ASBESTOS SURVEY REPORT

Termini: SR-40 Bridge Over Ocoee River, LM 3.12

Polk County, Tennessee

TDOT Project No. 70068-4209-04; PIN No. 123737.00

Bridge No. 70SR0400005

December 2016

Gregory M. Drelich

Tennessee Accredited Asbestos Inspector A-I-103660-55591

ASBESTOS SURVEY REPORT

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Gregory M. Drelich
Staff Geologist

Richard A. Lounsbury
Certified Project Manager I

Peter C. Frederick, CIEC
National Asbestos Leader

Prepared for:
Tennessee Department of Transportation
James K. Polk Building, Suite 900
505 Deaderick Street
Nashville, Tennessee 37243

Prepared by:
Arcadis U.S., Inc.
114 Lovell Road
Suite 202
Knoxville
Tennessee 37934
Tel 865 675 6700
Fax 865 675 6712

Our Ref.:
TNDT1935.HZ02

Date:
December 16, 2016

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ACRONYMS AND ABBREVIATIONS

%	percent
ACM	asbestos-containing material
AIHA	American Industrial Hygiene Association
EMSL	EMSL Analytical, Inc.
HA	homogeneous area
NESHAP	National Emission Standards for Hazardous Air Pollutants
NVLAP	National Voluntary Laboratory Accreditation Program
PLM	polarized light microscopy
RACM	regulated asbestos-containing material
TDOT	Tennessee Department of Transportation
USEPA	U.S. Environmental Protection Agency

ASBESTOS SURVEY REPORT

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Polk County, Tennessee
TDOT Project No. 70068-4209-04; PIN No. 123737.00
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1 INTRODUCTION

In accordance with our current Tennessee Department of Transportation (TDOT) Hazardous Material Contract E1935, a comprehensive inspection, including the collection of samples of suspect asbestos-containing materials (ACM), was recently conducted by Arcadis at the existing SR-40 bridge structure situated over the Ocoee River in Polk County, Tennessee. The purpose of this survey was to identify and quantify suspect ACM within the bridge's components prior to future repair of the structure. The survey was conducted in a phased approach, including visual observations, suspect material sampling, laboratory analysis, and reporting. All work was conducted in accordance with the TDOT-approved proposal prepared by Arcadis on July 28, 2016.

1.1 Bridge Identification

The bridge is identified in the TDOT Project System/Bridge Management System as follows:

TDOT Project Number:	70068-4209-04
TDOT PIN Number:	123737.00
Bridge Inventory Number:	70SR0400005 (70-SR040-03.12)
Route Number:	SR-40

The structure evaluated for this project is known as the SR-40 bridge located over the Ocoee River in Polk County, Tennessee.

1.2 Bridge Description

One two-lane, six-span, eight-approach span bridge structure was evaluated for this project. The existing 546-foot-long bridge, which was built in 1937, and is scheduled for repair, is constructed of concrete deck girders with a concrete deck and an asphalt wearing surface (Figure 1). Details regarding stormwater drains and utilities are discussed below in Section 2.2.

2 INSPECTION AND SAMPLING

The identification of ACM is performed by collecting bulk samples of suspect materials and having those samples analyzed by a laboratory. ACM are those materials found to contain greater than 1 percent (%) asbestos by calibrated visual area estimation by polarized light microscopy (PLM).

Bulk sampling is a procedure in which representative homogeneous sampling areas in a structure are identified and then sampled. A homogeneous sampling area is defined as an area that contains material of the same type (uniform in color and texture) and is applied during the same general time period. Once the homogeneous sampling areas are identified, bulk samples of suspect materials are obtained at the discretion of our inspectors, based on site conditions and professional judgment. It should be noted that it was necessary to minimally damage existing finishes to collect bulk samples.

2.1 Personnel Qualifications and Sampling Date

Mr. Gregory Drelich of Arcadis performed the inspection at the existing bridge structure along the SR-40 project corridor for this project. Mr. Drelich is a State of Tennessee-accredited asbestos inspector (Appendix A). Arcadis is also accredited by the State of Tennessee (accreditation number A-F-710-46035) to conduct asbestos activities (Appendix A). The asbestos survey and associated bulk sample collection were conducted by Arcadis on December 6, 2016. Traffic control measures for temporary lane or shoulder closures by TDOT were not required for this project.

2.2 Visual Survey

The inspection began with a visual survey of the structure to identify homogeneous areas (HAs) and to determine sampling locations for suspect ACM. Sample locations were sketched on a site drawing. Based on the visual survey completed on December 6, 2016, approximately 188 vertical steel stormwater drain pipes were observed on both sides of the bridge within the roadway shoulders and extending through the overhangs (Appendix B - Photo 16). No utilities were observed to be attached to the bridge. Skim coatings were not present on the majority of the bridge, however, they were observed to be remaining, but heavily weathered, on four small corner sections of the parapet wall/rail on each approach (Appendix B – Photo 13).

2.3 Sampling of Bridge Components

Individual bridge components were sampled as described in the following subsections. Materials such as metal and fiberglass (if present) were not considered suspect ACM. Arcadis collected bulk samples of suspect homogeneous materials in a random and representative manner, as determined by the inspector. Once sampling locations were determined, bulk concrete samples were collected by following these steps:

- The sample areas were thoroughly brushed and rinsed to remove surface debris and eliminate the possibility of sample contamination from asbestos-containing vehicular brake dust.
- A battery-powered hammer drill was used to cut away a thin layer of the concrete in order to make a dimple for sampling. This material was discarded.
- Additional drilling was continued after the asbestos inspector placed a new sample container near the drill bit to collect a concrete sample.
- The collected material was then bagged and labeled for transmittal to the laboratory.
- All equipment was then cleaned and the operation repeated at subsequent locations.

Non-concrete material sampling methods are described below. Material sampling included physically touching the material to determine friability, obtaining a representative bulk sample of the material for laboratory analysis, and more detailed observation of the material's condition and accessibility. A total of 49 suspect ACM samples from 15 HAs were submitted for laboratory analysis; these HAs are discussed below. Forty-nine samples (inclusive of all layers) were analyzed and reported by the laboratory. Laboratory analytical data sheets are presented in Appendix C. Generalized sample locations are presented on Figure 1. Representative photographs of each HA are also provided in Appendix B.

2.3.1 Abutment Concrete

Four bulk samples were collected from the abutment concrete (HA-01). Three samples were collected across the east side abutment wall and one sample was collected along the west side (per Section 2.3).

2.3.2 Abutment Wall Concrete

Three deck concrete samples were collected from the abutment wall (HA-02), between the abutment and the deck. All the samples were collected from the east end of the bridge (per Section 2.3).

2.3.3 Girder Concrete

Five bulk samples were collected from the girder concrete (HA-03). Three samples were collected on the east end of the bridge and two samples were collected from the west end of the bridge (per Section 2.3). One of the two samples collected on the west end of the bridge was collected from a cross-member girder that runs perpendicular to the deck girders.

2.3.4 Deck Concrete

Three bulk samples were collected from the deck concrete (HA-04). All the samples were collected on the east end of the bridge (per Section 2.3).

2.3.5 Abutment Joint Filler

Abutment joint filler (HA-05) was observed between the abutment and the deck. Three samples of the material were collected from east end of the bridge using cutting and tearing techniques.

2.3.6 Approach Bent Concrete

Three bulk samples were collected from approach bent concrete (HA-06). All the samples were collected on the east end of the bridge from three different bent structures (per Section 2.3).

2.3.7 Approach Bent Cap Concrete

Three bulk samples were collected from the approach bent concrete caps (HA-07). These samples were collected on the east end of the bridge from three different bent structures (per Section 2.3).

2.3.8 Main Span Bent Cap Concrete

Three bulk samples were collected from the main span bent cap concrete (HA-08). These samples were collected on the east end of the bridge (per Section 2.3).

2.3.9 Main Span Bent Concrete

Four bulk samples were collected from the main span bent concrete (HA-09). Three samples were collected on the east end of the bridge and one sample was collected on the west end (per Section 2.3).

2.3.10 Pier Concrete

Three bulk samples were collected from the pier concrete (HA-10). These samples were collected on the west end of the bridge (per Section 2.3).

2.3.11 Overhang Concrete

Three bulk samples were collected from the overhang concrete (HA-11). These samples were collected on the east end of the bridge (per Section 2.3).

2.3.12 Parapet Wall/Rail Concrete

Three bulk samples were collected from the parapet wall/rail concrete (HA-12). These samples were collected on the east end of the bridge (per Section 2.3).

2.3.13 Parapet Wall/Rail Skim Coating

Based on the estimated square footage of the remaining coating, three skim coat samples (HA-13) were collected from the approach parapet wall/rail. These samples were collected from the east end of the bridge. The skim coat was highly weathered and samples were collected without the use of hand tools.

2.3.14 Vibration Dampener

Three bulk samples were collected from the vibration dampener (HA-14). These samples were collected on the east end of the bridge between the approach bent and deck using cutting and tearing techniques.

2.3.15 Joint Filler

Abutment joint filler (HA-15) was observed between two approach spans. Three samples of the material were collected from southeast end of the bridge using cutting and tearing techniques.

3 ANALYTICAL PROCEDURES

The suspect asbestos-containing bulk samples were submitted under proper chain-of-custody protocol for analysis to EMSL Analytical, Inc. (EMSL) located in Cinnaminson, New Jersey. EMSL is a National

Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory (NVLAP Lab Code 101048-0) and an American Industrial Hygiene Association (AIHA) accredited laboratory (AIHA Laboratory 100194), using procedures compliant with the guidelines established by the U.S. Environmental Protection Agency (USEPA).

The bulk samples are analyzed in the laboratory using PLM coupled with dispersion staining. PLM is an analytical method for asbestos identification, which identifies the specific asbestos minerals by their unique optical properties. The optical properties are a result of the mineral's chemical composition, physical atomic structure, and visual morphology. This is the USEPA recommended method of analysis for asbestos identification in bulk samples. No other analytical methods (Point Counting, California Air Resource Board 435, or Transmission Electron Microscopy) were used or recommended per TDOT guidance.

4 REGULATORY CRITERIA

Applicable asbestos regulations define ACM as a material containing greater than 1% asbestos by weight and also distinguishing between friable and non-friable forms of ACM. Friable materials can be crumbled or reduced to powder by hand pressure. Non-friable materials cannot be crumbled, pulverized, or reduced to powder by hand pressure. The USEPA further classifies non-friable ACM as Category I and II.

4.1 National Emission Standards for Hazardous Air Pollutants

The USEPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR 61, Subpart B) requires that all regulated asbestos-containing materials (RACM) be properly removed prior to any renovation or demolition activities that will disturb them. These regulations define RACM as:

- Friable ACM.
- Category I non-friable ACM that has become friable.
- Category I non-friable ACM that will be or has been subject to sanding, grinding, cutting, or abrading.
- Category II non-friable ACM that has a high probability of becoming, or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

The NESHAP regulations also establish specific notification and control requirements for renovation and demolition work.

4.2 Definitions

Significant definitions related to regulation of asbestos under NESHAP include:

Friable ACM is defined by the Asbestos NESHAP as any material containing more than 1% asbestos, as determined using the method specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized

Light Microscopy (PLM), that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure (Sec. 61.141).

Non-friable ACM is any material containing more than 1% asbestos, as determined using the method specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized Light Microscopy (PLM), that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure. USEPA also defines two categories of non-friable ACM, Category I non-friable ACM and Category II non-friable ACM, which are described as follows:

- **Category I non-friable ACM** is any asbestos-containing packing, gasket, resilient floor covering, or asphalt roofing product which contains more than 1% asbestos as determined using PLM according to the method specified in Appendix A, Subpart F, 40 CFR Part 763. (Sec. 61.141).
- **Category II non-friable ACM** is any material, excluding Category I non-friable ACM, containing more than 1% asbestos, as determined using PLM according to the methods specified in Appendix A, Subpart F, 40 CFR Part 763, that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure. (Sec. 61.141).

RACM is (a) friable asbestos material; (b) Category I non-friable ACM that has become friable; (c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or (d) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

5 RESULTS

Forty-nine bulk samples were collected and submitted for analysis from this bridge; 49 results were reported, inclusive of all material layers. Multiple samples of each HA were collected in accordance with State of Tennessee, Department of Transportation Environmental Division, Social and Cultural Resources Office, Hazardous Materials Section requirements and delivered to the laboratory for visual observation and microscopic analysis. The samples were selected based on HAs of suspect materials, as described in Section 2.

Based on the laboratory analytical results, asbestos was confirmed to be present in one of the 15 HAs identified at the SR-40 bridge over the Ocoee River in Polk County, Tennessee. More specifically, one sample from the HA-14 vibration dampener material (HA-14C) contained <1% Chrysotile asbestos (Table 1). Photographs of this positive material are included in Appendix B (Photo 14). The laboratory analytical report for bulk samples obtained and analyzed by PLM is presented in Appendix C.

Based on the results of this survey, all vibration dampener material should be considered to contain <1% Chrysotile asbestos and should be handled/managed per Occupational Safety and Health Administration requirements during future repairs or demolition of the structure.

6 LIMITATIONS

Arcadis performed services in a manner consistent with the level of care and expertise exercised by members of the asbestos inspection and assessment profession. Arcadis does not imply or guarantee that every suspect ACM on or in the structure has been identified or sampled. Historically, asbestos has been used extensively in the United States. This inspection is intended to identify those components that are reasonably suspect and are most likely to be ACM in quantities subject to regulation based on existing industry and regulatory standards. The inspector did not utilize extensive destructive sampling techniques to assess those materials potentially located in the structural components.

The information presented herein is based on information obtained during the site visit(s) and from professional judgment. If additional information becomes available which might impact this report, Arcadis requests the opportunity to review the information and re-assess the potential concerns and modify this report, if warranted.

There are no third party rights or benefits conferred under this report. Use of this report is strictly limited to TDOT, the only party to whom Arcadis intends to confer any rights. Any reliance on the contents of this report by any third party is the sole responsibility of that party.

TABLES

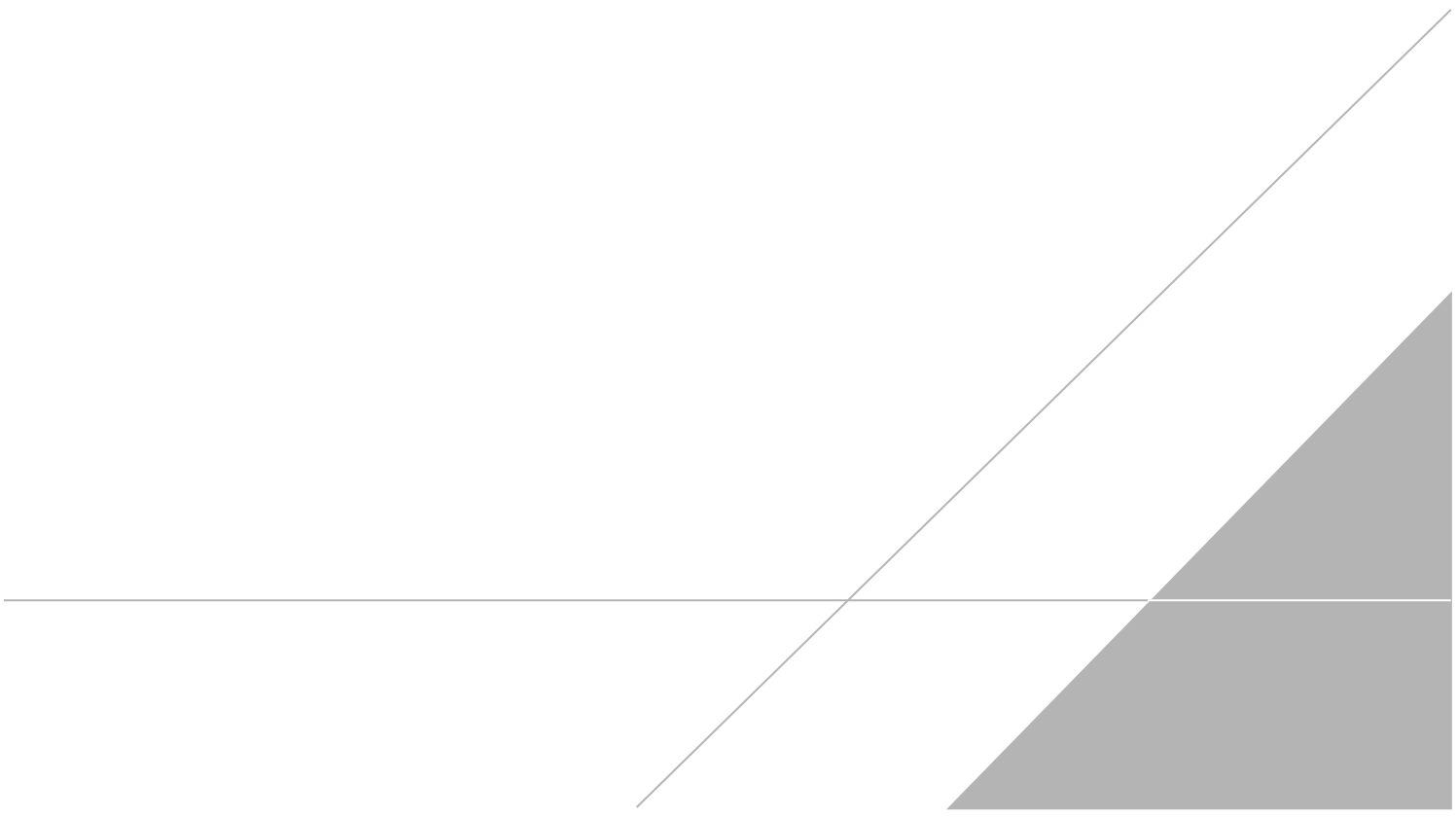


Table 1
Summary of Materials Containing Detectable Levels of Asbestos

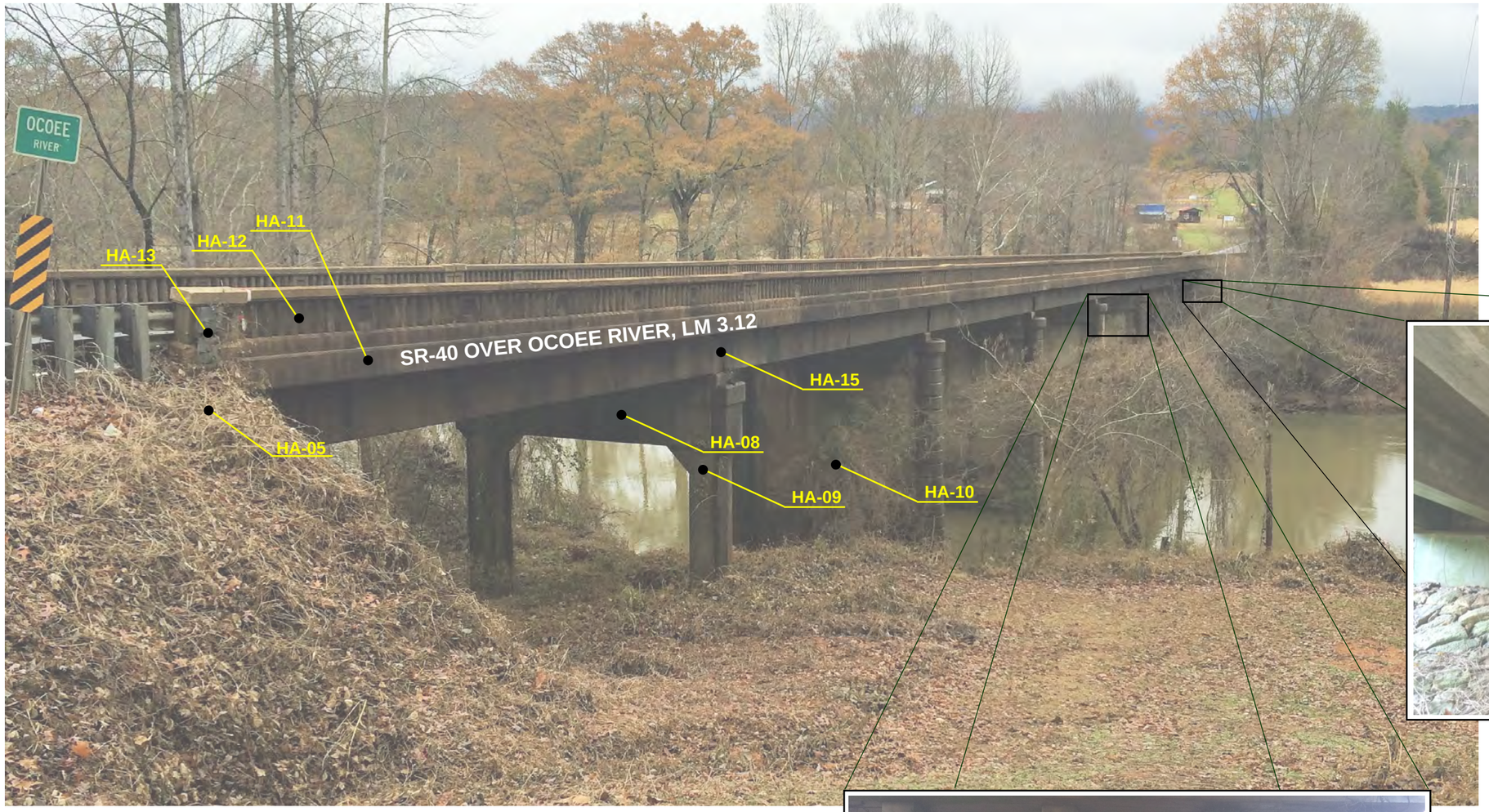
Tennessee Department of Transportation
SR- 40 Bridge Over Ocoee River, LM 3.12
Polk County, Tennessee
TDOT Project No. 70068-4209-04; PIN No. 123737.00
Bridge No. 70SR0400005

Inspection Date	Sample Identification No.	Homogeneous Area	Location (Bridge Component)	Approximate Quantity	Friable (Y/N)	Type of Asbestos and Content (%)
12/6/2016	HA-14C	Vibration dampener	Between approach bent structure and deck	432 sq ft	N	<1% Chrysotile

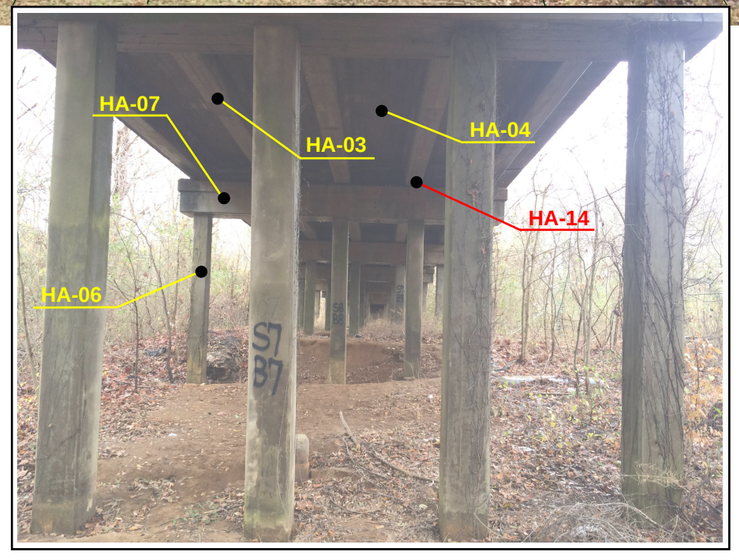
General Notes:
All vibration dampener material for this structure should be assumed to contain <1% Chrysotile based on the analytical results obtained.

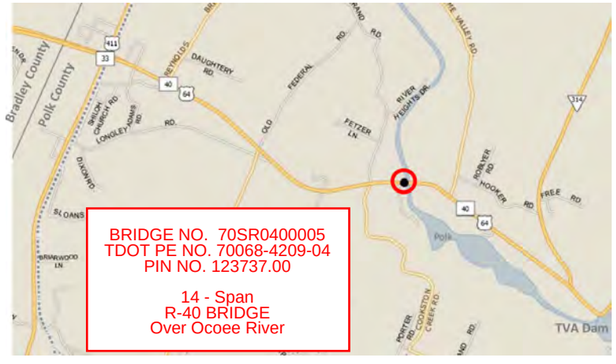
Acronyms and Abbreviations:
% = percent
sq ft = square feet

FIGURES



APPROXIMATE
NORTH





NOTES:
1) Homogenous Area (HA) sample locations illustrated above are generalized. Actual locations were placed at random locations across entire structure.
2) Samples were collected December 12, 2016.
3) Asbestos was not detected in the bulk samples collected, with the exception of HA-14 vibration dampener material (<1% Chrysotile), as shown above in red.
4) Numerous steel stormwater drain pipes were present on the bridge.
5) Total bridge length is 546 feet.

NOT TO SCALE

TERMINI: SR-40 BRIDGE OVER OCOEE RIVER, LM 3.12
POLK COUNTY, TENNESSEE
BRIDGE NO. 70SR0400005
TDOT PROJECT NO. 70068-4209-04; PIN NO. 123737.00

ASBESTOS SURVEY REPORT

Bulk Sample Location Map

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

APPENDIX A

Accreditations

THE STATE OF TENNESSEE

Department of Environment and Conservation
Division of Solid Waste Management
Toxic Substances Program

Initial

Gregory M Drelich

DOB	Sex	HGT	WGT
28-Jul-1983	M	6' 0"	185

Discipline	Accreditation	Expiration
Inspector	A-I-103660-55591	Nov-30-2017

Asbestos Accreditation

THE STATE OF TENNESSEE

Department of Environment and Conservation Division of Solid Waste Management
Toxic Substances Program
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 14th Floor Nashville TN 37243

By virtue of the authority vested by the Division of Solid Waste Management, the Company named below is hereby accreditted to offer and/or conduct Asbestos activities pursuant to Rule 1200-01-20:

Arcadis U.S., Inc.

P O Box 66 Syracuse NY, 13214

to conduct ASBESTOS ACTIVITIES in schools or public and commercial buildings in Tennessee. This firm is responsible for compliance with the applicable requirements of Rule 1200-01-20.

Discipline	Type	Accreditation Number	Effective Date	Expiration Date
Accreditation	Re-Accreditation	A-F-710-46035	December 01, 2015	December 31, 2016

Given under the Seal of the State of Tennessee in Nashville.

This **17th** Day of **December 2015**

Division of Solid Waste Management
Toxic Substance Program

CN-1324 (Rev 6/13) RDA-3020

APPENDIX B

Photographic Log

Project Photographs

Termini: SR-40 Bridge Over Ocoee River, LM 3.12
Polk County, Tennessee
TDOT Project No. 70068-4209-04, PIN No. 123737.00
Bridge No. 70SR0400005

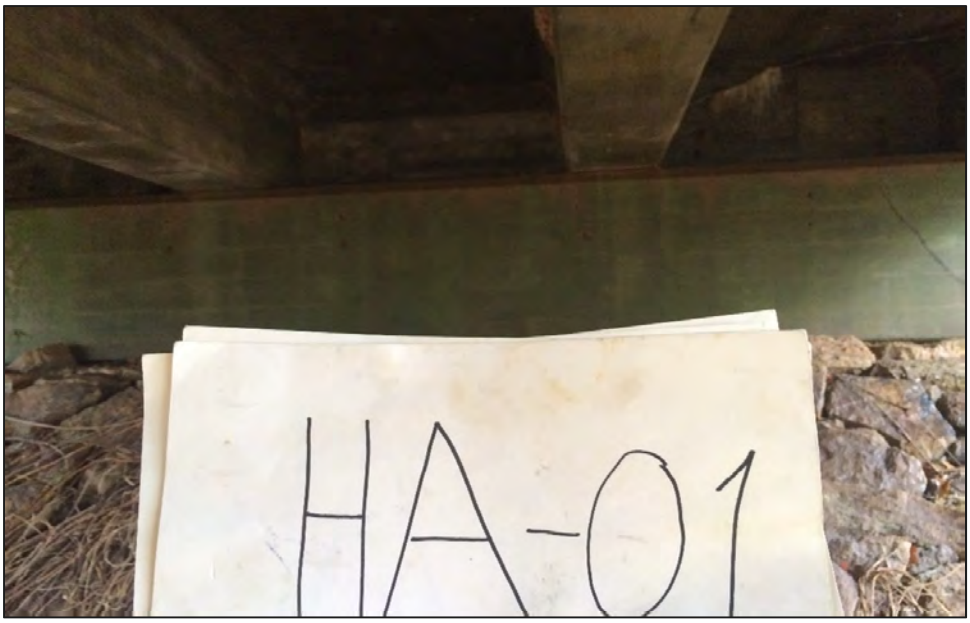


Photo: 1

Date:
December 6, 2016

Description:
View of abutment concrete (HA-01).

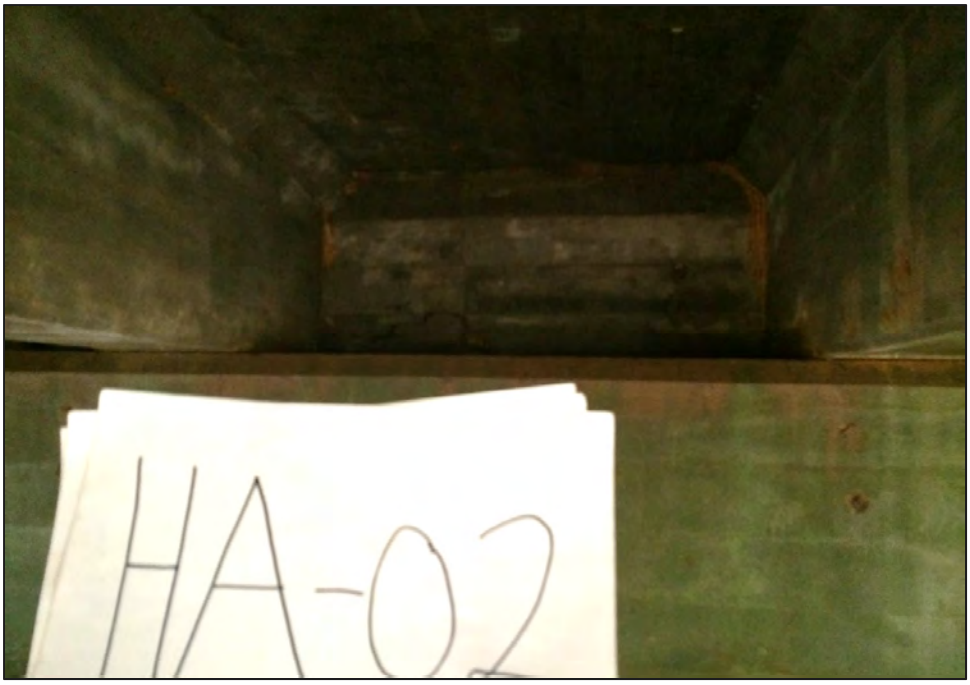


Photo: 2

Date:
December 6, 2016

Description:
View of abutment wall concrete (HA-02).

Project Photographs

Termini: SR-40 Bridge Over Ocoee River, LM 3.12
Polk County, Tennessee
TDOT Project No. 70068-4209-04, PIN No. 123737.00
Bridge No. 70SR0400005

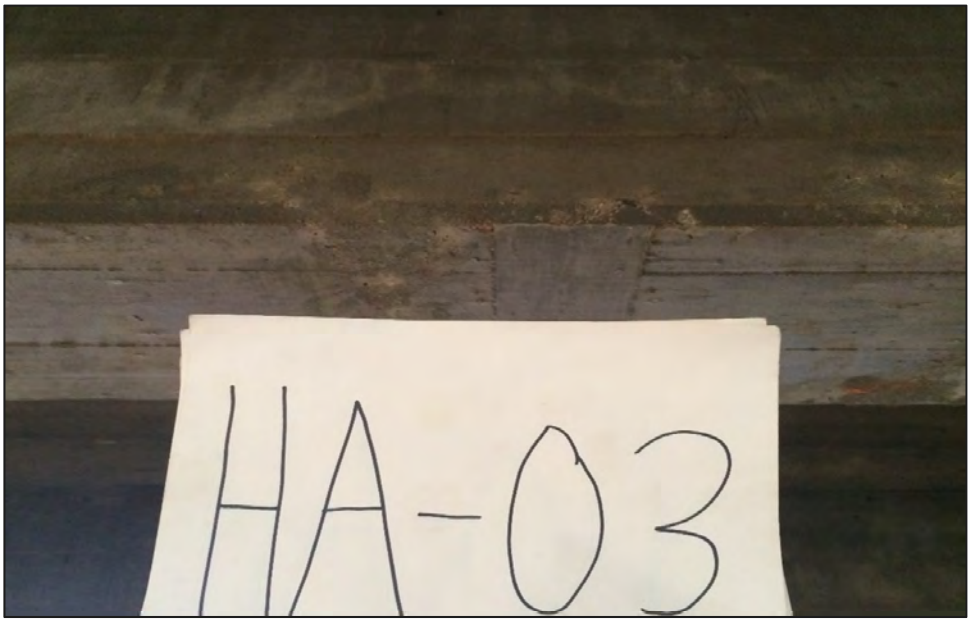


Photo: 3

Date:
December 6, 2016

Description:
View of girder concrete (HA-03).

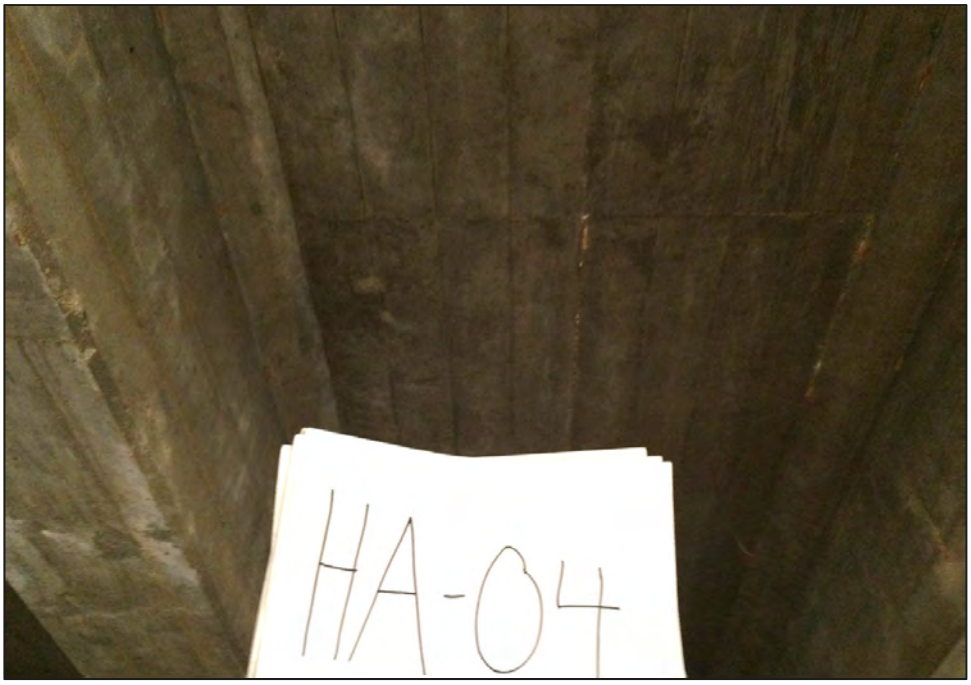


Photo: 4

Date:
December 6, 2016

Description:
View of deck concrete (HA -04) from under side of bridge.

Project Photographs

Termini: SR-40 Bridge Over Ocoee River, LM 3.12
Polk County, Tennessee
TDOT Project No. 70068-4209-04, PIN No. 123737.00
Bridge No. 70SR0400005

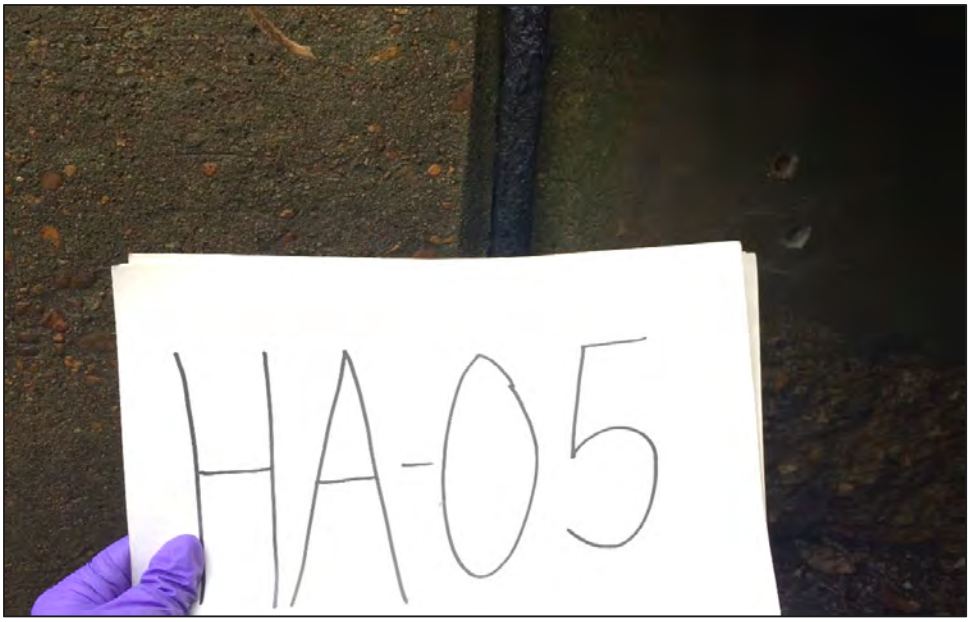


Photo: 5

Date:
December 6, 2016

Description:
View of abutment joint filler (HA-05).

Photo: 6

Date:
December 6, 2016

Description:
View of approach bent concrete (HA-06).

Project Photographs

Termini: SR-40 Bridge Over Ocoee River, LM 3.12
Polk County, Tennessee
TDOT Project No. 70068-4209-04, PIN No. 123737.00
Bridge No. 70SR0400005

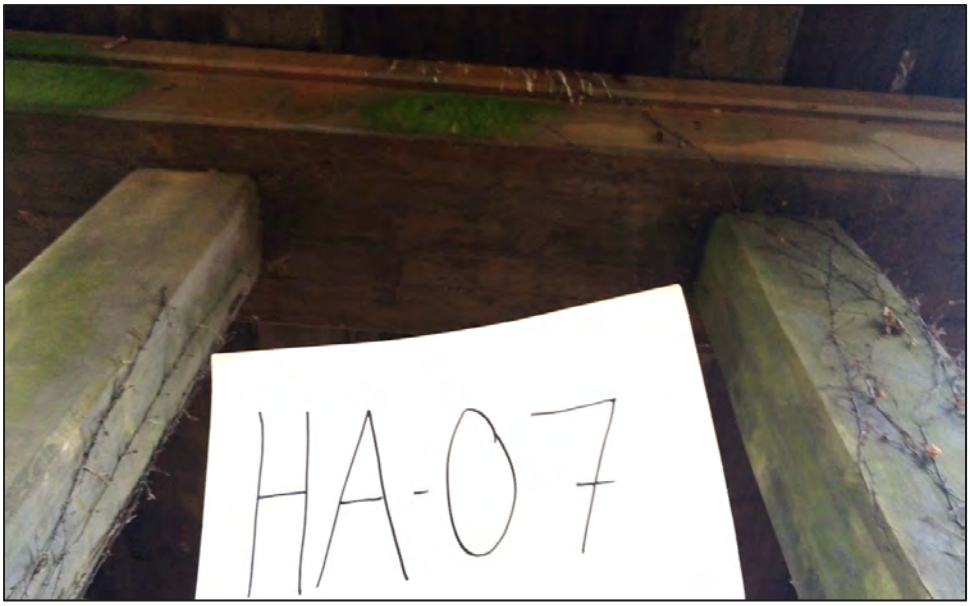


Photo: 7

Date:
December 6, 2016

Description:
View of approach bent concrete cap (HA-07) above the base structure.

Photo: 8

Date:
December 6, 2016

Description:
View of main span bent concrete cap (HA-08).

Project Photographs

Termini: SR-40 Bridge Over Ocoee River, LM 3.12
Polk County, Tennessee
TDOT Project No. 70068-4209-04, PIN No. 123737.00
Bridge No. 70SR0400005

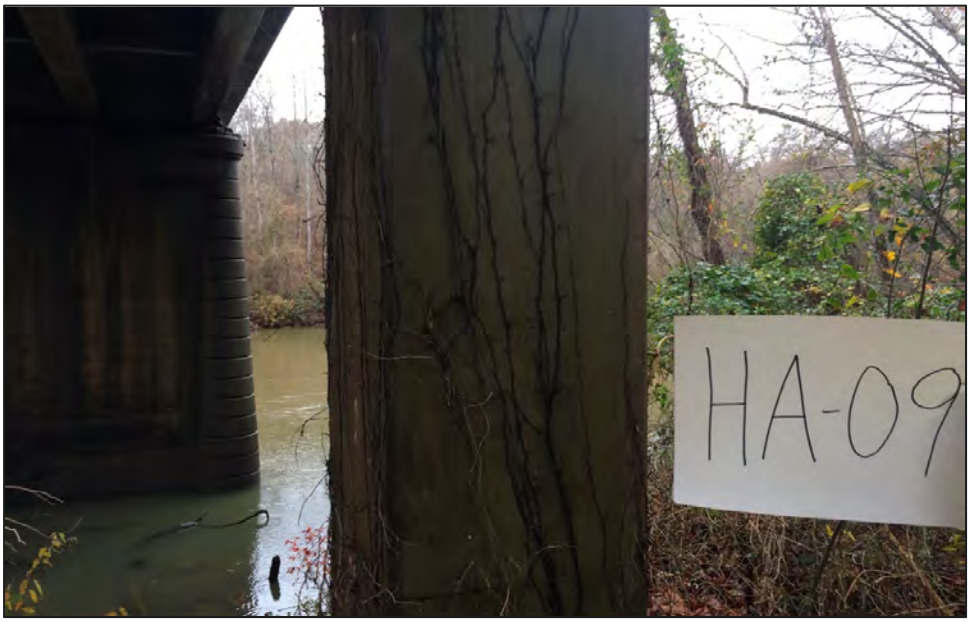


Photo: 9

Date:
December 6, 2016

Description:
View of main span bent concrete (HA-09).

Photo: 10

Date:
December 6, 2016

Description:
View of pier concrete (HA-10).

Project Photographs

Termini: SR-40 Bridge Over Ocoee River, LM 3.12
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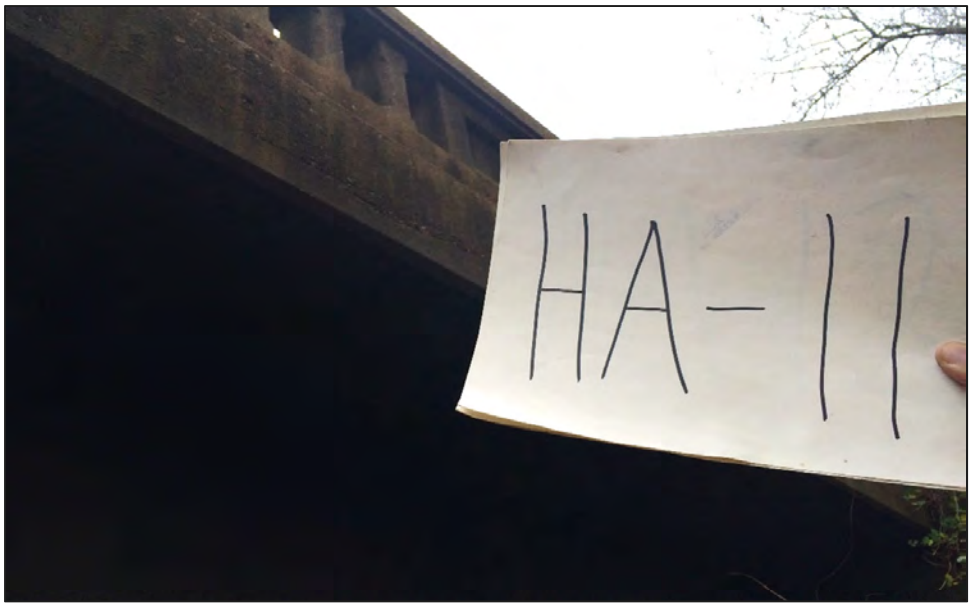

Photo: 11

Date:
December 6, 2016

Description:
View of overhang concrete (HA-11).

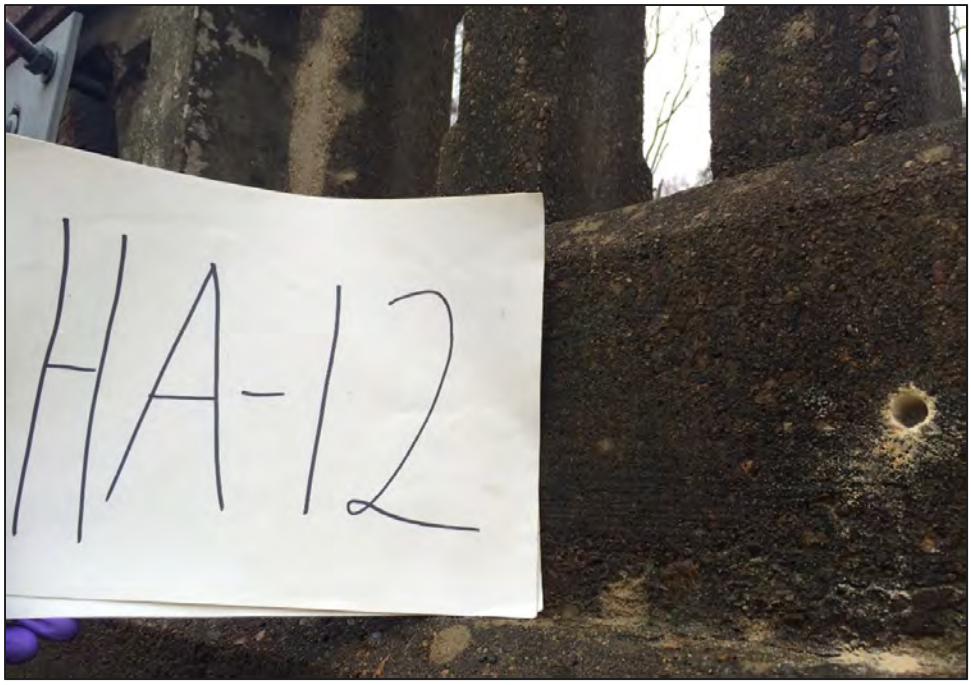

Photo: 12

Date:
December 6, 2016

Description:
View of parapet wall/rail concrete (HA-12).

Project Photographs

Termini: SR-40 Bridge Over Ocoee River, LM 3.12
Polk County, Tennessee
TDOT Project No. 70068-4209-04, PIN No. 123737.00
Bridge No. 70SR0400005

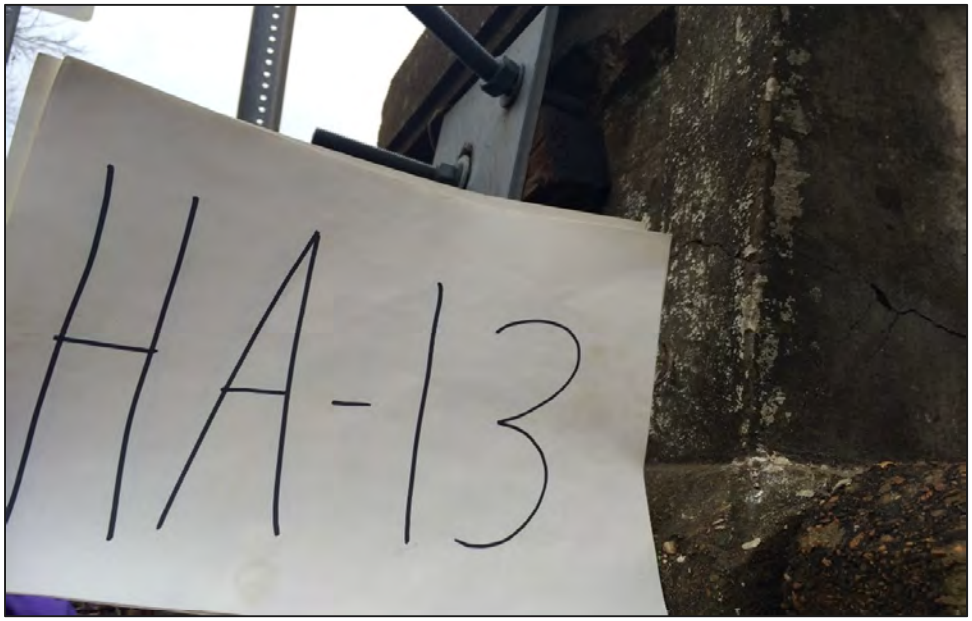

Photo: 13

Date:
December 6, 2016

Description:
View of parapet wall/rail skim coating (HA-13).

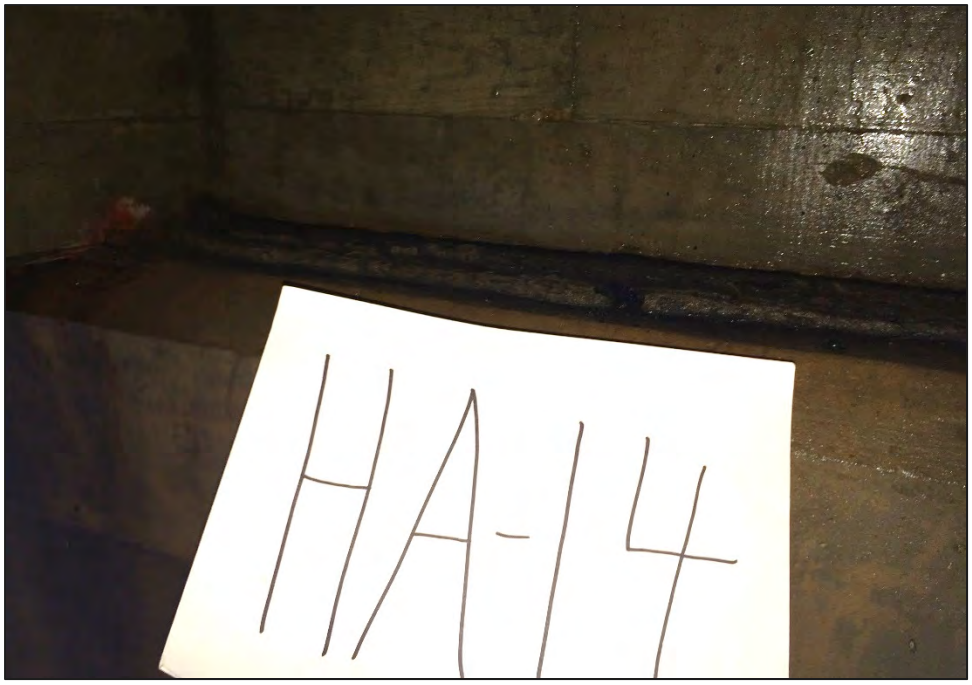

Photo: 14

Date:
December 6, 2016

Description:
View of vibration dampener (HA-14).

Project Photographs

Termini: SR-40 Bridge Over Ocoee River, LM 3.12
Polk County, Tennessee
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Bridge No. 70SR0400005

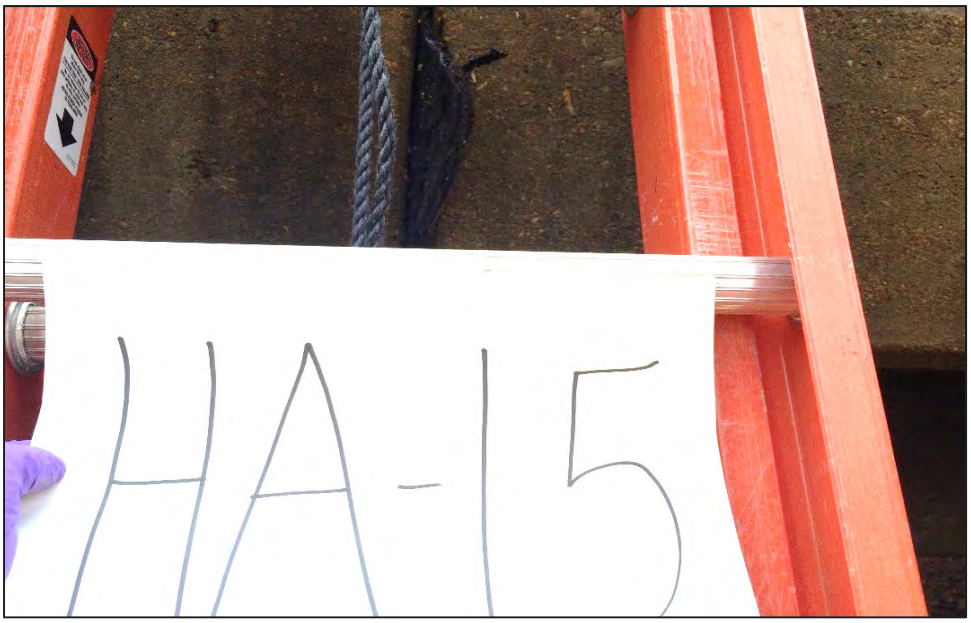

Photo: 15

Date:
December 6, 2016

Description:
View of joint filler (HA-15) between approach spans.

Photo: 16

Date:
December 6, 2016

Description:
View of vertical steel stormwater drain pipes.

APPENDIX C

Laboratory Analytical Data

EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077
Tel/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order: 041633199
Customer ID: ACAD78E
Customer PO:
Project ID:

Attention: Richard Lounsbury
ARCADIS U.S., Inc.
114 Lovell Road
Suite 202
Knoxville, TN 37934
Project: TNDT1935.HZ02 / SR-40 Bridge over Ocoee River

Phone: (865) 481-3000
Fax:
Received Date: 12/07/2016 9:30 AM
Analysis Date: 12/08/2016
Collected Date: 12/06/2016

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1A *041633199-0001*	NE - Abutment Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
1B *041633199-0002*	NE - Abutment Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
1C *041633199-0003*	SE - Abutment Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
1D *041633199-0004*	SW - Abutment Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2A *041633199-0005*	NE - Abutment Wall Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2B *041633199-0006*	NE - Abutment Wall Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2C *041633199-0007*	SE - Abutment Wall Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3A *041633199-0008*	NE - Girder Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3B *041633199-0009*	E - Girder Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3C *041633199-0010*	SE - Girder Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3D *041633199-0011*	SW - Girder Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3E *041633199-0012*	W (Crossmember) - Girder Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
4A *041633199-0013*	NE - Deck Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
4B *041633199-0014*	E - Deck Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
4C *041633199-0015*	SE - Deck Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
5A *041633199-0016*	NE - Abutment Joint Filler	Black Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (Other)	None Detected

Initial report from: 12/09/2016 07:11:29

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Tel/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order: 041633199
Customer ID: ACAD78E
Customer PO:
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
5B *041633199-0017*	NE - Abutment Joint Filler	Black Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (Other)	None Detected
5C *041633199-0018*	NE - Abutment Joint Filler	Black Non-Fibrous Homogeneous	25% Cellulose	75% Non-fibrous (Other)	None Detected
6A *041633199-0019*	BENT 1 (From E) - Approach Bent Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
6B *041633199-0020*	BENT 2 (From E) - Approach Bent Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
6C *041633199-0021*	BENT 3 (From E) - Approach Bent Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
7A *041633199-0022*	BENT 1 (From E) - Approach Bent Cap Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
7B *041633199-0023*	BENT 2 (From E) - Approach Bent Cap Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
7C *041633199-0024*	BENT 3 (From E) - Approach Bent Cap Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
8A *041633199-0025*	NE - Main Span Bent Cap Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
8B *041633199-0026*	NE - Main Span Bent Cap Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
8C *041633199-0027*	SE - Main Span Bent Cap Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
9A *041633199-0028*	NE - Main Span Bent Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
9B *041633199-0029*	NE - Main Span Bent Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
9C *041633199-0030*	SE - Main Span Bent Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
9D *041633199-0031*	SW - Main Span Bent Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
10A *041633199-0032*	NW - Pier Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
10B *041633199-0033*	W - Pier Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
10C *041633199-0034*	SW - Pier Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
11A *041633199-0035*	NE - Overhang Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

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EMSL Order: 041633199
Customer ID: ACAD78E
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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
11B *041633199-0036*	NE - Overhang Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
11C *041633199-0037*	NE - Overhang Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
12A *041633199-0038*	NE - Parapet Wall/Rail Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
12B *041633199-0039*	NE - Parapet Wall/Rail Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
12C *041633199-0040*	SE - Parapet Wall/Rail Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
13A *041633199-0041*	NE - Parapet Wall/Rail Skim Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
13B *041633199-0042*	NE - Parapet Wall/Rail Skim Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
13C *041633199-0043*	SE - Parapet Wall/Rail Skim Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
14A *041633199-0044*	Vibration Dampener between Approach Bent and Deck	Black Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
14B *041633199-0045*	Vibration Dampener between Approach Bent and Deck	Black Non-Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
14C *041633199-0046*	Vibration Dampener between Approach Bent and Deck	Black Non-Fibrous Homogeneous	30% Cellulose	70% Non-fibrous (Other)	<1% Chrysotile
15A *041633199-0047*	Joint Filler between Approach Spans 1 and 2 (From East)	Black Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
15B *041633199-0048*	Joint Filler between Approach Spans 1 and 2 (From East)	Black Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (Other)	None Detected
15C *041633199-0049*	Joint Filler between Approach Spans 1 and 2 (From East)	Black Non-Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (Other)	None Detected

Initial report from: 12/09/2016 07:11:29

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EMSL Order:	041633199
Customer ID:	ACAD78E
Customer PO:	
Project ID:	

Analyst(s)

Benjamin Verghese (33)
Samantha Rundstorm-Cruz (1)
William Nguyen (15)

Benjamin Ellis, Laboratory Manager
or Other Approved Signatory

Initial report from: 12/09/2016 07:11:29

OrderID: 041633199

Asbestos Chain of Custody

EMSL Order Number *(Lab Use Only)*: 041633199

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX: (856) 786-5974

Company : ARCADIS-US	**EMSL-Bill to:** ☐ Same ☒ Different If Bill to is Different note instructions in Comments**
Street: 114 Lovell Road, Suite 202	*Third Party Billing requires written authorization from third party*
City: Knoxville / **State/Province: TN**	**Zip/Postal Code: 37934-1984** / **Country: USA**
Report To (Name): Richard Lounsbury	**Fax #: 865.675.6712**
Telephone #: 865.777.3526	**Email Address: richard.lounsbury@arcadis.com**
Project Name/Number: TNDT1935.HZ02/SR-40 Bridge over OcoeeRiver	
Please Provide Results: ☐ Fax ☒ Email / **Purchase Order:**	**U.S. State Samples Taken: TN**

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☒ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air ☐ Check if samples are from NY
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☒ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ **4-4.5hr TAT (AHERA only)**
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ EPA Protocol (Semi-Quantitative)
- ☐ EPA Protocol (Quantitative)

Other:
- ☐

☐ **Check For Positive Stop – Clearly Identify Homogenous Group** | **Filter Pore Size (Air Samples):** ☐ 0.8µm ☐ 0.45µm

Samplers Name: Patrick Kontovich | **Samplers Signature:**

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
	See Attached Sheets		

RECEIVED
EMSL
CINNAMINSON, NJ
2016 DEC -7 A 11:02

Client Sample # (s): [redacted] **Total # of Samples:** [redacted]

Relinquished (Client): [redacted] **Date:** 12/6/16 **Time:** 19:30

Received (Lab): [redacted] **Date:** 12/7/16 **Time:** 930

Comments/Special Instructions: Bill to address: Accounts Payable, 630 Plaza Drive, Suite 100, Highlands Ranch, CO 80129

49

Project/Client TDOT / Bridge No. 70SR0400005 (SR-40 Bridge over Ocoee River) **Sample Date** 12/6/2016

Site Address Ocoee, Polk County, TN

Project Number TNDT1935.HZ02.00EXP **Inspector** G. Drelich/Z. Mongan

HA / Sample Number		Material Type	Color / Texture	Description	Floor	Sample Location	Condition	Friable Y / N	Quantity (square feet)	Photo #
1	A	Misc	Grey	Abutment concrete		NE	Good	N	~186	
	B		Grey			NE	Good	N	~186	
	C		Grey			SE	Good	N	~186	
	D		Grey			SW	Good	N	~186	
Notes:										
2	A	Misc	Grey	Abutment wall concrete		NE	Good	N	~81	
	B		Grey			NE	Good	N	~81	
	C		Grey			SE	Good	N	~81	
Notes:										
3	A	Misc	Grey	Concrete girder		NE	Good	N	~12,285	
	B		Grey			E	Good	N	~12,285	
	C		Grey			SE	Good	N	~12,285	
	D		Grey			SW	Good	N	~12,285	
	E		Grey			W (crossmember)	Good	N	~12,285	
Notes:										
4	A	Misc	Grey	Deck concrete		NE	Good	N	~14,742	
	B		Grey			E	Good	N	~14,742	
	C		Grey			SE	Good	N	~14,742	
Notes:										
5	A	Misc	Black	Abutment joint filler		NE	Fair	N	~20	
	B		Black			NE	Fair	N	~20	
	C		Black			SE	Fair	N	~20	
Notes:										
6	A	Misc	Grey	Approach bent concrete		BENT 1 (from E)	Good	N	~3,840	
	B		Grey			BENT 2 (from E)	Good	N	~3,840	
	C		Grey			BENT 3 (from E)	Good	N	~3,840	
Notes:										
7	A	Misc	Grey	Approach bent cap concrete		BENT 1 (from E)	Good	N	~648	
	B		Grey			BENT 2 (from E)	Good	N	~648	
	C		Grey			BENT 3 (from E)	Good	N	~648	
Notes:										
8	A	Misc	Grey	Main span bent cap concrete		NE	Good	N	~540	
	B		Grey			NE	Good	N	~540	
	C		Grey			SE	Good	N	~540	
Notes:										
9	A	Misc	Grey	Main span bent concrete		NE	Good	N	~640	
	B		Grey			NE	Good	N	~640	
	C		Grey			SE	Good	N	~640	
	D		Grey			SW	Good	N	~640	
Notes:										

Project/Client TDOT / Bridge No. 70SR0400005 (SR-40 Bridge over Ocoee River)

Site Address Ocoee, Polk County, TN

Project Number TNDT1935.HZ02.00EXP

Sample Date 12/6/2016

Inspector G. Drelich/Z. Mongan

HA / Sample Number		Material Type	Color / Texture	Description	Floor	Sample Location	Condition	Friable Y / N	Quantity (square feet)	Photo #
10	A	Misc	Grey	Concrete pier		NW	Good	N	~8,100	
	B		Grey			W	Good	N	~8,100	
	C		Grey			SW	Good	N	~8,100	
Notes:										
11	A	Misc	Grey	Concrete overhang		NE	Good	N	~2,184	
	B		Grey			NE	Good	N	~2,184	
	C		Grey			SE	Good	N	~2,184	
Notes:										
12	A	Misc	Grey	Parapet wall/rail concrete		NE	Good	N	~4,368	
	B		Grey			NE	Good	N	~4,368	
	C		Grey			SE	Good	N	~4,368	
Notes:										
13	A	Surfacing	White	Parapet wall/rail skim coating		NE	Good	N	~40	
	B		White			NE	Good	N	~40	
	C		White			SE	Good	N	~40	
Notes:										
14	A	Misc	Black	Vibration Dampener		Dampener between abutment bent and deck	Good	N	~432	
	B		Black			Dampener between abutment bent and deck	Good	N	~432	
	C		Black			Dampener between abutment bent and deck	Good	N	~432	
Notes:										
15	A	Misc	Black	Joint Filler		Filler between approach spans 1 and 2 (from e	Good	N	~54	
	B		Black			Filler between approach spans 1 and 2 (from e	Good	N	~54	
	C		Black			Filler between approach spans 1 and 2 (from e	Good	N	~54	
Notes:										

Arcadis U.S., Inc.

114 Lovell Road

Suite 202

Knoxville, Tennessee 37934

Tel 865 675 6700

Fax 865 675 6712

www.arcadis.com

Site Specific Health and Safety Plan

Revision 13c, 5/9/2016

Project Name:	Asbestos-Containing Material Bridge Survey Termini: SR-40 Bridge Over Ocoee River, LM 3.12 Bridge No. 70SR0400005 Ocoee, Polk County, Tennessee
Project Number:	TNDT1935.HZ02
Client Name:	Tennessee Department of Transportation
Date:	11/9/2016
HASP Expires	11/9/2017
Revision:	0

Approvals:

HASP Developer: Benita Ferrell

Project Manager: Rich Lounsbury

HASP Reviewer:

Emergency Information

Site Address: Asbestos-Containing Material Bridge Survey
Termini: SR-40 Bridge Over Ocoee River, LM 3.12
Bridge No. 70SR0400005
Ocoee, Polk County, Tennessee

Emergency Phone Numbers:

Emergency (fire, police, ambulance)		911
Emergency (facility specific, if applicable):		
		NA
		NA
Emergency Other (specify)		NA
Client Contact	Kyle Kirschenmann	615-598-1522
WorkCare (non-life-threatening injury/illness)		888-449-7787
Project H&S	Rich Lounsbury	865-621-2189
Task Manager	Zach Mongan	240-476-1315
Project Manager	Rich Lounsbury	865-621-2189
Corporate H&S Specialist	Sharon Lingle	864-331-9940
Corporate H&S Director	Denis Balcer	614-778-9171

Hospital Name and Address: Tennova Healthcare
2305 Chambliss Ave NW
Cleveland, TN 37311

Hospital Phone Number: 423-559-6000

Incident Notification Process

1	Dial 911/Facility Emergency Number/WorkCare as applicable	
2	Contact PM/Supervisor	Rich Lounsbury
3	Contact Corporate H&S	Denis Balcer
4	Contact Client	Kyle Kirschenmann

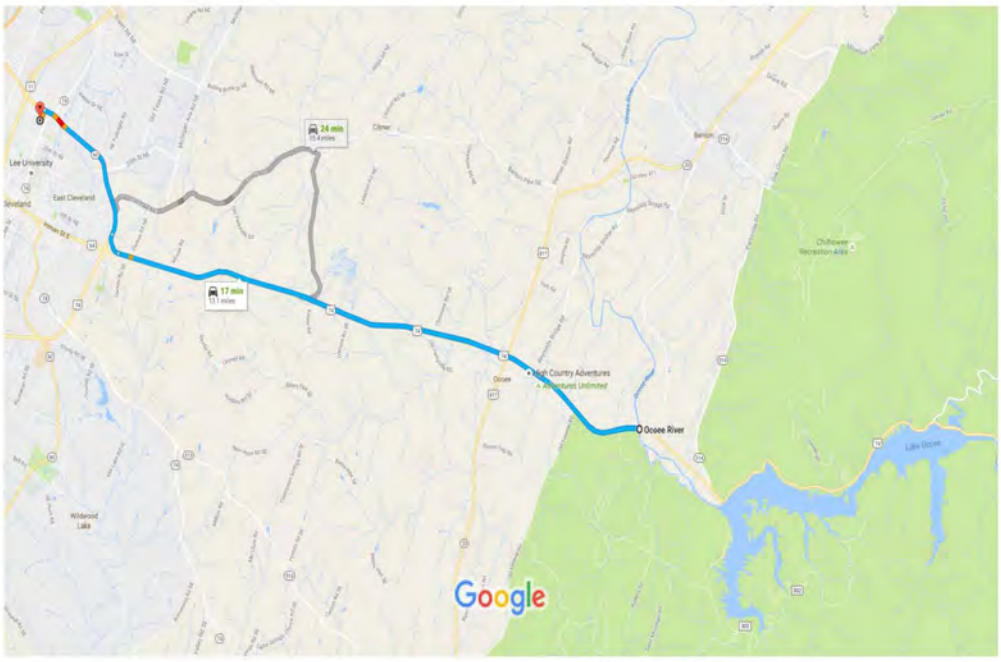
Complete below, as applicable, or clear cell contents:

Location of Assembly Area(s):

Nearest AED location: AED is not available at project site.
Nearest Storm Shelter: To be determined during tailgate H&S meeting

Route to the Hospital

Google Maps Ocoee River to Tennova HealthCare Drive 13.1 miles, 17 min



Map data ©2016 Google 1 mi

Ocoee River

1. Head west on US-64 W/US-74 W toward River Bend Dr — 10.1 mi
2. Take the TN-60 N exit toward Dayton — 0.3 mi
3. Continue straight onto TN-60 N/25th St NE — 2.4 mi
4. Turn left onto Chambliss Ave NW
   Destination will be on the right — 0.2 mi

Tennova HealthCare

2305 Chambliss Avenue Northwest, Cleveland, TN 37311

General Information

Site Type (select all applicable where work will be conducted):

- [x] Active
- [x] Bridge
- [ ] Buildings
- [ ] Commercial
- [ ] Construction
- [ ] Military Installation
- [ ] Inactive Industrial
- [ ] Active Industrial
- [ ] Landfill
- [ ] Marine
- [ ] Mining
- [ ] Parking Lot/Private Roadway
- [ ] Railroad
- [x] Remote Area
- [ ] Residential
- [ ] Retail
- [x] Roadway (public, including right-of-way)
- [ ] Water Treatment Plant
- [ ] Unknown
- [ ] Security Risk Site/Location
- [ ] Utility
- [x] Other (specify): State Highway Bridge over the Ocoee River

Temporary lane closures across the bridge and associated traffic control, if necessary, will be provided by the local TDOT Maintenance Division. Arcadis will coordinate closely with TDOT regarding the lane closure request and work scheduling as needed. Lane closures are estimated to take no more than 6 hours per day during non-peak travel times (i.e., 9:00 am to 3:00 pm).

Surrounding Area and Topography (select one):

- [ ] Surrounding area and topography are presented in the project work plan
- [x] Surrounding area and topography (*briefly describe*):

Bridge 70SR0400005 is located in a remote area along SR-40 in Polk County, Tennessee over the Ocoee River. Surrounding land use is generally rural, residential, and agricultural, and the topography is gently rolling.

Simultaneous Operations (SimOps)

- [x] Not applicable
- [ ] SimOps will exist on this project

Site Background (select one):

- [ ] Site background is presented in the project work plan
- [x] Site background (*briefly describe)* :

Prior to future repairs, TDOT is evaluating this bridge for the potential presence of asbestos to minimize future potential worker exposure. This bridge was constructed in 1937 and is in poor condition and consists of a 546-foot, two lane, six span, eight approach span structure constructed of concrete girders with a concrete deck and asphalt wearing surface.

Project Tasks
The following tasks are identified for this project:

Examples: "Drilling/soil sampling", "Surveying", "General Inspections", "Construction Management/Inspections"

1 Bridge Material ACM Recon/Survey & Sampling
2 General Site Work
3
4
5

☐ Subcontractor H&S information is attached
☐ Utility clearance required.
☐ Journey Management Plan attached
☐ State specific H&S required:

The following H&S Standards are attached:
Not applicable
Not applicable

Comments:
Arcadis Field H&S Handbook: I.D., II.H, II.M, III.A, III.F, III.H, III.I, III.K, III.M, III.N, III.R, III.U, III.T, III.BB, III.JJ, III.LL, V.F, V.G

Roles and Responsibilities

	Name	*Role*	*Additional Responsibilities (Describe)*
1	Rich Lounsbury	APM	Budgeting, SOW Planning, Client Comms
2	Zach Mongan	TM/Field Lead	Lead TN-certified ACM Inspector
3	Greg Drelich	SSO	General project support/resource
4			
5			
6			

Training

All Arcadis employees are required to have the following training to be on site:

H&S Program Orientation
HAZCOM GHS/EAP
Defensive Driving - Smith On-Line
Hazwoper 40 Hour
Asbestos Awareness
BBP (Bloodborne Pathogens)
First Aid/CPR
DOT HazMat #1
Fire Extinguisher
Hazwoper 8-Hour Annual Refresher
Hearing Conservation/Protection
Respirator
PPE

Client specific:
OSHA 10/30 Hr Construction Safety
Other:
#NA

Selected Arcadis employees are required to have the following additional training:

	Names or Numbers from above
Construction Safety - 30 Hour	1
Construction Safety - 10 Hour	2,3
Electrical General Awareness	2,3
Ladders	2,3
Fall Protection General Awareness	2,3
Other:	
TN Asbestos Inspector	2,3

Hazard Analysis

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Business Line
All Categories

Business Unit
All Categories

Task 1: Bridge Material ACM Recon/Survey & Sampling

Hazardous Activity #1

Field-Tools, power- use of chain saws, power hand augers, generators, small power tools, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III AD

Biological	-	Chemical	-	Driving	-	Electrical	M
Environmental	-	Gravity	L	Mechanical	M	Motion	M
Personal Safety	-	Pressure	-	Radiation	-	Sound	H

Overall Unmitigated Risk: Medium Mitigated Risk: Low if utilizing:

Controls that should be Considered: Primary: TRACK Operator Competency per Standard Engineering Controls (specify below) JSAs Secondary: HASP H&S Standards Job Briefing/Site Awareness Admin. Controls (specify below) Specialized Equipment (specify below) Inspections PPE (see HASP "PPE" section)

Enter Required Controls:

Hazardous Activity #2

Field-Equipment - work with or in the vicinity of energized equipment/components

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III AA, III AB

Biological	L	Chemical	-	Driving	-	Electrical	H
Environmental	-	Gravity	-	Mechanical	-	Motion	-
Personal Safety	-	Pressure	H	Radiation	-	Sound	-

Overall Unmitigated Risk: High Mitigated Risk: Medium. if utilizing:

Controls that should be Considered: Primary: TRACK H&S Standards Electrical (NFPA 70E) Training Lockout/Tagout Training Secondary: JSAs HASP Job Briefing/Site Awareness Engineering Controls (specify below) PPE (see HASP "PPE" section) Housekeeping Competent Person Required (designated person)

Enter Required Controls:

Hazardous Activity #3

Field-Tools, hand - use of hammers, screwdrivers, wrenches, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III AD

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	L	Mechanical	-	Motion	M
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Low if utilizing:

Controls that should be Considered: Primary: TRACK JSAs Engineering Controls (specify below) Inspections

Enter Required Controls:

Hazardous Activity #4

Field-Falls - work on elevated work surfaces including ladders, manlifts, platforms, scaffolding, etc.

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: IV A, IV B, IV C

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	H	Mechanical	-	Motion	-
Personal Safety	H	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: High Mitigated Risk: Medium if utilizing:

Controls that should be Considered: Primary: TRACK JSAs Fall Protection Awareness Training Competent Person Required (designated person) Engineering Controls (specify below) Secondary: Specialized Equipment (specify below) HASP H&S Standards Job Briefing/Site Awareness Housekeeping Inspections

Enter Required Controls:

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Task 2: General Site Work

Hazardous Activity #1

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III I, III M

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	H	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Controls that should be Considered: Primary: TRACK Field H&S Handbook (see ref. above) Secondary: H&S Standards Engineering Controls (specify below) Admin. Controls (specify below) Specialized Equipment (specify below) PPE (see HASP "PPE" section)

Enter Required Controls:

Hazardous Activity #2

Field-Biological - insects, spiders, snakes, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III N

Biological	M	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	-	Mechanical	-	Motion	-
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Controls that should be Considered: Primary: TRACK Engineering Controls (specify below) Secondary: JSAs HASP Job Briefing/Site Awareness PPE (see HASP "PPE" section) Housekeeping

Enter Required Controls:

Hazardous Activity #3

Field-Traffic - working on or adjacent to roadways

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: III AM, V F

Biological	-	Chemical	-	Driving	M	Electrical	-
Environmental	-	Gravity	-	Mechanical	-	Motion	H
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium. Mitigated Risk: Medium if utilizing:

Controls that should be Considered: Primary: TRACK Traffic Control Plan (TCP) Engineering Controls (specify below) Engineering Judgement Employee Required Secondary: H&S Standards Job Briefing/Site Awareness Admin. Controls (specify below) Specialized Equipment (specify below) PPE (see HASP "PPE" section)

Enter Required Controls:

Hazardous Activity #4

Field-Mobilization/Demobilization - from a site

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low): Suggested FHSHB Ref: #N/A

Biological	-	Chemical	L	Driving	M	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	L
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Low if utilizing:

Controls that should be Considered: Primary: TRACK Field H&S Handbook (see ref. above) Engineering Controls (specify below) Secondary: JSAs Job Briefing/Site Awareness PPE (see HASP "PPE" section) Admin. Controls (specify below)

Enter Required Controls:

Hazard Communication (HazCom)/Global Harmonization System (GHS)

☐ HAZCOM/GHS for this project is managed by the client or general contractor

List the chemicals anticipated to be used by Arcadis on this project per HazCom/GHS requirements.
(Modify quantities as needed)

	Preservatives	Qty
☑	Not applicable	
☐	Hydrochloric acid	<500 ml
☐	Nitric acid	<500 ml
☐	Sulfuric acid	<500 ml
☐	Sodium hydroxide	<500 ml
☐	Zinc acetate	<500 ml
☐	Ascorbic acid	<500 ml
☐	Acetic acid	<500 ml
☐	Isopropyl alcohol	< 4 gal.
☐	Formalin (<10%)	< 4 gal.
☐	Methanol	<500 ml
☐	Sodium bisulfate	<500 ml

	Decontamination	Qty
☑	Not applicable	
☐	Alconox	≤ 5 lbs
☐	Liquinox	≤ 1 gal
☐	Acetone	≤ 1 gal
☐	Methanol	≤ 1 gal
☐	Hexane	≤ 1 gal
☐	Isopropyl alcohol	≤ 4 gal
☐	Nitric acid	≤ 1 L
☐	Other:	
	_____	
	_____	
	_____	

	Calibration	Qty.
☑	Not applicable	
☐	Isobutylene/air	1 cyl
☐	Methane/air	1 cyl
☐	Pentane/air	1 cyl
☐	Hydrogen/air	1 cyl
☐	Propane/air	1 cyl
☐	Hydrogen sulfide/air	1 cyl
☐	Carbon monoxide/air	1 cyl
☐	pH standards (4,7,10)	≤ 1 gal
☐	Conductivity standards	≤ 1 gal
☐	Other:	
	_____	

	Fuels	Qty.
☑	Not applicable	
☐	Gasoline	≤ 5 gal
☐	Diesel	≤ 5 gal
☐	Kerosene	≤ 5 gal
☐	Propane	1 cyl
☐	Other:	
	_____	

	Kits		Qty.
☑	Not applicable		
☐	Hach (specify):	_____	1 kit
☐	DTECH (specify):	_____	1 kit
☐	Other:	_____	1 kit
	_____		
	_____		
	_____		

	Remediation
☑	Not applicable
☐	_____
☐	_____
☐	_____
☐	_____
☐	_____

	Other:	Qty.
☐	Not applicable	
☑	Spray paint	≤ 6 cans
☐	WD-40	≤ 1 can
☐	Pipe cement	≤ 1 can
☐	Pipe primer	≤ 1 can
☐	Mineral spirits	≤ 1 gal
☐	_____	

	DOT(1):	Qty.
☐	_____	
☑	urethane caulk	2 tubes
☐	_____	
☐	_____	
☐	_____	
☐	_____	
☐	_____	

(1) Attach applicable Materials of Trade (MOT) generic shipping determination. SDS not generally applicable to this category.

Safety Data Sheets (SDSs) must be available to field staff. Indicate below how SDS information will be provided:

☐ Not applicable
☐ Printed copy in company vehicle
☐ Printed copy in the project trailer/office
☑ Printed copy attached
☐ Electronic copy on field computer

☐ Contractor SDSs are not applicable
☐ Contractor SDSs are attached
☐ Contract

_____

☐ Bulk quantities of the following materials will be stored: _____

Contact the project H&S contact for information in determining code and regulatory requirements associated with bulk storage of materials.

Monitoring

☑ Chemical air monitoring is not required for this project or is the responsibility of contractor.

For projects requiring air monitoring, list the relevant constituents representing a hazard to site workers.

Constituent	Max. Conc.	Units	TWA	Units	STEL	Units	IDLH	Units	LEL/UEL (%)	VD Air=1	IP (eV)
Asbestos	0.0001	ppm	0.1	f/cc	1	f/cc30	NA	-	NA/NA	NA	NA
None			9999	-	0	-	0	-	0	0	0
None			9999	-	0	-	0	-	0	0	0
None			9999	-	0	-	0	-	0	0	0
None			9999	-	0	-	0	-	0	0	0
None			9999	-	0	-	0	-	0	0	0

Notes: TWAs are ACGIH 8 hr.-TLVs unless noted.
p-ppm m-mg/m3 c2- ceiling (2 hr.) se-sensitizer A - Arcadis specific TWA*
s- skin c-ceiling "9999" - NA O-OSHA PEL "#N/A"-Manually enter
r- respirable i-inhalable N-NIOSH 10 hr. REL

See Special Instructions

Monitoring Equipment and General Protocols

Air monitoring is required for any task or activity where employees have potential exposure to vapors or particulates above the TWA. Action levels below are appropriate for most situations. Contact the project H&S contact for all stop work situations. Select monitoring frequency and instruments to be used.

Monitoring Frequency:	Not required
Indicator Tube/Chip Frequency:	Indicator tube/chip monitoring not required

	Instrument	Action Levels			Actions
☐	Photoionization Detector		<	0.000	Continue work
		0.000	-	0.0	Sustained >5 min. continuous monitor, review eng. controls and PPE, proceed with caution
	Lamp (eV):		>	0.0	Sustained >5 min. stop work, contact SSO
☐	Flame Ionization Detector (FID)		<	0.0	Continue work
		0.0	-	0.0	Sustained >5 min. continuous monitor, review eng. controls and PPE, use caution
			>	0.0	Sustained >5 min. stop work, contact SSO
☐	LEL/O2 Meter	0-5% LEL			Continue work
		>5-10% LEL			Continuous monitor, review eng. controls, proceed with caution
		>10% LEL			Stop work, evacuate, contact SSO
		19.5%-23.5% O2			Normal, continue work
		<19.5% O2			O2 deficient, stop work, evacuate, cont. SSO
		>23.5% O2			O2 enriched, stop work, evacuate, contact SSO
☐	Indicator: ☐ tube ☐ chip	≤PEL/TLV			Continue work
		>PEL/TLV			Stop work, review eng. controls and PPE, contact SSO
	Compound(s):				
☐	Particulate Monitor (mists, aerosols, dusts in mg/m^3)		<	1.5	Continue work
		1.5	-	3.000	Use engineering controls, monitor continuously
			>	3.000	Stop work, review controls, contact SSO
☑	Other:	Specify:			Specify: Use wetting as the primary control to eliminate dust hazards.

* Arcadis administrative TWAs ensure mixture component TWAs are not exceeded that would require additional monitoring or medical surveillance.

One or more constituents listed above is a particulate hazard.

Personal Protective Equipment (PPE)

See JSA or Permit for the task being performed for required PPE. *If work is not conducted under a JSA or Permit, refer to the governing document for PPE requirements. At a minimum, the following checked PPE is required for all tasks during field work (outside of field office trailers and vehicles) not covered by a JSA or Permit on this project:*

Minimum PPE required to be worn by all staff on project:

☑	Hard hat	☐	Snake chaps/guards	☐	Coveralls:
☑	Safety glasses	☐	Briar chaps	☐	Apron:
☐	Safety goggles	☐	Chainsaw chaps	☐	Chem. resistant gloves:
☐	Face shield	☐	Sturdy boot	☑	Gloves other:
☐	Hearing protection	☑	Steel or comp. toe boot	☐	Chemical boot:
☐	Rain suit	☐	Metatarsal boot	☐	Boot other:
☐	Other:			☑	Traffic vest, shirt or coat:
				☐	Life vest:

Specify Type:

Leather work gloves	
Class III	

Task specific PPE: Hearing protection when using power tools/drill. See Level C Supplement for APR use for ACM sample collection.

Comments:
Also see various attached JSAs for task-specific PPE requirements (like snake chaps or PFDs).

Medical Surveillance (*check all that apply*)

- ☐ Medical Surveillance is not required for this project.
- ☑ HAZWOPER medical surveillance applies to all Arcadis site workers on the project.
- ☐ HAZWOPER medical surveillance applies to all subcontractors on the project.
- ☐ HAZWOPER medical surveillance applies to all site workers on the project except:

- ☐ Other medical surveillance required (describe type and who is required to participate):

- ☐ Client drug and/or alcohol testing required.

Hazardous Materials Shipping and Transportation (*check all that apply*)

- ☐ Not applicable, no materials requiring a Shipping Determination (SD) will be transported or shipped
- ☐ A SD has been reviewed and provided to field staff
- ☑ A SD is attached
- ☐ All HazMat will be transported under Materials of Trade by Arcadis (see generic MOT SD Form)
- ☐ Other (specify):

Roadway Work Zone Safety (*check all that apply*)

- ☐ Not applicable for this project
- ☐ All or portions of the work conducted under a TCP
- ☐ All or portions of the work conducted under a STAR Plan
- ☐ TCP or STAR Plan provided to field staff
- ☑ TCP or STAR Plan attached
- ☑ Other (specify): If temporary traffic lane closures are required, TDOT will deploy and maintain traffic control measures.

Arcadis Commercial Motor Vehicles (CMVs)

This section is applicable to Arcadis operated vehicles only

☑ This project will **not** utilize CMV drivers ☐ This project will utilize CMV drivers

This project will NOT utilize vehicles (alone or in combination with a trailer) with a gross vehicle weight rating (GVWR) of 10,001 pounds or more. GVWR Truck + GVWR Trailer = <10,001 pounds

Site Control (*check all that apply*)

- ☐ Not applicable for this project.
- ☑ Site control protocols are addressed in JSA or other supporting document (attach)
- ☐ Maintain an exclusion zone of _____ ft. around the active work area
- ☑ Site control is integrated into the STAR Plan or TCP for the project
- ☑ Level C site control - refer to Level C Supplement attached
- ☐ Other (specify):

Decontamination (*check all that apply*)

- ☐ Not applicable for this project.
- ☐ Decontamination protocols are addressed in JSA or other governing document (attach)
- ☑ Wash hands and face prior to consuming food, drink or tobacco.
- ☐ Remove gloves and coveralls and contain, wash hands and face prior to consuming food, drink or tobacco. Ensure footwear is clean of site contaminants
- ☑ Respiratory protection- refer to the Level C supplement attached.
- ☑ Other (specify):

Level C work requires decontamination of the APR prior to storage and transport. See Level C Supplement.

Sanitation *(check all that apply)*

- ☑ Mobile operation with access to off-site restrooms and potable water
- ☐ Restroom facilities on site provided by client or other contractor
- ☐ Project to provide portable toilets (1 per 20 workers)
- ☐ Potable water available on site
- ☐ Project to provide potable water (assume 1 gal./person/day)
- ☐ Project requires running water (hot and cold, or tepid) with soap and paper towels

Safety Briefings (*check all that apply*)

- ☑ Safety briefing required daily
- ☐ Safety briefing required twice a day
- ☐ Safety briefings required at the following frequency: _____
- ☐ Subcontractors to participate in Arcadis safety briefings
- ☐ Arcadis to participate in client/contractor safety briefings
- ☑ Other (specify):

TDOT to attend Arcadis briefings related to traffic control support, as necessary.

Safety Equipment and Supplies

Safety equipment/supply requirements are addressed in the JSA or Permit for the task being performed. *If work is not performed under a JSA or Permit, the following safety equipment is required to be present on site in good condition (Check all that apply):*

- ☑ First aid kit
- ☐ Bloodborne pathogens kit
- ☑ Fire extinguisher
- ☐ Eyewash (ANSI compliant)
- ☑ Eyewash (bottle)
- ☑ Drinking water
- ☑ Other: Truck strobe/worker ahead signage
- ☑ Insect repellent
- ☑ Sunscreen
- ☐ Air horn
- ☑ Traffic cones
- ☐ 2-way radios
- ☐ Heat stress monitor

International Travel

☑ This project does not involve international travel
☐ This project involves international travel

Behavior Based Safety Program (*check all that apply*)

☑ TIP required at the following frequency on this project:
Select One: _____ mhrs 1 time(s) _____ Define: per field mob
☐ H&S Field Assessment required at the following frequency on this project:
Select One: _____ mhrs _____ time(s) _____ Define: _____
☐ Other (specify):

Signatures

I have read, understand and agree to abide by the requirements presented in this health and safety plan. I understand that I have the absolute right to stop work if I recognize an unsafe condition affecting my work until corrected.

Printed Name	Signature	Date

Add additional sheets if necessary

You have an absolute right to STOP WORK if unsafe conditions exist!

Level C Supplement for the Standard HASP (Revision 5, 4/9/2015)

Level C Scope of Work

Describe the task(s) requiring Level C upgrade:
Asbestos inspection with half-face or full-face respirator.

*Verify the following (check box if condition **does not exist** for the task(s) listed above):*

- ☑ NO IDLH atmospheres
- ☑ NO oxygen deficient atmospheres
- ☑ NO permit required confined spaces
- ☑ NO unknown contaminant atmospheres

If any of the above conditions exist, contact your project H&S contact for assistance.

Roles and Responsibilities

Identify project team members and Level C responsibilities for each member for this work:

	Employee Name	Responsibilities
1	Zach Mongan	Lead ACM Inspector
2	Greg Drelich	SSO
3		
4		
5		
6		
7		
8		

Training
The following training is required beyond the training specified in the HASP:

- ☑ Respirator use and limitations
- ☑ Level C PPE specific to the project
- ☑ Site control specific to the project
- ☑ Decontamination specific to the project.
- ☐ Project air monitoring requirements under Level C
- ☐ Emergency Action Plan specific to this Level C project
- ☐ Other (specify): _____
- ☐ Other (specify): _____

Training will be provided on site prior to imitation of work and documented on:

- ☑ Tailgate Safety Briefing Form
- ☐ Field Logbook
- ☑ Other (specify): Internal ANA Training Records

Medical Surveillance

☑ All project team members have a current medical clearance to wear a respirator
☐ The following project team members are required to have a current medical clearance to wear a respirator

_____ _____
_____ _____
_____ _____

Air Monitoring Supplement

The following air monitoring requirements are in addition to the requirements in the HASP when work is performed under Level C conditions.

Constituent(s)	Odor Threshold (ppm)	MUC (ppm)	Comments

Other air monitoring equipment required for Level C work not specified in the HASP:

☐ 1) PID
☐ 2) FID
☐ 3) LEL/O2 Meter
☐ 4) Particulate monitor
☐ 5) Colorimetric indicator tubes (specify type): _____
☐ 6) Other: _____
☐ 7) Weather:
  ☐ Temperature
  ☐ Humidity
  ☐ Precipitation
  ☐ Wind direction
  ☐ Wind speed
  ☐ Other: _____

Air monitoring will be conducted at (check all that apply):

Location:	Frequency:	Type (instruments or numbers from above):
☐ Breathing zone		
☐ Exclusion zone boundary		
☐ Upwind		
☐ Downwind		
☐ Crosswind		
☐ Site perimeter		
☐ Other: _____		

☐ A windsock is required.

Comments:

Respirator Selection and Fit Testing

The following respirator is required for this project:

	APF	Permitted Fit Test
☐ Dust mask	10	QLFT
☑ Half facepiece air purifying respirator (dual cartridge)	10	QLFT
☑ Full facepiece air purifying respirator	50	QLFT
☐ Loose fitting facepiece powered air purifying respirator	25	QLFT
☐ Half facepiece powered air purifying respirator	50	QLFT
☐ Full facepiece powered air purifying respirator	1000	QNFT

Required fit test for project: ☐ Qualitative (QLFT) ☑ Quantitative (QNFT)
☐ QLFT fit test protocol attached

Cartridge Selection

The following cartridges are required for this project:
Note: Consult the manufacturer's literature for specific constituents of interest to ensure correct cartridge is selected.

Chemical:
- ☐ Multigas
- ☐ Organic vapor
- ☐ Organic vapor/acid gas
- ☐ Ammonia/methylamine
- ☐ Mercury vapor/chlorine
- ☐ Other (specify): _____

Particulate/Dust/Mists:
- ☑ P-100
- ☐ N-95
- ☐ R-95
- ☐ Other (specify): _____

Combination:
- ☐ Organic vapor/P-100
- ☐ Organic vapor/acid gas/P-100
- ☐ Ammonia/methylamine/P-100
- ☐ Mercury vapor/chlorine/P-100
- ☐ Other (specify): _____

End of Service Life Indicators (ESLIs) (aka Respirator Cartridge Change Out)

Respirator cartridge ESLIs shall be factored when selecting the appropriate cartridge. Use of warning properties such as odor and taste are not permissible practices. The ESLI shall be identified and a cartridge change out schedule established prior to start of work. Information used to establish the change out schedule will be computed using manufacturer's supplied guidance or software (see below). At a minimum, chemical cartridges will be changed out daily. For particulate filters and cartridges, replace when breathing becomes difficult or daily whichever comes first.

☐ ESLI information is attached.

Comments:
There is no safe threshold for exposure to asbestos, therefore cartridges should be changed out daily.

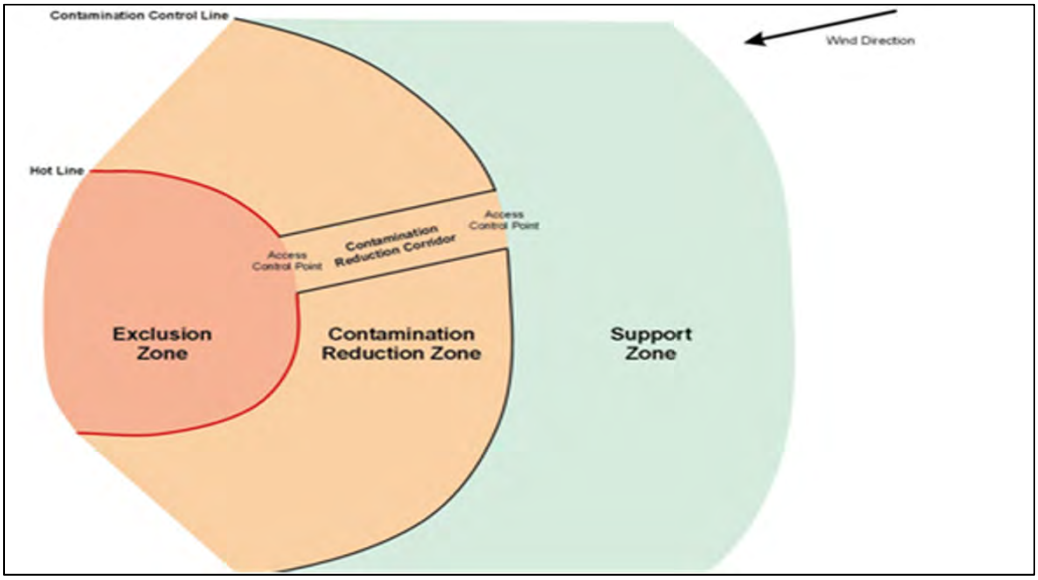
Respirator Care and Maintenance

☑ Cleaning protocol attached

All respirators will be stored in a clean and sanitary condition at all times. Each respirator used will be cleaned prior to be stored for the day. Each respirator will be inspected by the user prior to use. Any defective or worn part will be promptly replaced.

Site Control

Example site control layout (check configurations to be used below):



The size and configuration used for site control is dependent on many variables. Based on the hazards and tasks being performed, identify site control requirements for this project:

Configuration?

- ☐ Exclusion zone (EZ)
- ☐ Contamination reduction zone (CRZ)
- ☐ Contamination reduction corridor (CRC)
- ☐ Access control points (ACPs)
- ☐ Other: _____
- ☐ Other: _____

How delineated?

- ☐ Cones
- ☐ Channelizer cones
- ☐ Caution tape
- ☐ Safety fencing
- ☐ Other: _____
- ☐ Other: _____

☐ Site control is integrated into the STAR Plan or TCP for the project

Additional Level C PPE specific for each zone (excluding respirator):

EZ and ACP at EZ

- ☐ Coveralls: _____
- ☐ Boot covers: _____
- ☐ Outer gloves: _____
- ☐ Inner gloves: _____
- ☐ Taping _____
- ☐ Other: _____
- ☐ Other: _____

CRZ/CRC/ACP at Support Zone

- ☐ Coveralls: _____
- ☐ Boot covers: _____
- ☐ Outer gloves: _____
- ☐ Inner gloves: _____
- ☐ Taping _____
- ☐ Other: _____
- ☐ Other: _____

Support Zone

- ☐ See applicable JSA
- ☐ See HASP
- ☐ Other: _____

Comments:

Level C. Supplement - Respirator Cleaning Protocol

Remove cartridges/canisters/filters. Disassemble facepiece by removing speaking diaphragm, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer.

Wash components with warm (<110° F) water with a mild detergent or with a cleaner approved by the manufacturer. A soft, non-wire bristle brush may be used to facilitate dirt removal.

Rinse with warm (<110° F) clean water, preferably running water.

If the cleaner used does not contain a disinfecting agent, respirator components should be immersed in one of the following for two minutes:

1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43° C (110° F); or,

2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of

3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

Rinse components thoroughly in clean, warm (43° C [110° F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

Components should be hand-dried with a clean lint-free cloth or air-dried.

Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

Test the respirator to ensure that all components work properly.

Task Improvement Process

General

Observed Company:	
Observation Type:	
TIP Form:	H&S Field Multi-Task (General)
Task Observed:	
Observee Name:	
Observer Name:	
Observation Date:	
Project Number:	TNDT1935.HZxx
Project Name:	
Supervisor:	
Equipment On Site:	
Pertinent Information:	

Observation

Task	Correct	Questionable	Comments
General			
PPE worn according to HASP/JLA specifications and inspected before use?			
STOP work authority used where appropriate?			
Body Use/Positioning			
Proper lifting/pushing/pulling techniques used (no awkward positions/posture; no twisting or excessive reaching; no straining; no excessive weight; load under control/stable; etc.)?			
Body parts away from pinch points (clear or protected from being caught between objects/equipment or from contacting sharp objects/edges, etc.)?			
Body parts not in the Line of Fire (protected from being struck by traffic, equipment, falling/flying objects, etc.)?			
Work Procedures/Environment			
Correct type and number of barricades/warning devices/cones?			

Communication with others when necessary (hand signals, flags, etc.)?			
Right tools and equipment selected for the job and inspected before use?			
Tools and equipment used properly?			
Housekeeping performed (work areas and pathways clear of hazards, uneven surfaces addressed, etc.)?			
Slip/trip/fall hazards addressed (path selected and cleared, eyes on path, speed footing, etc.)?			
Proper energy control (electrical systems grounded, lock out/tag out performed, isolated, cords/fixtures in good condition, GFCI inspected and utilized when appropriate and used properly, etc.)?			
Protected from overhead/underground utilities (proper clearance, properly marked, spotters as necessary, etc.)?			
Safe work on/near water (appropriate flotation device, appropriate boat for body of water and operation of boat, etc.)?			
Chemical/Radiation protection (decontamination zones set up properly, air monitoring, completed, and logged, etc.)?			
Fall from elevated height prevention (maintains 3-points of contact, appropriate ladder, mounting/dismounting vehicle/equipment, fall arrest system, etc.)?			
Any additional safety issues identified:			

Tip Summary **Enter details of the TIP and follow up discussion provide details on how any**

Discussion following the TIP led by: _____

Date of follow-up discussion: _____

Positive Comments:

Discussion Summary Completed:

- ☐ Supervisor Led
- ☐ Peer to Peer
- ☐ Arcadis Employee to Subcontractor

Summary of Questionable Items

Action Items (Optional) Assign appropriate action items based on the observations made. You can

Item #	Action Item	Responsible Person	Due Date	Comp. Date
1				
2				
3				

Standard Review

Reviews to be performed after entry of this TIP into 4-Sight.

Quality Review

Quality Reviews to be performed after entry of this TIP into 4-Sight.

Field Validation and Verification

Use the 4-Sight generated copy of this TIP to perform field V&V activities.

Control Number: TSM- TNDT1935.HZxx

TSM + project number plus date as follows: xxxxxxxx.xxxx.xxxxx - dd/mm/year

ARCADIS Design & Consultancy for natural and built assets

TAILGATE HEALTH & SAFETY MEETING FORM

Project Name:			**Project Location:**
Date:	**Time:**	**Conducted by:**	**Signature/Title:**

Issues or concerns from previous day's activities:

Task anticipated to be performed today:

☐ Additional permits/checklists attached

USE TRACK! Evaluate the hazards (h) for the tasks being performed today and rank as Low (L), Medium (M) or High (H). Use relevant JSAs, FHSHB, permit or other work standard to communicate controls (c) to be used to eliminate or mitigate identified hazards.

☐ Gravity (i.e., ladder, scaffold, trips) (L M H)
h: _____
c: _____

☐ Motion (i.e., traffic, moving water) (L M H)
h: _____
c: _____

☐ Mechanical (i.e., augers, motors) (L M H)
h: _____
c: _____

☐ Electrical (i.e., utilities, lightning) (L M H)
h: _____
c: _____

☐ Pressure (i.e., gas cyl., wells) (L M H)
h: _____
c: _____

☐ Environment (i.e., heat, cold, ice) (L M H)
h: _____
c: _____

☐ Chemical (i.e., fuel, acid, paint) (L M H)
h: _____
c: _____

☐ Biological (i.e., ticks, poison ivy) (L M H)
h: _____
c: _____

☐ Radiation (i.e., alpha, sun, laser) (L M H)
h: _____
c: _____

☐ Sound (i.e., machinery) (L M H)
h: _____
c: _____

☐ Personal (i.e. alone, night) (L M H)
h: _____
c: _____

☐ Driving (i.e. car, ATV, boat, dozer) (L M H)
h: _____
c: _____

☐ Refer to the attached Hazard Analysis Sheet(s) or JSA

Comments:

Signature and Certification: I have read and understand the project specific HASP for this project.

Printed Name/Signature/Company	Sign In Time	Sign Out Time

I will STOP the job any time anyone is concerned or uncertain about health & safety or if anyone identifies a hazard or additional mitigation not recorded in the site, project, job or task hazard assessment.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.

If it is necessary to **STOP THE JOB,** I will perform **TRACK**; and then amend the hazard assessments or the HASP as needed.

I will not assist a subcontractor or other party with their work unless it is absolutely necessary and then only after I have done TRACK and I have thoroughly controlled the hazard.

All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.

In the event of an injury, employees will call **WorkCare at 1.800.455.6155** and then notify the field supervisor.

Utility strike, motor vehicle accident or 3rd party property damage - field supervisor will immediately notify the Project or Task Manager

Place any additional signatures on the back of this form.

ARCADIS
Infrastructure · Water · Environment · Buildings

IF NOT ME, THEN WHO?

- H&S SITUATIONS WHERE NO ARCADIS EMPLOYEES ARE INVOLVED OR WHEN ARCADIS DOES NOT HAVE HEALTH & SAFETY RESPONSIBILITY-

Effective: 1 March 2013

This document addresses the "If Not Me, Then Who?" concept in perceived or actual H&S situations (unsafe acts or behaviors, unsafe conditions, etc.) which do not involve our employees or partners and where we are not contractually or statutorily responsible for H&S[1].

For example, what does an ARCADIS employee do, when ARCADIS has no construction site responsibility but they see that a fence that was erected by a general contractor and is supposed to be protecting this site, has a gap that may allow an unauthorized person to enter the site where they could be injured?

The ARCADIS H&S Vision and Policy, and our culture using TRACK to 0 concept put H&S first in all things. Yet we also have the need to protect ourselves from injury and the company from undue risk and liability:

1. Take a minute to think through the situation, related risks, and risks that would result from corrective action (TRACK).
2. Act immediately to safe lives if in your best judgment delay would cost lives or severe injuries (imminent danger).
3. If we see unsafe acts/behavior or conditions that are not imminent dangers: speak up and promptly notify the appropriate party. In a project: liaise with project manager about best person to address (consider H&S responsible person - contractor and client). In other situations, attempt to identify the person with H&S or overall responsibility for the activities.
4. Re-confirm the formal H&S responsibilities (law & contract) with H&S and legal department before doing anything else, or, if action could not be postponed for risk of losing lives/severe injuries, immediately after the action.
5. When having pointed out, or about to point out, areas of concern outside of our scope of responsibilities, accompany with a specific disclaimer[2].
6. Refrain from taking H&S responsibility through further action (actual corrections, audits, reviews or other)[3].

It is noted that the above example actually occurred involving an ARCADIS employee. Instead of notifying the appropriate parties of the situation, our employee attempted to fix the contractor fence and got seriously injured in doing so. This resulted in lost time to our employee and a recordable injury against the company.

---

[1] The ARCADIS Stop Work Authority covers H&S situations that do involve our employees or where we are statutorily or contractually responsible for H&S.

[2] *In this activity, it is not our role to monitor H&S, but as a company we are very committed to a safe work environment and based on our previous experiences we believe [**] to create an imminent threat to [**].* If providing a disclaimer at the time is "too much", we can do a clear short one in writing immediately after.

[3] This is to avoid our employees running safety risks through corrective actions. We also wish to avoid being held responsible, and possibly liable, for work outside scope.

ARCADIS Design & Consultancy for natural and built assets

Weekly Vehicle Inspection Form

Vehicle # / License Plate # | **Wheels # / Last 6 of Vin #**

Inspection Date												
Odometer reading												
Driver / Inspector Name												
Check the appropriate box and enter repair date for identified repairs:	OK	Needs Repair	Repair Date	OK	Needs Repair	Repair Date	OK	Needs Repair	Repair Date	OK	Needs Repair	Repair Date
Interior[1] Horn operational												
Door Locks operational												
Seat Belts in good repair & operational												
Seats and Seating Controls operational												
Steering Wheel - No Excessive Play												
Interior Lights and Light Controls												
Instrument Panel/Gauges												
Wiper Controls operational												
Heat/Defrost/Air Conditioning operational												
Rear View Mirror present												
Backup Camera/Sensors working												
Jack and Lug Wrench present												
Exterior[1] Lights and Signals operational												
Tires and Spare Tire properly inflated												
Tires have proper tread depth (Page 2)												
Doors operational												
Windows Cracked/Damaged												
Side View Mirrors operational												
Damaged Body Panels and Bumpers												
Engine & Brakes Engine Start & Running Smoothly												
Fluid Levels-OK?, No Noticeable Leaks												
Belts tight, no cracks												
Parking Brake & Brakes operational												
Emergency Equipment[2] First Aid Kit, inspected monthly												
Fire Extinguisher properly secured												
Fire Extinguisher inspected monthly												
Amber emergency warning light present												
Roadside Assistance Information												
Recommend spotter cones available												
Cargo Cargo Secure and Properly Distributed												
Securing Devices in Good Condition												
Registration Valid License Plate /Tags												
Valid Registration and Insurance												
Valid City/State Inspection Decal												
Lease Plan information/Fuel Card												

[1] **Note all damages to the vehicle on the back of this page**

[2] **Emergency Equipment required per Motor Vehicle Standard ARC HSGE024**

GOAL Get Out And Look

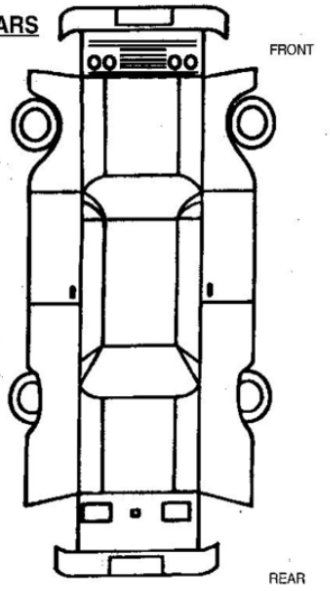
Note All Vehicle Damage Below

All Vehicle Damage must be reported to Anthony Cline (Corporate Fleet Manager) and Susan Berndt (Corporate Legal)

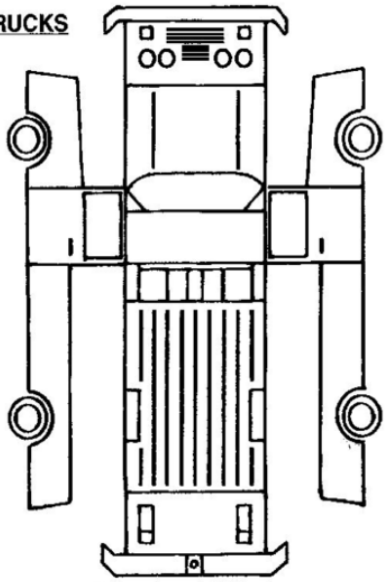
CODES:

B-BENT
BR-BROKEN
BU-BULGE
C-CHAFED
CH-CHIPPED
CPM-COVERED WITH PROTECTIVE MATERIAL-UNABLE TO DETERMINE DEFECTS IF ANY
CSA-CHAFED AND SCRATCHED ALL OVER
CR-CRACKED
D-DENTED
DMC-DUST AND MUD COVERED UNABLE TO DETERMINE OTHER DEFECTS IF ANY
G-GOUGED OR CUT
GC-GLASS CRACKED
HS-HAIRLINE SCRATCH
M-MISSING
P-PUNCTURED
R-RUSTY
S-SCRATCHED
SC-SCRAPED
SM-SMASHED
ST-STAINED AND/OR SOILED
T-TORN

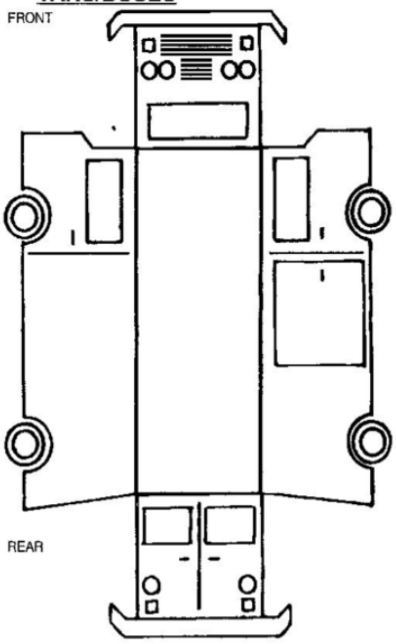
CARS



TRUCKS



VANS/BUSES



-INDICATE ON DIAGRAM-
-GIVE DIMENSIONS-
-CIRCLE WHERE APPLICABLE-

Notes:

Tread Depth Guide: If a tread gauge is not available coins may be used to determine remaining tread. 2/32" is the minimum by law in most states (top of Lincoln's head on penny), 4/32" is minimum recommended for wet surfaces (top of Washington's head on quarter), 6/32" is minimum recommended for snowy surfaces (top of Lincoln Memorial on penny).Vehicle tires should be replaced if the tread depth is less than 6/32".

2/32" remaining 4/32" remaining 6/32" remaining

Reference JSA 10907 For Weekly Vehicle Inspection

Visitor Acknowledgement and Acceptance of HASP Signature Form

By signing below, I waive, release and discharge the owner of the site and Arcadis and their employees from any future claims for bodily and personal injuries which may result from my presence at, entering, or leaving the site and in any way arising from or related to any and all known and unknown conditions on the site.

Name	Company	Reason for Visit	Date/Time On Site	Date/Time Off Site

SHIPPING DETERMINATION FORM

Revision 8c

Date:	8/31/2016
Project Name:	TDOT Bridge ACM Surveys
Project Number:	TNDT1935.HZxx
Supplemental Information:	None

1) Description of the Material to be Transported or Shipped

1a	Select a description category ===>	Samples
1b	*Asbestos containing material*	
1c	Potential Asbestos Containing Material, Non-Friable	

☐ This material is mixed with water, soil or other inert material

☐ This material will be shipped on wet or blue ice

☐ This material will be shipped on dry ice

2) Classification and Identification

This material is: None

Complete for Hazardous Materials ONLY:

2a	UN/NA/ID# :	NA	2b PG:	NA	Hazard Class:	NA
					Subsidiary Hazard Class:	NA
	PSN:	NA				

☐ See Sect. 7

2c This material is a: No additional criteria applies to this material

3) Packaging, Exceptions and Shipping Information

This material will be shipped (mode of transport and type of shipment):

3a None

If using an exception/exemption, list the exception/exemption below

3b None

Carrier/Transporter information:

3c None

Consider entering your desired bottle set in section 3f prior to completing 3a-3c to see if exceptions can be used.

Auth. Air Limits for EQ, LQ and Fully Reg. Shipments and Selected Ground LQ and SQE:

Inner Container Limit (NA- Not Applicable; F- Forbidden; mg, g, or kg for solids; ml or L for liquids):

Glass	NA	NA	Plastic Bag	NA	NA
Metal	NA	NA	Paper Bag	NA	NA
Plastic	NA	NA	Fibre	NA	NA

Outer package Limit:	NA	NA

Air Shipping Specification Package Requirements (NA-Not Available or Not Applicable):

Combination Packages					
Drums:	Steel	Aluminum	Plywood	Fibre	Plastic
	NA	NA	NA	NA	NA
Jerricans:	Steel	Aluminum	Plastic		
	NA	NA	NA		
Boxes:	Steel	Aluminum	Plywood	Fibreboard	Plastic
	NA	NA	NA	NA	NA
Single Packages					
Drums:	Steel	Aluminum	Fibre	Wood	Plastic
	NA	NA	NA	NA	NA
Jerricans:	Steel	Aluminum	Plastic		
	NA	NA	NA		
Boxes:	Steel	Aluminum	Plywood	Fibreboard	Plastic
	NA	NA	NA	NA	NA
Bags:	Textile	Plastic	Paper		
	NA	NA	NA		

Volume/mass limits and package information are not available for this hazard class, PSN or shipping configuration. Consult section 8 for guidance. If no Arcadis guidance is referenced, enter regulatory required quantity limits and packaging in section 7.

Complete 3d-3f for all Shipments HazMat and Not Regulated/Not Restricted :

3d	Packaging Type:	Combination Package - Non-Bulk				
3e	Inner Container Category:	Bag- plastic				
3f	Inner Container Specific/Pkg:		Container type		Net Qty. Each Container	
	≤# of Single /Inners:	50	None	None	5	grams
	≤# of Single /Inners:	0	None	None		None
	≤# of Single /Inners:	0	None	None		None
	≤# of Single /Inners:	0	None	None		None
	≤# of Single /Inners:	0	None	None		None
	≤# of Single /Inners:	0	None	None		None
3g	Intermediate Packaging:	None				
3h	Outer Packaging:	Non-specification box - fibreboard				
3i	Other:	All packed in one (air only)				

☐ ARCADIS Shipping Guide US-001 attached
☐ Specific package closure instructions are attached
☐ ARCADIS Shipping Guide or HSSP is available for this shipment: NA

4) Marks and Labels

☐ PSN, ID # (ID # -12 mm text height required)
☐ To/From Address (10 pt. font, Arial)
☐ Hazard Class Label(s) :
☐ Cargo Aircraft Only Label
☐ Orientation Arrows (2 req.)
☐ LTD QTY (Ground - no "Y")
☐ LTD QTY (Air -"Y")
☐ Excepted Quantity
☐ Small Quantity Exception by Hwy/Rail
☐ OVERPACK (12mm text height required)
☐ Dry Ice Class 9 Label
☐ Scientific Research Specimen
☐ Inside packages meet prescribed spec.
☐ RQ (place before PSN on package)
☐ Radioactive Matateriał, Exc Package
☐ Other: _____

Checked marks and labels are usually required - consult applicable regulation for actual marks/labels required.

5) Documentation

☑ No special documentation required
☐ Requires a Shipper's Declaration (air) prepared using : None
☐ Requires HazMat ground shipping papers prepared using: None
☐ Requires a Bill of Lading or Manifest (>MOT, Freight,Trucking Co., Waste Hauler, etc.)
☐ Requires Special Permit DOT-SP # _____
☐ Other: _____

6) Emergency Response

☐ Use ChemTel 24/7 Emergency Phone and Contract Number
or approved equivalent (authorized client or vendor) for this shipment:
1-800-255-3924 (ChemTel #MIS0007883) Register this shipment with ChemTel:
Have carrier tracking number available. http://arcadis.chemtel.net/

☐ Ensure current edition of North American Emergency Response Guidebook in vehicle (ARCADIS Transport requiring a shipping paper)

7) Special Instructions (Specify any "See Section 7" details in cell B124)

This is a free text field..

8) References and Rationale for the Determination (add additonal sheets, if requried):

	NA
DOT Special Provisions:	
Various suspect bulk material samples will be collected for TDOT for PLM analyses from the following bridge construction materials, or as determined by the TN-Licensed Asbestos Inspector: concrete, concrete skim coatings, stormwater drains/pipes, utility conduit(s), expansion joint filler/pre-formed expansion material between concrete sections, or other miscellaneous materials (such as tar paper, sealant/caulking, tar flashing, felt, fiberboard, vibrtation dampener pads, etc.). Historical sampling for TDOT at similar bridge structures has determined that some constuction materials contain small percentages (i.e., 1-15%) of Chrysotile asbestos in a limited number of sampled materials from any given strucuture. Suspect material samples are placed inside a plastic sample bag inside the outer container for air shipping to the anlaytical laboratory. Where possible samples are collected using wet methods.	
☐ See attached for rationale (IF CHECKED, DETERMINATION IS VOID IF RATIONALE NOT ATTACHED)	

9) Signatures

Determination performed by: Richard Lounsbury, APM
Phone (XXX-XXX-XXXX): 865.777.3526

Determination QA/QC performed by: Patrick Kowlowski

White Asbestos

(Chrysotile, Actinolite, Anthophyllite, Tremolite)

HazMat Shipping Support Package (HSSP-022)

Do Not Use After 12/31/2012

3/14/2012

Instructions:

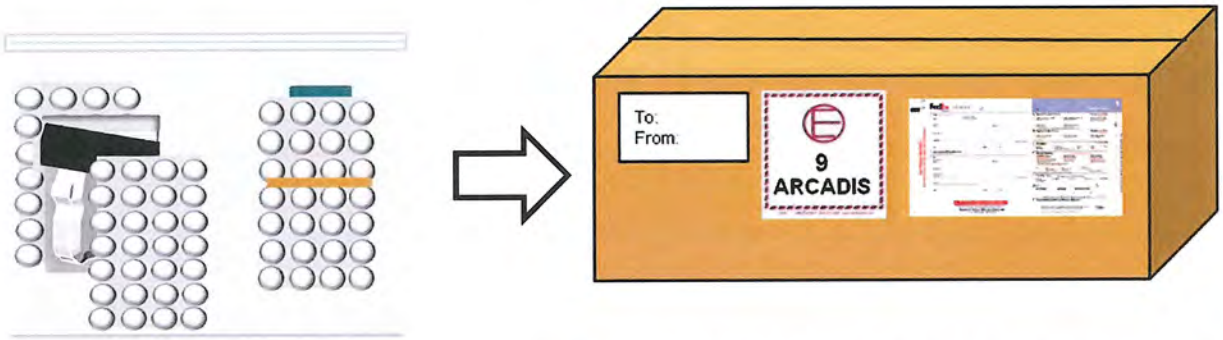
- ❑ **This package applies to FedEx Express air shipment of friable asbestos having the above Proper Shipping Name and using Excepted Quantity**
- ❑ **This guide does not apply to materials known as blue asbestos (crocidolite) or brown asbestos (amosite, mysorite)**
- ❑ **This shipment requires HazMat #1 training (or equivalent) for all persons collecting, preparing packaging, or offering this package to a carrier**
- ❑ **Follow all special instructions in the Shipping Determination**
- ❑ **Do not deviate from the wording, markings or labels presented in this package**
- ❑ **Affix all markings and labels on the same side of the package**
- ❑ **UN Specification outer packaging is not required. Can use standard cardboard box, cooler or case (i.e. Pelican® case) that is in good condition**
- ❑ **DO NOT use FEDEX or UPS branded boxes**
- ❑ **DO NOT use Tyvek or similar envelopes**
- ❑ **Excepted Quantity mark should be purchased but a downloadable version (right click to open hyperlink) is available for color printing**
- ❑ **Other required markings may be made on a computer**
- ❑ **Preparation of a Shipper's Declaration is not required.**
- ❑ **A 24 hour phone number is not required.**
- ❑ **DOT NOT give this information or the Shipping Determination to FedEx, keep on file at offering employee's office.**
- ❑ **Report all rejected shipments to the ARCADIS Transportation Compliance Manager**

Example Package Configuration for a Friable Asbestos Shipment

1) ≤ 30 grams of material per container:

Seal in bag Tape bag seal Seal in vial Tape vial lid Protect vial

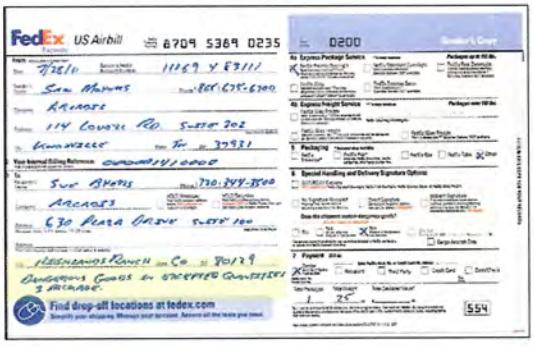
2) ≤ 1 Kg of material per package:



Secure samples in self sealing bag and protect with cushioning material

Place samples in box and secure against movement
Mark box as shown above

3) Mark shipping document or air waybill "*Dangerous Goods in Excepted Quantities, 1 Package*":



ARCADIS

TICK BITE PREVENTION

Health & Safety Fact Sheet

Administrative/Engineering Controls

- Consider mowing work area and paths prior to job if heavily tick infested.
- Consider time of year when planning work. Schedule work to avoid high tick activity season – avoid warmer months.
- Is pesticide application a possibility for highly infested areas?
- Avoid walking/working in wooded, overgrown/brushy/ tall grass areas.
- Walk in the middle of clearings and trails to avoid brush and tall grass.
- Plan and schedule "buddy checks" throughout day for ticks that may be present on clothing or along the hairline.
- Complete personal body checks in morning and evening.

CALL WORK CARE IF BITTEN BY TICK

WORKCARE® Making Health Count

800 455 6155 (US) **888 449 7787** (Canada)

Personal Prevention Measures

- Wear light-colored clothing to detect ticks more easily.
- Wear long pants and long-sleeved shirts.
- Button up shirt near collar and end of sleeves.
- Wear light-colored hat.
- Wear boots with a high cuff (> 6-in.) for tucking in pants. Gaiters may be worn but still need to tuck pants into socks.
- Consider wearing mesh head and/or body netting in infested areas.
- Tuck shirt into pants. Tuck pant legs into socks or inside boot cuffs.
- Tape pants near boots and sleeves near wrists to seal openings.
- Wear coveralls in highly tick-infested areas. Use of coveralls may require additional hazard assessment for high heat conditions. Evaluate the use of disposable breathable white coveralls.
- Using double-sided tape or duct tape (sticky-side out) around forearms and calves to capture ticks on outside of clothing. Note: tape may be a trip hazard or collect debris.
- Use 0.5% permethrin insecticide on clothes. **DO NOT APPLY TO SKIN! DO NOT APPLY DAY OF USE! FOLLOW PRODUCT USE AND SAFETY INSTRUCTIONS.**
- Use insect repellent containing 20 - 40% DEET on exposed skin, clothes, hats, & boots. When applying to face, avoid mouth and eyes, and do not apply to any exposed skin that is irritated or abraded. **FOLLOW PRODUCT SAFETY INSTRUCTIONS.**
- Consider, for purchase, clothing pre-impregnated with permethrin.

ARCADIS
Infrastructure, environment, facilities

Safety Bulletin

Take Care of Your Hands

Think through the task

- The materials being used or the job process itself might be hazardous
- Use the correct tool for the job
- The most common causes of hand injuries are:
  - Not understanding or recognizing the hazards
  - Being in the "line of fire"
  - Using the wrong tool
  - Not using the correct glove
  - Disregard for safety procedures
  - Distractions, carelessness, lack of awareness
  - Repetitive motion strain

Recognize the hazards that could hurt hands

- Sharp surfaces (i.e., cutting tools, etc.)
- Pinch points
- Sharp and/or pointy edges that can cause puncture wounds
- Chemicals
- Rotating equipment
- Bee stings/insect bites
- Bloodborne pathogens
- Extreme temperatures
- Vibrating equipment
- Struck by hazards – things falling on the hand or striking the hand

Assess the risks

- Cuts and wounds
- Heat burn
- Frostbite
- Crushing of hand or fingers
- Amputation

Control the hazards

Preventing injury:

- Always use the right glove for the job
- Use the correct cutting tool for the job and tools that have guarded or protected edges
- Be aware of pinch points
- Stay out of the "line of fire" of moving or falling equipment
- Be aware of hot and cold surfaces and weather conditions
- Be aware of rotating or moving surfaces
- Automated machinery may be controlled by remote control, or delayed timing devices that cause the machine to start automatically
- Use lockout/tagout procedures for de-energized equipment
- Loose clothing (including gloves) and jewelry may be caught in moving machinery (remove jewelry when it could be caught)
- Never remove machine safeguards or operate machinery with safeguards removed

Preventing strain:

- Doing a few simple exercises before work and between tasks will build hand strength and provide a rest from repetitive motions
  1. Stretch fingers by spreading them wide apart for a few seconds (repeat 3 times with each hand)
  2. Stretch your thumb by holding it down gently for five seconds (repeat 3 times with each hand)
  3. Stretch your wrist by making circles with your hands (repeat 10 times for each hand)

Which glove is best?

- **Cotton** - Light duty material handling and cleanup work (these do not provide puncture protection)
- **Leather** - Equipment handling, general construction, heavy cleanup, welding, moderately hot or cold material handling
- **Shock absorbing** - Operating rotary hammers and other vibrating equipment
- **Kevlar or wire mesh** - Work with sheet metal, glass, or heavy cutting (these do not provide puncture protection)
- **Rubber, nitrile, and other synthetics** - Chemical gloves must be chosen for the specific chemical being used (found in the MSDS or site safety plan)
- **Insulated** - extreme high and low temperatures

Keep health and safety first in all things

- Plan ahead on projects to obtain proper hand protection before work starts
- Stop work authority
- Ask for help from H&S!

National Oceanic and Atmospheric Administration
U.S. Department of Commerce

NOAA Knows...

Lightning

Lightning is one of the most underrated severe weather hazards, yet ranks as one of the top weather killers in the United States. Lightning strikes in America kill about 50 people and injure hundreds of others each year.

Unlike other weather hazards that often involve sophisticated watches and warnings from NOAA's National Weather Service, lightning can occur anywhere there is a thunderstorm. That's why the National Weather Service conducts an on-going campaign to educate people about lightning risks.

The Shocking Truth

Lightning is a rapid discharge of electrical energy in the atmosphere. The resulting clap of thunder is the result of a shock wave created by the rapid heating and cooling of the air in the lightning channel.

During a thunderstorm, winds within the thunderstorm cloud cause collision between the various precipitation particles within the storm cloud. These collisions cause very small ice crystals to lose electrons while larger particles of soft hail gain electrons.

Upward winds within the cloud redistribute these particles and the charges they carry. The soft hail causes a negative charge build up near the middle and lower part of the storm cloud which, in turn, causes a positive charge to build up on the ground beneath the storm cloud.

Eventually, when the charge difference between the negative charge in the cloud and the positive charge on the ground become large, the negative charge starts moving toward the ground. As it moves, it creates a conductive path toward the ground.

This path follows a zigzag shape as the negative charge jumps through segments in the air. When the negative charge from the cloud makes a connection with the positive charge on the ground, current surges through the jagged path, creating a visible flash of lightning.

Thunder, high winds, darkening skies, rainfall and brilliant flashes of light are warning signs for lightning strikes.

(continued on back)

Lightning Quick Facts

- Lightning often strikes the **same place repeatedly** if it is a tall, isolated object.
- Most lightning victims are **in open areas or near a tree**.
- Lightning strikes the U.S. about 25 million times each year.
- Lightning can heat its path through the air to **five times hotter** than the surface of the sun.

While most lightning casualties occur at the beginning of an approaching storm, a significant number of lightning deaths occur after the thunderstorm has passed. If thunder is heard, then the storm is close enough for a lightning strike. It is very important to seek safe shelter immediately.

When Thunder Roars, Go Indoors

When you hear thunder or see lightning, you should immediately seek safe shelter — a building with electricity and/or plumbing or a metal-topped vehicle with the windows closed. Picnic shelters, dugouts, small buildings without plumbing or electricity are **not** safe. Once inside, follow these important safety tips:

- **Stay off corded phones.** You can use cellular or cord less phones.
- **Don't touch electrical equipment or cords.**
- **Avoid plumbing.** Do not wash your hands, take a shower or wash dishes.
- **Stay away from windows and doors, and stay off porches.**
- **Do not lie on concrete floors or lean against concrete walls.**

Nowhere outside is safe when thunderstorms are in the area. Run to a safe building or vehicle when you first hear thunder, see lightning or observe dark threatening clouds developing overhead. Stay inside until 30 minutes after you hear the last clap of thunder.

Organizers of outdoor events should monitor the weather and evacuate participants as soon as they hear thunder. It's a good idea to post lightning safety rules in programs, flyers or signs so participants know what to do. Most importantly, keep an eye on the sky, listen for thunder, and keep up to date with the latest NWS forecasts.

For more lightning information and safety tips, visit **http://www.lightningsafety.noaa.gov**.

To learn more about NOAA, visit **http://www.noaa.gov**.

All Hazards NOAA Weather Radio
NOAA's National Weather Service

Job Safety Analysis

General

JSA ID	HASP 1	**Status**	Complete
Job Name	General Industry-Driving - passenger vehicles	**Created Date**	1/12/2015
Task Description	Driving a car, van, or truck on public roadways.	**Completed Date**	01/12/2015

Client / Project

Client	Tennessee Department of Transportation
Project Number	TNDT1810.HZxx
Project Name	**ACM Bridge Survey**
Project Manager	Rich Lounsbury

User Roles

Role	Employee	Due Date	Completed Date
Developer	Josh Ferry	1/12/2015	1/12/2015
HASP Reviewer	Lueke, Clair	1/12/2015	1/12/2015
Quality Reviewer			

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Pre-Trip Inspection	1	Failing to perform pre-trip inspections may cause mechanical failure, accident or injury	Perform walk around of vehicle with particular attention to tire inflation and condition. Check lights, wipers, seatbelts for proper operating condition. Properly adjust seat and mirrors prior to vehicle operation. Use or review vehicle inspection checklist as required under the MVSP.	ARC HSGE024 Motor Vehicle Safety Standard (MVSP)
		2	Scrapes, cuts, burns to hand if inspecting engine fluids and/or tires. Eye splash hazard if inspecting engine fluids. Pinch or crush hazards when opening or closing hood, trunk or tailgate.	Wear protective gloves and safety glasses as described below when checking under hood or tires. Use TRACK and keep hands clear when opening/closing hood, trunk, or tailgate to avoid crush or pinch hazard.	
		3	Struck by other vehicles while walking around vehicle performing inspections	Wear high visibility vest, shirt, or coat while performing inspections in parking lots or other areas with a traffic hazard. Remain vigilant of moving vehicles or equipment in area, face oncoming vehicles to extent practical.	
		4	Improperly secured cargo may dislodge creating injury, property damage or road hazard.	Ensure all cargo is properly secured to prevent movement while the vehicle is in opertation. This includes cargo in the cab of the vehicle.	

2	Driving a motor vehicle on public streets	1	Failing to observe traffic flow ahead increases risk of hard braking resulting in potential impact of vehicle ahead, being struck by another vehicle from behind and decreases decision making time.	Use Smith System Key #1, "Aim High in Steering". **Look ahead (15 seconds if possible) to observe traffic flow and traffic signals.** Adjust speed accordingly to keep vehicle moving and avoid frequent braking. Select lane of least traffic and adjust speed based on observed signal timing when possible. Avoid following directly behind large vehicles that obscure view ahead.	Smith System "5-Keys" is a registered trademark of Smith System Driver Improvement Institute, Inc.
		2	Failing to observe vehicles, pedestrians, bicyclists and other relevant objects in vicinity of your vehicle increases risk of side swipes, rear ending, and third party injury.	Use Smith System Key #2, "Get the Big Picture". **Maintain 360 degrees of awareness around vehicle.** Check a mirror every 6-8 seconds, maintain space around the vehicle, choose a lane that avoids being boxed in. Look for pedestrian activity ahead in crosswalks or sidewalks. Watch for construction zone approach signs and act early by executing lane changes and reducing speed.	
		3	Failing to keep your eyes moving increases risk of not seeing relevant vehicles, pedestrians and objects in your vicinity that may impair your ability to make timely and appropriate driving decisions and also increases risk of accident.	Use Smith System Key #3, "Keep Your Eyes Moving". **Move your eyes every 2 seconds and avoid staring while evaluating relevant objects.** Scan major and minor intersections prior to entering them. Check mirrors.	
		4	Failing to maintain space around and in front of your vehicle increases risk of striking another vehicle or being struck by another vehicle. Insufficient space shortens time for effective driving decision making resulting in increased accident risk.	Use Smith System #4, "Leave Yourself an Out". **Use 4 second rule when following a vehicle.** Avoid driving in vehicle clusters by adjusting speed and using lanes that permit maximum space and visibility. When stopped, keep one car length space in front of vehicle ahead or white line.	
		5	Failing to communicate with other drivers and pedestrians increases risk of striking vehicles, pedestrians, or being struck by other vehicles, especially from the rear.	Use Smith System Key #5, "Make Sure They See You". **Brake early and gradually when stopping to reduce potential of being rear ended.** Keep foot on brake while stopped. Use turn signals and horn effectively. Establish eye contact with other drivers and pedestrians to extent practical. Use vehicle positioning that promotes being seen.	
		6	Distractions within the vehicle takes focus off driving, increases risk of accident decreases time for making effective driving decisions.	**Cell phone use (any type or configuration) is prohibited while the vehicle is in motion.** Familiarize yourself with vehicle layout and controls (radio, temperature controls, etc.) prior to operating unfamiliar vehicles. Set controls prior to operating vehicle. Use GPS in unfamiliar areas to avoid use of paper maps/directions while driving. Set GPS prior to vehicle operation. Pull over and stop to modify GPS functions. Avoid consuming food or drink while driving.	

3	Parking	1	Parking vehicle in areas of clustered parked vehicles or near facility entrance may impair visibility to oncoming traffic in lot and increase exposure to pedestrian traffic.	**Use pull through parking or back into parking space when permitted or practical.** When practical and safe to do so, park away from other vehicles and avoid parking near the facility entrance or loading docks. If available, use a spotter to aid in backing activity. Back no further than necessary and back slowly. Get out and look (GOAL) if uncertain of immediate surroundings. Tap horn prior to backing.	

PPE Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses	While checking engine or tires	Required
Hand Protection	work gloves (specify type)	Leather or equivalent checking engine or	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
	other	Vehicle kit (applies to company trucks)	Required
Miscellaneous	fire extinguisher	Applies to company trucks	Required
	first aid kit	Applies to company trucks	Required

Job Safety Analysis

General

JSA ID	NONE	**Status**	(3) Completed
Job Name	TN Bridge Surveys	**Created Date**	3/16/2012
Task Description	Bridge Asbestos Surveys	**Completed Date**	03/19/2012
Template	FALSE	**Auto Closed**	FALSE

Client / Project

Client	TDOT Hazmat Contract
Project Number	TNDT1810.HZxx
Project Name	Bridge Asbestos-Containing Material Surveys
PIC	Whitaker, Brian
Project Manager	Lounsbury, Richard

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Hodges, Greg	3/16/2012	3/16/2012	Padron, Eduardo	☑
HASP Reviewer	Padron, Eduardo	3/19/2012	3/19/2012		☑
Quality Reviewer	Allman, John	3/19/2012	3/19/2012	Walter, Lee	☐

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Preparation & Planning	1	Not completing the Task Hazard Analysis Checklist could result in field staff being unprepared for site work.	Coordinate completion of Task Hazard Analysis Checklist with PM/TM. Determine need for ladders, lifts, fall protection, confined space entry, unsafe areas, etc. Identify age of bridges and potential to encounter friable ACM. Review information supplied by client. Ensure that any personnel that will be required to wear respiratory protection is medically cleared and annual fit testing requirements are satisfied. Coordinate traffic flow/control activities will be properly established at the time of survey.	ARC HSIH002, ARC HSFS003, ARC HSFS007, ARC HSFS015
2	Mobilization	1	Driving early/late to jobsite that is a good distance from office	Driving times should be planned ahead. Driving should not be done when driver is tired. Do not use cell phones while driving. Practice Smith Defensive Driving System.	
3	Tailgate Safety Meeting	1	Poor Communication	Communicate site-specific health & safety information to entire sampling team and traffic control providers. Confirm all team members have site-specific training, as required. Review site-specific hazards and procedures, including coordination with other work on-going at site. These may include lock-out/tag-out of utilities, confined space entry, using ladders, working on lifts, additional lighting to work in dark areas, etc.	Field HS Handbook III.A; ARCADIS Tailgate Meeting Standard (ARC HSGE001)
4	Evaluate site upon arrival for personal safety and security	1	Bridge could have structural issues creating fall hazards or debris could cause slip/trip/fall hazards	Assess bridge and make sure that hazards were similar as what was scoped in the project or reported by the client. Additional hazards that could impact safety of personnel should be called into the project manager. A qualified and licensed engineer should perform an assessment on any bridge/building that appears structurally unsafe.	
		2	Personal Security	Assess potential personal security issues prior to starting work. Verify cell phone reception. In high risk areas, have a security escort or a buddy as needed. Notify PM/TM or supervisor at time of entry and anticipated time of exit. Inform that person of anticipated walking route. Assess presence of other individuals unrelated t0 the work, such as general public, temporary bridge dwellers, onlookers, etc and determine control measures. Seek advice from client and traffic control staff as needed; do not confront these individuals.	

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
5	Visual inspection of areas to be sampled	1	Trip, slip or fall in dark areas or over clutter.	Inspect walking surface before proceeding. Use temporary lighting or flashlight if area lighting is not adequate. Use a headlamp to keep hands free. Cover or demarcate openings in walking surfaces. Have replacement flashlight batteries handy; use work lights if possible for work in dark areas under the bridge structure.	Refer to Field Handbook, ARC HSIH008, HSIS015, Elevated Heights JSA.
		2	Heat Stress from working in an unventilated facility or in direct sunlight; or Cold Stress from working in an unheated facility or outdoors	Dress for weather accordingly. Keep hydrated in hot environments.	

		3	Noise exposure >85dBA from site conditions.	Use engineering and administrative controls to minimize noise exposure; Use hearing protection to reduce exposure below 85 dBA action level.
		4	Fall from elevated heights during inspection.	Select appropriate ladder/lift for work activity, do not overextend or lean out; use a spotter to stabilize extension ladders. Use 3-points of contact when climbing ladders; keep belt buckle within the limits of the side rails; use a tool belt to bring equipment up the ladder. use two people to carry ladders, keep a clear line of sight. Wear proper fall arresting equipment as dictated by the activity being performed.
		5	Limited access and egress to/from active work area.	Confirm that everyone entering the area where samples are being collected is aware of the escape route and periodically discuss where the escape route is in relation to the current work area as you move throughout the bridge.
		6	Stray animals, mice, rats	Be mindful of wildlife residing in the structure. Make noise to scare away wildlife and carry repellent spray in the event of encountering stray animals. If a dangerous or aggravated animal is spotted, leave the area immediately.
6	Collect potential asbestos-containing building material samples	1	Ergonomic - using excessive force or repetitive motion to obtain samples could result in injury to musculoskeletal system.	Work slowly, use appropriate sample tool, don't overextend, stretch exercises for hands/fingers.
		2	Insufficient Lighting	Ensure suitable permanent or temporary lighting in work area and access/egress locations.
		3	Trip, slip and fall	All cords, equipment, supplies and debris should be cleared and/or organized within the work area.
		4	Electric shock from cords while working in wet or difficult to access area.	Require the use of GFCI interrupters for any/all electrical equipment. Lock Out/Tag Out power to utilities that may be contacted during sampling work.
		5	Heat/Cold Stress or Inclement Weather	Dress for the weather accordingly. Take breaks as necessary. Keep hydrated in hot environments.
		6	Biological Hazards: Insects, Snakes, Wildlife, Vegetation	Inspect work areas upon arrival at site to identify hazards. Where possible, landscape site to reduce high grass and stagnant water that create habitats attractive to wildlife and remove hazardous flora. Where needed, wear long pants and snake chaps in areas with grass higher than 4 inches. If moving through vegetated areas, use a long handled tool to disturb vegetation prior to stepping through. Use insect repellant when in areas with grass higher than 4 inches or standing water where insects are observed. Prior to beginning work in vegetated areas, survey employees to determine whether they have known sensitivities to hazardous flora and fauna. Reassign sensitive employees to tasks in non-vegetated areas or provide Tyvek to reduce potential for dermal contact.

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
		7	Lifting hazards (heavy or bulky equipment, ladders).	Use TRACK to plan lifts and routes to work location. Use proper lifting techniques.	
		8	Awkward body positions and twisting.	Plan activity to avoid twisting of body or awkward body positions. Use buddy system or job rotation to reduce exposure to conditions that can not be avoided.	
		9	Noise exposure >85 dBA from sample collection with power tools.	Use engineering and administrative controls to minimize noise exposure; Use hearing protection to reduce exposure below 85 dBA action level.	
		10	Fall from ladder when attempting to obtain samples.	Maintain three points of contact with ladder at all times.	
		11	Exposure to asbestos could cause lung cancer, mesothelioma, or asbestosis	Use wet methods when sampling suspect ACM. Wear air purifying respirator with P100 (HEPA) filters. Conduct personal air monitoring (PEL and STEL) on a routine basis to verify and validate respiratory protection requirements. Wash hands thoroughly after collection activities. Clean any generated debris using appropriate wet-wiping techniques.	
		12	Coring through roadway for sampling.	If sampling >1.0", verify through TDOT/811 & AUS policy that utilities are not present. Prevent debris from falling.	
		13	Cuts or splinters from sample collection.	Wear cut resistant gloves and cut away from yourself when sampling.	
		14	Site investigation might require entry into confined spaces which could present physical/health hazard.	Personnel must have confined space awareness training. Personnel must NOT enter a permit-required confined space unless specialized permit-required confined space training is received, rescue operations have been practiced/arranged, and employee is familiar with the permit required confined space program and hazard identification/testing requirements.	

7	Decontaminate sampling equipment	1	Exposure to potential asbestos fibers while decontaminating equipment	Wear all protective PPE as outlined in the HASP; including, gloves, eye protection, and respirator (if friable material).	
		2	Cuts from handling sampling equipment	Use gloves to minimize potential contact with sharp edges.	
8	Demobilization	1	Driving early/late to jobsite that is a long distance from office	Driving times should be planned ahead. Driving should not be done when driver is tired. Do not use cell phones while driving. Practice Smith Defensive Driving System.	

Personal Protective Equipment (PPE)

Type	Personal Protective Equipment	Description	Required
Dermal Protection	coveralls	Tyvek as necessary	Required
	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	boots	non-slip, steel toe	Required
Hand Protection	chemical resistant gloves (specify type)	nitrile or latex	Required
	work gloves (specify type)	cut-resistant	Required
Head Protection	hard hat		Required
Miscellaneous PPE	traffic vest--Class II or III	as necessary	Required
Respiratory Protection	full face respirator	P100 cartridges	Required
	half face respirator	P100 cartridges	Required

Supplies

Type	Supply	Description	Required
Communication	mobile phone		Required
Decontamination	Decon supplies (specify type)	Water	Reccomended
Miscellaneous	fall protection (specify type)	as necessary	Required
	fire extinguisher		Required
	first aid kit		Required
	flashlight	with spare batteries	Required
Personal	eye wash (specify type)	personal bottles or equivalent	Required
	insect repellant	as necessary	Required
	sunscreen	as necessary	Required
	water/fluid replacement	as necessary	Required
Traffic Control By TDOT	barricades	as necessary	Required
	signage	as necessary	Required
	traffic cones	as necessary	Required

Review Comments

Reviewer	Comments
Employee: **Role** **Review Type** **Completed Date**	
Employee: **Role** **Review Type** **Completed Date**	

Job Safety Analysis

General

Client Name	TDOT Hazmat Contract
JSA ID	3342 - Ladder Safety
Job Name	Environmental-Other
Task Description	Asbestos Survey
Project Number	Misc. TDOT Bridge Projects
Project Name	ACM Bridge Surveys
PIC Name	WHITAKER, BRIAN
Project Manager	LOUNSBURY, RICHARD
Status	(3) Completed
Creation Date	8/27/2010 01:55:08 PM
Auto Closed	True

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active
Created By	Powell, Jace'que	9/17/2010	8/27/2010		Mosher, Tyler	True
Developer (Primary Contact)	Powell, Jace'que	9/17/2010	8/27/2010		Mosher, Tyler	True
HASP Reviewer	Webster, Charles	9/10/2010			Insco, Ashly	True
Quality Reviewer	Rankin, William	9/29/2010	9/29/2010		Ulm, David	True
Reviewer	Wisbeck, Diane	9/10/2010	9/1/2010	True	Smith, Lee	True

Reviewer Comments

Role	Employee	Approval Status	Completed Date	Comments
HASP Reviewer	Webster, Charles			
Reviewer	Wisbeck, Diane	Approve	09/01/2010	
Quality Reviewer	Rankin, William	Quality	09/29/2010	Good. Also, many ladders have an angle sticker affixed to the side of the ladder to help ensure the ladder is used at the appropriate angle. Suggest using when present.

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	Non-fixed Ladder Selection	1	Improper ladder selection could result in ladder failure	Select ladder with load rating appropriate for work being performed.	Field H&S Handbook section III JJ
		2	Improper ladder selection could result in electrocution	Select non-conductive ladders if working near electrical wiring or other electrical hazard	Field H&S Handbook section III JJ
		3	Use of ladders that are in unsound operational condition may result in injury or death	Inspect all ladders prior to use, do not use a ladder marked "out of service", check ladders for proper operation, good ropes, if equipped, good feet, and free of oil grease or other slick substance on rungs. Check wood ladders for signs of cracking or splitting. Inspect all ladders prior to use.	Field H&S Handbook section III JJ
2	Non-fixed Ladder transport to work area	1	Lifting and carrying ladders	Use TRACK. Use buddy system when moving heavy ladders or long extension ladders. Don't carry ladders that obstruct view of path forward or use awkward body twist picking up ladders. Use proper lifting techniques.	

		2	striking other workers or objects with ladder during carrying	Plan route with ladder, remember to check the rear when turning corners with ladder, use buddy system to carry longer ladders to maintain better control. Look up when moving shorter step ladders vertically.	
		3	Property damage, vehicle damage or injury from improperly secured ladders on vehicles during transport	Make sure ladders are adequately secured such that doors can be operated and driver views are not impaired. Secure in manner that prevents forward or rear movement of ladder if mounted on top of vehicle. Inspect securing devices prior to moving/driving the vehicle. if ladder extends >4 ft from rear of vehicle, attach 18 square inch fluorescent red or orange flag to end.	
3	Working on Non-fixed ladders	1	Muscle strain setting up or taking down ladders	Use buddy system to place/remove heavy or long ladders. Avoid awkward twisting or bending during this activity.	
		2	Falls from ladders	Always maintain 3 points of contact, over 6 ft from ground fall safety devices to be utilized by workers, only one worker on ladder at time, ensure ladder extends at least 3 ft above level being accessed. Ensure extension ladder is at a 1ft horizontal to every 4 ft vertical rise to maintain proper angle. Follow all warning label requirements.	
		3	Tipping of ladders that are improperly secured	Ensure ladders are on level firm ground, tie off ladders at top,	
		4	Collapse of ladders that are over extended or over loaded.	Ensure ladder weight ratings are maintained, maintain at least 3 ft of overlap on extension ladders or other overlap length per ladder instructions.	
		5	Struck by objects or debris dropped from ladders	Keep ground workers away from work activities on ladders. Do not walk under occupied ladders.	
4	Fixed ladder work	1	Falls from height causing injury or death	Always maintain 3 points of contact. Utilize ladder fall safety devices if ladder is equipped. Do not hurry when climbing fixed ladders, rest at any landings provided by the ladder.	
		2	Slips on wet or icy rungs creating impact injuries	Inspect for presence of hazard, clear if possible, do not attempt to climb ladders with ice on rungs, use anti-slip footwear and gloves. Maintain 3 points of contact and climb in a slow methodical manner. Use Stop Work authority for any condition making climbing unsafe	

		3	Temperature stress contact stress to hands while climbing	Wear gloves with good dexterity and anti-slip coatings, wear footwear good tread and anti-slip soles. Rest at any landing provided by the ladder. Shift weight to other hand, leg periodically if at one position on the ladder for an extended period of time.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	boots		Required
Hand Protection	work gloves (specify type)	leather	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fall protection (specify type)	if needed for task and ladder type	As Needed
Miscellaneous	first aid kit		Required
Miscellaneous	Other	securing devices for mounting on vehicle	Required
Miscellaneous	Other	flags for transport	Required

Job Safety Analysis

General

JSA ID	11315	**Status**	(3) Completed
Job Name	Environmental-Other	**Created Date**	7/8/2014
Task Description	Collect ACM samples from bridge components	**Completed Date**	07/09/2014
Template	FALSE	**Auto Closed**	FALSE

Client / Project

Client	TDOT
Project Number	TNDT1810.HZxx
Project Name	ACM Bridge Surveys
PIC	Whittaker, Brian
Project Manager	Lounsbury, Richard

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	MacKenzie, Marcia	7/30/2014	7/9/2014	Selger, David	☑
Developer	Moore, Wendy	7/30/2014	7/9/2014	Benoit, Michael	☑
Developer	Shivell, Michael	7/30/2014	7/9/2014	Scoville, Michael	☑
HASP Reviewer	Whipple, Curtis	7/23/2014	7/9/2014	Nelson, Bruce	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Approach sampling point.	1	Moving water. Possibility of tripping or slipping on rocks.	Wear flotation device, use buddy system, step carefully. Wear 3 mm neoprene waders for moderate temperatures, 5 mm neoprene waders for colder temps. Stop work if water is above the knee and have certified divers or a boat to carry out the tasks. The buddy must be certified in first aid and CPR. If working in remote area, contact an offsite party to let them know you will be working on/in water and when you expect to be off. Place a follow up call after completing water work. Keep a hand free when walking, consider using a bucket to carry multiple items. Use a walking stick to probe the bottom and add stability.	Emp Field H&S Handbook Sections III and V, Subsections H & G, respectively.
		2	Access bridge component.	Access near water can be challenging. Ensure stable footing and ask sampling partner to lower equipment from above, if appropriate.	
		3	Moving water.	Understand river conditions, water speed, flow rate, and depth of water. Do not proceed if footing is unstable. Research if water body is dam-controlled and if so, learn release schedule ahead of sampling event. Determine if water levels have the potential to rise due to dam release and reschedule event if the water body is affected.	
2	Sampling.	1	Moving/loose rocks, moving water, water depth. Slipping or tripping over rocks.	Wear flotation device, do not proceed if water is above the knee. Move carefully. Wear waders. Do not enter water unless you have a buddy certified in first aid and CPR on shore. If area is remote, contact on offsite party to let them know you will be working on/in water and when you expect the the task to be completed. Place a follow up call after completing water work.	PushPoint Method SOP, Emp Field H&S Handbook Section 1 Subsections D & E.
		2	Potential electrica shock or damage to pump and/or battery in or near water.	Use enough tubing to purge and collect data readings from a safe, dry distance. Keep hands dry when working with pump battery or cables.	
3	Decontaminate sampling equipment.	1	Exposure to decon rinse (hexane solution).	Provide and have staff review Safety Data Sheet (SDS). Provide single use nitrile gloves. Dispose of purge & rinse water in properly labeled drum for proper transport and disposal.	Emp Field H&S Handbook Section 3 Subsection F.

PPE	Personal Protective Equipment		
Type	**Personal Protective Equipment**	**Description**	**Required**
Dermal Protection	coveralls	Neoprene waders-3 mm moderate, 5 mm	Required
Eye Protection	safety glasses		Required
Foot Protection	boots		Required
	outer boot covers	Waders	Required
	rubber boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile Gloves	Required
	work gloves (specify type)	Heavy duty work gloves	Required

Supplies			
Type	**Supply**	**Description**	**Required**
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	Alconx/liquinox & hexane solution & DI	Required
Miscellaneous	first aid kit		Required
Personal	insect repellant		Required
	sunscreen		Required
	water/fluid replacement	Drinking water or gatorade.	Required

Review Comments		
Reviewer		**Comments**
Employee:	Whipple, Curtis	
Role	HASP Reviewer	
Review Type	Approve	
Completed Date	7/9/2014	

Job Safety Analysis

General

JSA ID	2995	**Status**	(3) Completed
Job Name	Environmental-Other	**Created Date**	7/6/2010
Task Description	Hammer drilling	**Completed Date**	07/06/2010
Template	FALSE	**Auto Closed**	FALSE

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Bell, Caitlin	7/6/2010	7/6/2010	Phillips, Hollis	☑
HASP Reviewer	Tremblay, Tony	7/20/2010	7/7/2010	Kundert, Brian	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Prepare before mobilizing by completing utility clearance, completing site-specific health and safety requirements (training, notifications, approval of specific sample locations, scheduling), confirm lighting and power requirements.	1	Electrical shock, damage to utility lines, inadequate or unsafe power source.	Confirm no utilities in work area (in concrete or overhead) that could be impacted by coring or travel through work area. Confirm adequate power source.	Utility Location Policy & Procedure ARCHSF019
2	Conduct Tailgate Safety Meeting. Identify best travel routes within plant/on site, locate power source(s), establish order of sample locations, set up protection from traffic/equipment/other workers on site (cones, caution tape, etc).	1	High traffic in sampling area could cause collision with sampling crew or impact with tools, equipment.	Establish clear communication on site with sampling crew and others working on site. Mark work area clearly so it is visible to others working on site. Locate samples in lowest risk locations possible to achieve sampling objectives.	
3	Operate impact hammer drill to demolish concrete.	1	Exposure to dust, contaminants of concern.	Operate dust monitor to measure dust levels, upgrade PPE as indicated (respirator). Wear all required PPE as specified in HASP.(half-face APR with P100 cartridges, tyvek suit, rubber booties)	
		2	Hand Injury from repetitive motion on vibrating equipment.	Wear heavy work gloves. Trade positions with sampling buddy to minimize impact (drill operation & sample collection).	
		3	Noise	Wear earplugs	
4	Remove concrete	1	Exposure to concrete dust or constituents of concern.	Utilize dust monitor and PPE as dictated by HASP. Note action levels, and respond accordingly should dust levels in air reach action level.	
		2	Strains from moving heavy items repeatedly	Be sure to remove in mangable sized bits	
5	Decontaminate tools/drill bits	1	Chemical exposure	Work upwind. Use specified decon products for constituents of concern. Collect and containerize decon fluids and wastes. Change gloves as frequently as necessary.	
		2	Strains from moving heavy items repeatedly	Utilize the smallest containers of fluids and water as practical. Use vehicle or cart to move equipment, tools and decon fluids.	
6	Clean up work area. Gather tools/equipment.	1	Slips, trips, falls, strains from moving heavy equipment	Rest if fatigued. Utilize cart and/or vehicle to the extent possible to move heavy items. Remove and put away all cords, tools, bits.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	chemical protective suit (specify type)	Tyvek	Required
	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	rubber boots	covers	Required
	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	nitrile	Required
	work gloves (specify type)	leather	Recommended
Head Protection	hard hat		Required
Hearing Protection	ear muffs		Recommended
	ear plugs		Required
Respiratory Protection	half face respirator	half-face with P100 cartridges	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	alconox	Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)		Required
	water/fluid replacement		Required

Review Comments

Reviewer		Comments
Employee:	Tremblay, Tony	
Role	HASP Reviewer	
Review Type	Approve	
Completed Date	7/7/2010	

Traffic Control Plan/Site Traffic Awareness and Response Plan
Revision 8, 7/13/2015

1.0 General

Plan type	TCP
Project Name:	TDOT Bridge Asbestos Surveys
Project Number:	TNDT1935.HZxx
Developer Name:	R. Lounsbury
Engineering Judgement (EJ) Review By:	
Duration of Work (hours or days):	<1 hr per HA; <1 day total for bridge
Roadway Work Zone Start Point	
Roadway Work Zone End Point	
Posted Speed Limit (roadway)	
Number of Lanes (each direction)	variable depending on bridge size
Time Restrictions (describe below)[2]	If TC is required, 9 am to 3 pm

Comments:
Temporary lane closures across the bridge and associated traffic control, if necessary, will be provided by the local TDOT Maintenance Division. Arcadis will coordinate closely with TDOT regarding any lane closure requests and work scheduling, as needed. Lane closures are estimated to take no more than 6 hours per day during non-peak travel times (i.e., 9:00 am to 3:00 pm).

2.0 Work Description

Provide a brief description of scope of work:
Collection of bulk concrete samples from bridge components using hand tools and power hammer drill. Most work is performed from underneath the bridge deck using ladders. Inspector discretion may require collection of samples from the bridge shoulder. If required after pre-inspection, TDOT will provide and implement traffic control measures and brief the field team on all signage and barrier systems.

3.0 Type and Duration

Work locations on this project will be: Short term work (<1 hour per location)

Roadway work will be performed:
On & off shoulders, sidewalk, mobile operation

Special traffic conditions may include (select most prevalent): Not applicable

4.0 Traffic Control Layout, Number of Devices Required and Phasing

The following traffic control configuration in the Field Guide to RWZ Safety applies:
Section 6.2 Work on the Shoulder (DOT Facts-301j)
Section 6.2 Work on the Shoulder (DOT Facts-301j)

All Arcadis vehicles in a RWZ will, at a minimum, have a functioning high intensity strobe or rotating orange light. All Arcadis employees in the RWZ will wear, at a minimum, a retroreflective high visibility vest meeting Class II or III requirements and other PPE required by JSA or HASP. Don't leave vehicle doors open.

Select the traffic control devices to be used and enter number each required:

Check all that apply:	*Wording or Pictogram*	*Number:*
☑ Warning signs	Roadway Work Ahead	2 - 6
☐ Warning signs		
☐ Warning signs		
☐ Stop/Slow paddle		
☐ Red flag		
☐ Drums		
☑ Channelizer cone (42 inch height, 10 lb base)		6 - 10
☐ Channelizer cone (42 inch height, 30 lb base)		
☐ Traffic cones (≥ 18 inches tall)		
☐ Barricade ☐ Type I ☐ Type II		
☐ Flags for cones		
☐ Lights (for night work)		
☐ Plastic fencing (rolls)		
☐ Caution tape (rolls)		
☑ Other (specify):		
	flashing strobe	1

TCP Phasing:

1) Deploy warning signs at first approach, if required

2) Deploy subsequent approach warning signs, if required

3) Deploy channeling devices, if required, starting with first approach

4) Deploy "End Road Work" signs, if required

5) Position vehicle as shield to the extent practical

6) Commence work, SSO or designated contractor to maintain devices

7) Remove devices in reverse order

5.0 Approvals

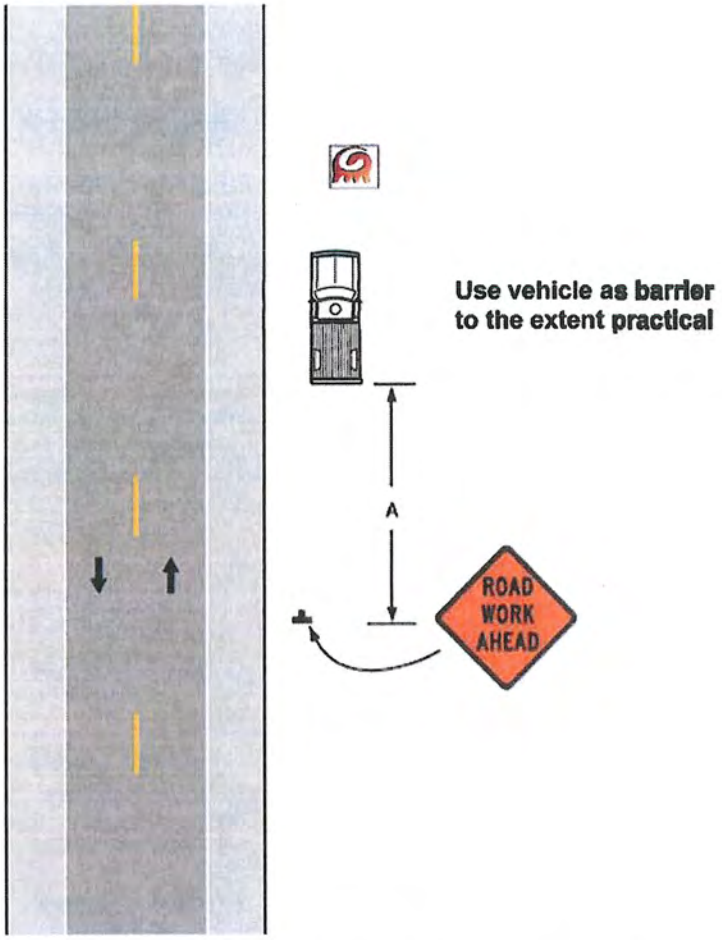
Plan Developer: Richard Lounsbury 8/31/2016

HASP Reviewer 8/31/2016

Engineering Judgment Review By:

DOT Facts-301i
Work Beyond the Shoulder

The following configuration may be used for work conducted beyond the shoulder of the roadway:



Road Type	"A" (m/ft)
Urban (Low Speed)	30/100
Urban (High Speed)	100/350
Rural	150/500

Mandatory:

M1. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.

Guidance:

G1. If the work space is in the median of a divided highway, an advance warning sign should also be placed on the left side of the directional roadway.

G2. The ROAD WORK AHEAD sign may be replaced with other appropriate signs such as the SHOULDER WORK sign. The SHOULDER WORK sign may be used for work adjacent to the shoulder.

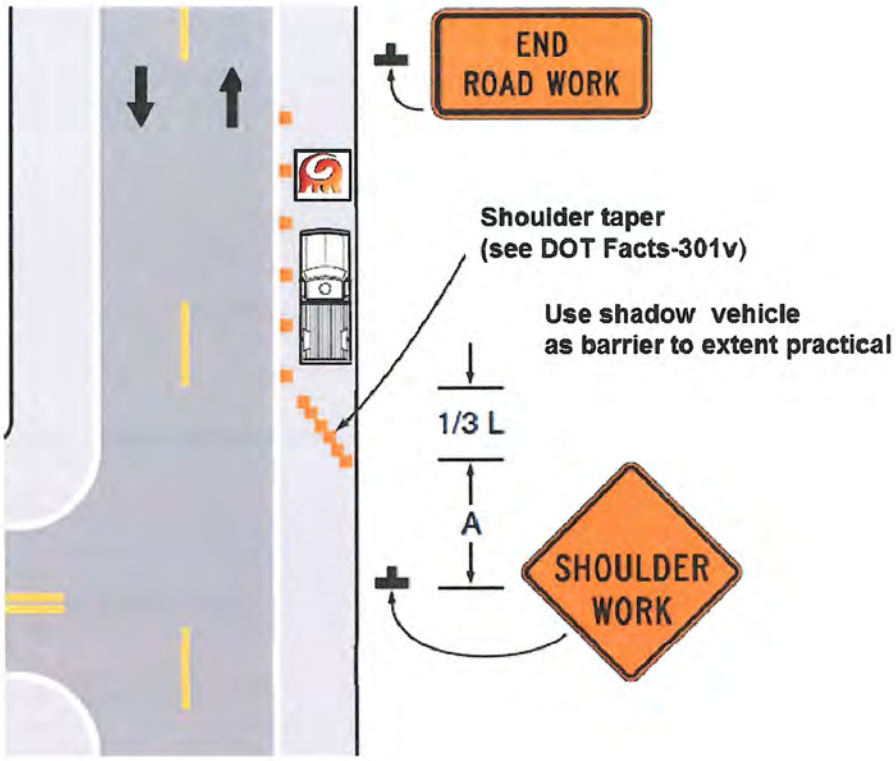
G3. The ROAD WORK AHEAD sign may be omitted where the work space is behind a barrier, more than 600 mm (24 in) behind the curb, or 4.6 m (15 ft) or more from the edge of any roadway.

G4. For short-term, short-duration or mobile operation, all signs and channelizing devices may be eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.

G5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

DOT Facts-301j
Work on the Shoulder

The following configuration may be used for work conducted on the shoulder of the roadway:



Road Type	"A" (m/ft)
Urban (Low Speed)	30/100
Urban (High Speed)[1]	100/350
Rural	150/500

1 – Excludes freeway, expressway, and interstate highway scenarios

The ARCADIS Transportation Safety Program is committed to continuous improvement. Report all errors or omissions to Sam Moyers in the Knoxville, TN office. sam.moyers@arcadis-us.com.

Revision 2, 8/26/2014

Mandatory:

M1. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.

M2. When paved shoulders having a width of 2.4 m (8 ft) or more are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

Guidance:

G1. A SHOULDER WORK sign should be placed on the left side of the roadway for a divided or one-way street only if the left shoulder is affected.

G2. The Workers symbol signs may be used instead of SHOULDER WORK signs.

G3. The SHOULDER WORK AHEAD sign on an intersecting roadway may be omitted where drivers emerging from that roadway will encounter another advance warning sign prior to this activity area.

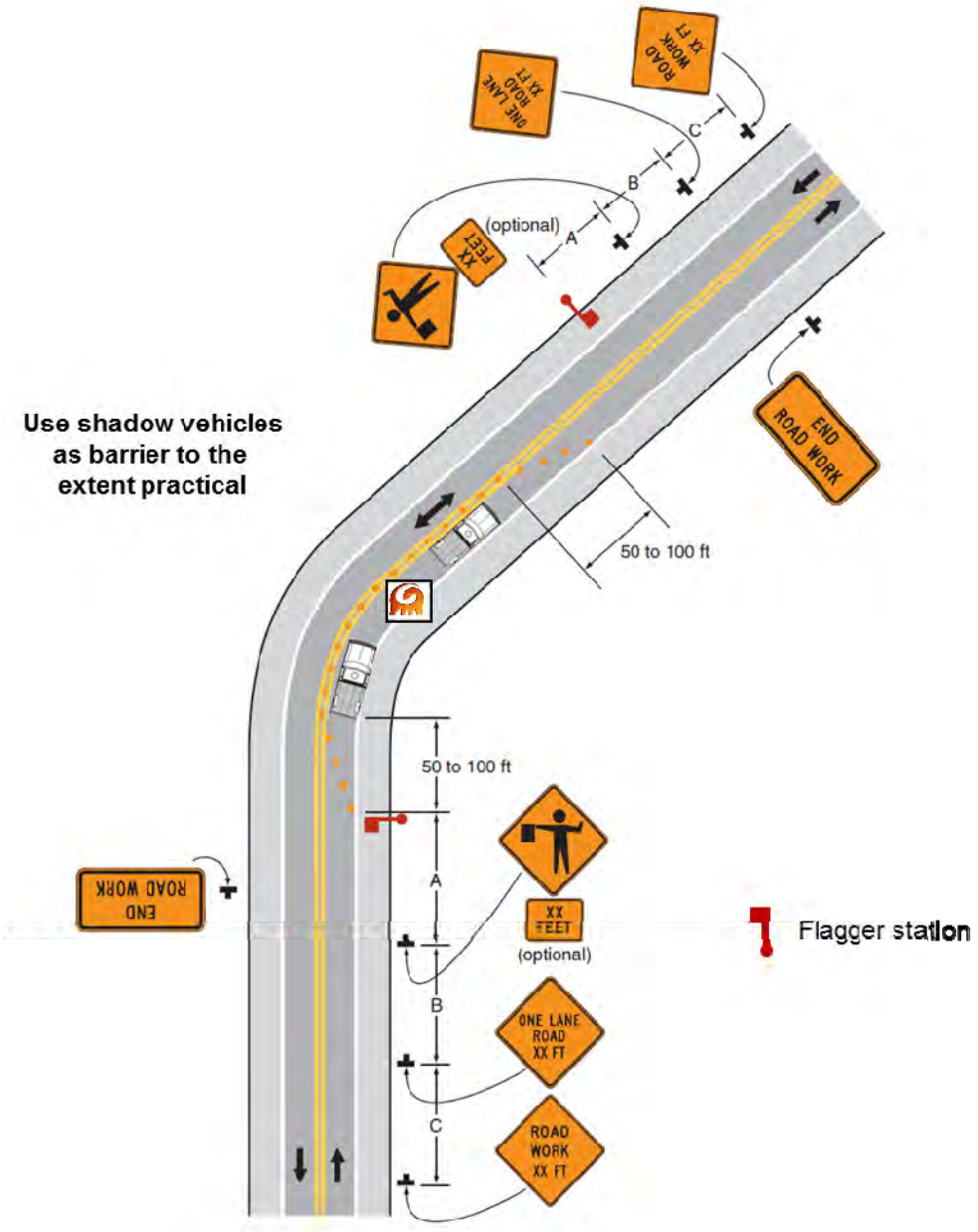
G4. For short-duration operations of 60 minutes or less, all signs and channelizing devices may be eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.

G5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Revision 2, 8/26/2014

DOT Facts-301n
Lane Closure on Two-Lane Road Using Flaggers

The following configuration may be used for lane closure on two-lane roads using flaggers:



This fact sheet is not a substitute for ARCADIS Transportation Safety Program procedures or applicable MUTCD guidance. The user should review the actual procedure or regulation for compliance issues. Procedures, fact sheets, and training/education materials may be revised without notice. Always refer to the current copy on the Source for accurate information.

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Revision 2, 8/26/2014

Road Type	"A" (m/ft)	"B" (m/ft)	"C" (m/ft)
Urban (Low Speed)	30/100	30/100	30/100
Urban (High Speed)[1]	100/350	100/350	100/350
Rural	150/500	150/500	150/500

1 – Excludes freeway, expressway, and interstate highway scenarios

Mandatory:

M1. At night, flagger stations shall be illuminated, except in emergencies.

Guidance:

G1. For low-volume situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger, positioned to be visible to road users approaching from both directions, may be used (refer to DTO Facts-301f for more information).

G2. The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short-duration operations.

G3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs. A BE PREPARED TO STOP sign may be added to the sign series.

G4. The buffer space should be extended so that the two-way traffic taper is placed before a horizontal (or crest vertical) curve to provide adequate sight distance for the flagger and a queue of stopped vehicles.

G5. When used, the BE PREPARED TO STOP sign should be located between the Flagger sign and the ONE LANE ROAD sign.

G6. When a highway-rail grade crossing exists within or upstream of the transition area and it is anticipated that queues resulting from the lane closure might extend through the highway-rail grade crossing, the Roadway Work Zone should be extended so that the transition area precedes the highway-rail grade crossing.

G7. When a highway-rail grade crossing equipped with active warning devices exists within the activity area, provisions should be made for keeping flaggers informed as to the activation status of these warning devices.

G8. When a highway-rail grade crossing exists within the activity area, drivers operating on the left side of the normal centerline should be provided with comparable warning devices as for drivers operating on the right side of the normal centerline.

Revision 2, 8/26/2014

G9. Early coordination with the railroad company should occur before work starts.

G10. A flagger or a uniformed law enforcement officer may be used at the highway-rail grade crossing to minimize the probability that vehicles are stopped within 4.6 m (15 ft) of the highway-rail grade crossing, measured from both sides of the outside rails.

Revision 2, 8/26/2014

Revision Number: 004.0

Issue date: 08/03/2015

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: **Loctite® PL® Polyurethane Concrete Crack and Masonry Sealant**

IDH number: 1618522

Product type: Sealant

Restriction of Use: None identified

Region: United States

Company address:
Henkel Corporation
One Henkel Way
Rocky Hill, Connecticut 06067

Contact information:
Telephone: +1 (800) 624-7767
MEDICAL EMERGENCY Phone: Poison Control Center 1-877-671-4608 (toll free) or 1-303-592-1711 TRANSPORT EMERGENCY Phone: CHEMTREC 1-800-424-9300 (toll free) or 1-703-527-3887

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER: CAUSES SKIN IRRITATION.
MAY CAUSE AN ALLERGIC SKIN REACTION.
CAUSES SERIOUS EYE IRRITATION.
MAY CAUSE ALLERGY OR ASTHMA SYMPTOMS OR BREATHING DIFFICULTIES IF INHALED.

HAZARD CLASS	HAZARD CATEGORY
SKIN IRRITATION	2
EYE IRRITATION	2A
RESPIRATORY SENSITIZATION	1
SKIN SENSITIZATION	1

PICTOGRAM(S)

Precautionary Statements

Prevention: Avoid breathing dust or fumes. Wash thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace. Wear eye and face protection. Wear protective gloves. In case of inadequate ventilation wear respiratory protection.

Response: IF ON SKIN: Wash with plenty of water. IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If skin irritation or rash occurs: Get medical attention. If eye irritation persists: Get medical attention. If experiencing respiratory symptoms: Call a poison center or physician. Take off contaminated clothing.

Storage: Not prescribed

Disposal: Dispose of contents and/or container according to Federal, State/Provincial and local governmental regulations.

Classification complies with OSHA Hazard Communication Standard (29 CFR 1910.1200) and is consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

See Section 11 for additional toxicological information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Component(s)	CAS Number	Percentage*
Limestone	1317-65-3	10 - 30
Stoddard solvent, <0.1% Benzene	8052-41-3	1 - 5
Talc	14807-96-6	1 - 5
Calcium oxide	1305-78-8	1 - 5
Toluene-2,4-diisocyanate	584-84-9	0 - 0.1
Unknown components~		60 - 100
Titanium dioxide	13463-67-7	1 - 5
Toluene-2,6-diisocyanate	91-08-7	0.1 - 1
Gamma-glycidoxypropyl trimethoxysilane	2530-83-8	0.1 - 1

* Exact percentage is a trade secret. Concentration range is provided to assist users in providing appropriate protections.

4. FIRST AID MEASURES

Inhalation: If inhaled, immediately remove the affected person to fresh air. Immediate medical treatment necessary.

Skin contact: Wash affected area immediately with soap and water. If symptoms develop and persist, get medical attention. Remove contaminated clothes.

Eye contact: In case of contact with the eyes, rinse immediately with plenty of water for 15 minutes, and seek immediate medical attention.

Ingestion: Do not induce vomiting, seek medical advice immediately.

Symptoms: See Section 11.

Notes to physician: An individual having a dermal or pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.Treatment based on judgement of the physician in response to reactions of the patient.

5. FIRE FIGHTING MEASURES

Extinguishing media: Water fog. Foam Carbon dioxide.

Special firefighting procedures: Wear self-contained breathing apparatus and full protective clothing, such as turn-out gear. In case of fire, keep containers cool with water spray.

Unusual fire or explosion hazards: None known.

Hazardous combustion products: Nitrous gases Irritating fumes. Isocyanate vapors.

6. ACCIDENTAL RELEASE MEASURES

Use personal protection recommended in Section 8, isolate the hazard area and deny entry to unnecessary and unprotected personnel.

Environmental precautions: Do not empty into drains / surface water / ground water.

Clean-up methods: Ensure adequate ventilation. Scrape up spilled material and place in a closed container for disposal. Wear suitable protective clothing, gloves and eye/face protection.

7. HANDLING AND STORAGE

Handling: Avoid contact with eyes, skin and clothing. Avoid extreme temperatures. Wash thoroughly after handling. Protect from moisture. Use only with adequate ventilation.

Storage: For safe storage, store between 18.3 °C (64.9 °F) and 40 °C (104°F) Avoid moisture. Keep in a cool, well ventilated area away from heat, sparks and open flame. Keep container tightly closed until ready for use.

For information on product shelf life, please review labels on container or check the Technical Data Sheet.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Employers should complete an assessment of all workplaces to determine the need for, and selection of, proper exposure controls and protective equipment for each task performed.

Hazardous Component(s)	ACGIH TLV	OSHA PEL	AIHA WEEL	OTHER
Limestone	10 mg/m3 TWA Total dust.	5 mg/m3 PEL Respirable fraction. 15 mg/m3 PEL Total dust.	None	None
Stoddard solvent, <0.1% Benzene	100 ppm TWA	500 ppm (2,900 mg/m3) PEL	None	None
Talc	2 mg/m3 TWA Respirable fraction.	20 MPPCF TWA 2.4 MPPCF TWA Respirable. 0.1 mg/m3 TWA Respirable. 0.3 mg/m3 TWA Total dust.	None	50 ppm
Calcium oxide	2 mg/m3 TWA	5 mg/m3 PEL	None	None
Toluene-2,4-diisocyanate	0.005 ppm TWA 0.02 ppm STEL (Sensitizer.)	0.02 ppm (0.14 mg/m3) Ceiling	None	None
Unknown components~	None	None	None	None
Titanium dioxide	10 mg/m3 TWA	15 mg/m3 PEL Total dust.	None	None
Toluene-2,6-diisocyanate	0.005 ppm TWA 0.02 ppm STEL (Sensitizer.)	None	None	None
Gamma-glycidoxypropyl trimethoxysilane	None	None	None	None

Engineering controls: Local exhaust ventilation is recommended when general ventilation is not sufficient to control airborne contamination below occupational exposure limits.

Respiratory protection: Observe OSHA regulations for respirator use (29 CFR 1910.134). Use a NIOSH approved air-purifying respirator if the potential to exceed established exposure limits exists. Respirator with combination filter for vapor/particulate.

Eye/face protection: Safety glasses with side-shields. Full face protection should be used if the potential for splashing or spraying of product exists.

Skin protection: Use impermeable gloves and protective clothing as necessary to prevent skin contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Solid
Color: Tan
Odor: Slight
Odor threshold: Not available.
pH: Neutral

Vapor pressure:	Not available.
Boiling point/range:	Not available.
Melting point/ range:	Not applicable
Specific gravity:	1.15
Vapor density:	Not available.
Flash point:	Does not flash.
Flammable/Explosive limits - lower:	Not available.
Flammable/Explosive limits - upper:	Not available.
Autoignition temperature:	None expected.
Evaporation rate:	Not available.
Solubility in water:	Insoluble
Partition coefficient (n-octanol/water):	Not available.
VOC content:	2.89 %; 33 g/l
Viscosity:	Not available.
Decomposition temperature:	Not available.

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions of storage and use.
Hazardous reactions:	Contact with moisture, other materials that react with isocyanates, or temperatures above 350° F (177° C), may cause polymerization.
Hazardous decomposition products:	Irritating and/or toxic fumes and gases may be emitted upon the product's decomposition. nitrogen oxides Aromatic isocyanates. carbon oxides. carbon monoxide Hydrogen cyanide.
Incompatible materials:	Oxidizing agents. Alcohols. Water. Strong bases.
Reactivity:	Not available.
Conditions to avoid:	Avoid moisture. Prolonged exposure to heat.

11. TOXICOLOGICAL INFORMATION

Relevant routes of exposure: Inhalation, Skin, Eyes, Ingestion

Potential Health Effects/Symptoms

Inhalation: As a result of previous repeated overexposures or a single large dose, certain individuals will develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the TLV. Chronic overexposure to isocyanates has been reported to cause lung damage. Dryness of nasal passages, sore throat, cough, tightness of chest, shortness of breath. Persons suffering from allergic reactions to isocyanates should avoid contact with the product. This product may cause sensitization by inhalation and skin contact. Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage. May cause respiratory tract irritation.

Skin contact: Contact with skin can cause irritation and allergic reaction (sensitization) in some individuals. This product may discolor the skin.

Eye contact: Contact with eyes will cause irritation.

Ingestion: Ingestion of this product may cause nausea, vomiting and diarrhea.

Hazardous Component(s)	LD50s and LC50s	Immediate and Delayed Health Effects
Limestone	None	Nuisance dust
Stoddard solvent, <0.1% Benzene	None	Central nervous system, Irritant
Talc	None	Irritant, Lung, Some evidence of carcinogenicity
Calcium oxide	None	Irritant, Corrosive, Eyes
Toluene-2,4-diisocyanate	Oral LD50 (RAT) = 5,800 mg/kg Inhalation LC50 (RAT, 4 h) = 14 mg/l Inhalation LC50 (RABBIT) = 11 mg/l	Allergen, Eyes, Irritant, Lung, Respiratory, Some evidence of carcinogenicity
Unknown components~	None	No Data
Titanium dioxide	None	Irritant, Respiratory, Some evidence of carcinogenicity
Toluene-2,6-diisocyanate	None	Allergen, Bone Marrow, Corrosive, Eyes, Irritant, Mutagen, Respiratory, Some evidence of carcinogenicity
Gamma-glycidoxypropyl trimethoxysilane	None	Allergen, Irritant

Hazardous Component(s)	NTP Carcinogen	IARC Carcinogen	OSHA Carcinogen (Specifically Regulated)
Limestone	No	No	No
Stoddard solvent, <0.1% Benzene	No	No	No
Talc	No	Group 2B	No
Calcium oxide	No	No	No
Toluene-2,4-diisocyanate	Reasonably Anticipated to be a Human Carcinogen.	Group 2B	No
Unknown components~	No	No	No
Titanium dioxide	No	Group 2B	No
Toluene-2,6-diisocyanate	Reasonably Anticipated to be a Human Carcinogen.	Group 2B	No
Gamma-glycidoxypropyl trimethoxysilane	No	No	No

12. ECOLOGICAL INFORMATION

Ecological information: Not available.

13. DISPOSAL CONSIDERATIONS

Information provided is for unused product only.

Recommended method of disposal: Dispose of according to Federal, State and local governmental regulations.

Hazardous waste number: It is the responsibility of the user to determine if an item is hazardous as defined in the Resource Conservation and Recovery Act (RCRA) at the time of disposal. Product uses, transformations, mixtures, processes, etc., may render the resulting material hazardous, under the criteria of ignitability, corrosivity, reactivity and toxicity characteristics of the Toxicity Characteristics Leaching Procedure (TCLP) 40 CFR 261.20-24.

14. TRANSPORT INFORMATION

The transport information provided in this section only applies to the material/formulation itself, and is not specific to any package/configuration.

U.S. Department of Transportation Ground (49 CFR)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

International Air Transportation (ICAO/IATA)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

Water Transportation (IMO/IMDG)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

15. REGULATORY INFORMATION

United States Regulatory Information

TSCA 8 (b) Inventory Status: All components are listed or are exempt from listing on the Toxic Substances Control Act Inventory.

TSCA 12 (b) Export Notification: Toluene-2,6-diisocyanate (CAS# 91-08-7).

CERCLA/SARA Section 302 EHS: Toluene-2,6-diisocyanate (CAS# 91-08-7).

CERCLA/SARA Section 311/312: Immediate Health, Delayed Health

CERCLA/SARA Section 313: This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (40 CFR 372). Toluene-2,6-diisocyanate (CAS# 91-08-7).

California Proposition 65: This product contains a chemical known in the State of California to cause cancer. This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Canada Regulatory Information

CEPA DSL/NDSL Status: All components are listed on or are exempt from listing on the Canadian Domestic Substances List.

16. OTHER INFORMATION

This safety data sheet contains changes from the previous version in sections: This Safety Data Sheet contains changes from the previous version in Section(s):
2, 3, 8, 9, 15

Prepared by: Mary Ellen Roddy, Sr. Regulatory Affairs Specialist

Issue date: 08/03/2015

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SAFETY DATA SHEET

K07307000

Section 1. Identification

Product name : KRYLON® PRO PROFESSIONAL Solvent-Based Fluorescent Marking Paint Orange

Product code : K07307000

Other means of identification : Not available.

Product type : Aerosol.

Relevant identified uses of the substance or mixture and uses advised against

Not applicable.

Manufacturer : Krylon Products Group
Cleveland, OH 44115

Emergency telephone number of the company : (216) 566-2917

Product Information Telephone Number : (800) 457-9566

Regulatory Information Telephone Number : (216) 566-2902

Transportation Emergency Telephone Number : (800) 424-9300

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE AEROSOLS - Category 1
GASES UNDER PRESSURE - Compressed gas
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
CARCINOGENICITY - Category 1A
TOXIC TO REPRODUCTION (Fertility) - Category 2
TOXIC TO REPRODUCTION (Unborn child) - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1
ASPIRATION HAZARD - Category 1

Percentage of the mixture consisting of ingredient(s) of unknown toxicity: 47.8%

GHS label elements

Hazard pictograms :

Signal word : Danger

Section 2. Hazards identification

Hazard statements : Extremely flammable aerosol.
Contains gas under pressure; may explode if heated.
Causes serious eye irritation.
Causes skin irritation.
May cause cancer.
Suspected of damaging fertility or the unborn child.
May be fatal if swallowed and enters airways.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Causes damage to organs through prolonged or repeated exposure.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not spray on an open flame or other ignition source. Use only outdoors or in a well-ventilated area. Do not breathe dust or mist. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Pressurized container: Do not pierce or burn, even after use.

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements

DANGER: Rags, steel wool, other waste soaked with this product, and sanding residue may spontaneously catch fire if improperly discarded. Immediately place rags, steel wool, other waste soaked with this product, and sanding residue in a sealed, water-filled, metal container. Dispose of in accordance with local fire regulations. DELAYED EFFECTS FROM LONG TERM OVEREXPOSURE. Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal. WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Adequate ventilation required when sanding or abrading the dried film. If Adequate ventilation cannot be provided wear an approved particulate respirator (NIOSH approved). Follow respirator manufacturer's directions for respirator use. DELAYED EFFECTS FROM LONG TERM OVEREXPOSURE. Abrading or sanding of the dry film may release Crystalline Silica which has been shown to cause lung damage and cancer under long term exposure.

Please refer to the SDS for additional information. Keep out of reach of children. Keep upright in a cool, dry place. Do not discard empty can in trash compactor.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

CAS number/other identifiers

Ingredient name	% by weight	CAS number
Crystalline Silica, respirable powder	19.8	14808-60-7
Propane	14.65	74-98-6
Acetone	10.13	67-64-1
Hexane	8.42	110-54-3
Butane	6.9	106-97-8
Lt. Aliphatic Hydrocarbon Solvent	6.74	64742-89-8
2-Methylpentane	3.9	107-83-5
Xylene	1.87	1330-20-7
3-Methylpentane	1.45	96-14-0
2,3-Dimethylbutane	1.23	79-29-8
Toluene	0.48	108-88-3
Ethylbenzene	0.33	100-41-4

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Section 4. First aid measures

Eye contact : Causes serious eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.

Skin contact : Causes skin irritation.

Ingestion : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
irritation
redness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
nausea or vomiting
reduced fetal weight
increase in fetal deaths
skeletal malformations

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Section 5. Fire-fighting measures

Specific hazards arising from the chemical : Extremely flammable aerosol. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion. Bursting aerosol containers may be propelled from a fire at high speed. Runoff to sewer may create fire or explosion hazard. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
sulfur oxides
metal oxide/oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. In the case of aerosols being ruptured, care should be taken due to the rapid escape of the pressurized contents and propellant. If a large number of containers are ruptured, treat as a bulk material spillage according to the instructions in the clean-up section. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use. Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Avoid breathing gas. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Protect from sunlight. Store locked up. Eliminate all ignition sources. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits (OSHA United States)

Ingredient name	Exposure limits
Crystalline Silica, respirable powder	**OSHA PEL Z3 (United States, 2/2013).** TWA: 250 mppcf / (%SiO2+5) 8 hours. Form: Respirable TWA: 10 mg/m³ / (%SiO2+2) 8 hours. Form: Respirable **ACGIH TLV (United States, 3/2015).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable fraction **NIOSH REL (United States, 10/2013).** TWA: 0.05 mg/m³ 10 hours. Form: respirable dust
Propane	**NIOSH REL (United States, 10/2013).** TWA: 1000 ppm 10 hours. TWA: 1800 mg/m³ 10 hours. **OSHA PEL (United States, 2/2013).** TWA: 1000 ppm 8 hours. TWA: 1800 mg/m³ 8 hours.
Acetone	**ACGIH TLV (United States, 3/2015).** TWA: 250 ppm 8 hours. STEL: 500 ppm 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 250 ppm 10 hours. TWA: 590 mg/m³ 10 hours. **OSHA PEL (United States, 2/2013).** TWA: 1000 ppm 8 hours. TWA: 2400 mg/m³ 8 hours.
Hexane	**ACGIH TLV (United States, 3/2015).** **Absorbed through skin.** TWA: 50 ppm 8 hours.

Section 8. Exposure controls/personal protection

	NIOSH REL (United States, 10/2013). TWA: 50 ppm 10 hours. TWA: 180 mg/m³ 10 hours. **OSHA PEL (United States, 2/2013).** TWA: 500 ppm 8 hours. TWA: 1800 mg/m³ 8 hours.
Butane	**NIOSH REL (United States, 10/2013).** TWA: 800 ppm 10 hours. TWA: 1900 mg/m³ 10 hours. **ACGIH TLV (United States, 3/2015).** STEL: 1000 ppm 15 minutes.
Lt. Aliphatic Hydrocarbon Solvent	None.
2-Methylpentane	**ACGIH TLV (United States, 3/2015).** TWA: 500 ppm 8 hours. TWA: 1760 mg/m³ 8 hours. STEL: 1000 ppm 15 minutes. STEL: 3500 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 350 mg/m³ 10 hours. CEIL: 510 ppm 15 minutes. CEIL: 1800 mg/m³ 15 minutes.
Xylene	**ACGIH TLV (United States, 3/2015).** TWA: 100 ppm 8 hours. TWA: 434 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
3-Methylpentane	**ACGIH TLV (United States, 3/2015).** TWA: 500 ppm 8 hours. TWA: 1760 mg/m³ 8 hours. STEL: 1000 ppm 15 minutes. STEL: 3500 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 350 mg/m³ 10 hours. CEIL: 510 ppm 15 minutes. CEIL: 1800 mg/m³ 15 minutes.
2,3-Dimethylbutane	**ACGIH TLV (United States, 3/2015).** TWA: 500 ppm 8 hours. TWA: 1760 mg/m³ 8 hours. STEL: 1000 ppm 15 minutes. STEL: 3500 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 350 mg/m³ 10 hours. CEIL: 510 ppm 15 minutes. CEIL: 1800 mg/m³ 15 minutes.
Toluene	**OSHA PEL Z2 (United States, 2/2013).** TWA: 200 ppm 8 hours. CEIL: 300 ppm AMP: 500 ppm 10 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 375 mg/m³ 10 hours. STEL: 150 ppm 15 minutes. STEL: 560 mg/m³ 15 minutes.

	ACGIH TLV (United States, 3/2015). TWA: 20 ppm 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 3/2015).** TWA: 20 ppm 8 hours. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 435 mg/m³ 10 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.

Occupational exposure limits (Canada)

Ingredient name	Exposure limits
Crystalline Silica, respirable powder	**CA British Columbia Provincial (Canada, 5/2015).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 0.1 mg/m³ 8 hours. Form: Respirable dust. **CA Ontario Provincial (Canada, 7/2015).** TWA: 0.1 mg/m³ 8 hours. Form: Respirable fraction. **CA Alberta Provincial (Canada, 4/2009).** 8 hrs OEL: 0.025 mg/m³ 8 hours. Form: Respirable particulate **CA Saskatchewan Provincial (Canada, 7/2013).** TWA: 0.05 mg/m³ 8 hours. Form: respirable fraction
Propane	**CA Alberta Provincial (Canada, 4/2009).** 8 hrs OEL: 1000 ppm 8 hours. **CA British Columbia Provincial (Canada, 5/2015).** TWA: 1000 ppm 8 hours. **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 1000 ppm 8 hours. TWAEV: 1800 mg/m³ 8 hours. **CA Ontario Provincial (Canada, 7/2015).** TWA: 1000 ppm 8 hours. **CA Saskatchewan Provincial (Canada, 7/2013).** STEL: 1250 ppm 15 minutes. TWA: 1000 ppm 8 hours.
Acetone	**CA Alberta Provincial (Canada, 4/2009).** 8 hrs OEL: 1200 mg/m³ 8 hours. 15 min OEL: 1800 mg/m³ 15 minutes. 8 hrs OEL: 500 ppm 8 hours. 15 min OEL: 750 ppm 15 minutes. **CA British Columbia Provincial (Canada, 5/2015).** TWA: 250 ppm 8 hours. STEL: 500 ppm 15 minutes. **CA Ontario Provincial (Canada, 7/2015).**

	TWA: 500 ppm 8 hours. STEL: 750 ppm 15 minutes. **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 500 ppm 8 hours. TWAEV: 1190 mg/m³ 8 hours. STEV: 1000 ppm 15 minutes. STEV: 2380 mg/m³ 15 minutes. **CA Saskatchewan Provincial (Canada, 7/2013).** STEL: 750 ppm 15 minutes. TWA: 500 ppm 8 hours.
Hexane	**CA Alberta Provincial (Canada, 4/2009). Absorbed through skin.** 8 hrs OEL: 50 ppm 8 hours. 8 hrs OEL: 176 mg/m³ 8 hours. **CA British Columbia Provincial (Canada, 5/2015). Absorbed through skin.** TWA: 20 ppm 8 hours. **CA Ontario Provincial (Canada, 7/2015). Absorbed through skin.** TWA: 50 ppm 8 hours. **CA Quebec Provincial (Canada, 1/2014). Absorbed through skin.** TWAEV: 50 ppm 8 hours. TWAEV: 176 mg/m³ 8 hours. **CA Saskatchewan Provincial (Canada, 7/2013). Absorbed through skin.** STEL: 62.5 ppm 15 minutes. TWA: 50 ppm 8 hours.
2-Methylpentane	**CA Alberta Provincial (Canada, 4/2009).** 15 min OEL: 3500 mg/m³ 15 minutes. 8 hrs OEL: 1760 mg/m³ 8 hours. 15 min OEL: 1000 ppm 15 minutes. 8 hrs OEL: 500 ppm 8 hours. **CA British Columbia Provincial (Canada, 5/2015).** TWA: 200 ppm 8 hours. **CA Ontario Provincial (Canada, 7/2015).** TWA: 500 ppm 8 hours. STEL: 1000 ppm 15 minutes. **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 500 ppm 8 hours. TWAEV: 1760 mg/m³ 8 hours. STEV: 1000 ppm 15 minutes. STEV: 3500 mg/m³ 15 minutes. **CA Saskatchewan Provincial (Canada, 7/2013).** STEL: 1000 ppm 15 minutes. TWA: 500 ppm 8 hours.
Toluene	**CA Alberta Provincial (Canada, 4/2009). Absorbed through skin.** 8 hrs OEL: 50 ppm 8 hours. 8 hrs OEL: 188 mg/m³ 8 hours. **CA British Columbia Provincial (Canada, 5/2015).** TWA: 20 ppm 8 hours. **CA Ontario Provincial (Canada, 7/2015).** TWA: 20 ppm 8 hours.

	CA Quebec Provincial (Canada, 1/2014). Absorbed through skin. TWAEV: 50 ppm 8 hours. TWAEV: 188 mg/m³ 8 hours. **CA Saskatchewan Provincial (Canada, 7/2013). Absorbed through skin.** STEL: 60 ppm 15 minutes. TWA: 50 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Not available.

Odor : Not available.

Odor threshold : Not available.

pH : 7

Melting point : Not available.

Boiling point : Not available.

Flash point : Closed cup: -29°C (-20.2°F) [Pensky-Martens Closed Cup]

Evaporation rate : 9.1 (butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 0.9%
Upper: 12.8%

Vapor pressure : 13.5 kPa (101.325 mm Hg) [at 20°C]

Vapor density : 1.55 [Air = 1]

Relative density : 0.89

Solubility : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Kinematic (room temperature): <0.205 cm^2/s (<20.5 cSt)
Kinematic (40°C (104°F)): <0.205 cm^2/s (<20.5 cSt)

Molecular weight : Not applicable.

Aerosol product

Type of aerosol : Spray

Heat of combustion : 23.77 kJ/g

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame).

Incompatible materials : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Acetone	LD50 Oral	Rat	5800 mg/kg	-
Hexane	LC50 Inhalation Gas.	Rat	48000 ppm	4 hours
	LD50 Oral	Rat	15840 mg/kg	-
Butane	LC50 Inhalation Vapor	Rat	658000 mg/m³	4 hours
Xylene	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
Toluene	LC50 Inhalation Vapor	Rat	49 g/m³	4 hours
	LD50 Oral	Rat	636 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Acetone	Eyes - Mild irritant	Human	-	186300 parts per million	-
	Eyes - Mild irritant	Rabbit	-	10 microliters	-
	Eyes - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
	Eyes - Severe irritant	Rabbit	-	20 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	395 milligrams	-
Hexane	Eyes - Mild irritant	Rabbit	-	10 milligrams	-
Xylene	Eyes - Mild irritant	Rabbit	-	87 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	100 Percent	-
Toluene	Eyes - Mild irritant	Rabbit	-	0.5 minutes 100 milligrams	-
	Eyes - Mild irritant	Rabbit	-	870 Micrograms	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 milligrams	-
	Skin - Mild irritant	Pig	-	24 hours 250 microliters	-
	Skin - Mild irritant	Rabbit	-	435 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
	Skin - Moderate irritant	Rabbit	-	500 milligrams	-
Ethylbenzene	Eyes - Severe irritant	Rabbit	-	500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-

Sensitization

Not available.

Mutagenicity

Section 11. Toxicological information

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Crystalline Silica, respirable powder	-	1	Known to be a human carcinogen.
Xylene	-	3	-
Toluene	-	3	-
Ethylbenzene	-	2B	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Propane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Acetone	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Hexane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Butane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Lt. Aliphatic Hydrocarbon Solvent	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
2-Methylpentane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Xylene	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
3-Methylpentane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
2,3-Dimethylbutane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Toluene	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Ethylbenzene	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects

Specific target organ toxicity (repeated exposure)

Section 11. Toxicological information

Name	Category	Route of exposure	Target organs
Crystalline Silica, respirable powder	Category 1	Inhalation	Not determined
Propane	Category 2	Not determined	Not determined
Acetone	Category 2	Not determined	Not determined
Hexane	Category 2	Not determined	Not determined
Butane	Category 2	Not determined	Not determined
Lt. Aliphatic Hydrocarbon Solvent	Category 2	Not determined	Not determined
2-Methylpentane	Category 2	Not determined	Not determined
Xylene	Category 2	Not determined	Not determined
3-Methylpentane	Category 2	Not determined	Not determined
2,3-Dimethylbutane	Category 2	Not determined	Not determined
Toluene	Category 2	Not determined	Not determined
Ethylbenzene	Category 2	Not determined	Not determined

Aspiration hazard

Name	Result
Propane	ASPIRATION HAZARD - Category 1
Hexane	ASPIRATION HAZARD - Category 1
Butane	ASPIRATION HAZARD - Category 1
Lt. Aliphatic Hydrocarbon Solvent	ASPIRATION HAZARD - Category 1
2-Methylpentane	ASPIRATION HAZARD - Category 1
Xylene	ASPIRATION HAZARD - Category 1
3-Methylpentane	ASPIRATION HAZARD - Category 1
2,3-Dimethylbutane	ASPIRATION HAZARD - Category 1
Toluene	ASPIRATION HAZARD - Category 1
Ethylbenzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.

Skin contact : Causes skin irritation.

Ingestion : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
irritation
redness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
nausea or vomiting
reduced fetal weight
increase in fetal deaths
skeletal malformations

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : Causes damage to organs through prolonged or repeated exposure.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : Suspected of damaging the unborn child.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : Suspected of damaging fertility.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	119917.5 mg/kg
Inhalation (gases)	139439 ppm

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Acetone	Acute EC50 7200000 µg/l Fresh water	Algae - Selenastrum sp.	96 hours
	Acute LC50 6000000 µg/l Fresh water	Crustaceans - Gammarus pulex	48 hours
	Acute LC50 6900 mg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 5600 ppm Fresh water	Fish - Poecilia reticulata	96 hours
	Chronic NOEC 4.95 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Chronic NOEC 0.016 ml/L Fresh water	Crustaceans - Daphniidae	21 days
	Chronic NOEC 0.1 ml/L Fresh water	Daphnia - Daphnia magna - Neonate	21 days
Hexane	Acute LC50 2500 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Lt. Aliphatic Hydrocarbon Solvent	Acute LC50 >100000 ppm Fresh water	Fish - Oncorhynchus mykiss	96 hours
Xylene	Acute LC50 8500 µg/l Marine water	Crustaceans - Palaemonetes	48 hours

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		pugio	
	Acute LC50 13400 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Toluene	Acute EC50 12500 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 11600 µg/l Fresh water	Crustaceans - Gammarus pseudolimnaeus - Adult	48 hours
	Acute EC50 6000 µg/l Fresh water	Daphnia - Daphnia magna - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
	Acute LC50 5500 µg/l Fresh water	Fish - Oncorhynchus kisutch - Fry	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Daphnia - Daphnia magna	21 days
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 6530 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Acetone	-	-	Readily
Xylene	-	-	Readily
Toluene	-	-	Readily
Ethylbenzene	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Hexane	-	501.187	high
Lt. Aliphatic Hydrocarbon Solvent	-	10 to 2500	high
Xylene	-	8.1 to 25.9	low
Toluene	-	90	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	IATA	IMDG
UN number	UN1950	UN1950	UN1950	UN1950	UN1950
UN proper shipping name	AEROSOLS	AEROSOLS	AEROSOLS	AEROSOLS, flammable	AEROSOLS
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.
Additional information	- **ERG No.** 126	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2. 13-2.17 (Class 2). **ERG No.** 126	- **ERG No.** 126	-	**Emergency schedules (EmS)** F-D, S-U

Special precautions for user : Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (sea, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport. People loading and unloading dangerous goods must be trained on all of the risks deriving from the substances and on all actions in case of emergency situations.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Proper shipping name : Not available.

Ship type : Not available.

Pollution category : Not available.

Section 15. Regulatory information

SARA 313

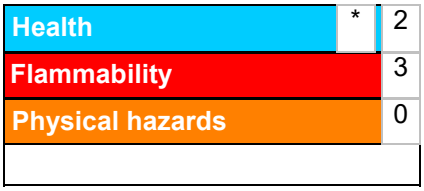
SARA 313 (40 CFR 372.45) supplier notification can be found on the Environmental Data Sheet.

California Prop. 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



The customer is responsible for determining the PPE code for this material.

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE AEROSOLS - Category 1	On basis of test data
GASES UNDER PRESSURE - Compressed gas	Calculation method
SKIN CORROSION/IRRITATION - Category 2	Calculation method
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A	Calculation method
CARCINOGENICITY - Category 1A	Calculation method
TOXIC TO REPRODUCTION (Fertility) - Category 2	Calculation method
TOXIC TO REPRODUCTION (Unborn child) - Category 2	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1	Calculation method
ASPIRATION HAZARD - Category 1	Calculation method

History

Date of printing : 7/15/2016

Date of issue/Date of revision : 7/15/2016

Date of previous issue : 6/4/2016

Version : 4.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader

Section 16. Other information

It is recommended that each customer or recipient of this Safety Data Sheet (SDS) study it carefully and consult resources, as necessary or appropriate, to become aware of and understand the data contained in this SDS and any hazards associated with the product. This information is provided in good faith and believed to be accurate as of the effective date herein. However, no warranty, express or implied, is given. The information presented here applies only to the product as shipped. The addition of any material can change the composition, hazards and risks of the product. Products shall not be repackaged, modified, or tinted except as specifically instructed by Sherwin-Williams, including but not limited to the incorporation of non Sherwin-Williams products or the use or addition of products in proportions not specified by Sherwin-Williams. Regulatory requirements are subject to change and may differ between various locations and jurisdictions. The customer/buyer/user is responsible to ensure that his activities comply with all country, federal, state, provincial or local laws. The conditions for use of the product are not under the control of the manufacturer; the customer/buyer/user is responsible to determine the conditions necessary for the safe use of this product. The customer/buyer/user should not use the product for any purpose other than the purpose shown in the applicable section of this SDS without first referring to the supplier and obtaining written handling instructions. Due to the proliferation of sources for information such as manufacturer-specific SDS, the manufacturer cannot be responsible for SDSs obtained from any other source.