
11507-7-1	7		
-2			
-3			
-4			
-5			
-6			
-7			
-8			

# Airborne Asbestos Analysis

By Transmission Electron Microscopy  
Yamate Level II Methodology (EPA Contract No. 68-02-3266)



Client: S & ME, Inc.  
3718 Old Battleground Rd.  
Greensboro, NC 27410

Attn: Dennis Forbis

Lab Order ID: 700441

Analysis ID: 700441\_LII

Date Received: 1/18/2007

Date Reported: 1/19/2007

Project: 1585-07-000 NC DOT Caldwell  
County

Sample ID	Description	Volume	Analytical Sensitivity	Asbestos Structures	Raw Structure Count	Loading	Concentration
Lab Sample ID	Lab Notes	Filter Area	Str/cc			Str/mm <sup>2</sup>	Str/cc
		Area Analyzed					
11507-1	Hand Auger monitoring	702 L	0.00439	None Detected		<8.00	<0.00439
		385 mm <sup>2</sup>					
700441LII_1		0.125 mm <sup>2</sup>					

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Nathan Durham (1)

Analyst

  
Approved Signatory





## **Primary Elements for a Naturally Occurring Asbestos Compliance Plan**

### **Introduction**

Any Standard Operating Procedure is must be designed in compliance with the applicable requirements of OSHA 29 CFR 1926.1101, effective August 10, 1994. The intent of this document is to outline the components, which will comprise a naturally occurring asbestos hazard management program for site work.

### **Background**

Naturally occurring asbestos has been identified at the NC DOT project located at the Bridge 190 over the Johns River on SR 1328 (Playmore Beach Road) in Caldwell County, North Carolina.

Asbestos is a generic term used to describe the fibrous form of any combination of six (6) legally-recognized asbestos minerals – Chrysotile, Amosite, Crocidolite, Actinolite, Anthophyllite and Tremolite. The mineral identified at this particular site is Anthophyllite, although historical research of the site indicates that Chrysotile may also be present.

The purpose of an asbestos hazard management plan is to maintain safe working conditions on the construction site and to prevent migration of asbestos laden dust off the site.

### **Primary Elements of the Program**

#### **1) Minimizing Generation of Asbestos Laden Dusts:**

When working. Moving or excavating soils and rock, or rock drilling, blasting or hoe rams, the surfaces are likely to generate dust must be kept wet to minimize the potential generation of asbestos dust. Excavated soils and rock suspected to contain asbestos that are held on site should be kept wet or covered until properly disposed.

Adequate vehicle and equipment cleaning must be performed to avoid the spread of asbestos to places such as parking lots and roads.

#### **2) Personal Protection:**

Workers in areas of potential dust generating operations, where OSHA permissible exposure limit (PEL) may be reached, must be equipped with disposable impermeable coveralls, rubber boots and respirators to protect them and their families from asbestos. All on-site employees must be provided asbestos awareness training to familiarize affected workers with the nature of asbestos, including the types of health problems it can cause, the appropriate protective gear that is

recommended to minimize the exposure to asbestos dust, and the proper use of that equipment. Additional training is required for the individuals directly working within regulated areas, which require the utilization of personal protection equipment.

Regulated areas shall be clearly delineated with barrier tape imprinted with appropriate asbestos warning labels. Strict decontamination procedures must be followed to help ensure that asbestos dust stays where it belongs.

### 3) Personal and Perimeter Ambient Air Monitoring:

Certain representative workers should be equipped with devices to monitor asbestos levels to which they could be exposed. Personal results will be compared to the OSHA permissible exposure limits (PELs).

Ambient air should likewise be monitored along the perimeter of the site to ensure that dust control measures are keeping airborne fibers concentrations from migrating from the site. Ambient air monitoring results should be compared to the OSHA and EPA standards.

### **Right to Know**

Any multi-employer (i.e., subcontractors, inspectors, etc.) working on site, must be notified of the possible asbestos hazard. They must also be informed of the control measures and guidelines which must be enforced on-site to limit the generation of dust, and the spread of contaminated soil and rock. Such notification should be provided in writing.

Employers with employees that have a potential for exposure to asbestos, should review the asbestos hazard management plan and agree that the provisions and protocols of the plan are understood and will be implemented and observed routinely. If the provisions of the model program are deemed insufficient to protect their workers, additional protections (or an alternate plan), should be developed by the affected employers. All personnel involved in operations where exposure to asbestos dust may occur must participate in asbestos awareness training in accordance with provisions of OSHA's Hazard Communications and Asbestos Construction Industry Standards.

Employers with employees that are deemed likely to either; come into contact with NOA, disturb asbestos, and those who are deemed likely to be exposed to airborne fiber concentrations in excess of OSHA exposure thresholds must be trained in a manner appropriate to their work activities and exposures. Key topics to be addressed in these training sessions include: Recognition and uses of asbestos; Health effects and medical surveillance; and Applicable regulatory requirements. In addition, as part of the training, those personnel performing any operation which could reasonable exceed the OSHA Permissible Exposure Limits must be instructed in the use of Personal Protective Equipment. Training information should include at a minimum, the provisions detailed in the OSHA standard - 29 Code of Federal Regulations Sections 1926.1001 and 1926.134.

If air monitoring data collected at any time during the project indicates that workers performing other tasks may be exposed to levels in excess of standards, those personnel must also be trained and be required to use proper respiratory protection and other personal protection as prescribed.

### **Engineering Controls**

A key to controlling Naturally Occurring Asbestos fibers is to keep all dust levels down to an absolute minimum through the use of wetting. Operations that disturb asbestos containing soil or rock shall not be undertaken without first wetting the soil or rock to control the emission of dust. For those operations where it is likely that visible dust will be generated even after initial wetting (i.e., rock drills), additional dust control measures must be taken. These additional measures may include reducing (or eliminating) the drilling or reducing excavation speeds, and continuous misting of the air with water to reduce airborne dust and fibers. A dedicated water source should be in place and be ready to be used at all times for this purpose.

If at anytime during operations, visible dust is observed, operations should cease until the area is wetted or other measures are taken to control the dust.

### **Air Monitoring**

During all operations in which potentially asbestos containing soils or rock are being disturbed, ambient air monitoring should be performed at the site's perimeter lines to determine if dust control measures are adequate.

Air monitoring should be maintained downwind and near the immediate vicinity of daily work activities. Results will be compared to the EPA recommended airborne asbestos fiber concentrations (and the NC public exposure standard) of 0.01 f/cc. Additionally personnel exposures should be compared to the OSHA's 8-hour 0.10 f/cc Time-Weighted Average limit and the 30-minute Excursion limit of 0.10 f/cc for worker exposures. OSHA employee exposure monitoring must be represented by breathing zone air monitoring performed on representative personnel, with the greatest risk of exposure. This will help to document that exposures remain within acceptable levels and that dust suppression methods employed are adequate to reduce airborne fiber releases. Phase-contrast microscopy (PCM), using the most current version of the OSHA method ID-60 or NIOSH Method 7400, must be used to determine the concentration of fibers in the air. Transmission Electron Microscopy (TEM) may be utilized to verify actual asbestos fiber concentrations versus total fiber concentrations. This confirmation can be done since other fibrous substances, if present, may interfere with PCM analysis<sup>1</sup>.

All air monitoring results should be made a part of the project documentation provided back to NC DOT upon completion of the project and should also be distributed periodically (e.g. daily or weekly) between all on-site trades in order to disseminate airborne asbestos trends. Such reporting should include at a minimum

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<sup>1</sup> (Please see 29 CFR Vol. 59 #153 Appendix B for details).

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sample dates, locations, work activity monitored, engineering controls / PPE utilized, fiber concentration per cubic centimeter of air and copies of actual lab reports.

As air monitoring information is collected and evaluated, changes in the levels of personal protection and dust control may be made. Written notification of these changes should be made available to NC DOT and other trades on a timely basis.

### **Daily Activities Log**

The individual conducting air monitoring tasks should likewise maintain a log of pertinent site activities including records of information that describes and tracks the use of health and safety procedures, activities, work locations on site, flow rates, wind direction and temperatures. This information is useful to interpret the air sampling data and employee exposure data correctly. A summary of the information from this log should be incorporated into the periodic (and final) air monitoring reports which are should be submitted to the NC DOT. Such records shall be kept by employers in accordance with applicable OSHA requirements.

### **Competent Person**

Pursuant to OSHA requirements in 29 CFR 1926.1101, there shall be a designated "competent" person on site during all construction activities where asbestos containing soil or rock may be disturbed. The competent person shall be a person with the proper training required to recognize asbestos hazards and have the authority to direct corrective actions.

### **Personal Protective Equipment and Decontamination According to Task**

Depending on the tasks being performed on-site, workers will fall into one of four OSHA-defined worker categories. The following categories and suggested on-site activity descriptions are defined according to the relative potential for exposure to the asbestos containing soil, rock, and/or airborne fibers and the personal protective equipment (PPE) which will be required to be used by individuals in that category:

#### **CATEGORY 1**

Exposure Potential: Those individuals who will not be in contact with asbestos containing soil, rock, or airborne fiber levels suspected to be over the standards. This includes workers nowhere near the vicinity of excavations, workers up wind of asbestos-soil handling operation and workers on site during days of no excavations that don't come into any contact with any form of asbestos.

PPE required: No special PPE required.

Decontamination requirements: There are none.

#### **CATEGORY 2**

Exposure potential: Those individuals whose only contact with asbestos containing soil or rock will be by walking through these wetted materials. This includes site workers who are engaged in activities in the vicinity of open excavations or trenches,

where there is successful dust suppression, but who are not working within the open excavations or trenches.

PPE required: Rubber boots, which can be removed and hosed off to limit spread of contaminated soil.

Decontamination requirements: All visible soil on boots shall be cleaned with water as the individual leaves the area where asbestos containing material is exposed.

### **CATEGORY 3**

Exposure potential: Those individuals whose job duties would cause their clothing to be soiled with asbestos-containing soil, rock, or dust, but who would not be exposed to airborne fiber levels in excess of EPA-recommended concentrations and/or the OSHA PELs. This includes site workers who are engaged in activities in open excavations with adequate dust suppression.

PPE required: Rubber boots - Disposable coveralls<sup>2</sup>.

Decontamination requirements: As individuals exit areas where asbestos soil is exposed, clean with water all visible soil from boots and other washable gear and wet wipe visible debris from coveralls or remove and properly dispose of them if grossly contaminated. Then wash hands, face and any other areas of exposed skin and clothing properly.

### **CATEGORY 4**

Exposure potential: Individuals operating rock drilling or sawing equipment, hoe ramming, rock removal, or other job categories identified (or found through air monitoring) to be at risk of exposure to airborne fibers in excess of EPA recommended concentrations and/or the OSHA's PELs.

PPE required: Rubber boots - Disposable coveralls<sup>2</sup> - Half-face negative pressure respirators with N100-filtration<sup>3</sup>

Decontamination requirements: If the potential exists for the OSHA permissible exposure level to be reached or exceeded, as evidenced by personnel monitoring data, planned work activities (i.e., drilling, rock sawing), or physical conditions of the site (i.e., fibrous rock outcroppings), personnel shall exist work area through decontamination facilities and shower units with appropriate filtration devices. The workers shall dispose of disposable coveralls properly, and use the decontamination facilities to clean all portions of the exterior of respirators prior to their removal.

As air monitoring data is collected and evaluated, changes in the levels of personal protection may be made. Any such changes would follow consultation between air monitoring personnel, representatives from the primary contractor, and NC DOT.

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<sup>2</sup> For the performance of some tasks, rubber or vinyl rain suit pant may be worn over the disposable coveralls to protect them from tearing. Precautions should be observed when wearing unbreathable clothing to prevent hypothermia during warm temperatures.

<sup>3</sup> The use of respirators must meet the requirements of OSHA 20 CFR 1910.134. Accordingly, a written respirator plan must be developed to address the needs of all employees using respirators, including medical reports. (Please see medical Surveillance section)

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## **Medical Surveillance**

If the dust-generating operations impacting the asbestos bearing rock and soils are found to result in workers exposures at or above the OSHA PELs, then a medical surveillance program should be implemented in accordance with 29 CFR 1926. The medical evaluation for the affected personnel should entail a medical history, pulmonary function testing, chest x-ray, and any additional tests considered necessary by the examining physician.

All personnel that are provided respirators should be in good physical condition and be judged by a physician to be fit to wear a negative pressure respirator. Personnel required to wear respirators should undergo an asbestos medical history check, X-ray, and pulmonary function tests. However, additional tests may be required as deemed necessary by the examining physician.

## **Decontamination of Equipment**

All tools, equipment, trucks, or machinery must be cleaned of visible stone/soil as they exit the areas where asbestos containing soils is exposed. For wheeled vehicles, this cleaning must take place prior to entering paved roads or parking areas to ensure that asbestos contaminated soils are not tracked onto road surfaces.

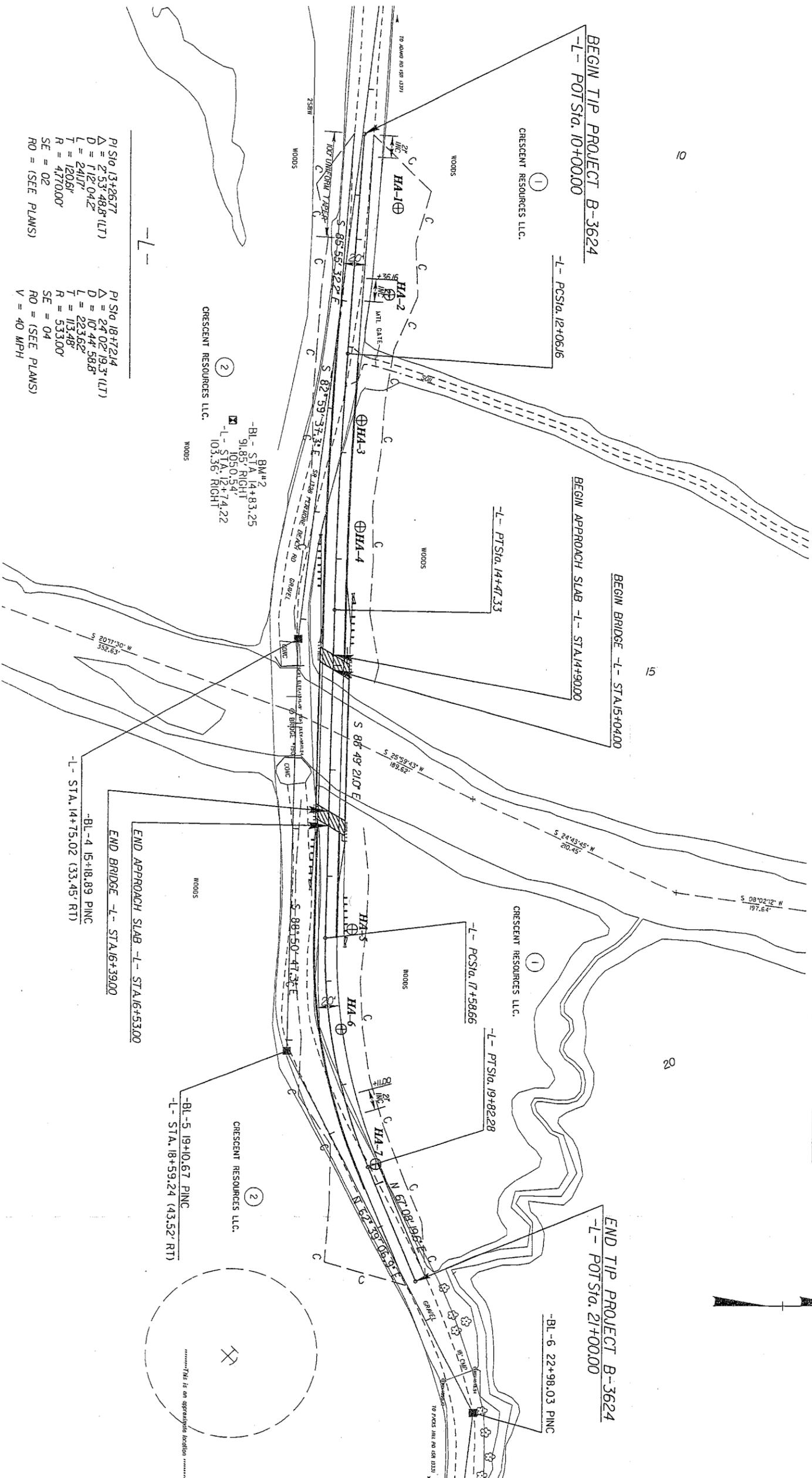
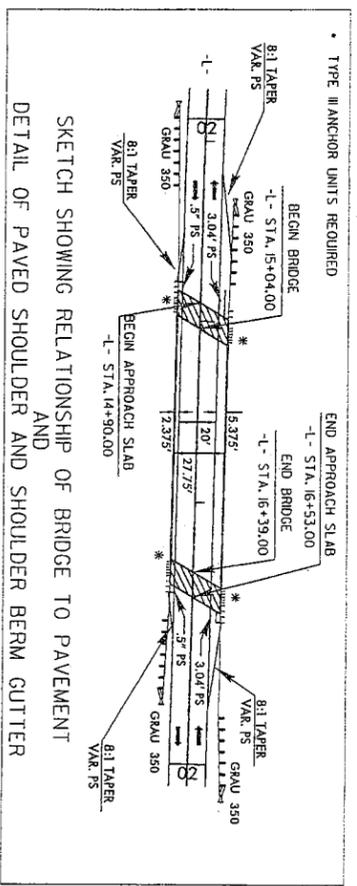
## **Contaminated Spoils**

All asbestos contaminated spoils maintained on-site shall be covered with a minimum of 6" of clean (non-asbestos containing) compatible material or other suitable for sealing material such as plastic. Run off from water or air erosion must be totally controlled.

Asbestos-containing spoils transported off-site must be wetted and covered. Prior notice including the date(s) of transport and the name and location of the recipient shall be given to NC DOT for approval. During transport of asbestos-containing material on the site, the material must be adequately wetted. Personal monitoring may be performed for equipment operators transporting the asbestos-containing material. If results of the personal and perimeter monitoring indicate elevated fiber concentrations, additional engineering controls including re-wetting the material shall be employed. Should the elevated fiber concentrations approach the OSHA PELs, appropriate personnel protective equipment should be employed.

Disposable clothing, towels, and used respirator filters shall be bagged and disposed of as friable asbestos-containing waste according to appropriate Federal, State and local regulations. Proper waste transport and disposal records should be provided to NC DOT upon conclusion of the project.

B-3624		4	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR A/C ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			



$P/1\text{ Sta } 13+26.77$   
 $\Delta = 2.53^\circ 48.8' (LT)$   
 $D = 112.042'$   
 $L = 241.7'$   
 $T = 120.6'$   
 $R = 4770.00'$   
 $SE = 02$   
 $RO = (\text{SEE PLANS})$

$P/1\text{ Sta } 18+21.14$   
 $\Delta = 24^\circ 02' 19.3' (LT)$   
 $D = 107.44 58.8'$   
 $L = 223.62'$   
 $T = 113.48'$   
 $R = 533.00'$   
 $SE = 04$   
 $RO = (\text{SEE PLANS})$   
 $V = 40 \text{ MPH}$

