NO. OP 19-0085

IN THE SUPREME COURT OF THE STATE OF MONTANA

::

BNSF RAILWAY COMPANY,

Relator,

-vs-

THE ASBESTOS CLAIMS COURT OF THE STATE OF MONTANA, THE HONORABLE AMY EDDY, PRESIDING JUDGE,

Respondent.

::

APPENDIX OF EXHIBITS TO REPLY MEMORANDUM IN SUPPORT OF PETITION FOR WRIT OF SUPERVISORY CONTROL REGARDING NONPARTY DEFENSES

On Review from the Asbestos Claims Court of the State of Montana, Cause No. AC-17-0694
Hon. Amy Eddy

APPEARANCES:

Attorneys for Petitioner BNSF
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Chad Knight
Anthony Nicastro
Nadia Patrick
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Asbestos Claims Court Judge,
Respondent
Honorable Amy Eddy
ASBESTOS CLAIMS COURT
90 South Main Street, Suite 310
Kalispell, MT 59901
Telephone: 406-758-5906
aeddy@mt.gov

Table of Contents to Exhibits:

EXHIBIT N - DEFENDANT BNSF RAILWAY COMPANY AND JOHN SWING'S EXPERT WITNESS DISCLOSURE SERVED OCTOBER 26, 2018

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Attorneys for BNSF Railway Company and John Swing

IN THE SUPREME COURT OF THE STATE OF MONTANA

IN RE ASBESTOS LITIGATION, *Consolidated Cases*	Cause No. AC 17-0694 THIS DOCUMENT RELATES TO: *Tracie Barnes, et. al. v. BNSF Railway, et. al.* Lincoln County Cause No: DV-16-111

DEFENDANTS BNSF RAILWAY COMPANY AND JOHN SWING'S EXPERT WITNESS DISCLOSURE

COMES NOW Defendants, BNSF Railway Company and John Swing (hereinafter "BNSF"), by and through its counsel of record, Knight Nicastro, LLC, Chad M. Knight, Esq., Anthony N. Nicastro and Nadia Patrick and hereby submits its Expert Witness Disclosures pursuant to the Court's Amended Rule 16 Scheduling Order entered August 29, 2018 as follows:

A. <u>RETAINED EXPERT WITNESSES:</u>

1. Tracey Coenen
Sequence, Inc.
310 E. Buffalo St.
Milwaukee, WI 53202
(414) 727-2361

a. The qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years: Tracey Coenen's Curriculum Vitae is attached hereto as **Exhibit 1-A.**

b. The compensation to be paid for the evaluation and interpretation is $400.00 per hour, testimony is $4,500.00 per day.

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BOULDER, CO 80302
(303) 815-5869

c. A listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years: Ms. Coenen's testimony history is attached hereto as **Exhibit 1-B**.

d. Tracy Coenen is a certified public accountant and certified in financial forensics. Ms. Coenen will testify in general accord with her report, which is attached hereto as **Exhibit 1-C**. She will provide testimony at trial in a manner consistent with the findings and conclusions documented in her report. In addition, she may be asked to assess and comment upon expert opinions offered by expert witnesses on Plaintiffs' behalf if and when those opinions become available.

e. Ms. Coenen's testimony and opinions are based upon her expertise and review of all records and materials provided to her. Ms. Coenen's opinions will encompass all pertinent information provided to her before and at the time of her trial testimony. Ms. Coenen's will supplement her expert report and provide rebuttal testimony if necessary.

f. Any exhibits to be used as a summary of or support for the opinions: Ms. Coenen's may use any and/or all records and documents identified in her report.

2. **Dr. Michael Graham**
Division of Forensic and Environmental Pathology
St. Louis University School of Medicine
1402 S. Grand Blvd., R510
St. Louis, MO 63104
(314) 977-7841

a. The qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years: Dr. Graham's Curriculum Vitae is attached hereto as **Exhibit 2-A.**

b. The compensation to be paid for the evaluation and interpretation is $500.00 per hour, testimony is $500.00 per hour.

c. A listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years: Dr. Graham's testimony history is attached hereto as **Exhibit 2-B**.

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d. Dr. Graham is a board certified medical doctor in Anatomic and Clinical Pathology and Forensic Pathology. Dr. Graham will testify in general accord with his report, which is attached hereto as **Exhibit 2-C** regarding Gerri Flores. Dr. Graham will also provide a report regarding Tracie Barnes which will be provided immediately upon receipt. He will provide testimony at trial in a manner consistent with the findings and conclusions documented in his completed report. In addition, he may be asked to assess and comment upon expert opinions offered by expert witnesses on Plaintiffs' behalf if and when those opinions become available.

e. Dr. Graham's testimony and opinions are based upon his expertise and review of all pathology and records provided to him. Dr. Graham's opinions will encompass all pertinent information provided to him before and at the time of his trial testimony. Dr. Graham will supplement his expert report and provide rebuttal testimony if necessary.

f. Any exhibits to be used as a summary of or support for the opinions: Dr. Graham's may use any and/or all records and documents identified in his report.

3.Steven E. Haber, M.D., F.A.C.P., F.C.C.P.
Respiratory Medicine Consultants
9225 Katy Freeway, Suite 404
Houston, Texas 77024
(713) 932-8664

a. The qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years: Dr. Haber's Curriculum Vitae is attached hereto as **Exhibit 3-A.**

b. The compensation to be paid for the evaluation and interpretation is $500.00 per hour, testimony is $600.00 per hour.

c. A listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years: Dr. Haber's testimony history is attached hereto as **Exhibit 3-B**.

d. Dr. Haber is a board certified medical doctor in Internal Medicine and is a Certified NIOSH "B" Reader. Dr. Haber will testify in general accord with his report, which is attached hereto as **Exhibit 3-C**. He will provide testimony at trial in a manner

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consistent with the findings and conclusions documented in his report and Roentgenographic Interpretation. In addition, he may be asked to assess and comment upon expert opinions offered by expert witnesses on Plaintiffs' behalf if and when those opinions become available.

e. Dr. Haber's testimony and opinions are based upon his expertise and review of all medical imaging provided to him. Dr. Haber's opinions will encompass all pertinent information provided to him before and at the time of his trial testimony. Dr. Haber will supplement his expert report and provide rebuttal testimony if necessary.

f. Any exhibits to be used as a summary of or support for the opinions: Dr. Haber's may use any and/or all records and documents identified in his report.

4. Dr. John Kind
CTEH
5120 Northshore Dr.
North Little Rock, AR 72118
(501) 801-8500

a. The qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years: Dr. Kind's Curriculum Vitae is attached hereto as **Exhibit 4-A.**

b. The compensation to be paid for the evaluation and testimony is $510.00.

c. A listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years: Dr. Kind's testimony history is attached hereto as **Exhibit 4-B**.

d. Dr. John Kind is a toxicologist and Certified Industrial Hygienist with CTEH group in Little Rock, Arkansas. Dr. Kind will testify in general accord with his reports, which is attached hereto as **Exhibit 4-C**. He will provide testimony at trial in a manner consistent with the findings and conclusions documented in his report. In addition, he may be asked to assess and comment upon expert opinions offered by expert witnesses on Plaintiffs' behalf if and when those opinions become available.

e. Dr. Kind's testimony and opinions are based upon his expertise and review of all deposition transcripts and exhibits along with medical records provided to him. Dr. Kind's opinions will encompass all pertinent information provided to him before

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and at the time of his trial testimony. Dr. Kind will supplement his expert report and provide rebuttal testimony if necessary.

f. Any exhibits to be used as a summary of or support for the opinions: Dr. Kind s may use any and/or all records and documents identified in his report.

5. Dr. Bertram Price
Price Associates, Inc.
P.O. Box 43
Bar Harbor, MA 04609
(207) 288-8012

a. The qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years: Dr. Price's Curriculum Vitae is attached hereto as **Exhibit 5-A.**

b. The compensation to be paid for the evaluation and interpretation and testimony is $450.00 per hour.

c. A listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years: Dr. Price's testimony history is attached hereto as **Exhibit 5-B**.

d. Dr. Price conducts epidemiology, statistical and risk analysis. Dr. Price will testify in general accord with his report, which is attached hereto as **Exhibit 5-C**. He will testify in a manner consistent with the findings and conclusions documented in his report. He may be asked to assess and comment upon expert opinions offered by expert witnesses disclosed by Plaintiffs if, and when those opinions become available.

e. Dr. Price's testimony and opinions are based upon his expertise and review of all deposition transcripts and exhibits along with plaintiffs' records provided to him. Dr. Price's opinions will encompass all pertinent information provided to him before and at the time of his trial testimony. Dr. Price will supplement his expert report and provide rebuttal testimony if necessary.

f. Any exhibits to be used as a summary of or support for the opinions: Dr. Price may use any and/or all records and documents are identified in his report.

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6. **Dr. David Sicilia**
Department of History, Key Hall
4282 Chapel Lane
University of Maryland
College Park, MD 20742
(301) 405-7778

a. The qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years: Dr. Sicilia's Curriculum Vitae is attached hereto as **Exhibit 6-A.**

b. The compensation to be paid for the evaluation and interpretation is $250.00 per hour, deposition and trial testimony is $450.00 per hour.

c. A listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years: Dr. Sicilia's testimony history is attached hereto as **Exhibit 6-B**.

d. Dr. Sicilia is an associate professor of history and the Henry Kaufman Chair in Financial History at the University of Maryland. He will provide testimony at trial regarding the following topics:

i. **Zonolite and Libby History**:

In 1924, businessman Edward Alley began to mine vermiculite at a small mountain near Libby, MT. Because the naturally occurring sheet silicate mineral is fire resistant and – when exfoliated or "expanded" or "popped" – light and fluffy, Alley found markets for the material, which he branded "Zonolite." Within two years, Alley's firm was shipping both non-expanded and expanded Zonolite to distant markets, much on it carried by the Great Northern Railway (BNSF [Burlington Northern and Santa Fe] Railway Company after 1970). The Zonolite mining and processing operations quickly became one of Libby's leading employers. Alley died in 1935, and the facilities were sold to conglomerate W.R. Grace and Co. in 1963. As demand for vermiculite for insulation, construction materials, soil conditioning, and other applications grew, Grace expanded the Zonolite operations in and around Libby to become the world's largest vermiculate

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production facility, employing hundreds of local residents. Grace closed down the facility in 1990 and sold it few years later.

ii. **State of the Art Medical and Scientific Literature on Vermiculite**:

The medical and scientific literature on human health effects from exposure to vermiculite developed much later than the literature on asbestos human health effects and, during its first few decades, researchers found the potential dangers from vermiculate to be either unproven or far less serious than those of asbestos. An early animal study by Hunter and Thomson published in the *British Journal of Industrial Medicine* in 1973 – found "the lack of carcinogenic potential of vermiculate."[1] In the early 2000s, following press reports of vermiculite asbestos contamination at Libby, Montana, several medical studies were published specifically about the vermiculite mined at that locale.

iii. **Asbestos Contamination in Libby, Montana**:

Press reports beginning in 1999 documented unusually high levels of asbestos-related disease among residents of Libby, and further investigation showed that Zonolite contained tremolite asbestos fibers. During subsequent tort litigation, plaintiffs presented evidence that local managers at the Grace facilities as well as state and federal environmental officials possessed knowledge going back decades that Zonolite posed or might pose a significant hazard to the community but did not share that knowledge with plant workers, industrial customers and vendors, or the local community.

iv. **BNSF and Zonolite Shipping**:

The Great Northern Railway (GN) under the visionary leadership of James J. Hill brought settlement and commerce to the Northwestern region of the United State when it operated as the only profitable transcontinental railroad among the nation's four. When one of its branches passed through Libby, the connection provided enormous economic benefits and helped establish

[1] B. Hunter and C. Thomson, "Evaluation of the tumorigenic potential of vermiculite by intrapleural injection in rats," *British Journal of Industrial Medicine* 30 (1973): 167-173; quotation p. 173.

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Libby as a viable community. Operating under standard common carrier laws, BNSF relied on shippers – including the companies that mined and processed Zonolite in Libby – to package and/or load and unload their products and to inform the carrier if materials to be shipped posed any special hazards. Grace and the earlier Zonolite companies did not share their knowledge of asbestos-related health effects from Zonolite with the GN/BNSF prior to when those companies ceased vermiculite operations in 1990.

He will also testify in a manner consistent with the findings and conclusions documented in his completed report, which will be provided immediately upon receipt. In addition, he may be asked to assess and comment upon expert opinions offered by expert witnesses on Plaintiffs' behalf if and when those opinions become available.

e. Dr. Sicilia's testimony and opinions are based upon his expertise and review of all records provided to him. Dr. Sicilia's opinions will encompass all pertinent information provided to him before and at the time of his trial testimony. Dr. Sicilia will supplement his expert report and provide rebuttal testimony if necessary.

f. Any exhibits to be used as a summary of or support for the opinions: Dr. Sicilia may use any and/or all records and documents will be identified in his report.

7. Dr. Brian Slomovitz
Professor of Clinical Obstetrics and Gynecology
University of Miami Health System
Don Soffer Clinical Research Center 610A
Miami, FL
305-243-2233

a. The qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years: Dr. Slomovitz' Curriculum Vitae is attached hereto as **Exhibit 7-A.**

b. The compensation to be paid for the evaluation and interpretation is $600.00 per hour, deposition and trial testimony is $4,000.00 per half-day.

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c. A listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years: Dr. Slomovitz' testimony history will be supplemented immediately upon receipt.

d. Dr. Slomovitz is a Board-Certified physician in obstetrics and gynecology and a Board-Certified physician in gynecological oncology. Dr. Slomovitz will offer the opinion in this case that while it was unfortunate Ms. Braaten suffered twice from ovarian cancer, the disease progressed at a typical fashion and the chemotherapy plan, surgical plan and surveillance, diagnostic surveillance, and treatment surveillance, all aligned with the appropriate standard of care. Further, he will testify that a review of Ms. Braaten's records and review of Dr. Young's pathology report, indicate that she did not have mesothelioma any other asbestos related disease. Instead, Ms. Braaten suffered from translocated ovarian cancer. Her treatment for ovarian cancer was appropriate, there is no pathological correlation between her ovarian cancer and mesothelioma, and there is no evidence that an asbestos related disease played any role in her diagnosis of ovarian cancer.

He will also testify in a manner consistent with the findings and conclusions documented in his completed report, which will be provided immediately upon receipt. In addition, he may be asked to assess and comment upon expert opinions offered by expert witnesses on Plaintiffs' behalf if and when those opinions become available.

e. Dr. Slomovitz' testimony and opinions are based upon his expertise and review of all records provided to him and will encompass all pertinent information provided to him before and at the time of his trial testimony. Dr. Slomovitz will supplement his expert report and provide rebuttal testimony if necessary.

f. Any exhibits to be used as a summary of or support for the opinions: Dr. Slomovitz may use any and/or all records and documents to be identified in his report.

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8. **Dr. Robert Henry Young MD**
Massachusetts General Hospital
Department of Pathology, WRN 215
55 Fruit Street
Boston, MA 02114
617-726-88992

a. The qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years: Dr. Young's Curriculum Vitae is attached hereto as **Exhibit 8-A.**

b. The compensation to be paid for the evaluation and interpretation is $700.00 per hour, deposition and trial testimony is $800.00 per hour.

c. A listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years: Dr. Young's testimony history is attached hereto as **Exhibit 8-B**.

d. Dr. Young is a professor in the area of diagnostic surgical pathology with subspecialty interest in gynecological and urologic pathology. Dr. Young will testify in general accord with his report, which is attached hereto as **Exhibit 8-C**. He will provide testimony at trial in a manner consistent with the findings and conclusions documented in his report. In addition, he may be asked to assess and comment upon expert opinions offered by expert witnesses on Plaintiffs' behalf if and when those opinions become available.

e. Dr. Young's testimony and opinions are based upon his expertise and review of all records provided to him. Dr. Young's opinions will encompass all pertinent information provided to him before and at the time of his trial testimony. Dr. Young will supplement his expert report and provide rebuttal testimony if necessary.

f. Any exhibits to be used as a summary of or support for the opinions: Dr. Young may use any and/or all records and documents identified in his report.

B. <u>NON-RETAINED EXPERT WITNESSES</u>

9. **Scott Carney, Project Manager**
Kennedy/Jenks
405 East Superior St., Ste. 250
Duluth, MN 55802

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929 PEARL STREET, SUITE 350
BOULDER, CO 80302
(303) 815-5869

a. Mr. Carney was a primary author of the OU-6 Report, which is attached hereto as **Exhibit 9-A**, and he may testify regarding all the information contained therein.

10. Mel Burda
Former BNSF Director of Environmental Operations
Fort Worth, Texas
(current address unknown)

11. Don Cleveland
2500 Lou Menk Drive
Fort Worth, Texas 76131
(817) 352-2330

BNSF also reserves the right to endorse additional expert witnesses and supplement the information herein disclosed based upon further investigation in this case as discovery continues.

Defendant may call any non-objectionable witness, including specially retained expert witnesses, identified by Plaintiffs.

Defendant may call any witness necessary for rebuttal.

Defendant may call any fact or expert witness necessary for impeachment purposes.

Defendant may call any fact or expert witness necessary to introduce or authenticate exhibits.

Defendant may call any witness necessary for foundation.

Any witness necessary to rebut previously undisclosed claims for theories of the Plaintiff.

Any witness necessary for impeachment, foundation or rebuttal.

Dated this 26th day of October, 2018.

KNIGHT NICASTRO, LLC

By: _____
Chad M. Knight

KNIGHT NICASTRO, LLC
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BOULDER, CO 80302
(303) 815-5869

Anthony M. Nicastro
Nadia Patrick
Steve T. Williams
ATTORNEYS FOR DEFENDANT BNSF RAILWAY COMPANY AND JOHN SWING

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing was served upon the following counsel of record via E-Mail and U.S. Mail on this 26th day of October 2018:

Roger Sullivan
Allan M. McGarvey
John Lacey
McGarvey, Heberling, Sullivan & Lacey, P.C.
345 First Avenue East
Kalispell, MT 59901
Attorneys for Plaintiff

Jennifer Marie Studebaker
210 East Capitol Street, Suite 2200
Jackson, MS 39201
Attorney for International Paper Co.

Jean Elizabeth Faure
P.O. Box 2466
1314 Central Avenue
Great Falls, MT 59403
Attorney for International Paper Co.

By: _____
Nadia H. Patrick
Attorney for BNSF Railway and John Swing

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EXHIBIT O - DEPOSITION TRANSCRIPT OF TRACIE M. BARNES TAKEN JULY 17, 2018

IN THE SUPREME COURT OF THE STATE OF MONTANA

CAUSE NO. AC 17-0694

IN RE ASBESTOS LITIGATION,

Consolidated Cases.

The Document Relates to:
Tracie Barnes, et al. v. BSNF Railway, et al.
Lincoln County Cause No. DV-16-111

VIDEOTAPED DEPOSITION

OF

TRACIE BARNES

(Taken on Behalf of the Defendants
BNSF Railway Company and John Swing)

Taken at McGarvey, Heberling, Sullivan & Lacey, PC
345 First Avenue, E.
Kalispell, Montana
Tuesday, July 17, 2018 - 10:20 a.m.

Reported by Jolene Asa, RPR, and Notary Public
for the State of Montana, Flathead County

A P P E A R A N C E S

APPEARING ON BEHALF OF THE PLAINTIFFS:

Jinnifer Jeresek Mariman, Esq.
McGarvey, Heberling, Sullivan & Lacey, PC
345 First Avenue, E.
Kalispell, Montana 59901
jmariman@mcgarveylaw.com

APPEARING ON BEHALF OF THE DEFENDANTS, BNSF RAILWAY AND JOHN SWING:

Nadia H. Patrick, Esq.
Knight Nicastro, LLC
519 Southwest Boulevard
Kansas City, Missouri 64108
npatrick@knightnicastro.com

APPEARING ON BEHALF OF THE DEFENDANT STATE OF MONTANA:

Katherine Matic, Esq.
Dale R. Cockrell, Esq.
Moore, Cockrell, Goicoechea & Johnson, PC
145 Commons Loop, Suite 200
P.O. Box 7370
Kalispell, Montana 59904-0370
kmatic@mcgalaw.com
dcockrell@mcgalaw.com

ALSO PRESENT:

Mr. Scott Wurster, Videographer

S T I P U L A T I O N S

It was stipulated by and between counsel for the respective parties that the deposition be taken by Jolene Asa, Registered Professional Reporter and Notary Public for the State of Montana, residing in Flathead County, Montana.

It was further stipulated and agreed by and between counsel for the respective parties that the deposition be taken at the time and place set out on the caption and pursuant to the Montana Rules of Civil Procedure.

It was further stipulated and agreed by and between counsel for the respective parties and the witness that the reading and signing of the deposition would be expressly reserved.

EXAMINATION INDEX

EXHIBIT INDEX

THE VIDEOGRAPHER: Good morning. We are going on the record at 10:20 a.m. on July 17th, 2018. Please note that the microphones are sensitive and may pick up whispering, private conversations and cellar interference. Please turn off all cell phones or place them away from the microphones as they can interfere with the deposition audio.

Audio and video recording will continue to take place until all parties agree to go off the record. This is Media Unit 1 of the video recorded deposition of Tracie R. Barnes taken by counsel for the defendant in the matter of Tracie R. Barnes, et al., versus BNSF Railway, et al., filed in the Supreme Court of the State of Montana, Cause No. AC-17-0694.

This deposition is being held at McGarvey, Heberling, Sullivan & Lacey located at 345 First Avenue East, Kalispell, Montana. My name is Scott Wurster from the firm of Legal Video Services, and I am the videographer. The court reporter is Jo Asa from the firm of Asa & Gilman Reporting.

I am not authorized to administer an oath. I am not related to any party in this action, nor am I financially interested in the outcome.

Counsel and all present in the room and everyone attending remotely will now state their

appearance and affiliations for the record. If there are any objections to proceeding, please state them at the time of your appearance beginning with the noticing attorney.

Will the court reporter please swear with the witness.

MS. PATRICK: Nadia Patrick on behalf of defendant BNSF Railway Company.

MS. MATIC: Katherine Matic on behalf of defendant State of Montana.

MS. MARIMAN: I'm Jinnifer Mariman on behalf of plaintiff Tracie Barnes.

TRACIE BARNES,

being first duly sworn to tell the truth, the whole truth and nothing but the truth, testified as follows:

EXAMINATION

BY MS. PATRICK:

Q. Good morning, Mr. Barnes.

A. Hi.

Q. You and I met briefly off the record. My name is Nadia Patrick. I represent the BNSF Railway Company in this lawsuit that you have brought against them, along with two other co-defendants, Gerrie

Flores and Rhonda Barnes, the estate of Rhonda Barnes.

Do you understand that you're under oath today and expected to give full and truthful answers as if you were testifying in court?

A. Yes.

Q. Are there any reasons that you wouldn't be able to answer my questions fully and truthfully today?

A. No.

Q. Have you taken any medications that would stop you from answering my questions today?

A. No.

Q. As we go through today's deposition, I would appreciate it if you could just try to give verbal answers to all of my questions, no nodding of the head, even though we're on video, no "Uh-huhs," "Huh-uhs." It makes it very hard for the court reporter to get everything down, so if you could give me verbal answers, yeses and noes, I'd appreciate that.

A. That would be good.

Q. Also, as we start to have a conversation, sometimes I might talk over you, you might talk over me. Let's try not to do that today. Again, it makes for a cleaner record if we can just take our time.

I'll let you finish, you let me finish and we'll just try to proceed like that.

A. Okay.

Q. Have you ever had your deposition taken before?

A. No.

Q. Have you ever testified at trial before?

A. No.

Q. The last thing I'll mention before we get started is, if at any point you need a break, just let me know. The only thing that I will ask is that if there's a pending question you answer it before we take a break. So just let me know if you need some time.

A. Okay.

Q. What did you do to prepare for today's deposition?

A. Really nothing. Just came to answer the questions.

Q. All right. Did you review any documents?

A. No.

Q. Speak to anyone, family, friends?

A. Just my wife.

Q. What is your date of birth?

A. 5/15/1955.

Q. And how old does that make you today?
A. 63.
Q. How tall are you?
A. Five eight.
Q. Any idea what your current weight is?
A. I do. 165.
Q. What's your current address?
A. 71 Roza, R-O-Z-A, Road, Libby, Montana.
Q. And do you own or rent that property?
A. Own.
Q. Is there a mortgage on it, or do you own it outright?
A. I own it outright.
Q. Do you own any other properties?
A. No.
Q. Who lives with you at that address?
A. My wife, Joni.
Q. Can you spell that for me?
A. J-O-N-I, M., Marie Barnes.
Q. And how long have you guys lived there?
A. About 17 years, I think.
Q. Does anyone else live there with you?
A. No. Our dog, Louie.
Q. When did you and Joni get married?
A. 1982.

Q. And is that your only marriage?
A. Second marriage.
Q. Who were you married to prior to Joni?
A. Vickie Volkenand.
Q. Can you spell that last name for me?
A. V-O-L-K-E-N-A-N-D.
Q. And when were you married to her?
A. Oh, boy. That I don't remember. I think probably about 1976, '77. That's a long time ago.
Q. It is a long time ago. Any recollection when you got divorced?
A. 1981.
Q. Do you have any children?
A. Two.
Q. What are their names?
A. Juli and Justin.
Q. Last name Barnes for both of them?
A. Yes.
Q. How old are they?
A. Juli is 35 and Justin is 31.
Q. Do they live in Libby also?
A. No. Juli does. Justin lives in Seattle.
Q. Do you have any grandchildren?
A. Yes.
Q. How many?

A. Two.
Q. And how old are they?
A. Five and two.
Q. And are they Justin's or Juli's?
A. Juli's.
Q. Are any of your children or grandchildren financially dependent on you?
A. No.
Q. Is anyone financially dependent on you?
A. Just -- no. Just Joni. I guess that wouldn't really be financially dependent. She works too.
Q. Right. Do you have any siblings?
A. Yes. Two sisters.
Q. Any idea how old they are?
A. Chris would be -- I think she's 65, and Jini is 69, right in there, 69, 70.
Q. Have you ever been convicted of a crime, Mr. Barnes?
A. No.
Q. Did you go to Libby High School?
A. Yes.
Q. What year did you graduate?
A. 1973.
Q. Have you lived in Libby your entire life?

A. I have. Moved away for about one year, not even a full year, and then I was right back.

Q. This might not be something that you recall since you were born and raised in Libby. What was the first address that you resided at in Libby?

A. The oldest one I remember is 1019 Utah.

Q. And approximately what were the years that you lived there?

A. Probably most -- probably my whole life up until 1973.

Q. And is that when you left your parents' home?

A. Yes.

Q. Who lived in that home with you?

A. My dad and my mom. My sisters had left previous. They were there for years.

Q. In 1973 where did you move?

A. I moved out on Vicks Lane. I rented a trailer.

Q. How long did you live there?

A. Boy, I don't know. I'd have to guess. Probably two, three years.

Q. Did anyone live there with you?

A. I had a roommate for a while, Dennis Day. Other than that, no.

Q. This is going to be tedious and taxing. I apologize for that. Where did you move next?

A. Boy, from there, I can't remember, actually. Where did I go from there? I think I just moved into town.

Q. Any guess where in town?

A. It seems like when I left there I bought a house out in the Woodway Park area. I don't even know what the address of it would be now.

Q. And how long did you live there?

A. Just a few years.

Q. Did you live with anyone at that location?

A. My first wife.

Q. Where did you go next?

A. Let's see. From there I kind of bounced around town in some rentals.

Q. Any addresses for those locations?

A. You know, I can't remember the addresses to all of them. There's around three of them, and then we bought a place on Park Street, and that was Joni and I.

Q. Do you remember the street address of that Park Street home?

A. It's probably changed now because they changed it with that GPS stuff, but it was 153 Park

Street at the time, and we were there for quite a few years.

Q. And when you say "Quite a few years," what year range are we talking about?

A. Well, we sold that house and bought the one we're in, so 17 years ago.

Q. Any idea when you would have moved into that home?

A. December.

Q. Of what year?

A. Let's see. 17 years ago. What does that figure out? I can't remember the year.

Q. 17 years ago would have been when you moved out of that house; is that right?

A. Yeah. And moved into the one -- we moved into the one we're in now in December 17 years ago.

Q. So you remember what year that would have been 17 years ago, but when would you have moved into the house?

A. Into the one on Park Street?

Q. Yes.

A. Let's see. Boy, a few years after we were married, so probably '80 -- I'd say '85 to '87 area.

Q. And was it just you and Joni?

A. Yes. Actually, we had Juli when we moved in

there, I think. Yeah, we did. We had Juli.

Q. I can't tell you for certain, but your dates seem to be pretty close because I'm the same age as your daughter, so you probably did live in that house when you had her.

So you've been living in the home on Utah ever since?

A. No. The home on Utah was when I was just a little kid.

Q. Oh, you're right. I'm sorry. Sorry. On Roza Road.

A. Roza Road, yeah. We lived there since we moved out of the house on Park Street.

I think before the house on Park Street -- boy, we bounced around to some different ones. One was on Third Street. It seemed like every other year we were moving around. You know how the rental thing goes.

Q. Uh-huh. I do. Are you still in touch with any of your friends from high school?

A. A few.

Q. Can you give me their names, please?

A. I talk to Todd Hileman a little bit.

Q. I'm sorry. Todd?

A. Todd.

Q. Anyone else?

A. Not on a consistent basis, really. Just recently I ran into one, Dennis Day, and -- there's a lot of them that live around Libby that you kind of see all the time, so it's not a real surprise.

Q. Do you know if any of them have been screened by the CARD Clinic?

A. I don't, actually.

Q. How about your sisters?

A. They've been screened.

Q. Do you know if either of them have any current claims pending against the railroad?

MS. MARIMAN: I'm just going to state an objection based on relevance.

Go ahead.

THE WITNESS: I'm not sure. I think both of them, actually.

BY MS. PATRICK:

Q. I should have told you this in the beginning, but if Ms. Mariman raises an objection, unless she instructs you to not answer my question, I'd ask that you just go ahead and answer them for me, please.

How about the State of Montana?

MS. MARIMAN: And I'd just object as to

vague. What are you asking about the State of Montana?

MS. PATRICK: The same exact question I just asked about the railroad.

MS. MARIMAN: Do you understand what the question is?

THE WITNESS: Repeat the question again, please.

BY MS. PATRICK:

Q. Sure. Have either of your siblings filed a claim against the State of Montana?

MS. MARIMAN: Same objection.

THE WITNESS: I don't know if they filed a claim against the State of Montana. I honestly don't know.

BY MS. PATRICK:

Q. Has Joni been screened by the CARD Clinic?

A. No.

Q. How about your children?

A. No.

Q. Do you have any other family that lives in Libby?

A. No. Just my two sisters.

Q. No aunts, grandparents?

A. Well, I have an aunt, 80 years old, but

she's not from the area.

Q. Does she live in Libby currently?

A. Yes.

Q. What is her name?

A. Joan Barnes. She's from Los Angeles her whole life.

Q. Anyone else? Any cousins?

A. No.

Q. Growing up in Libby, did you attend any church services?

A. Yes.

Q. Where?

A. As a little kid, St. John Lutheran. As an adult, Christ Lutheran.

Q. Growing up, did you go to church every Sunday?

A. No.

Q. How often, would you say?

A. Gee, I don't know. When I was a kid, once or twice a month.

Q. And when you say you go to Christ Lutheran, how long have you been going there?

A. We're still a member, actually.

Q. And would that have been since you and Joni were married --

A. Yes.
Q. -- before that? And how often would you say you go to services there?
A. Hardly at all now. We went pretty regular when the kids were growing up.
Q. Do you have any knowledge as to whether there's asbestos abatement done at either church?
A. I don't have any knowledge, no.
Q. Growing up as a child in Libby, what did your family do for fun?
A. Worked. Maybe a little bit of fishing.
Q. Okay. Where would you have gone fishing?
A. Actually, my grandparents had a cabin on Thompson River. I remember that as a little kid.
Q. Did you go camping?
A. No.
Q. Hiking, hunting, anything like that?
A. As a little kid?
Q. Yeah.
A. Yeah. Hunting.
Q. Where would you have done that?
A. Lots of places. Depended on what you were hunting.
Q. Would any of those hunting trips have taken you close to the W.R. Grace mine?

A. No.
Q. Did you play baseball as a child?
A. Yes.
Q. For how long?
A. From Pee Wee all of the way up through Majors.
Q. How long does baseball season last in Libby?
A. Not very long.
Q. That's why I chuckled. Probably two, three months?
A. When the population was higher, it would last part of the summer.
Q. Any other outdoor recreational activities you participated in?
A. Mostly just hunting and fishing for outdoor.
Q. As you were raising your family as an adult, what did you guys do for fun?
A. Mostly sports.
Q. What kind of sports?
A. Baseball, softball, wrestling.
Q. So as your children were growing up, how often would you say you were out at the ball fields?
A. The entire season.
Q. And how many days a month would you approximate that to be?

A. How many days a month? You'd have a couple practices a week, so eight -- about ten.

Q. Did you guys go fishing?

A. Yes. My son and I.

Q. Where would you go fishing?

A. Various places.

Q. Anywhere near the load-out facility that W.R. Grace has?

A. In the river there, yes.

Q. How often would you say you went fishing there?

A. Not very often.

Q. Would that mean a couple times a year, more than that?

A. A couple times a year tops.

Q. Did you go hiking much?

A. No.

Q. How about hunting?

A. Yes. I got my hiking in there.

Q. Did you do any of your hunting near where the W.R. Grace facility was?

A. The mine itself?

Q. Yes.

A. No.

Q. So you clarified, "The mine itself." Where

did you go hunting around there?

A. The majority of the time for big game south of town, McGinnis Meadows.

MS. MARIMAN: You just gave up your secret hunting spot, Tracie.

THE WITNESS: Yeah. That's okay. It's like a city out there now.

BY MS. PATRICK:

Q. I'm not much of a hunter, if you couldn't tell, so your secret is safe with me.

Growing up, did your mother work outside the home?

A. No.

Q. How about your father?

A. Yes.

Q. He worked at W.R. Grace for a short period of time; is that correct?

A. One year.

Q. What did he do there?

A. He worked in the tailings mill, dry mill.

Q. I've seen a couple of notes in your medical record indicating that you took him lunch while he was working at W.R. Grace. How often would you do that?

A. I remember once or twice. It was just a rare thing.

Q. Tell me about what you witnessed when you took him lunches a couple times.
A. Walking in the building, I remember a room full of dust, and the air sparkled around the light bulbs.
Q. Did you ever visit the mine on any other occasion?
A. Maybe in high school, it seems like, but, otherwise, no.
Q. Do you mean on, like, a school field trip?
A. Yeah. That type thing, yeah.
Q. Did your children ever visit the mine on school field trips?
A. I don't know.
Q. While you were off adventuring as a child, did you ever ride your bike anywhere near the mine, near the load-out facility, anything like that?
A. No.
Q. When your father came home from working at the mine, were his clothes visibly dusty?
A. Muddy. Dusty, yeah. Depending on the time of the year.
Q. Do you recall having dust in and around your home from his clothes?
A. I remember seeing his clothes covered, but I

don't remember seeing dust.

Q. Why did he end up leaving Grace?

A. Another opportunity.

Q. He next went to work for Great Northern at the time; right?

A. Let's see. I can't remember where he went from there right now. I don't recall where he went from there.

Q. Do you recall when he began working for Great Northern?

A. He worked for them, I think, two times. The military interrupted it, I think, and then he wound up -- I don't remember if he went to work at the mill after the mine, because he was in the railroad end on the mill. He was in the traffic department.

Q. So would that have been the first time that he worked there or the second time that he worked there?

A. That would be when he went to work for the mill. So that would be after the second time he worked for the railroad. So he was doing the railroad end of it for somebody else.

Q. Do you recall specifically who he was doing the railroad end for?

A. St. Regis Paper Company.

Q. Do you know what his job was while he was at the railroad?

A. Let's see. Well, he worked in the depot the last part, I remember. What he did in there, I don't know. I think it was a lot of duties.

Q. Would you say that most of his duties were indoors?

A. No.

Q. What was your understanding of what his duties were?

A. I know he had to go out and tag cars, and even when the passenger trains came, he'd pull a little wagon out there that they put luggage on. I think he was in charge of organizing and switching cars. All kinds of duties.

Q. Did he come home from working for the railroad with dust on his clothes?

A. I don't remember.

Q. How long did he work at the mill?

A. He was at the mill several years. I don't know exactly how many.

Q. And how -- what did he do there?

A. At the mill, that's when he was in the traffic department, routing and rating railcars and trucks. Shipping. I guess that would sum it up.

Q. Did you work while you were in high school?
A. Yes.
Q. Where did you work?
A. Several places. I worked for Libby Rexall Pharmacy, Bonanza 88-Cent store. I guess that was the two primary right there.
Q. How about after graduation?
A. After graduation, I went right to work at St. Regis Paper Company.
Q. And what year would that have been?
A. 1973.
Q. How long did you work at St. Regis?
A. One year.
Q. What did you do while you were there?
A. I was in the labor pool, so wherever they needed me.
Q. What would your general duties consist of as part of the labor pool?
A. We didn't have a bid job, so whatever department they sent you to, they'd give you instructions, and you would work whatever job it was, if someone was on vacation or sick or whatever.
Q. Could you just give me some examples of what that work would have entailed?
A. Stud mill was pulling lumber. Saw mill

was -- saw mill chain was also pulling wet lumber, dimension. Plywood plant, there various duties in there, but you could work on the dryers. You could pull on the green end, flip sheets.

Q. Why did you leave the lumber mill?

A. I went to work for Remp Sand and Gravel.

Q. And how long did you work there?

A. Five years.

Q. You were a dump truck operator; is that correct?

A. Yes.

Q. What does that mean? What exactly did you do?

A. You ran a piece of equipment and for -- whatever the job required with that piece of equipment.

Q. One of those jobs was hauling and delivering vermiculite; is that correct?

A. If we were asked to.

Q. Do you have any idea over the course of those five years how many times you were asked to haul or deliver vermiculite?

A. Once or twice.

Q. Over the course of five years?

A. Uh-huh.

Q. Did you do any other work that would have taken you close to W.R. Grace's facilities?

A. I don't remember anything else.

Q. And after those five years, where did you end up working?

A. Let's see. From there I worked for Wallace Colville Motor Freight.

Q. Did you haul vermiculite for them also?

A. Bagged from the bagging plant on the railroad tracks.

Q. And who would load that bagged vermiculite into your truck?

A. Whoever was on shift.

Q. Were they Grace employees or railroad employees?

A. Grace.

Q. How long did you do that job?

A. I was with them for five years, I believe.

Q. Do you recall where you went next?

A. I went to work for Windom Distributing just for one year. It seems like it was kind of in between. Wallace Colville slowed down, and I went to work for Windom Distributing and then back to Wallace Colville for a short time, so -- the dates got kind of over tangled in there.

Q. Fair enough. So when you went back to Wallace, how long did you work there then?

A. I think the total time I was there was, like, five years.

Q. So after Windom, after Wallace, where did you work?

A. Let's see. After Wallace Colville, where did I go from there? I ran a -- I ran a tanker for City Service somewhere in there for one year, and then from City Service I went to Franz Bakery.

Q. When you say "Ran a tanker," do you mean deliver oil, deliver gas?

A. Gas and oil, diesel. It was a transport truck, so --

Q. Did you ever deliver anything on behalf of -- did you say it was the city? Sorry.

A. City Service.

Q. City Service.

A. They're actually based out of Kalispell here. They own the truck.

Q. So when you were delivering fuel and diesel on behalf of City Service, did you ever deliver any to the Grace mine?

A. One time I remember, yeah.

Q. And then you said you went to Franz Bakery?

A. Yes.
Q. How long did you work there?
A. 32 years.
Q. What did you do for them?
A. Route salesman.
Q. Was that your job the entire time you worked there?
A. Uh-huh.
Q. And what did your job duties entail?
A. Ordering the product, sales and distribution.
Q. Did you interact with W.R. Grace at all in that position?
A. No.
(Mr. Cockrell entered the room.)
BY MS. PATRICK:
Q. Do you smoke, Mr. Barnes?
A. No.
Q. Does your wife?
A. No.
Q. Have you ever lived with anyone that was a smoker?
A. Yes.
Q. Who was that?
A. My mom.

Q. How long did she smoke?
A. Her whole life.
Q. How long did you live at home with her?
A. 18 years.
Q. How many cigarettes a day would you say she smoked?
A. I don't know. I don't recall, actually.
Q. Anyone else in your household growing up smoke?
A. My dad, rarely.
MS. MARIMAN: Tracie, I don't mean to interrupt, but this is Dale Cockrell. He represents the State of Montana as well.
MR. COCKRELL: Hi.
THE WITNESS: Hi. Nice to meet you.
MR. COCKRELL: Nice to meet you.
MS. PATRICK: I was just going to say, if we could take five minutes so I could talk to Dale real quick. Sorry.
MS. MARIMAN: That would be fine.
THE VIDEOGRAPHER: The time is 11:00 even. We are off the record.
(Break held from 11:00 a.m. to 11:08 a.m.)
THE VIDEOGRAPHER: The time is 11:08 a.m., continuation of Media Unit 1. We are on the record.

Go ahead, Counsel.

MS. PATRICK: Thank you.

BY MS. PATRICK:

Q. I'm going to switch gears a little bit, Mr. Barnes. The complaint that you filed in this case alleges negligence on the part of BNSF. Specifically, what ways do you believe BNSF was negligent?

A. Not containing the ore.

Q. What do you mean by that?

A. The ore on the tracks is one thing that comes to mind.

Q. When you say "Ore," do you mean raw vermiculite? Do you mean vermiculite concentrate? Are you talking about vermiculite tailings? What do you mean when you say "Ore"?

A. I don't know what kind it was. All I know is what it was.

Q. And how do you know what it was?

A. It was pretty common around.

Q. Do you have any idea how the ore that you're mentioning on the tracks got there?

A. I think a lot of times it leaked out of the cars because it would be in piles on the tracks.

Q. And is that something that you have personal knowledge of?

A. Yes.
Q. How so?
A. I used to walk the tracks to go duck hunting down at the river.
Q. And while you were duck hunting down at the river, you saw vermiculite leaking out of cars?
A. Saw it on the tracks in piles where the cars had sat, saw it on the sides of the tracks. I suppose it blows around once the trains go by.
Q. I'm just trying to figure out, you know, what are your assumptions versus what you actually have observed, have actually seen, have actual knowledge of. So when you say fell off the cars where they were on the tracks, is that something that you observed, or is that what you assumed happened?
A. I didn't really say it fell off the cars. It appeared to have leaked out. When it's in a pile, it's obviously something that sat there for a while, and it was allowed to pile up in that spot.
Q. But, again -- and I'm sorry if it seems like I'm asking the same question, but I promise you they are different questions. Did you observe vermiculite leaking out of train cars onto the train tracks?
A. No.
Q. So that was the first example that you gave.

What else do you specifically allege BNSF did that was negligent?

A. I can't think of anything else other than the ore on the tracks.

Q. And in your opinion how did BNSF's alleged negligence of having ore out on the tracks lead to your alleged injuries in this case?

MS. MARIMAN: Are you asking for an industrial hygiene opinion from this witness?

MS. PATRICK: I am asking for his personal opinion.

MS. MARIMAN: Okay.

THE WITNESS: Do you want to repeat that again?

BY MS. PATRICK:

Q. Sure. Specifically, how would you -- how are you alleging BNSF's negligence led to your injuries that you are alleging in this case?

A. Well, being along the tracks when the trains go by, they go by kind of fast. If that stuff is dry laying on the tracks, it's airborne.

Q. When you say "Airborne," it's out in the open air; is that correct?

A. (Witness nodded head.)

Q. Sorry. Is that a "Yes"?

A. Yes.

Q. Just a reminder. I need yeses or noes, not head nods.

You say when it was dry. How often is it dry in Libby, Montana?

A. A lot.

Q. Can you give me some sort of estimation of what a lot would be?

A. Depending on the year, depending on the weather in the spring, it can be months.

Q. And how were you specifically exposed to the vermiculite on the dry tracks?

A. Walking the tracks as a kid hunting, working. Later in life, I'd be at the railroad tracks with Wallace Colville Motor Freight loading bagged ore from the bagging plant onto trailers. With City Service I was dropping fuel oil at a depot right on the tracks that Paul Rumelhart used to own. Boy, there was a lot of different ways.

Q. The bagging plant, again, though, that belonged to W.R. Grace?

A. Yeah.

Q. So you weren't actually on the railroad tracks when you were at the bagging plant?

A. If I was any closer, I would get hit.

Q. So is that a "Yes" or a "No"?
A. I was close to the tracks, yes.
Q. Was there ever any spillage when you were loading the bagged vermiculite onto the trailer --
A. Yes.
Q. -- at the bagging plant?
A. Yes. There could be, yes.
Q. Is there any way for you to differentiate what spillage was created by W.R. Grace versus what was created by BNSF?
A. Well, yeah. Because it would be contained to my trailer if W.R. Grace did it, if they poked a hole in a bag, but the other stuff was outside on the ground.
Q. And that's just specifically if they had poked a bag while they were loading your specific trailer --
A. Yeah.
Q. -- and not necessarily if they had spilled any --
A. Right.
Q. -- prior to that?
You mentioned in -- or, your medical records mentioned that you played in piles as a child. Do you recall specifically where you played in piles as a

child?

A. I don't. I remember in some people's gardens they would have it.

Q. Any other locations?

A. Maybe just a couple locations around town where people would have piles of it for their gardens and we'd ride our bikes through them.

Q. Again, just to be very specific here, those piles are wholly unrelated to BNSF's activities of hauling vermiculite through town; is that correct?

A. Yes.

Q. What are some of the other places in town that you claim you were exposed to vermiculite?

A. Well, I suppose in -- you didn't know most the time. It would be in buildings one place. It was in some of the schools.

Q. In fact, it was in one of the homes that you owned; is that right?

A. Yes.

Q. Which home was that?

A. Park Street.

Q. And where was that vermiculite in the home?

A. Ceiling.

Q. Did you have an attic that you could go up into in that home?

A. No. Actually, there was no attic. There was -- there was an opening in the ceiling where you could get up there if you needed to repair electrical or something. There was no attic to store anything or anything in.

Q. And did you ever have to go up there to repair anything in the home?

A. No.

Q. What sort of wiring, equipment like a furnace or anything like that -- was there anything that was up in the ceiling with the vermiculite?

A. No. Just the wiring and --

Q. Did you use a wood-burning stove for heat in that home?

A. We had a fireplace.

Q. And was that the primary source of heat in that house?

A. No.

Q. What was the primary source of heat?

A. Oil.

Q. And where was that boiler? Was it a boiler that you had?

A. No. Oil furnace.

Q. Okay. Oil furnace.

A. It was in the center of the house.

Q. I'm sorry. I couldn't hear you.
A. It was in the center of the house.
Q. How often would you say you had wood-burning fires in that Park Street home?
A. Oh, gosh. Just randomly. Mostly, of course, in the coldest part of the winter.
Q. Do any of -- or did any of the properties that you listed for us before have the primary heating source of wood-burning fireplace or wood-burning stove?
A. No.
Q. At the current home that you live in with Joni on Roza Road, over the course of the last, I think you said, 17 years you've lived there -- is that correct?
A. Yes.
Q. How often would you say you've created a wood-burning fire in that home?
A. Probably a couple months, the coldest months of the winter. Usually, oh, January, February, some in December, maybe.
Q. So for about three months --
A. Yeah.
Q. -- a year every year?
A. Yes.

Q. Did you ever have vermiculite insulation in the Roza Road house?
A. No.
Q. Any other asbestos-containing products in the home?
A. No. Not that I'm aware of.
Q. Did you ever do any testing to verify that?
A. Yes.
Q. When?
A. A few years ago. The ER, they cleaned the outside. They did the testing.
Q. And who was that?
A. Environmental Restoration.
Q. Any idea what year that would have been?
A. No. I don't recall. Several years ago.
Q. I want to give you what we will mark as Exhibit 1.
(Exhibit 1 was marked.)
BY MS. PATRICK:
Q. I'm going to hand this to you, and I'm also going to hand you a Sharpie. What I've given you is just a map of the city of Libby.
You mentioned --
MS. MARIMAN: Do you have any other copies?
Thank you.

BY MS. PATRICK:

Q. -- vermiculite piles both on the tracks and other places in town. Would you be able to identify where on that map those piles would have been and mark it with the marker that I just handed you?

A. This would be the haul bridge right here, the old company haul bridge, if I'm correct, and that would be the bridge across the river that we use currently. Right?

MS. MARIMAN: And just -- if I can just ask counsel a question. There's a road appearing to go across the river, going to Remps Extension Road. Is that correct?

MS. PATRICK: I -- this is a City of Libby map, so I have no knowledge of what any of this is, but if the witness --

MS. MARIMAN: Okay. Obviously, there's a highway that goes out to the dam, but as far as a bridge downstream of that going to Remps Extension Road -- is this -- this is a City of Libby map from GIS Tech?

MS. PATRICK: Correct.

MS. MARIMAN: I guess, Tracie, go ahead and take your time and get your bearings --

MS. PATRICK: Absolutely.

MS. MARIMAN: -- on what the map is depicting because I'm not familiar with a bridge in that location.

THE WITNESS: Do you want me to just put a little "X" on there?

BY MS. PATRICK:

Q. Yes, please.

A. Well, we used to walk this whole stretch of tracks right here.

MS. MARIMAN: If you need to do a line instead of an "X," whatever is easiest for you.

THE WITNESS: And then the depot would be right in here somewhere. Yeah, it would be. Because it would be in between these two bridges, so --

MS. MARIMAN: And, I guess, Tracie, I believe this long line going out -- is this the highway heading out to the dam --

THE WITNESS: I would --

MS. MARIMAN: -- at the end of California Avenue?

THE WITNESS: I would --

MS. PATRICK: Jinnifer, if you could just let the witness identify things without pointing things out on the map to him, I'd appreciate that.

MS. MARIMAN: I'm just trying to prevent

confusion.

MS. PATRICK: I understand that, and I will walk him through it once he makes any markings or if he has questions, and I can answer --

MS. MARIMAN: And I'll redirect him if need be --

THE WITNESS: Oh, I see.

MS. PATRICK: Yeah.

MS. MARIMAN: -- if he's confused on what the map is showing.

Counsel, can I ask a question? This is a City of Libby map, so is the tan area intended to depict the city boundary? Is that what it is?

MS. PATRICK: According to the key, it's the Libby city limits.

MS. MARIMAN: Okay.

THE WITNESS: The brown is Libby city limits? I don't think there was any city limits across the river. This would be the rail siding going into the mill yard right there.

BY MS. PATRICK:

Q. If you want to put a dashed line there.

A. So we used to walk these tracks right -- this whole stretch, clear down to that island, and we would walk down to there to get to the tracks, and I

am presuming that -- it doesn't really make sense, but I would say that's the Kootenai River bridge, and that Remp Extension Road would be up there behind Dream Marine which drops down there on the bottom.

So I would think that this is the old haul bridge, but that doesn't make sense. That is confusing. Oh, that makes that look like the Kootenai River bridge right there because Pipe Creek is coming off of it and Park Street is coming off that. So that's not the haul bridge. That's the Kootenai River bridge. I don't know what that is.

Yeah. There's no bridge across right there. There's just the Kootenai River bridge because Park Street came right off of Highway 37 right there, so that part is not right right there, but this is pretty accurate right here where I drew the line.

And then down here where the depot sat, I'm going to guess where that's at. So it would be right in here. If you walked on those sidings down there, that's where you'd see a lot of ore sitting where the cars sat because they would sit there along -- they had, like, three tracks there are on sidings.

Q. If it's okay with you, I will -- I'll have you mark -- I'm going to give you a better marker --

A. Like, a yellow highlighter.

Q. -- with a "1" and "2" the two different areas that you marked just so we can talk about them and have a clear record.

A. (Witness complied.)

Q. Thank you.

A. Uh-huh.

Q. So Area 1 is the line that you've drawn across or near the railroad track. How often would you say you have walked that path?

A. Oh, boy. Probably -- wow. A lot. I'd say 30 times, probably, at least, as a kid.

Q. And any recollection who you would have walked that path with?

A. Todd Hileman.

Q. And were you on railroad property while walking?

A. We would walk the tracks.

Q. So that's a "Yes"?

A. Yes. If that's their property.

Q. Is there any reason you would have walked the tracks instead of taking a different route?

A. Yes.

Q. What's that?

A. You couldn't walk any other way. There was water and marsh and creek. There was no other way to

get down where we wanted to go if we didn't walk the tracks.

You have to understand. We were walking. We couldn't drive then, and so we would walk the tracks down. If we could have drove, we could have came in from the other end.

Q. And how old would you say you were when you did this?

A. Junior high.

Q. And you said what made it dusty is when the trains came through; is that true?

A. (Witness nodded head.)

Q. And obviously the trains --

MS. MARIMAN: Answer audibly just so we get a clear record.

THE WITNESS: Yes.

BY MS. PATRICK:

Q. Obviously, the trains wouldn't have been coming through while you guys were walking on the tracks?

A. They did.

Q. While you were on the tracks?

A. Well, we had to get off.

Q. So what is -- how many times are you claiming that that has happened?

A. Almost every time.
Q. Do you know how many trains came through Libby -- first of all, let me back up.
What year range would you say this was?
A. I'd say late '60s.
Q. Do you have any idea how many trains would have been coming through Libby in the late '60s?
A. I don't.
Q. Do you recall any specific occasions that you were walking through this particular section of track?
A. Yes.
Q. Can you tell me about those?
A. We found a dog that had been hit by a train. That's why I remember. And they had a reward.
Q. What time of year was that?
A. That would have been fall.
Q. What time of day?
A. Morning.
Q. Any idea what year?
A. No.
Q. You said you would take that walk to go fishing? Is that what you said?
A. Duck hunting.
Q. Duck hunting. When is duck hunting season?

A. It starts in the fall. I believe it starts in October.

Q. Would you have taken that road to go anywhere else?

A. That route?

Q. Yes, that route. To do anything other than duck hunting?

A. No.

Q. Did you attend school full time when you were in junior high school?

A. Yes.

Q. So the mornings that you would have gone duck hunting would have been on the weekends?

A. Primarily. We did go a few times before school.

Q. There's no way for you to know the dust that you're claiming was picked up by the trains, whether that was vermiculite, whether that was just dirt? Is there any way for you to know?

A. No.

MS. MARIMAN: Objection. Form.

BY MS. PATRICK:

Q. I'm sorry. What was your answer?

A. No.

Q. The second location that you marked on the

map that you put a two by, what does that represent?

A. The rail siding at the depot.

Q. And what would of brought you to the rail siding at the depot?

A. Oh, I don't remember. Yeah. I don't remember.

Q. Is there any way for you to come up with a number of how many times you claim exposure at that location site?

A. No.

Q. Are there any other locations where you are claiming exposure to contaminated vermiculite in the town of Libby on that map?

A. No.

MS. MARIMAN: And just a question, Counsel. Are you referring to piles of vermiculite? Are you talking about other sources?

MS. PATRICK: I'm talking about his exposures of the places he's claiming exposure. We got through the piles. Now I'm at exposures in general.

THE WITNESS: No.

BY MS. PATRICK:

Q. How did you come to be seen by the CARD Clinic?

A. Went in for a routine screening. My dad was on me to do it.

Q. And when was the first time you got screened by the CARD Clinic?

A. I don't remember the specific date. Let's see. I'm guessing about four years -- four years ago. Four or five.

Q. Your father had been diagnosed with an asbestos-related disease; is that correct?

A. Correct.

Q. When did he get diagnosed?

A. I don't know.

Q. Do you know what he was diagnosed with?

A. I don't know the specific diagnosis.

Q. Did your mother also have an asbestos-related disease?

A. Don't know.

Q. Are your parents still alive?

A. No.

Q. You said that your father encouraged you to go get screened by the CARD Clinic.

A. Yes.

Q. What was his reasoning?

A. He had it real bad and pressured me to go get checked.

Q. When you say "He had it real bad," just -- could you specify for me what you mean?

A. He had pleural plaquing and thickening in his lungs real bad.

Q. I'm sorry to get so specific and graphic in my questions. I do apologize. But what was the official cause of death for your father?

A. Asbestos, lung.

Q. And when did he pass away?

A. I think it was, like, 11 years ago, I think.

Q. So he passed away 11 years ago, but I think that you just testified that he was the one that encouraged you to go get screened at the CARD Clinic, and if my notes are correct, that was four years ago. So what precipitated you going four years ago versus 11 years ago?

A. Well, I didn't think I'd have it. I just was being stubborn, didn't go.

Q. What was your mother's official cause of death?

A. Breast cancer.

Q. When were you officially diagnosed by the CARD Clinic with asbestos-related disease?

A. I don't remember the exact date. The first time I was screened I was told that I had it slightly.

Q. And who did you talk to that gave you that diagnosis?
A. Dr. Black.
Q. Did you apply for any benefits as a result of that diagnosis?
A. No.
Q. Not Medicare, the Libby Pilot Program, anything like that?
A. The Medicare was provided as part of it, Part A.
Q. How about any of the Pilot program benefits?
A. No.
Q. Did you receive any of those?
Did you retire from your job at the Franz Family Bakery?
A. Yes.
Q. Was there any pension that you received for that?
A. Yes.
Q. When did you begin receiving that pension?
A. Year and a half ago.
Q. Congratulations on the retirement.
A. Thank you.
Q. You've since applied for Social Security disability; is that correct?

A. Yes.
Q. And how much do you receive from Social Security?
A. Roughly 2,200.
Q. Does your wife collect any Social Security?
A. No.
Q. The pension that you receive, how much is that every month?
A. I have taxes withheld. Before or after?
Q. Before.
A. 3,000. 2,950, I think it is.
Q. It's my understanding that as a part of this lawsuit you originally also filed against International Paper. Is that correct?
A. Initially.
Q. And what happened to that claim?
A. We decided not to go through -- go through with it.
Q. Do you have any understanding of what the reasoning was behind that?
MS. MARIMAN: I'm going to object based on attorney/client privilege.
So don't answer.
BY MS. PATRICK:
Q. Have you ever applied to receive money from

the W.R. Grace trust?

A. "Trust" being what they provided initially, medically stuff? Is that --

Q. Any financial compensation, any medical compensation, any of that.

A. No.

Q. Were you referred to McGarvey Heberling by the CARD Clinic?

A. No.

Q. How did you come to be represented by them?

A. My dad.

Q. Was he also represented by McGarvey Heberling?

A. Yes.

Q. Do you have any understanding as to how he came to be represented by them?

A. I don't.

Q. Do you know any of the attorneys here personally?

A. No.

Q. You mentioned your friend Todd. Did you frequent his house as a child growing up together?

A. Yes.

Q. Do you recall what that address was?

A. I don't remember the number, but it was on

Lincoln Boulevard.

Q. And how often would you say you went to that home?

A. Several times a week.

Q. Back to your dad. Do you remember the specific time frame that he worked at W.R. Grace?

A. I don't.

Q. Do you know if he ever filed any claim against W.R. Grace?

A. I believe he did.

Q. Do you know whether he filed any claim against the railroad?

A. Yes.

Q. When would that have been?

A. I don't know.

(Exhibit 2 was marked.)

BY MS. PATRICK:

Q. I'm going to hand you what I've marked as Exhibit No. 2. That's just a copy of the third amended complaint in this case. Have you seen this document before?

A. No.

Q. Have you seen any of the complaints that were filed on your behalf?

A. No.

Q. Can you turn to page three of the document that I just handed you?

Paragraph 14(b) states that you rode your bike through piles of vermiculite at the downtown Libby rail yard and bagging plant facility. Are those locations that you've identified on the map in Exhibit 1?

A. No.

Q. Why is that?

A. Well, because you asked me where I was hunting, where I was walking the tracks, so I outlined where I was walking the tracks.

Q. Well, I asked where you were claiming exposure to vermiculite in town.

A. We were currently talking about the tracks, walking the tracks and hunting.

Q. And then I followed up with, where else are you claiming exposure in town? So are you, indeed, claiming exposure to piles of vermiculite at the downtown Libby rail yard and bagging plant facility?

A. Well, yes, I am.

Q. Can you mark that on the map and put a number "3" by it, please?

A. Uh-huh. It's hard to tell on this map. That would be -- okay. This is approximately.

Q. And how often -- how many times a year would you say you drove -- or, rode your bike through that location?

A. Not very many. Just as kids we'd mess around down there behind the ball fields.

Q. So a handful of times?

A. Yes. Because we'd ride our bikes to the baseball fields to play baseball, and then afterwards, as a kid, you always just mess around.

Q. The next sentence says that you played baseball for many years and at the fields adjacent to the rail yard you were exposed to loose vermiculite between the years of 1961 and 1973. Is that a correct representation of the years that you're claiming exposure at the ball fields?

A. I didn't play up until my senior year, so the last part -- the last three years -- it would be more, like, up to 1970.

Q. Okay. And how many times a year would you have been exposed to the alleged condition each of those nine years?

A. Oh, we'd -- boy, we would have a couple practices a week and a game on the weekend, so at least three times a week.

Q. For how many weeks?

A. I don't remember how long the baseball season was. I guess we'd have two games a week because we played during the week. About the same. Averages are the same.

Q. Which would be what?

A. It would be three to four times a week.

Q. For how many weeks?

A. I don't remember how long the season was.

Q. And has that exposure been noted on the map?

A. Yes.

Q. What number has that been identified as?

A. Well, that would be No. 3 because those were -- vermiculite piles were right behind the fields.

Q. I'm going to mark another copy of the exact same map as Exhibit 3.

(Exhibit 3 was marked.)

BY MS. PATRICK:

Q. I'll hand that to you.

Paragraph 14(a) states that several of your Libby residences were located in close proximity to the railroad tracks. Could you please mark those on the map?

A. You want all of them where I lived?

Q. If you can identify them on the map, and

then we'll go through, and you can tell me which one is which.

A. I think I got those. Three of them.

Q. If you could number those for me just with "1," "2," "3".

A. According to time span, do you mean?

Q. Yes, please.

A. Okay.

Q. Sorry I wasn't clear.

A. (Witness complied.)

Q. The location that you marked as "1," which home was that?

A. 1019 Utah.

Q. And how long did you live in that house?

A. About 18 years.

Q. How about No. 2?

A. That was the house on Third Street. That was a couple years.

Q. During what years?

A. Boy, we hadn't been married very long, so probably around -- in the early '80s.

Q. The same question with the house on Utah. Those 18 years would have spanned approximately what years?

A. '73 down -- 20 years. 1955 to '73. Does

that sound right?

Q. Somewhere in between 1955 and 1973?

A. Yeah.

Q. How about the third location?

A. The third location was Park Street, 153 Park Street, and we were in that house for a number of years. I want to guess around 15, but --

Q. Please tell me what you observed while living at 1019 Utah, Location No. 1, that would encompass the exposures that are alleged in paragraph 14 of your complaint.

MS. MARIMAN: And, Counsel, you're talking about all of the subsections of paragraph 14?

MS. PATRICK: Correct.

THE WITNESS: Most of the exposure would have been from my dad. That's where we lived when he worked there.

BY MS. PATRICK:

Q. When you say "There," do you mean the railroad? Do you mean W.R. Grace?

A. When he worked for W.R. Grace and brought his clothes home muddy. That would have been my primary exposure at that residence.

Q. How about Location No. 2 on Third Street?

A. On Third Street it was close -- it was close

to the Legion ball field, which is right by the railroad tracks.

Q. Is it your understanding that BNSF had any involvement in the installation of the vermiculite at the ball fields?

A. That I don't know.

Q. How about Location No. 3?

A. No. 3, Park Street. I think that one was the house that had it in the ceiling.

Q. Mr. Barnes, if you don't mind, I'm going to take a five-minute break, if that's okay with you.

A. Sure.

Q. Thank you.

MS. MARIMAN: Counsel, do you know how long you intend to go? Because We could break for lunch now, if you want.

MS. PATRICK: Is it already lunchtime?

MS. MARIMAN: Yeah.

MS. PATRICK: That's fine.

THE VIDEOGRAPHER: The time is 12:05 p.m. This is the end of Media Unit No. 1. We are off the record.

(Lunch held from 12:05 p.m. to 1:12 p.m.)

THE VIDEOGRAPHER: The time is 1:12 p.m. This is the beginning of Media Unit No. 2. We are on

the record.

Go ahead, Counsel.

BY MS. PATRICK:

Q. I just wanted to clarify something that we were talking about before we went on our break.

No. 3 on Exhibit 3 -- it's the map where you marked your homes -- you mentioned that that particular property was both close to the railroad tracks and near the ball field; is that correct?

A. No. 3 is not the closest to the ball field.

Q. Okay. So can you clarify for us, then, which one you were talking about?

A. No. 2.

Q. No. 2. And when you say "Closest to," how far away from the ball fields were they -- from the railroad tracks was the home? Sorry.

MS. MARIMAN: I'm sorry. Is the question from the railroad tracks or the ball field?

MS. PATRICK: So he said that the railroad tracks and ball field were close to that home.

BY MS. PATRICK:

Q. Is that correct?

A. Yes.

Q. Okay. So how far was the home from the railroad tracks?

A. Well, one full block. It was in the second block.

Q. And how far was the home from the ball fields?

A. Two blocks.

Q. And do you have any idea on the distance between the ball fields and the railroad tracks?

A. No.

Q. I'm going to hand you a series of photographs that was given to me by Ms. Mariman this morning. I'll mark these as --

MS. PATRICK: Jinnifer, are you good with marking the entire stack as four?

MS. MARIMAN: Sure.

MS. PATRICK: Okay.

MS. MARIMAN: Do you want to put pages numbers on them?

MS. PATRICK: That's what I was going to do.

MS. MARIMAN: Okay.

(Exhibit 4 was marked.)

BY MS. PATRICK:

Q. I'm going to hand you what's been marked as Exhibit No. 4, and these are photographs that you provided to your attorney; correct?

A. Yes.

Q. If look at the photograph that I've labeled for you as No. 4, can you tell me what it is that we're looking at?

A. One of the baseball fields down by --

Q. Which baseball -- sorry. Go ahead.

A. I'm not sure if it was Kelly or Walliston by the angle of the picture. There was two of them side by side.

Q. Do you know what that building is in the background with the metal roof and wood siding?

A. I'm not sure what that building was. It was part of the W.R. Grace facility.

Q. How about the building to the left of that building?

A. That's the -- an ore bin. It had, like, four or five different bins of ore in it.

Q. I'm sorry. So --

A. Yeah. That --

Q. Can you just circle on that photograph and just write "Ore bin"?

A. (Witness complied.)

Q. And was that on W.R. Grace's property?

A. I don't know. I presume so.

Q. I believe that you testified earlier that there were piles of vermiculite adjacent to the ball

fields. Are there any piles that you can see in this photograph that you've provided?

A. No. Just inside the bin.

Q. Are these ball fields on the north or south side of the river?

A. It would be on the south side.

Q. And are these the same ball fields that you played on?

A. Yes.

Q. Do you know whether or not -- during the time that you played on those ball fields, if there was any vermiculite installed in the fields themselves?

A. I don't.

Q. Do you know when this photograph was taken?

A. I don't remember the year.

Q. Do you know who took it?

A. I'm not sure. I think I did.

Q. So from the direction that this photograph was taken, is this a north view, south view, east view, west view? Do you know?

A. It would be southwest.

Q. Do you have any photographs of the railroad tracks?

A. Not with me, no.

Q. Do you know if you have any at home?
A. I'm not sure yet. I'm looking.
Q. Let's turn to Picture No. 5. What direction are you facing taking this photograph? Or let me back up one second. Did you take this photograph?
A. I don't know. Myself or my wife could have. I'm not sure.
Q. Can you identify the direction that the photo is being taken from?
A. Well, it appears to be west towards Troy, basically.
Q. Can you identify any piles of vermiculite in this photograph?
A. No. This is just the ball field.
Q. What's that building that we can see right behind the field?
A. Concession stand.
Q. Was that in the same location when you played ball at that field?
A. No.
Q. Do you know when that building came to be?
A. I don't. I don't even think there was one when I played.
Q. Finally, looking at Picture No. 6, I'll ask you the same questions. Do you know who took this

photograph?

A. No.

Q. Do you know what direction we're looking at here?

A. Mostly easterly. It would be northeast.

Q. Going back to the piles of vermiculite for one second -- and, I guess, maybe we should go to the first map, number --

MS. PATRICK: That's your copy.

BY MS. PATRICK:

Q. No. 1.

MS. PATRICK: Is it No. 1?

MS. MARIMAN: Yeah.

BY MS. PATRICK:

Q. I believe you had stated that at those locations you had -- or, at one of those locations you had played in piles of vermiculite. Is that accurate?

A. Not played in them. Basically, kind of walked through them.

Q. Okay.

A. Just kind of kicked through them.

Q. Can you identify for us, again, which number that is on that map?

A. Well, actually, it would be mostly the No. 1 area, walking those tracks.

Q. Do you know how many piles?
A. No.
Q. How big the piles were? How deep they were?
A. Oh, they would vary.
Q. Is Location No. 1 that you marked on that map the only location where you noted vermiculite piles?
A. No. There could be some in the whole stretch. No. 2, the trains would stop and sit there sometimes.
Q. But you can't remember any specific occasion on which you viewed the piles?
A. No.
Q. Now, as far as the other piles that you rode your bike through that we talked about from your complaint, do you recall how big those piles were?
A. No. They weren't very big. Just enough where you could run over them with a bicycle and think it was cool.
Q. Any idea how many piles that would have been?
A. No.
Q. Who is your primary care physician right now?
A. Actually, the one I've seen the most -- I

don't go to a doctor for anything, other than the CARD Clinic since I got sick, so Dr. Black.

Q. Have you seen any other physician in the last 12 months?

A. Yes. Just for standard screenings. Dr. Ercanbrack.

Q. Can you spell that for me? If you can. If not --

A. E-R-A-N-C-K-B-R-O-C-K (sic), I think. Something like that.

Q. Is Dr. Ercanbrack a primary care physician or --

A. No. He does, like, colonoscopies and stuff.

Q. Have you seen any other physicians in the last 12 months?

A. Yes. Just a -- a gal from over here for -- what do you call it? For a rash on your skin. What do you call that?

Q. Dermatologist?

A. Yes.

Q. Just those three doctors?

A. And I have to think of his name. A doctor here in Kalispell for arthritis. I can't think of his name.

Q. Are you currently on any medications?

A. One. From -- an everyday one from the arthritis doctor. The rest --

Q. Do you know what it's called?

A. Hydroxychloroquine.

Q. And what's your understanding of how that's supposed to assist you with your arthritis?

A. I guess it's supposed to slow it down.

Q. Did your doctor explain to you that hydroxychloroquine is an antimalarial drug?

A. Yes.

Q. Did he explain any side effects of it to you?

A. A few.

Q. Such as?

A. Could upset your stomach, could cause diarrhea, stuff like that.

Q. Have you ever had any autoimmune screening done?

A. No.

Q. Can you think of any coworkers whose names you remember from when you worked at the lumber mill?

A. Mark Larson.

Q. Anyone else?

A. I could go on all afternoon. Do you want more?

Q. Yes, please.
A. Of course, now, Steve Grotjohn worked there. I didn't work directly with him, though. Jim Johnson. How many you want? That enough?
Q. Let's have a couple more.
A. Let's see. I moved around so much down there. I know everybody. Let's see. Gary Stratemeyer.
Q. How about when you worked at the sand and gravel operation?
A. Ronnie Remp.
Q. Ronnie Remp?
A. Yes.
Q. Anyone else?
A. Ray Remp. Lee Gill.
Q. Lee Gill?
A. Gill, yeah.
Q. Do you still see those people around town?
A. Those three are all deceased.
Q. Okay. Do you know of any surviving coworkers that worked there?
A. Possibly. I don't know if he's still alive or not. Lives over here. Bob McClanahan and Randy Remp. He worked with us for a year. He's still alive.

Q. Is Wallace Colville still in business?
A. They're not. I think they're under a different name.
Q. Do you know whether the owners are the same?
A. I don't.
Q. Do you know of any surviving coworkers that you worked with there?
A. Yes. Roberta Nelson.
Q. Can you recall anyone that you believe is still around that you worked with at City Service?
A. I don't think he works there anymore, but Dave Waatti was -- he was the boss.
Q. I'm sorry. You said Dave Waatti?
A. Waatti, yeah.
Q. Anyone else that you can think of?
A. That worked there at the same time?
Q. Correct.
A. Joe White.
Q. Have you settled your case with Robinson Insulation?
A. I don't know what Robinson Insulation is.
Q. Do you know whether you've reached a settlement with the State of Montana?
A. I believe so.
Q. When you say you believe so, have you

received any money from the State of Montana?

A. No.

Q. Going back to your complaint, Mr. Barnes -- I don't remember what number that was.

MS. MARIMAN: I believe it's Exhibit 2.

BY MS. PATRICK:

Q. Exhibit 2. I asked you earlier today if you knew what your father did when he was working for the railroad, and I believe you testified that you weren't really sure. Is that accurate?

MS. MARIMAN: I believe that misstates his testimony.

THE WITNESS: I don't recall. When he worked for the railroad, he worked in the depot, I think I told you.

BY MS. PATRICK:

Q. But do you remember specifically what tasks he performed?

A. You know, I was pretty small then. No.

MS. MARIMAN: He did testify to some tasks.

THE WITNESS: I know he used to check cars. I remember him talking about checking cars and checking numbers of cars and had to sort cars.

BY MS. PATRICK:

Q. If we look at page 20 of the complaint --

MS. MARIMAN: Which paragraph are you looking at, Counsel?

MS. PATRICK: Is he there? Okay.

BY MS. PATRICK:

Q. Paragraph 90.

MS. PATRICK: And just to clarify for the record, I'm moving past because if that's his testimony now, then I don't need to ask about his father.

BY MS. PATRICK:

Q. Your complaint mentions piles of vermiculite in the rail yard complex. Do you know specifically what those piles were made of, whether it was raw ore, vermiculite concentrate? Do you have any idea what those piles were made up of?

A. Well, I'm not an expert, but I would just say it was raw ore.

Q. And when you say in paragraph 90, "Most children growing in Libby recall playing in the area of the railroad yard and in the piles of vermiculite located throughout the rail yard complex," can you explain to me what you mean by "The rail yard complex"?

A. Just the area.

Q. What area is that?

A. Around the trains, around the depot.
Q. Can you identify on that -- on those maps that you have in front of you where the depot would have been?
A. That being the Kootenai River bridge, it would be right off the end of the Mineral Avenue there.
Q. So I'm going to hand you, then, a third map. Each serves a specific purpose, so I don't want to have us wondering what numbers are what later.
MS. MATIC: Do you want to mark that?
MS. PATRICK: Yeah. Mark that as Exhibit No. 5.
(Exhibit 5 was marked.)
BY MS. PATRICK:
Q. If you would just stick that on the bottom corner.
A. Okay.
Q. Thank you.
A. Just put an "X" and a "5"?
Q. Where you think the load-out facility would have -- or not the load-out facility. I apologize. The depot.
A. Depot.
Q. And then if you could separately just number

where you mean when you say "Piles of vermiculite located throughout the rail yard complex". If you could just put numbers where you believe those piles would have been in conjunction to where the depot is.

A. In that stretch there.

Q. And if there's a better way for you to identify it on the map, please just let us know what that is, other than numbers.

A. You want me just to number, like, "1," "2," "3"?

Q. Where you recall there being piles near the depot.

A. Okay. I'll just -- just a little check mark. How is that? You actually want numbers?

Q. I'd like -- yeah. I'd like to have numbers so that if I need to ask you questions about them we can --

A. Okay.

MS. MARIMAN: Would it be easier for him to just check first and we can go back and number it?

MS. PATRICK: Sure. As long as we can identify them on the record.

THE WITNESS: We'd see them all of the way down about to this island down here. I'd just say that stretch right there.

BY MS. PATRICK:

Q. And how many check marks did you put?

A. I've got three.

Q. Okay. So let's label them "1," "2," "3".

A. Okay.

Q. So for Pile No. 1, do you have any idea how large those piles would have been?

A. I don't recall them being over a foot tall.

Q. Any idea how wide?

A. Depended how long the car sat there, I guess. About the same. It wasn't like they were all the same.

Q. The same question for No. 2.

A. Same answer.

Q. Would your answer be the same for No. 3 also?

A. Yes.

Q. Did you ever travel through the area and not see piles?

A. I don't recall.

Q. You mentioned that you went on these excursions with your friend Todd. Is there anyone else that would have been traveling with?

A. No. That's the only guy I duck hunted with down there.

Q. Do you have any pictures of vermiculite at any of the sites that you've indicated?
A. No.
Q. Did you ever keep any vermiculite as a souvenir?
A. No.
Q. If we look at page 21 of your complaint, paragraph 94, halfway through the paragraph you mention -- it mentions "Resulting in the creation of consistent clouds of visible dust." Do you have any information as to whether that dust actually contained any asbestos?
A. No.
Q. On page 24 of that complaint, paragraph 104, you mention John Swing working for BNSF in Libby. Do you know John Swing?
A. Yes.
Q. Do you know him personally?
A. He's a friend of my parents. My dad worked with him, actually, there.
Q. He was a clerk at the depot; right?
A. John? I don't know.
Q. Do you know what your dad's title was at the depot?
A. I don't.

Q. If we go to page 26 your complaint, paragraph 112 starts a section on negligence versus BNSF and John Swing. What acts or omissions do you believe John Swing personally did or did not do in relation to your claim?

A. I'm not familiar with it.

Q. Do you believe that John Swing knew there was asbestos in the vermiculite that was being shipped by BNSF?

MS. MARIMAN: Objection. Foundation.

THE WITNESS: I have no clue. No.

BY MS. PATRICK:

Q. Do you believe that your dad had information about whether the vermiculite being shipped had any asbestos in it?

MS. MARIMAN: Objection. Foundation.

THE WITNESS: I have no clue.

BY MS. PATRICK:

Q. Would you agree that vermiculite was being used all around town in the '50s, '60s and '70s?

A. Yes.

MS. MARIMAN: Objection. Form.

BY MS. PATRICK:

Q. Would you agree that the mine itself was a point of pride for the community during those time

frames?

A. I don't know.

Q. I'm going to switch gears a little bit.

(Exhibit 6 was marked.)

BY MS. PATRICK:

Q. I'll hand you what I have marked as Exhibit No. 6. Are you familiar with this document?

A. Yes.

Q. Is this something that you filled out yourself?

A. I believe so, yes.

Q. My understanding of how this document works is that the patient fills it out and then it's reviewed with the patient by someone at the CARD Clinic. Is that your experience?

A. Yes.

Q. Do you recall who you reviewed this document with at the CARD Clinic?

A. I don't.

Q. Do you recall whether you went through the contents of it with Dr. Black?

A. I don't recall.

Q. If you look at No. 2 on page one, it says "Fishing or floating on the Kootenai River near the mouth of Rainey Creek." It says, "Number of years,

eight. Days per year, three." Do you know what years those were?

A. No.

Q. As you sit here today, do you recall doing that for approximately eight years for three days a year?

A. Yes. I do recall some, yes.

Q. But you can't recall what year, what decade, even?

A. No.

Q. How about "Being in or around vermiculite piles," No. 4? It says "Number of years, two. Days Per Year, two." Do you recall what years those would have been?

A. No.

Q. Do you have any recollection of the additional information you gave people at the CARD Clinic for them to come up with the number-of-days, number-of-years calculation that's in the section that says "This section filled by CARD"?

A. No.

Q. No. 8 says "Handling or installing vermiculite insulation outside of any job," and there's a big circle and "X" for "Yes." Do you recall what that is referencing?

A. I don't, no. You know, it might have been from one of our old houses.

Q. Do you know when that would have been?

A. No. Not an exact year.

Q. How about even a decade?

A. I don't. It would have been in that house on Park Street.

Q. No. 12 says "Spending time on or around railroad tracks," and the number of years listed is three; the days per year, five; hours per day, point five. Do you recall what specifically that was referring to?

A. No.

Q. Would you disagree with the allocation of three years, five days per year, half an hour per day?

A. No, because when we couldn't drive, we weren't old enough to drive is when we walked, so no.

Q. So that's about accurate, then?

A. That's pretty close.

Q. If we could look at page two of that document. There's a bunch of scribbles and handwriting. Is that your handwriting?

A. On page two?

Q. On page two.

A. This page; right?

MS. MARIMAN: The second --
BY MS. PATRICK:
Q. Sorry. The second page of this document, so go to page three.
MS. MARIMAN: Yeah. So it's Bates Barnes_Tracie-003 on the bottom? Is that the page?
MS. PATRICK: Correct. Yeah. It's the second page of this document.
THE WITNESS: Oh. That's not my writing.
BY MS. PATRICK:
Q. That's not your handwriting. Do you recall who at the CARD Clinic you met with in relation to this page?
A. I don't.
Q. Moving on to the next page, it asks about your occupation at Franz Bakery. Is this your handwriting on this page?
A. It looks like just the "Franz Bakery" part is my writing.
Q. You don't recall filling out the rest of that form?
A. No.
Q. If we look at the next page, which is Bates No. 0005, No. 16 on that page asks if you were involved in quarrying, including rock blasting, and

you said "Yes." Which job was that?

A. It would have been Remp Sand and Gravel.

Q. Are you aware of whether there were any asbestos deposits in that sand and gravel that you were mining?

A. No.

Q. "No," you're not aware?

A. Not aware.

Q. When did you file for Social Security disability?

A. It would have been about a year ago, I guess.

Q. Do you recall what date you retired?

A. No.

Q. Do you recall whether you filed for disability prior to retirement or after retirement?

A. It was after.

Q. And what had changed in your condition that led to you filing for Social Security disability?

A. What was the change in my condition?

Q. Correct.

A. My lung capacity dropped about 40-some percent, and I couldn't -- I couldn't do my job like I used to.

Q. But you had already retired; correct?

A. Yes.
Q. Do you still fish?
A. Once last year. I intend to.
Q. Do you golf?
A. Just started.
Q. How about hunting?
A. I do hunt. Not like I used to.
Q. What else do you do as a hobby or for enjoyment?
A. You pretty much covered it.
Q. Does Joni work?
A. Yes.
Q. What does she do?
A. Hairdresser, beautician.
Q. Do you do any odd jobs or jobs on the side currently?
A. No.
Q. Have you taken any vacations recently?
A. No. Not -- well, last September, I guess, so --
Q. And where did you go?
A. Southern California.
Q. How long was that trip?
A. One week.
Q. Did you travel with anyone?

A. Joni.
Q. Have you had to alter the things that you do on a day-to-day basis in any way as a result of your ARD diagnosis?
A. Yes.
Q. How so?
A. I can't walk steep ground anymore. I can't -- I get winded doing certain things. Put that.
Q. And when you say "Walk steep ground," what do you mean?
A. Steep terrain. Like, I can't hunt like I used to. I pretty much got to flatland it.
Q. And when did your issues with being able to walk on an incline start?
A. Probably about two years before I retired.
Q. Is there anything that you can no longer do at all?
A. No. Not so far.
Q. Other than hunting, is there anything that's been affected?
A. Yeah. A lot of things. Just everyday stuff. Carrying things, walking carrying things. I can't be around certain things, smoke.
Q. Anything else?
A. Cold, damp weather.

Q. What do you mean by that?
A. I get lung infections. It makes me kind of sick. It's like you get pneumonia or something.
Q. Have you had pneumonia in the last few years?
A. No.
Q. Have you ever?
A. Not that I know of.
Q. Have you had to be on antibiotics for anything lung related in the last 24 months?
A. I'm not sure if it's an antibiotic. I've had to -- I think it is. I've had to take Z-Paks, they're called, when my lungs get bad. Then there's a pill I take with it. I'm not sure what it's called. I want to say -- it could be wrong -- prednisone.
Q. And when was the last time you had to take a Z-Pak and prednisone?
A. Not since spring, early spring.
Q. And when you had to take it in the early spring, was that because of your asbestos-related disease or because you had gotten sick?
A. I think it's because of the disease is why I got sick.
(Exhibit 7 was marked.)
/////

BY MS. PATRICK:

Q. I'll hand you what I've marked as Exhibit No. 7. You can put everything else to the side because that's not stapled, so that might make it easier.

Have you seen this before? Take your time and read through it, and let me know when you're ready for me to ask you questions.

A. I don't believe I've seen it before.

Q. I'm sorry. You have not?

A. No.

Q. Do you recall being asked to answer any questions that BNSF presented to your attorney?

MS. MARIMAN: Objection. Attorney/client privilege.

I'd instruct you not to answer.

BY MS. PATRICK:

Q. So you have not seen the interrogatory responses that were served to BNSF on your behalf?

A. No.

Q. Okay.

MS. PATRICK: Let's go off the record and take five minutes. I think I might be close to being done.

MS. MARIMAN: Okay.

THE VIDEOGRAPHER: The time is 2:00 p.m. We are off the record.

(Break held from 2:00 p.m. to 2:08 p.m.)

THE VIDEOGRAPHER: The time is 2:08 p.m., continuation of Media Unit No. 2. We are on the record.

Go ahead, Counsel.

BY MS. PATRICK:

Q. Mr. Barnes, if we look at Exhibit 7, page 11, I had asked you earlier in your deposition if you had filed for anything with a Grace bankruptcy trust, and I believe your testimony was that you had not. This answer to this interrogatory, to Interrogatory No. 10 states that, a Grace -- a W.R. Grace Personal Injury Trust asbestos exposure claim was filed online in December of 2017. Were you aware that that was done your behalf?

A. I'm not sure now.

Q. As you sit here today, you don't recall signing off on anything for you to apply to the bankruptcy trust?

MS. MARIMAN: I'm just going to object as to attorney/client privilege.

So don't answer.

/////

BY MS. PATRICK:

Q. Have you received any paperwork from the Grace bankruptcy trust?

A. No.

Q. Have you signed any releases for your information to be disclosed to the Grace bankruptcy trust?

A. I don't know.

Q. I asked you earlier if either of your sisters had been screened by the CARD Clinic. Do you know if they were diagnosed with asbestos-related diseases?

A. Yes.

Q. What are your sisters's names again?

A. Virginia Huth and Chris Andrusco.

Q. And what was Virginia diagnosed with?

A. I'm not sure, actually.

Q. Do you know whether she has a claim pending against the railroad?

A. I don't know, actually.

Q. How about your sister, Chris?

A. That I don't know either.

Q. How often do you talk to your sisters?

A. Chris lives in Canada. Not very often. Jini lives at home, so I talk to her a little bit.

Q. And by "Home," you mean Libby?
A. Yes. I believe Jini had some stuff that has already been done. I don't know what she's got now --
Q. What do you mean --
A. -- as far as claims.
Q. -- by "Stuff"? Okay.
What was the process to apply for Social Security disability?
A. Filling out paperwork.
Q. And did you do that yourself?
A. No. I had a lady help me.
Q. Do you recall who helped you?
A. I can't remember her name.
Q. Where was this lady from?
A. She was from Libby.
Q. Did she work at the CARD Clinic?
A. She did.
Q. And did she assist you with your application in her capacity as working for the CARD Clinic?
A. Yes.
Q. Do you recall what information you had to provide her?
A. Whatever she asked.
Q. Was that the only step was getting in touch with that lady from the CARD Clinic?

A. Yes.
Q. How long after the application was filled out did you start receiving benefits?
A. I can't remember. It was a few months. It was quite a few months, actually.
Q. Do you recall the first month that you started receiving a check for Social Security?
A. I don't.
Q. Can you think of anyone else that would have information regarding your claim?
A. No.
Q. Can you think of anything else that we should talk to you about regarding the piles of vermiculite that you referenced earlier near BNSF's property?
A. No.
Q. The home that you lived in with vermiculite in the ceiling, was that vermiculite ever removed?
A. After we sold it, it was.
Q. What year did you sell that house?
A. Oh, boy. I don't remember what year we sold it. We've been in our house about 17 years, so --
MS. PATRICK: I don't think that I have any more questions for you right now, Mr. Barnes.
MS. MARIMAN: Do you have any, Katie?

MS. MATIC: The State is going to reserve questions both because we have a proposed settlement to which Mr. Barnes is a participant and for lack of notice of the deposition as we found out about it today.

MS. MARIMAN: Okay. That's an issue that we can take up later, if needed.

Let's go ahead and take a quick break, and I'll just have a few clarifications.

MS. PATRICK: Sure.

THE VIDEOGRAPHER: The time is 2:16 p.m. We are off the record.

(Break held from 2:16 p.m. to 2:25 p.m.)

THE VIDEOGRAPHER: The time is 2:25 p.m., continuation of Media Unit No. 2. We are on the record.

Go ahead, Counsel.

EXAMINATION

BY MS. MARIMAN:

Q. All right, Tracie. I just want to make sure the record is clear on just a couple of things you testified about.

Most recently you were asked questions about your application for Social Security disability, and

you had testified that a lady from -- who worked at the CARD Clinic assisted you with the application. Can you explain to me how that came about?

A. It was because I'm not a computer person, and I explained that, and so she said she could do the computer part. I sat down with her, answered the questions, and she put it in. Simple as that.

Q. Okay. One other thing I wanted to clear up with you was, in your CARD exposure history that you completed, which was Exhibit 6, Item No. 12 said, "Spending time on or around the railroad tracks" and had three years for five days per year for half an hour a day. What was that -- when you were answering that question, what was that -- what exposure were you talking about there when you were answering that question when you completed this paperwork?

A. It would have been when I was in junior high school because we couldn't drive and we walked.

Q. And so that would be the three years you were in junior high school and you were walking the tracks to go bird hunting?

A. Correct.

Q. Now, it says it was a half hour a day. How long would it take you to walk one way to go bird hunting?

A. A half hour one way.
Q. So would it be more accurate that your exposure would have been one hour per day?
A. Round trip, yes.
Q. Okay. And this exposure that you're talking about, Item No. 12, doesn't include your other exposures that you've previously testified to in and around the railroad tracks, does it?
A. No.
MS. PATRICK: Objection. Leading.
BY MS. MARIMAN:
Q. So this Item No. 12, "Spending time on or around the railroad tracks," does that include all of your exposures around the railroad tracks?
A. No.
Q. Okay. Now, one last thing I wanted to clarify just to make sure the record is clear. When we're looking at Exhibit No. 3, which was the map that you marked of houses you lived in the city of Libby, you put an "X" where you believed your residence on, I believe it was, 1019 Utah was. Is that "X" in the correct spot?
A. It's on the wrong side of the highway.
Q. Okay. So how about -- would you go ahead and put the "X" where your house was on Utah Avenue?

Here is a marker for you.

MS. PATRICK: If I can interrupt, I'll give you a different color marker so that way --

MS. MARIMAN: I was just going to have him number it a different number. Is that okay?

MS. PATRICK: Sure.

BY MS. MARIMAN:

Q. So go ahead and put it on -- put it where it actually is, as best you can recall.

A. Utah Avenue. I'm on the wrong side of the highway. Right there.

Q. Let's put "1B" by that.

A. (Witness complied.)

Q. The previous Utah Avenue was noted just "1". Let's put a "1A" by that.

A. (Witness complied.)

Q. Okay. So, now, your house on Utah Avenue, the "X" that you've put at "1B," is that where your house was located?

A. Yes.

Q. And that's the childhood home you grew up at?

A. Yes.

Q. Okay. Now, you were asked a line of questions about your exposures at your various

residences on this map. They were noted "1," "2" and "3" at the time. When you were answering those questions, were you answering those with the understanding of exposures that you may have had actually at the house?

A. Yes, at the house.

Q. So you weren't necessarily answering with respect to exposures that may have occurred in that same time frame but while you were, say, walking the tracks to go bird hunting?

A. Correct.

MS. MARIMAN: Okay. That's all the questions I had.

MS. PATRICK: I do not have any follow-up for you. Thank you so much for your time, Mr. Barnes.

THE WITNESS: Thank you.

THE VIDEOGRAPHER: Okay. So we are off the record at 2:34 -- or 2:29 p.m., and this concludes today's testimony given by Tracie R. Barnes. The total number of media units used was two and will be retained by Legal Video Services. We are off the record.

(Whereupon, the Videotaped Deposition of TRACIE BARNES was concluded at 2:29 p.m., and signature was reserved.)

REPORTER'S CERTIFICATE

State of Montana)
County of Flathead)

I, Jolene Asa, Registered Professional Reporter and Notary Public for the State of Montana, residing in Kalispell, Montana, do hereby certify:

THAT I did report the foregoing matter at the time and place stated in the above-entitled matter after having duly sworn TRACIE BARNES; and

THAT the foregoing pages constitute a true and accurate transcription of the testimony of TRACIE BARNES that was taken in shorthand by me and reduced to writing under my direction to the best of my ability; and

THAT I am not an attorney nor counsel of any of the parties, nor a relative or employee of any attorney or counsel connected with the action, nor financially interested in the action.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my seal on this ____ day of _____, ____.

_____

JOLENE ASA, RPR

CORRECTION PAGE

PAGE	LINE	CORRECTION

I have read the foregoing testimony and believe the same to be true, except for the corrections noted above.

DATED this _____day of _____, _____.

_____

TRACIE BARNES

IN RE ASBESTOS LITIGATION - BARNES, ET AL.

VS. BNSF RAILWAY, ET AL. - AC 17-0694

EXHIBIT P - THIRD AFFIDAVIT OF
ROGER SULLIVAN SERVED
JANUARY 4, 2019

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IN THE ASBESTOS CLAIMS COURT OF THE STATE OF MONTANA

IN RE ASBESTOS LITIGATION, *Consolidated Cases*	Cause No. AC 17-0694 THIRD AFFIDAVIT OF ROGER SULLIVAN Applicable to: *Barnes, et al. v. State of Montana, et al,* Lincoln County Cause No. DV-16-111

State of Montana)
) ss
County of Flathead)

Roger Sullivan, being first duly sworn deposes and states:

1. I am an attorney for the Plaintiffs in this action. I have personal knowledge of the matters stated herein.

2. Attached hereto are true and correct copies of the documents designated Exhibit 88 through Exhibit 100:

Ex. 88 – BNSF Libby Rail Yard Libby Amphibole Impacted Soil Removal Health and Safety Plan (July 2004);

Ex. 89 – Administrative Order on Consent for Removal Action between BNSF and EPA (11/4/2001) –Negotiation Document;

Ex. 90 - Railyard Maintenance Activity Asbestos Air Sample Results (4/24/2001-4/25/2001);

Ex. 91 - W. R. Grace Asbestos Sampling Results (1975);

Ex. 92 - Correspondence from EMR to BNSF re: Results of October 2001 Sampling at Libby Railyard (11/30/2001);

Ex. 93 – Kennedy/Jenks Consultants' Map BNSF Railyard noting areas covered in visible vermiculite (June 2004);

Ex. 94 - Photos of vacuum remediation efforts (August 2003);

Ex. 95 - *Wetsch v. BNSF*, Montana's Fourth Judicial District, Cause No. DV-16-1146, BNSF Opening Statement (June 5, 2018);

Ex. 96 - EPA's Initial Pollution Report for Operable Unit 6 (Libby Railyard) (9/29/2003);

Ex. 97 - Soil Sample Results (August 2003);

Ex. 98 - Photos of subsequent excavation and capping efforts produced by Kennedy Jenks;

Ex. 99 – J. Millette & S. Compton, *Analysis of Vermiculite for Asbestos and Screening for Vermiculite from Libby, Montana*, the Microscope, Vol. 63:2, pp.59-75 (2015);

Ex. 100 - Chemical Control Division Office of Toxic Substances, *Disposition Paper for Asbestos-Contaminated Vermiculite,* (1982);

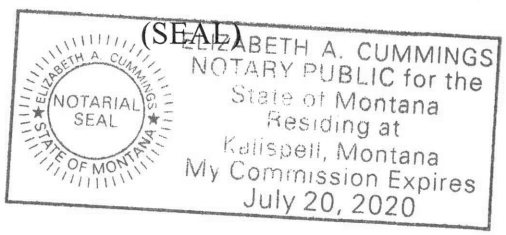
Further the affiant sayeth not.

RESPECTFULLY SUBMITTED this 4th day of January, 2019.

Roger Sullivan

SUBSCRIBED AND SWORN to before me this 4th day of January, 2019.

(SEAL)



Notary Public for the State of Montana
Residing at: _____, Montana
My Commission Expires:

CERTIFICATE OF SERVICE

I, Roger M. Sullivan, hereby certify that I have served true and accurate copies of the foregoing Affidavit - Other to the following on 01-04-2019:

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Electronically Signed By: Roger M. Sullivan
Dated: 01-04-2019

VOLUME III

HEALTH AND SAFETY PLAN

BNSF LIBBY RAIL YARD LIBBY AMPHIBOLE IMPACTED SOIL REMOVAL

LIBBY, MONTANA

EMR PROJECT 5539

Prepared for:
Mr. David Smith
Manager Environmental Remediation
The Burlington Northern and Santa Fe Railway Company
139 North Last Chance Gulch
Helena, Montana 59601

Prepared by:

EMR, INC.
2509 152ND Ave. NE, Suite E
Redmond, Washington 98052

EMR
INCORPORATED

JULY 2004

TABLE OF CONTENTS

1.0 HEALTH AND SAFETY PLAN

Sampling is being performed in accordance with applicable Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), corporate, and site health and safety requirements. A site-specific Accident Prevention Plan is included in Section 3. This Health and Safety Plan will be present on Site for the duration of the work activities.

A daily health and safety briefing will be conducted at the beginning of each workday and will be repeated as health and safety issues arise at the site. These health and safety briefings will discuss the hazards expected to be encountered each day during work activities including, at a minimum, the hazards of asbestos, heavy equipment, and heat or cold related health hazards.

No eating, drinking of beverages, use of tobacco, or applying of cosmetics will be allowed in the Exclusion Zone (EZ) or Contamination Reduction Zone except as indicated in Section 3.4. None of these activities may be done during the workday unless the worker has passed through the decontamination trailer within the Contamination Reduction Zone (CRZ) or similarly decontaminated their person. All workers entering the EZ will be required to wear protective equipment including but not limited to:

- Disposable Tyvek® or equivalent coveralls with hood;
- Powered Air Purifying Respirators (PAPRs) with P100 HEPA cartridges until negative exposure air data warrants downgrading to a respirator with P100 HEPA cartridges;
- Orange hard hat with reflective tape;
- Orange reflective vest;
- Safety glasses (if half face respirator is being worn);
- Safety toed boots;
- Disposable gloves duct-taped to disposable coveralls; and
- Disposable Boot Covers duct-taped to disposable coveralls.
- Hearing Protection

2.0 DECONTAMINATION AND DUST SUPPRESSION REQUIREMENTS

2.1 DECONTAMINATION PROCEDURES

No vehicles or equipment extraneous to the job will be allowed to enter the EZ. All equipment will be decontaminated before being removed from the site. Personnel will be required to decontaminate themselves upon leaving the EZ or CRZ. The following paragraphs provide an overview of the decontamination and cleaning activities.

2.1.1 Personnel Decontamination

The contractor will furnish and install a personnel decontamination trailer at the site for workers to use upon entering and exiting the EZ. Specifications for the decontamination facility are identified in Section 01563 of the Project Specification. The area east of the highway overpass on the north side of the tracks will be used for the decontamination facility location. Administrative controls will be utilized to ensure that the decontamination facility is available for use by men and women separately. The decontamination trailer will consist of a three-stage unit including a clean room, a shower, and an equipment (dirty) room. Workers exiting the EZ will first take off an outer Tyvek® suit, wash their boots at a boot wash station, walk to the decontamination trailer and enter the dirty room, remove their protective clothing (except their respirators), shower, remove respirators, and then enter the clean room and re-robe before taking work breaks or leaving the Site for the day (Project Specification Section 01527). Respirators are to be taken off and cleaned in the shower before entering the clean room.

2.1.2 Decontamination of Construction Equipment

The contractor will erect the decontamination pad consisting of polyethylene sheeting large enough to hold equipment and trucks anticipated to enter the EZ. The edges will be raised, forming a berm such that water used for decontamination is contained, and a means of transferring waste water to a series of filters with the capability of collecting particles of 5.0 microns or less will be in place. The filtered water will be containerized in 55-gallon drums until permission is secured to discharge water at a sanitary sewer location. See the Project Specification Section 01010 Part 16a for additional information.

All equipment will be decontaminated before leaving the site. The excavation equipment will remain in the CRZ for the duration of the project unless mechanical failure requires its removal. Decontamination of equipment will consist of rinsing the equipment such that visible soil is removed from the exterior of the equipment. The interior of all equipment will be wiped with a wet cloth to remove any visible dust from the interior surfaces; polyethylene sheeting will be

required to cover cloth materials during excavation activities. At the end of the project, the polyethylene sheeting and spent water filters will be disposed of as asbestos-containing material.

Trucks used for hauling soils impacted with Libby Amphibole or those entering the site prior to receipt of clearance samples that exhibit no Libby Amphibole will be required to decontaminate before exiting the EZ or CRZ. Trucks not entering the EZ should be visually inspected to assure that no dirt or debris is attached to the exterior of the truck. If soil is attached, the truck will need to be decontaminated.

2.1.3 Air Sampling Equipment Decontamination

Air sampling equipment (e.g., pumps, cassette holders, etc.) that is used within the EZ will be decontaminated prior to removal from the CRZ. Air sampling pumps, tubing, sampling stands, and rotometers will be decontaminated in the personal decontamination trailer. Equipment will be cleaned with wet disposable wipes or rags and dried with clean disposable wipes or rags. These rags will be disposed of as asbestos-containing material.

2.2 DUST SUPPRESSION PROCEDURES

Contaminated soils will be wetted prior to and during excavation and loading. Dust suppression will also be conducted along site access roads to prevent visible dust emissions outside of the EZ and CRZ.

Soils are to be kept adequately wet to suppress dust and fiber generation such that there are no visible emissions from the site. This will be accomplished utilizing water truck or other water supply line plumbed into the EZ.

3.0 ACCIDENT PREVENTION PLAN

An Accident Prevention Plan has been prepared. Accidents can be prevented by continuously evaluating and reviewing job site hazards, conducting daily safety briefings, and being aware of on-site activities at all times. Phone numbers and directions of emergency services will be posted in the personal decontamination trailer. Tailgate safety meeting forms with attached egress routes and closest hospital information are attached as Appendix A.

3.1 GENERAL INFORMATION

Project Name: BNSF Libby Rail yard Libby Amphibole Impacted Soils Removal

EMR Project No.: 5539

Project Manager: Tanya Drake

Project Field Manager: David L. Welch

Project Reviewer: Tanya Drake

Location: Libby, Montana

Prepared by: Don Clabaugh **Date prepared**: 4/18/02

Revised by: Tanya Drake **Date prepared**: 7/22/04

Approval by: Chuck Hendrix **Date**: 8/14/02

Site Safety Officer Review: Dan Westrum **Date**: 10/16/02

EMR CIH Review: Robert Gilmore, CIH **Date:** 7/24/04

EMR Project Manager Review: David L. Welch/Scott Rhen **Date**: 10/16/02

Scope/Objective of Work: Remove or cap with a geotextile fabric and soil cover any visible hydrated biotite and Libby Amphibole that was mapped in 2001 - 2004 from the surface of the Site. Excavate soils with a trackhoe or backhoe equipped with a straight edged bucket. Cover remaining soils with a geotextile cloth. Soils will be loaded into lined end dump trucks and the loads will be sealed and covered with a tarpaulin. Soil will be trucked directly to the approved local landfill where it will be offloaded. EPA's authorized agent, CDM Federal Programs, will conduct all landfill oversight. Following removal of visible hydrated biotite and other soils known or suspected of containing Libby Amphibole, confirmation soil samples will be collected to verify no detectable

Libby Amphibole is present. Discrete and composite samples will be collected. Discrete samples will be held pending analysis of composite samples. Soil samples will be analyzed in accordance with Libby Amphibole (Tremolite/Actinolite Series) Method 9002, Issue 2. If composite samples contain a concentration of trace (<1%) Libby amphibole or greater, then the discrete samples may be analyzed.

Proposed Date(s) of Field Activities: Between August 23, 2004 and October 31, 2004, weather permitting.

Background Information: X Complete ___ Preliminary (analytical data incomplete)

Documentation/Summary:

Overall Chemical/Waste hazard: _ Serious _ Moderate X Low _ Unknown

Overall Physical hazard: _ Serious X Moderate _ Low _ Unknown

3.2 SITE/WASTE CHARACTERIZATION

Waste Type(s): _ Liquid X Solid _ Sludge _ Gas/Vapor

Characteristics:

__ Flammable __ Volatile _ Corrosive _ Acutely toxic (LBP)

X Carcinogen (ACM) _ Reactive _ Explosive _ Radioactive

Other:

Physical Hazards:

X Overhead ___ Confined Space ___ Below Grade X Trip/fall

_ Puncture _ Burn X Cut __ Splash X Noise

Other:

Site History/Description and Unusual Features: Libby Railyard. Work will be conducted in areas excluding the main line track and feeders. BNSF flagmen will supervise work near rail lines but will not be allowed into the EZ.

Locations of Chemicals/Wastes: Hydrated biotite has been observed and mapped, along with analytical data indicating the presence of Libby Amphibole, at the Site. See Figures 1 and 2.

Estimated Volume of Chemicals/Waste: Unknown

Sites currently in operation: _X_ Yes __ No

3.3 HAZARD EVALUATION

Prior to each day of work, a "tailgate" safety meeting will be held to review the overall Health and Safety Plan, specific physical and chemical/waste hazards for the Site, railroad safety and track protection, and discuss routes of egress from the Site, and routes to the nearest hospital in case of accident. Following the meeting, site personnel will sign a sheet with the current date and the date that they reviewed the Health and Safety Plan and discussed specific hazards and routes of egress for the Site. The sign-off sheet for each day will identify the specific work tasks planned for that day. Telephone service will be available on site in case of emergency. Equipment leaving the EZ, including cellular phones and radios, will be decontaminated. In the case of emergency, there will be two possible scenarios:

Scenario 1: Non-life threatening: Personnel will be escorted out of EZ and assisted in decontamination prior to delivery of injured worker to hospital.

Scenario 2: Life-threatening: EMR personnel will call 911, inform emergency personnel to access the site from the north such as to not cross the main rail line, receive emergency medical personnel at the site, supervise and assist with suiting up the emergency personnel in PPE at the decontamination trailer, and escorting the emergency personnel into the EZ. Emergency personnel will stabilize the victim, bring the victim out of the EZ, decontaminate the victim and themselves at decontamination trailer, and deliver victim to hospital. If delay caused by donning PPE or the decontamination process may threaten the victim's life, medical personnel and the site supervisor may chose to forgo any and all procedures previously outlined in section.

3.3.1 Physical Hazard Evaluation/Control:

1. Hazard: Work around construction equipment mechanical hazards.

   Control: Daily tailgate meeting to identify hazards.

2. Hazard: Work around railroad lines involves extreme hazard of collision, which will be managed by BNSF flagman and other suitable track protection determined by BNSF personnel.

   Control: Work closely with BNSF road master to identify rail schedule, avoid crossing BNSF mainline track, ensure all personnel working on-site have gone through BNSF Railway contractor safety training at www.contractororientation.com .

3. Hazard: Work with polyethylene liner and water involves slip, trip, and fall hazards. Work climbing into and out of truck involves slip, trip, and fall hazards

Control: Daily tailgate meeting to identify hazard; contractor will keep polyethylene liner flat with minimal folds. Three-point contact will be utilized while entering and leaving equipment and trucks.

3.3.2 Chemical/Waste Hazard Evaluation/Control

(Source: NIOSH pocket guide to chemical hazards-June 1997)

Hazard:

COMPOUND	PEL/TWA	ROUTE OF EXPOSURE	ACUTE SYMPTOMS	ODOR THRESHOLD	ODOR DESCRIPTION
Asbestos	0.1 fiber/cc	Inhalation Ingestion Contact	None	None	None

Control:

Wet methods, vacuum technology with HEPA filtration, air monitoring to determine airborne fiber content.

3.4 SITE SAFETY WORK PLAN

Site Control:

X Perimeter identified _ Site secured X Work area designated

X Zones of contamination identified

Personnel Protection: Tyvek®, hardhat, steel-toed boots, safety glasses, and hearing protection.

Anticipated Levels of Protection: Modified Level C

Modifications: Safety Glasses, PAPRs with HEPA cartridge downgraded to half-face air purifying cartridge respirators if negative exposure air data warrants.

Action Levels for Evacuation of Work Zone: N/A (air monitoring detection will result in a change in the methods and/or procedures).

Air Monitoring Required: See Section 1.3

Decontamination Solutions and Procedures for Equipment, Sampling Gear, etc.: water solution

Personnel Decontamination Protocol: 3-stage decontamination trailer with clean room, shower and equipment (dirty) room.

Decontamination Solution Monitoring Procedure, if applicable: NA

Special Site Equipment, Facilities, or Procedures (sanitary facilities, lighting, etc.): Portable toilets will be available on site.

Site Entry Procedures and Special Considerations: Site entry will be accessed from the north to avoid crossing the main rail line that runs east to west on the south side of the rail yard. This consists of an access road that is present at the north side of the highway overpass.

Work Limitations (time of day, weather conditions, etc.) and heat/cold stress requirements:

- During daylight hours.
- Adequate breaks will be taken during the day to avoid heat stress. Workers will be allowed to decontaminate hands, respirators and faces at the edge of the EZ and consume liquid for hydration.
- Work will stop for 15 minutes for each audible or visual lightning strike. Work will begin after 15 minutes passes without any record of strikes.

General Spill Control, if applicable: NA

Investigation-Derived Material Disposal (i.e. expendables, decontamination waste, cuttings): Expendables will be bagged for appropriate disposal as asbestos-containing materials.

Sample Handling Procedures, including protective wear: disposable gloves, safety glasses, respirators

3.5 EMERGENCY INFORMATION

Ambulance: 911

Hospital Emergency Room: St. Johns Lutheran Hospital
350 Louisiana Avenue
Libby, MT 59923
(406) 293-0100

Poison Control Center: 1-800-542-6319
Police/Sheriff: 911
FIRE Department: 911

Agency contacts (EPA, state, local):

EPA Regional Office, Emergencies	(406) 293-6194
MDHE	(406) 444-2544

EMR Contacts:

Tanya Drake - Work: (612) 789-2642 .....Home: (763) 383-6956
Bob Gilmore, CIH - Work: (425) 820-4669 .....Home: (425) 864-0507
Ric Cook – Work (785) 842-9013: .....Home:
David L. Welch - Work: (425) 861-4561 .....Home: (425) 337-9124
Scott Rhen – Work (817) 371-5946... .....Home:

Water Supply Source: BNSF water supply, City of Libby water supply, or Kootenai river water will be utilized for dust suppression.....

Hospital Address: St. Johns Lutheran Hospital, 350 Louisiana Avenue

Directions: To be attached to each "tailgate" safety meeting sign-off sheet.

Emergency Egress Routes for Site Evacuation: North access road off Highway 37 overpass. (See attached pages)

4.0 TRAINING REQUIREMENTS

Different training requirements are required depending on tasks within the work area. All personnel conducting soil removal will be required to have 40 hour Hazardous Waste Operations (HAZWOPER) training and On-track Safety Training (www.contractororientation.com). All workers and equipment operators entering the EZ and conducting or assisting in rail, tie or soil removal will be required to have 32 hour EPA asbestos worker or 40 hour EPA asbestos supervisor training. The contractor will be required to have one 40-hour asbestos supervisor on site.

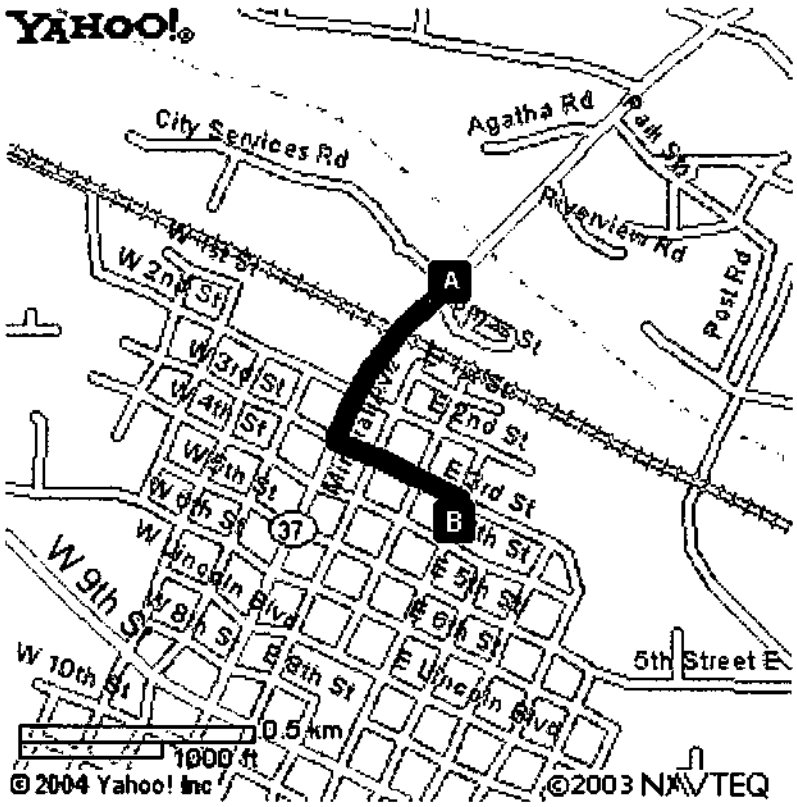
Any project management personnel entering the EZ but not conducting or assisting in rail, tie or soil removal will be required to have two hour OSHA asbestos awareness training, respirator training and fit test, and 40 hour HAZWOPER training.

Air monitoring personnel working outside the EZ are required to have 40-hour asbestos supervisor training, and NIOSH 582 equivalent course training. Soil sampling personnel working inside the EZ are required to have 24-hour EPA asbestos building inspector training and Montana certification.

On-track safety training is a requirement of BNSF and Federal Railroad Administration (FRA) for all personnel on BNSF property or within 25 feet of railroad track. 40 hour HAZWOPER Training is a requirement of 29 CFR 1910.120. EPA asbestos training is a requirement under the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). The EPA regulations for implementing ASHARA are under the Model Accreditation Plan (MAP) contained in the Federal Register, dated February 3, 1994 (40 CFR 763 Appendix C to Subpart E). The MAP went into effect October 4, 1994. The asbestos training is also required under the OSHA Asbestos in Construction Industry Standard (29 CFR 1910.1101).

Each worker will be required to submit records of a current respirator fit test and physical exam. A daily sign in sheet will be maintained at the entrance to the decontamination trailer. Each worker shall sign in and out as they enter and exit the site.

ROUTE TO HOSPITAL



APPENDIX A

DAILY TAILGATE SAFETY FORM

DAILY TAILGATE SAFETY MEETING FORM

Date: _____ Time: _____ Project Number: _____

Project Name: _____

Specific Location: _____

Type of Work: _____

Chemical Present: _____

Safety Topics Discussed

Protective Clothing/Equipment: ☐ Emergency Procedures: ☐

Hospital/Clinic: ☐

Hazards of Chemicals Present: ☐

(List others not in HASP) _____

_____

Physical Hazards: ☐

(List others not in HASP) _____

_____

Special Hazards: ☐

(List others not in HASP) _____

_____

Other Topics:

_____

_____

Name (Printed) Signature

_____

_____

_____

_____

_____

APPENDIX B

DOCUMENT SIGNATURE PAGE

HEALTH AND SAFETY DOCUMENT SIGNATURE PAGE

I have read and understand the safety rules described in the Health and Safety Plan.

NAME	SIGNATURE	COMPANY	DATE

APPENDIX C

BNSF EMPLOYEE SAFETY RULES

BNSF Safety Vision

We believe every accident or injury is preventable. Our vision is that Burlington Northern Santa Fe will operate free of accidents and injuries. Burlington Northern Santa Fe will achieve this vision through:

A culture that makes safety our highest priority and provides continuous self-examination as to the effectiveness of our safety process and performance ...

A work environment, including the resources and tools, that is safe and accident-free where all known hazards will be eliminated or safe-guarded ...

Work practices and training for all employees that make safety essential to the tasks we perform ...

An empowered work force, including all employees, that takes responsibility for personal safety, the safety of fellow employees, and the communities in which we serve.

Introduction

This version contains the following revised or added pages:

Oct. 10, 1999: 4a, 4b, 9, 10, 11, 12, 15, 16, 17, 18, 23, 24, 27, 28, 29, 30.

Feb. 1, 2001: 7, 8, 24a, 25b, 37, 38, 39, 40.

June 25, 2001: 5, 6.

October 30, 2003: 3, 4, 21, 22.

March 7, 2004: Title Page, 2, 47, 48.

BNSF

Employee Safety Rules

IN EFFECT AT 0001
Central, Mountain and Pacific
Continental Time

Sunday, January 31, 1999 (including revisions up to Sunday, March 7, 2004)

These rules are for all employees of Burlington Northern Santa Fe who do not fall under the jurisdiction of the TY&E Safety Supplement, the Mechanical Safety Rules or the Maintenance of Way Safety Rules.

This version contains revisions to the following rules: S-28.2.3

Table of Contents

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S-1.0 Core Safety Rules

These rules provide a core of safe work practices for BNSF people. The rules apply every day and in every job we do. They will guide and direct us in maintaining a safe work environment.

S-1.1 Job Safety Briefing

Employees must participate in a job safety briefing before beginning work and when work or job conditions change. The briefing includes a discussion of the general work plan, existing or potential hazards, and ways to eliminate or protect against hazards. Outside parties or contractors involved in the work or who are in the work area must also be included in the job safety briefing.

S-1.2 Rights and Responsibilities

We have the right and responsibility to perform our work safely. Our training, skills, work experience, and personal judgment provide the foundation for making safe decisions about work practices.

S-1.2.1 Sufficient Time

Take sufficient time to perform job tasks safely.

S-1.2.2 Authorized and Trained

Perform job tasks only when authorized and trained to perform them.

S-1.2.3 Alert and Attentive

Assure that you are alert and attentive when performing duties.

S-1.2.4 Co-Workers Warned

Warn co-workers of all unsafe practices and/or conditions.

S-1.2.5 Safety Rules, Training Practices, Policies

Comply with all company safety rules, engineering instructions, training practices, and policies.

S-1.2.6 Warning Signs

Comply with verbal warnings, warning signs, posted instructions, and placards identifying restricted areas, safety and health precautions, or potential hazards.

S-1.2.7 Two or More People

Do not perform a task alone that can only safely be performed by two or more people.

S-1.2.8 Reporting

Make reports of incidents immediately to the proper manager.

S-1.2.9 Horseplay

Conduct yourself in a way that supports a safe work environment-free of horseplay, practical jokes, and harassment.

S-1.2.10 "Bill of Rights" Relative to Employees Riding in Transport Vehicles

Safety is a two-way street. Below are some expectations with respect to your rights regarding riding in transport vehicles.

A large percentage of our employees are transported to and from various locations on the BNSF daily. Safety is not only something for which we are each responsible, but we are also empowered to take those steps which make a safe workplace for ourselves and our co-workers. Please accept this challenge to exercise your rights with regard to riding in transport vehicles.

Right 1
Expect transport vehicles to be properly serviced, maintained, and in good working order. In addition, contract vans must be clean with all seat belts and all safety appliances working,.

Right 2
Expect a safety briefing regarding movements to be made, route to be taken, location of safety appliances, i.e. fire extinguisher, first aid kit, emergency response plan in the event of a medical emergency, etc.

Right 3
Expect the vehicle to be parked in the most accessible location closest to the pickup/drop-off point. The driver will take into consideration walking conditions and surfaces when positioning the vehicle. When possible, stop the vehicle off any public roadways.

Right 4
Expect the vehicle to be secured against movement after it has stopped for loading or unloading passengers and baggage, by placing the vehicle in park, securing the parking brake and shutting off the engine.

Right 5
Expect the driver to request assistance when backing where required due to vision limitations.

Right 6
During hazardous weather conditions, expect the driver not to use cruise control, and have the necessary traction devices, studs or chains, when weather requires.

Right 7
Our employees can expect that the driver will not be distracted from paying attention to the road while driving, by such things as eating and drinking.

Right 8
Our employees can expect every van used to transport employees between stations to have a functional two-way radio, which could be a pack-set, tuned to the appropriate railroad frequency. In addition, when equipped with a cellular phone, it must be in working order.

Right 9
Our employees can expect assistance with baggage as requested.

Right 10
Our employees can expect that the driver will demand all employees to have seat belts on before the vehicle is moved, and will stop the vehicle when the driver is aware that seat belts are removed by any occupant.

Right 11
Expect that all doors are securely closed prior to departure.

Right 12
Expect to be reminded of the BNSF No Smoking Policy, as necessary.

Right 13
Our employees are empowered with the right to refuse to be transported in an unsafe vehicle, or be driven by a driver who does not meet the aforementioned criteria. However, in the same vein, all employees are responsible to abide by all rules, processes, and procedures that govern their working environment. No matter what we may think, these rules have been placed into effect for the continued safety and well-being of all employees.

The sole responsibility of our safety cannot rest on just the driver. We cannot safely rely on the driver assuring that all employees remain buckled up after the vehicle is in motion. As co-workers, we are obligated to constantly remind each other to wear seat belts where required and to follow all rules that pertain to our work place.

S-1.3 Personal Protective Equipment and Clothing

S-1.3.1 Requirements

Be familiar with and wear personal protective equipment and clothing as required by your job. Any changes made in the recommended use or design of personal protective equipment or clothing must be approved by the manufacturer.

S-1.3.2 Finger Rings

Do not wear finger rings unless you are working in an office or office-like area.

S-1.4 Tools and Equipment

S-1.4.1 Inspection

Inspect tools and equipment for defects before and during use. Repair or remove from service those that fail inspection. Promptly tag and report to your supervisor or person in charge any defect(s). If necessary, guard the hazard.

S-1.4.2 Use as Intended

Use tools and equipment for the purposes intended.

S-1.4.3 Manufacturer Specifications

Read and follow the manufacturer's specifications when using tools and equipment.

S-1.4.4 Manufacturer Approval

Secure manufacturer approval for any changes made in the recommended use or design before using.

S-1.4.5 On or Off Moving Equipment

Do not get on or off moving equipment, except in emergency to avoid injury.

S-1.4.6 Three-Point Contact

Maintain three-point contact when getting on or off vehicles, equipment, and machinery, and when ascending or descending ladders or platforms. Three-point contact consists of both feet and one hand or both hands and one foot.

S-1.4.7 Physical Exertion

Employees must only use BNSF approved stretches when stretching at the beginning of the shift, before physical exertion, after rest breaks, and after a long period of sitting or maintaining the same posture. Employees are to stretch without exceeding personal capabilities, but must participate to the extent of their ability or as directed by a physician. Stretches following rest breaks may consist of a subset of the approved stretches.

Always use safe lifting practices when lifting, carrying or performing other tasks that might cause back pain, injury or property damage. Do not use excessive force to accomplish tasks. If one person cannot manually handle a load safely, then use mechanical assistance. Where mechanical assistance is not readily available, request assistance or stop and obtain the mechanical means necessary to complete the task.

S-1.4.8 Passengers

Transport passengers in vehicles equipped to transport passengers.

S-1.4.9 Seat Belts

Wear seat belts while operating or riding in equipment or vehicles that are equipped with them.

S-1.5 Work Environment

S-1.5.1 Housekeeping

Keep work locations, vehicles, and the inside and outside of buildings clean and orderly at all times.

S-1.5.2 Inspection

Inspect your work locations and vehicles for any conditions that might cause injury, property damage, or interference with service. If you find such a condition, take necessary action to protect against the hazard, or discontinue activities in the area or with the vehicle. Promptly tag (where appropriate) and report any defect or hazard to your supervisor or person in charge.

S-1.5.3 Footing

Be alert to all walkway conditions, and adjust your actions to accommodate weather, time of day, and grade. Guard against slipping and stumbling hazards by using handholds and railings when available. Except in emergency, running is not permitted in the performance of duty.

S-1.5.4 Confined Spaces

Consider all confined spaces hazardous unless proven otherwise. Only authorized and trained individuals may enter confined spaces.

S-1.5.5 Hazardous Materials

Handle contaminants and hazardous chemicals according to all applicable government regulations and BNSF policies.

S-1.6 Working On or About Tracks

S-1.6.1 Movement of Equipment

Expect the movement of trains, engines, cars, or other equipment at any time, on any track, and in either direction.

S-2.0 Chemical Safety

S-2.1 Environmental Safety

In compliance with BNSF's environmental protection policy, take measures to prevent:

- Spills of oil or other material.
- Discharge of contaminants to sewers, waterways, or the ground.
- Smoke and gas emissions when operating combustion equipment.

Treat all unidentified material as hazardous until identified. Do not transport unidentified material.

S-2.2 Chemical Spills and Chemical Releases to Air

In the event of a chemical spill or release of a chemical or unknown material to the air, evacuate the area.

Report oil or hazardous material spills promptly to the dispatcher and your supervisor. Include in your report:

- Spill location.
- Material and amount of spill.
- Distance to the nearest public waters.
- Other important information.

Do not take any further action unless you are specifically trained to do so, using appropriate protective gear and work practices.

Do not re-enter the affected area until given the "All Clear" by incident response personnel.

S-2.3 Labeling Chemical Containers

At the time you place a chemical in a container, affix to that container a label identifying the chemical and appropriate hazard warnings.

S-2.4 Ventilation for Maintaining Safe Atmospheres

Provide mechanical ventilation to enclosed areas when:

- Applying solvents, paints, and other chemicals.
- Welding, torch cutting, or burning.
- Emissions from combustion engines, stoves, or heaters (especially in enclosed areas) may cause concentration of excessive airborne contaminants.
- Recommended in product instructions or MSDS.

S-2.5 Skin Cleaning

Do not clean any part of your body with gasoline, solvents, or oily rags. Use company-supplied hand creams and soaps for cleaning hands, arms, face, and other parts of the body.

If the skin has been exposed to corrosive agents (acids or bases), use plain water to flush continuously for at least fifteen minutes.

Do not apply ointments, soaps, or creams to chemical or thermal burns.

S-2.6 Containment and Spill Prevention

When dispensing petroleum products or other materials such as soaps and solvents from drums or containers:

- Whenever possible, place drums in a vertical position and use an appropriate pump for dispensing the product. Place an absorbent mat or dike on top of the dispensing drum or container.
- If drums must be placed in a horizontal position, use self-closing dispensing valves.
- Place the drum or container in a dike or other containment.
- Place containment devices such as drip pans under drums and valves.
- Properly label receiving container.
- When dispensing flammable liquids, ground and bond all containers.
- Properly dispose of contaminated absorbent material and mats.

S-2.8 Protection from Asbestos Exposure

Conduct all work involving asbestos in accordance with BNSF's Asbestos Control program.

S-2.8.1 Repair and Maintenance

When providing any repair or maintenance where Asbestos Containing Materials (ACM) or Potential Asbestos Containing Materials (PACM) will likely be disturbed, or where ACM or PACM will be removed, implement the Asbestos Control program.

S-2.8.2 Training

Before working with ACM or PACM, complete asbestos training. Complete additional asbestos training on an annual basis as long as you continue to work with ACM or PACM.

S-2.10 Protection from Silica-Containing Dust

Whenever you are exposed to visible airborne dust arising from ballast, taconite, or sand, wear respiratory protection.

S-2.11 Chemical Approval

Do not bring a chemical product onto BNSF property until the chemical is approved.

S-3.0 Electrical Safety

S-3.1 Requirements

S-3.1.1 General

- Use ground fault circuit interrupters (GFCIs) on electrical circuits when working in damp areas or outdoors.
- Do not use portable metal ladders for electrical work.
- Do not use electrical cords for hoisting or lowering.
- Test structures (metal buildings, flood light towers, etc.) with live power circuits, before touching them, to make sure they are not energized.

S-3.1.2 Authorized Employees

Only authorized and trained employees are permitted to work on electrical apparatus or equipment. Wear a dielectric hard hat when working where you could contact power lines or high-voltage equipment.

S-3.1.3 Warning Signs

Place danger signs near exposed energized circuits.

S-3.1.4 Flashlights

Use only an approved flashlight with a nonmetallic case around electrical equipment.

S-3.1.5 Contacts

Do not use flag sticks or other objects to close or open contacts on engines under electrical load.

S-3.1.6 Lockout/Tagout

Follow approved lockout/tagout procedures:

- Assume all wires, conductors, and other electrical equipment are energized, unless known to be locked out.
- Do not alter safety features of fuses, circuit breakers, or other electrical equipment.
- Do not open secondary circuits of energized current transformers.

S-3.3 Charging and Jumping Batteries

S-3.3.1 Precautions for Servicing Batteries

Follow these precautions when servicing batteries:

- Do not smoke in battery-charging areas.
- Do not allow open flames, sparks, or electric arcs in battery-charging areas or around exposed batteries.
- Make sure charging area is adequately ventilated.
- When charging a battery, keep the vent caps in place to avoid electrolyte spray.
- Leave the battery compartment doors open when charging an engine battery from an external source.
- Wear face shield over splash goggles and other protective equipment as required by the job when filling or charging a battery.

- Do not permit battery electrolytes (acid) to contact eyes, skin, or clothing. Wash battery electrolytes from your eyes or skin with cold water immediately.
- Remove any leads from terminal posts when scrapping batteries.

S-3.3.2 Battery Flushing

Use insulated funnels for flushing batteries.

S-3.3.4 Metallic Objects

Keep tools, metal jewelry (including watches), and other metallic objects away from the top of uncovered batteries.

S-3.3.5 Jumping Batteries

Do not use a welding machine to jump-start a battery.

S-5.0 Fire Prevention, Response, and Hazards

S-5.1 General Requirements

Know and understand area emergency plans and special instructions related to fire protection.

In case of smoke or fire, notify all individuals who may be affected, supervisors, and appropriate emergency responders.

Keep exit aisles, emergency exits, and fire doors clear. Keep areas around buildings, structures, and equipment free of fire hazards.

S-5.2 Emergency Procedures

Fight a fire only if properly trained and equipped and if your personal judgment dictates you can do so safely.

S-5.2.2 Right-of-Way Fires

If the fire could spread to a bridge or other structure, stop the train, and fight the fire only if properly trained and equipped and if your personal judgment dictates you can do so safely.

Do not drive through plumes of smoke or chemical vapors unless necessary to escape from a life-threatening situation.

S-5.3 Fire Extinguishers and Protection Devices

S-5.3.1 Defective Fire Extinguishers

Report any out-of-date, discharged, or defective fire extinguishers to proper authority.

S-5.3.2 Access to Fire Extinguishers and Protection Devices

Maintain clear access to fire extinguishers, alarm boxes, and other fire protection devices. Do not park vehicles or place material within 25 feet of fire hydrants.

S-5.5 Fueling Vehicles, Machinery, and Equipment

While fueling vehicles, machinery, power tools, and other equipment:

- Stop engines (diesel locomotives excluded).
- Do not smoke.
- Avoid open flames.
- Do not leave fueling hose unattended when fueling.

Fuel gasoline-powered tools before use. If refueling is necessary during use, be careful to avoid spills and allow the engine to cool before refueling, since hot engine parts may ignite fuel.

While fueling, make sure the safety can spout or hose nozzle touches the side of the tank opening to prevent static electricity discharge. Only use safety cans to transport fuel.

S-5.6 Electrical Circuits

If you are not experienced in handling energized electrical circuits, do not attempt to extinguish fires on power line poles or directly connected equipment.

Never use water to extinguish fires on energized power line poles or electric equipment.

S-5.9 Refrigeration Systems

S-5.9.1 Qualified Employees

Only qualified employees may work on refrigeration systems.

S-7.0 Hand Tools

S-7.3 Precautions During Use

When using tools such as knives, chisels, and screwdrivers, direct sharp edges away from your body or hands.

S-7.5 Banding Material

Carefully handle banding material and tools as follows:

- Wear cut-resistant gloves to protect your hands from sharp corners of the cutting band.
- Use only band cutters to cut steel bands.
- Place scrap banding in suitable containers for disposal, or move it to a designated area.

S-7.7 Correct Tool Use

Use tools only for what they are designed to do. If unsure about a tool's correct use, ask your supervisor.

S-8.0 Intermodal Facility Safety

S-8.1 Gate Inspection

The gates at hub centers have concentrated movement of traffic. Gate inspectors need to be especially alert to equipment movement from all directions.

S-8.1.1 Inspection

Only qualified people may inspect equipment.

S-8.2 Hub Track Access Protection

Prevent access to the intermodal loading tracks using positive protection, where installed, in the form of a derail or switch lined away from the track and locked out. At locations where positive protection is not available, use approved systems and procedures to provide an indication of restriction to loading tracks.

Do not remove track access protection until all personnel and equipment are clear.

S-8.3 Power Rack Units

Do not plug or unplug cords while power rack is running.

S-8.3.1 Securing and Routing Cables

To prevent tripping, route cables under or around end sill platforms. To prevent whipping, chafing, or drooping, use clamps or nylon cable ties to secure power cables. When running cables between wells, leave sufficient slack to allow for drawbar movement.

S-8.4 Tractor/Trailer Operations

S-8.4.1 Protection

If trailer is protected, do not couple this equipment until protection has been removed. Provide visible protection for bare chassis at the end of trailer rows.

S-8.4.2 Signaling

Make sure all crew members understand all signals you may use.

S-8.4.3 Coupling Tractors to Trailers

Adjust trailer/chassis to proper height before attempting to connect trailer and tractor. Connect air line to trailer/chassis and set brakes before coupling.

S-8.4.4 Entering or Exiting Trailers

Use suitable ladder when entering or exiting trailer. Do not use ICC bumper as a step.

S-8.5 Trailer, Chassis and Container Repair

S-8.5.1 Protection

When working in or on equipment **in a shop**, display red stop sign on front of equipment until equipment is removed from shop.

When working in or on equipment **in other locations**, protect it and equipment on each side and directly behind, so they cannot be coupled into.

S-8.5.2 Jacking and Supporting Trailers

- Verify that jacks being used are stenciled with rated capacity.
- Check that jack has had current internal inspection every six months per OSHA requirements.
- Chock wheels securely on end opposite of end to be jacked.
- Make sure jacks are adequate for weight to be lifted.
- Use cushioning material between jack and equipment to prevent slipping. Do not allow metal-to-metal contact.

S-8.5.3 Repairing Trailers, Chassis and Containers

- Do not apply open flame to air lines, reservoirs, brake chambers, or valves when working on equipment brakes.
- Only authorized/qualified people may service, install, or remove refrigeration on air-conditioning systems.
- Do not put any substance other than air into brake lines when working on equipment brakes. (This includes antifreeze, alcohol and oil.)
- Support equipment on work stands or couple to a tractor when working on equipment with landing leg problems.
- Make sure tractor is turned off, brakes are set, and driver is out of cab when working on equipment coupled to a tractor.
- Do not use welder, cutting torch, or heating torch on loaded equipment unless a proper authority directs you to do so.

S-9.0 Ladders, Platforms, Scaffolds, and Aerial Baskets

S-9.1 Inspection

Before using a ladder, scaffold, platform, or elevated board, inspect it to make sure it is securely placed and capable of supporting a load. Do not use cross-grained or knotty lumber in any part of the device.

Before using ladders, inspect them for:

- Broken, cracked, or missing steps, rungs, or cleats.
- Broken side rails.
- Other defects.

Never use a defective ladder. Tag and mark it for repair or replacement. Do not paint wooden ladders or splice side rails.

S-9.2 Storage

Store ladders (except vehicle-carried ladders) where they will not be exposed to the weather.

S-9.3 Stage Boards

When using stage boards not securely fastened to the supports, do not let them extend more than 6 inches beyond the last support. Use stage boards equipped with end stops or drop pins to keep them in place on the supports.

S-9.4 Safety Feet

Use only portable straight ladders equipped with grippers, cleats, or nonslip safety feet suitable to the surface on which the ladder is placed.

S-9.5 Ladder and Scaffold Placement

Place a straight ladder so that the distance from the base of the ladder to the vertical plane of the support is approximately 1/4 the ladder length between the supports and ladder base.

When setting ladders or portable scaffolds:

- Extend the ladder side rails at least 3 feet above the surface you will be stepping onto.
- Place the legs on firm footing and secure them against movement.
- Do not lean legs against an unstable object.
- Do not place legs on boxes, barrels, or blocks for additional height.
- Secure the ladder or scaffold in position if it could move.
- Do not use ladders in a horizontal position as runways or scaffolds.
- Secure ladders used near a door, aisle, pathway, or roadway, or have a co-worker guard the ladder base. When using a ladder within the swing of a door, secure the door or have employee guard the ladder base.

S-9.6 Ladders for Electrical Work

Do not use metal ladders or scaffolds while working on energized electrical circuits. Use approved fiberglass or other type of approved nonconductive ladders.

S-9.7 Instructions for Climbing

When climbing:

- Always face ladders or scaffolding.
- Do not stand higher than the manufacturer's specifications dictate.
- Have only one person on a ladder at a time.
- Do not jump or slide from a ladder, scaffold, platform, or other elevated position.
- Do not move laterally from one ladder to another.
- Never overreach or attempt to "walk" a ladder.
- Keep the center of your body within the outside rails of the ladder.

S-9.7.1 Climbing with Tools or Materials

Do not climb ladders with tools or materials in your hands; use a hand line.

Position tools or materials on a scaffold or platform where they will not fall or be knocked off.

S-9.8 Performing Work

Do not work under a ladder.

S-9.9 Extension Ladders

Use only approved extension ladders, and use them as follows:

- Carefully raise them so that the top of the ladder safely overlaps the support by 3 feet minimum.
- Make sure guides and hooks are properly engaged.
- Do not splice short ladders together to make a longer one.

S-9.10 Step Ladders

Follow these instructions when using step ladders:

- Use only a fully open step ladder with spreaders properly set.
- Do not use step ladders taller than 10 feet unless another employee holds and steadies the ladder.

S-9.11 Construction Scaffolding

Use only scaffolds and suspended platforms constructed and maintained according to departmental instructions.

Do not stand on the handrails of any scaffold or platform to gain additional height.

S-9.11.1 Sectional Metal Scaffolds

Erect sectional metal scaffolding according to the manufacturer's instructions and adequately brace. Maintain outriggers in good working condition and protect from damage.

S-9.12 Non-Powered Mobile Scaffolding

When using non-powered mobile scaffolding:

- Do not ride rolling scaffolds.
- Secure or remove all material and equipment from the platform before moving the scaffold.
- Apply caster or wheel brakes at all times when a scaffold is stationary.
- Do not try to move the scaffold without help.

- Watch out for holes in the floor and for overhead obstructions when moving the scaffold.
- Follow the manufacturer's guidelines for adjusting screws.

S-9.13 Aerial Work Platforms

When working from aerial platforms, including scissor lifts and boom-mounted baskets or buckets:

- Check pathway and overhead for obstructions before moving the platform.
- Always stand firmly on the floor and do not sit or climb on the edge of the platform or use planks, ladders or other objects to increase reach.
- Do not exceed the manufacturer's rated safe load.
- Maintain a safe distance from high-voltage power sources.
- Do not modify the equipment without prior written approval from the manufacturer.

S-9.13.1 Scissor Lifts

When working from a scissor lift:

- Platform must be equipped with a guardrail and toeboards. Guardrails must be completely installed, in good condition and with gates fastened.
- Never climb or stand on toeboards or guardrails. Never hang outside the guardrails.
- If required by local or state law, a safety belt or harness must be worn that meets the same requirements as stated below in S-9.13.2. Safety belts may only be used for fall restraint in scissor lifts.
- Personnel using fall protection or restraint equipment must attend appropriate training.

When working from elevated platforms or scissor lifts, use only elevated platforms or scissor lifts equipped with a guardrail and toeboards.

S-9.13.2 Boom-Mounted Baskets or Buckets

When working from a boom-mounted basket or bucket:

- A safety belt or harness equipped with a lanyard that restrains personnel within the platform must be worn to prevent personnel from being ejected out of the platform.
- The lanyard must be secured to an anchor point designed and designated by the manufacturer for this use.
- Do not attach the lanyard to a pole, piece of equipment, or any other structure.
- Do not allow the platform to rest on or against any structure or equipment while working from the platform.
- Do not climb in or out of an elevated basket or bucket unless it is equipped with a door or a gate and the lift is positioned to provide safe access.
- On equipment designed primarily as personnel carriers, use only equipment with upper and lower platform controls where the lower controls can override the upper controls.
- Personnel using fall protection or restraint equipment must attend appropriate training.

S-11.0 Material Handling

S-11.1 Material Storage

S-11.1.1 Stacking Material

Store material neatly, interlocking it where possible to prevent shifting or falling. Do not store heavy materials on top of fragile or crushable materials. Material should be stored only on shelving or racks with sufficient rated capacity.

S-11.1.2 Overhead Clearance

Maintain a minimum of 18 inches of clearance below sprinkler heads so they can operate effectively in the event of a fire.

S-11.1.3 Storing Combustibles

Keep combustible materials away from a source of ignition.

S-11.1.4 Storage Racks

Secure material storage racks to the floor or a wall where there is a height-to-depth ratio greater than 3 to 1. If racks can be fastened together to achieve a 3-to-1 ratio, no securement is required. Inspect pallet racks and shelving on a regular basis.

S-11.2 Hand Trucks

When possible, push a hand truck rather than pulling it. However, if assisting someone, push the hand truck from the rear, not from the side, and stand where you can see ahead clearly.

When pulling a hand truck, do not jerk it to get over an obstruction; pull with a steady force. Do not walk backward while pushing or pulling a hand truck or wagon. Do not ride on hand trucks or wagons.

S-11.3 Pallet Use and Stacking

When stacking loaded pallets:

- Determine how much the material and packaging can support.
- Stack pallets only as high as the material on the bottom of the stack can support.
- Inspect pallets for damage and stability.

The forklift operator must warn others working near the stacking operations.

S-11.4 Loading and Unloading Cars, Trucks, and Trailers

When loading and unloading cars, trucks, and trailers:

- Chock wheels of cars, trucks, and trailers spotted at doors and platforms before loading or unloading.
- Use truck jacks at the front of trailers, in addition to chocking, where trailers are not attached to tractors.
- Make sure all transfer equipment (gangplanks, transfer plates, etc.) is properly secured before using it.
- Do not place gangplanks, transfer plates, or skids in doorways of cars coupled to a locomotive unless there is protection against movement.
- Do not load and unload a trailer truck while the tractor is being coupled or uncoupled.
- Trucks and trailers secured by an automatic locking bar hooked to the ICC Bar do not require chocks.

S-11.5 Sharp Edges

Eliminate sharp or ragged edges and nails on drums, cans, and kegs when using them as shipping containers.

S-11.5.1 Banding Material

Carefully handle banding material and tools as follows:

- Wear cut-resistant or leather gloves to protect your hands from sharp edges of banding.
- Use only band cutters to cut steel bands.
- Place scrap banding in suitable containers for disposal, or move it to a designated area.

S-11.6 Wheelsets

To stop mounted freight car or locomotive wheelsets:

- Stand on the trailing side of the wheelset and apply force to the axle to slow the movement.
- Do not hold the flange of the wheel.

> Do not walk in front of the mounted wheelsets or leave mounted wheelsets unattended until they are stopped and secure.

S-11.7 Hazardous Material Handling

S-11.7.1 Complying with Regulations

Handle all hazardous materials, wastes and substances as defined by the DOT and EPA, according to federal, state and local regulations and company policy. An authorized employee must supervise the task.

S-11.7.2 Loading or Unloading Tank Cars

When loading or unloading tank cars:

- Make sure cars are protected against movement when loading or unloading material.
- Set hand brake and chock wheels before loading or unloading.
- All tank cars must have a railing around the platforms where workers stand.
- Make sure the outlet valve is shut off.
- If material is flammable, use non-sparking wrenches. Do not smoke or generate sparks or open flames.
- Properly ground tank cars containing gasoline or other flammables.

S-11.7.3 Handling Fluorescent/Neon Tubes

Handle fluorescent or neon tubes carefully. If they break, do not inhale the dust and vapor. Dispose of in accordance with BNSF policy.

S-11.7.4 Disposing of Spray Containers

Carefully store and dispose of pressure spray containers. Do not expose them to excessive heat. Dispose of them per state law.

S-11.8 Forklifts

S-11.8.1 Parking Requirements

Do not park a forklift on a ramp or incline. When parking a forklift:

- Park the forklift clear of obstructions.
- Set the hand brake.
- Lower the forks.

S-11.8.2 Dismounting Forklift—Attended and Unattended Forklifts

When dismounting forklift and still in attendance of the equipment (within 25 ft. and forklift in sight):

- Bring the forklift to a complete stop.
- Place directional controls in neutral.
- Apply the parking brake, and if equipped with automatic brake, place in Park.
- Lower forks to the ground. (Exception: when task requires elevated load)
- Use three-point contact when climbing from forklift.
- Do not allow yourself or others to be directly in front or behind forklift, unless engine is shut off.

When leaving a forklift unattended:

- Lower forks to the ground.
- Shut off the engine.
- Remove the key (where security is a problem).
- Do not allow the forklift to foul tracks.
- Apply the parking brake, and if equipped with automatic brake, place in Park.

S-11.8.3 Passengers

Passengers are not allowed on forklifts unless the truck is equipped with passenger seat and seat belt.

S-11.8.4 Tool Storage

Do not place tools, material, or other objects on a forklift that may interfere with its operation.

S-11.8.5 Seat Belts

Use seat belts where provided.

S-11.9 Forklift Operation

S-11.9.1 Speed and Movement Restrictions

When operating a forklift:

- Reduce speed and sound the horn when rounding corners or passing doorways or congested areas.
- Watch for and avoid contact with overhead and side obstructions and high-voltage wires.
- Make sure the way is clear before moving in any direction.
- Bring a forklift to a complete stop before reversing direction.
- Look in both directions before crossing tracks. Where possible, cross diagonally.
- Operate the forklift backwards if the load obstructs your view.

S-11.9.2 Getting On or Off

Do not get on or off a moving forklift. Maintain a three-point contact when getting on and off forklifts.

S-11.9.3 Operation On Ramps

Back a loaded forklift slowly down ramps or inclines.

S-11.9.4 Gates/Doors

Do not use a forklift to open or close doors or gates on buildings.

S-11.9.5 Load Limits

Do not pick up loads that exceed the forklift's marked load capacity. Do not move the machine until the load is secured.

S-11.9.6 Unloaded Fork Position

When moving an unloaded forklift, keep the forks 18 inches or less from the floor or ground to avoid obstructions.

S-11.9.7 Personnel Baskets

When using personnel baskets:

- Use a forklift only as an elevator for employees (for example, to service light fixtures) when it is equipped with an approved work platform that meets OSHA standards.
- Always secure the approved basket to the mast guard when using forklift to lift personnel.
- Ensure that passengers stand only on the floor of the basket.
- Fork lift operator must stay at controls while basket is occupied.

S-11.9.8 Inspections

- Always do a safety inspection of a forklift before operating it the first time.
- Complete safety inspection records as required.
- Promptly report all defects for needed repairs to the proper authority.
- When defects are found, which affect the safe operation of a forklift, the forklift is to be red tagged, the key is to be removed and the defect immediately reported to the proper authority.

S-11.9.9 Fueling a Forklift

- Turn off the engine.
- See Rule S-5.8 for requirements regarding LPG tanks.

S-12.0 Motor Vehicles and Trailers

S-12.1 Operation of Motor Vehicles

S-12.1.1 General Requirements

Every company driver must:

- Know and obey local, state, and federal laws and regulations for operating vehicles, both on and off company property.
- Carry a required driver's license.
- Complete a vehicle log and inspection form, if applicable.
- Ensure that necessary emergency equipment, tools, and a fire extinguisher are in the vehicle and in good conditions.
- Use headlights any time the vehicle is moving.
- Do not exceed the manufacturer's specifications for speed.

S-12.3 Motorcycle Use

Do not use motorcycles to perform your duties or to deadhead.

S-12.4 Utility Vehicles

Complete a Utility Vehicle Safety Training Course prior to operating a utility vehicle.

When operating a utility vehicle:

- Wear seat belts where provided.
- Ensure that the utility vehicle is modified to limit maximum speed to 15 MPH or less.

S-12.5 Seat Belts

Seat belts must be worn according to the manufacturer's guidelines posted in the vehicle or equipment and must be worn while operating or riding in moving equipment or vehicles that are equipped with them. Lying down while wearing seat belts is prohibited.

S-12.6 Passengers

Do not transport unauthorized persons in a company vehicle except in an emergency.

Notify the driver before boarding any vehicle. Never get on or off of a moving vehicle except in an emergency.

S-12.7 Maintenance/Inspections

Drivers assigned to vehicles and trailers, and their managers or foremen, are equally responsible for maintenance, cleanliness, and inspections to ensure that the equipment operates properly and safely and complies with federal motor carrier safety regulations.

Any defects found during inspections that might prevent the vehicle from operating safely must be corrected by a trained person before the vehicle is used. All other defects must be repaired as soon as possible.

S-12.8 Backing

Position the vehicle, when possible, to avoid backup movement.

Before backing, inspect areas to the rear to ensure that no persons or obstructions are in the path of movement.

When backing vehicles other than automobiles and pickup trucks:

- Position someone near the back of the vehicle to guide movement, when available.
- Sound the horn three short blasts in vehicles not equipped with backup alarms.
- Stop if the person guiding the movement disappears from view.

S-12.9 Parking

When parking vehicles:

- Place standard transmission in low gear with engine shut off.
- Place automatic transmission in Park.
- Remove the ignition key, close the windows, and lock the doors if leaving the parked vehicle unattended. EXCEPTION: You may leave the engine of an unattended vehicle running, in cold weather, if you have a second set of keys.
- If parking on a grade, set the emergency brake and take other precautions to prevent the vehicle from rolling unexpectedly.

S-12.9.1 Fouling Tracks or Roadways

Except when necessary to perform duties, do not park vehicles or trailers where they foul tracks or roadways. If they do foul tracks or roadways, never leave them unattended without the proper protection.

S-12.10 Work Under Vehicles or Trailers

Do not sit or lie underneath vehicles or trailers, except when inspecting or repairing them, and then make sure that the:

- Brakes are set.
- Wheels are blocked.
- Engine is stopped.
- Proper support stands are in place.

Do not sit or lie under a raised vehicle or trailer supported only by a jack.

S-12.11 Transporting Tools and Material

Properly secure tools, equipment, material and freight. Do not transport hazardous materials, such as gasoline and solvents, in passenger compartments. Transport gasoline or other flammable material in a DOT-approved container. When transporting hazardous materials, follow federal and state placarding and shipping document regulations.

S-12.12 Special Equipment Mounted on Vehicles or Trailers

Only qualified personnel may operate special equipment, such as winches, cranes and hoists, mounted on vehicles or trailers. When operating vehicles with special equipment:

- Inspect the equipment frequently.
- Do not exceed load limits.
- Make sure outriggers are in place.
- Secure the equipment in the proper position before moving the vehicle.
- Comply with the manufacturer's instructions.

S-12.13 Trailers

S-12.13.1 Required Equipment

Trailers must be equipped with:

- Safety chains (except fifth-wheel or gooseneck trailers).
- Required stop, tail, directional, and clearance lights.
- Electrical connectors that are compatible in size and design with those on the designated towing vehicle.

2. **In-Terminal**—Hauling employees within a city and driving on roads with posted speed limits below 55 mph.

   When hauling employees in-terminal, the above railroad policy shall not apply.

3. **Combined Long Haul and In-Terminal**—In calculating the total hours of on-duty and drive time as required for adherence to the BNSF Policy for Long Haul drivers, both long haul and in-terminal on-duty and drive hours will be counted to determine whether a driver may be permitted to perform long haul service. When an employee goes from long haul to in-terminal service, the on-duty and drive time will not apply.

Crew Hauler Vehicle Checklist

Vehicle ID No. _____ Mileage _____ Date & Time _____

Inspected by _____ Signature _____

Vehicle shall be inspected daily by the driver and the inspection documented on this form. ALL ITEMS SHALL BE APPROPRIATELY MARKED (S, NS, or NA) FOR THIS INSPECTION TO BE COMPLETE. For any item marked NS, correct or protect the problem if possible and describe it and the action taken in "COMMENTS." If the problem cannot be corrected or protected, do not use the vehicle, and immediately notify your supervisor. This form is to be filed upon completion of the driver's shift and retained for 12 months.

__ Tire tread and inflation	__ Mirrors and windows clean	__ Clean and orderly
__ Door handles and locks	__ Windshield wipers and blades	__ First Aid kit
__ Trunk lock	__ Dash gauges working	__ Comm. equipment
__ Spare tire (inflated)	__ Fuel level	__ Brakes
__ Emergency road kit	__ Battery	__ Parking brakes
__ Snow chains	__ Engine temperature	__ Horn
__ Fluid levels (oil, etc.)	__ Interior lights	__ Back up alarm
__ Head, tail and brake lights	__ Air conditioning/heating	__ Seat belts
__ Turning signals	__ Tools and jack	__ Fire extinguisher
__ Emergency flashers	__ Traction devices	__ Radio operational
__ Baggage area (restraints)		

S = SATISFACTORY NS = NOT SATISFACTORY NA = NOT APPLICABLE

Comments: _____

_____

REMINDER: Always conduct a job safety briefing with passengers prior to departure.

S-13.0 On or Near Tracks, Locomotives and Rail Cars

S-13.1 General Requirements

S-13.1.3 Tracks

A. Crossing Tracks

When crossing tracks:

- Do not cross within 25 feet of the end of standing equipment.
- Do not cross in front of approaching equipment, unless you are sufficiently ahead of the equipment to cross safely.

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S-12.13.2 Inspection

Before towing trailers, inspect equipment and material loaded on the trailer, and inspect the following to make sure they are operable:

- Tires.
- Brakes (if equipped).
- Hitches and locking devices.
- Safety chains (if equipped).
- Electrical connections and lights.

If the vehicle and trailer hitch are not compatible in size and design, or if locking devices are defective, do not tow the trailer.

S-12.14 Accidents/Incidents

Promptly report traffic incidents, accidents, and vehicle damage, no matter how minor, to the proper manager.

S-12.15 Clerical Instructions for Transporting BNSF TY&E Crews

These requirements shall apply when operating a vehicle both on and off company property unless specifically stated otherwise.

S-12.15.1 General

1. New drivers must view the defensive driving and Operation Lifesaver videos before transporting crews. Within 60 days of accepting an assignment transporting crews, drivers must complete a state-certified defensive driving course and an Operation Lifesaver class. All drivers already transporting crews must view the defensive driving and Operation Lifesaver videos immediately and attend a state-certified defensive driving course and an Operation Lifesaver class within 60 days.
2. Contact the State Highway Authority before departure if there is any possibility of inclement weather. If either the driver or passengers feels that conditions may be unsafe for travel based on reported or actual weather conditions, they may immediately terminate the trip. Immediately notify the dispatcher and your supervisor if the trip is canceled or delayed.
3. All vehicles used to transport passengers shall be maintained in good repair, and shall be clean and in safe operating condition.

S-12.15.2 Before Operating the Vehicle

1. Inspect the vehicle daily before leaving the parking area, using the Crew Hauler Vehicle Checklist. If any item is not satisfactory (NS), correct the problem immediately and note it in the comments section. If the problem cannot be corrected or protected, notify your supervisor and do not drive the vehicle.
2. Restock any missing safety equipment.

S-12.15.3 When Picking Up Employees

1. Park the vehicle in a secure and accessible location. Park off public roadways whenever possible.
2. Secure the vehicle against movement by placing the vehicle in park (low gear if it is a manual transmission), engaging the parking brake, and shutting down the engine. If vehicle is not parked in a designated loading zone or parking lot, activate the vehicle flashers and place high visibility devices (flares or reflective triangles) in front of and behind the vehicle.
3. Assist passengers with baggage as requested. Make sure baggage is securely stowed against movement in the designated storage area.

4. Conduct a job safety briefing. The briefing must include, at a minimum, the location of emergency equipment, the results of the vehicle inspection, the route of travel, expected weather/road conditions, and how to obtain emergency assistance. Ask if anyone is First Aid/CPR qualified. Remind passengers of the no-smoking policy. If provided, the Division Superintendent's Job Safety Briefing audiocassette will be played to supplement the driver's trip-specific job safety briefing.
5. Do not move the vehicle until all luggage is stowed, doors are closed and locked, passengers are seated, and seat belts are fastened, properly securing passengers in an upright position.

S-12.15.4 When Traveling

1. Request assistance to direct the vehicle movement when backing if visibility is limited.
2. Do not play loud music or engage in conversation that would be a distraction from driving. Do not eat or drink while the vehicle is moving.
3. During inclement weather:
   - Slow down.
   - Do not use the cruise control.
   - Apply traction devices as needed (for example, snow chains).

   If requested, or if in your opinion it is unsafe to proceed, pull off the road at a secure location until the weather clears sufficiently to drive.
4. Proceed directly to the destination without any other stops unless directed by the train dispatcher or other designated railroad authority.
5. If any passenger removes any part of his or her seatbelt or lies back, stop the vehicle until the seatbelt is being worn correctly.
6. Crossings within yard facilities: Move at a speed that allows the vehicle to be stopped within 50 feet of and no closer than 15 feet (where possible) to the rail at any crossing. Listen and look in each direction for an approaching train or on-track equipment before proceeding over the crossing. Stop signs or other traffic control devices take precedence over these directions.

   Crossings outside yard facilities not equipped with automatic warning devices (lights, gates, bells or any combination thereof): Stop within 50 feet, but not less than 15 feet from the nearest rail. Look in both directions and listen for an approaching train or on-track equipment before proceeding over the crossing.

S-12.15.5 Crew Hauling On-Duty Time

The following shall apply to clerical employees required to haul crews:

1. **Long Haul**—Hauling employees from one city to another.

   Employee will adhere to the BNSF policy prohibiting drivers from transporting railroad employees at any time when:

   a. The driver has completed a total of ten (10) hours of driving since last obtaining eight (8) consecutive hours of off-duty time; or
   b. The driver's combined on-duty and drive time hours equal fifteen (15) hours since last obtaining eight (8) consecutive hours of off-duty time; or
   c. The total number of hours of on-duty and drive time exceeds seventy (70) hours in any period of eight (8) consecutive days.

   Whenever one of these three restrictions has been met, the driver must take a mandated eight (8) consecutive hours off-duty rest period.

While within the limits of a designated mechanical facility, when crossing between standing equipment that is not under blue signal protection:

Employee may cross within 25 feet of standing equipment, provided:

1. Speed limits for all equipment on the track is 5 MPH or less, and;
2. Check for movement is made prior to crossing track, and;
3. Distance is sufficient to allow safe passage should there be unexpected movement, and;
4. Designated walkways are used, when available.

B. Stepping On Rails

Step over, not on:

- Rails.
- Frogs.
- Switches.
- Interlocking apparatus.
- Connections.

Watch for conditions that could interfere with footing.

C. Fouling Track

Do not walk between rails or foul the track, except when duties require and proper protection is provided. Use caution during bad weather and when visibility is impaired.

S-13.1.4 Sitting or Standing

Comply with these restrictions for sitting or standing on equipment or structures:

- Do not sit on rails or track structures unless duties require.
- Do not stand, sit, or walk on top of or on the sides of any open top car such as gondola, hopper, ballast, or air dump cars.
- Do not sit on the steps of moving engines or cabooses.
- Do not sit or lie underneath or lean against standing equipment unless duties require, and only when proper safeguards are provided, such as blue signal protection.
- Do not stand or sit on engine or caboose handrails.

S-13.8 Fusees and Torpedoes

S-13.8.1 Storing Fusees and Torpedoes

Store fusees and torpedoes as follows:

- Store them in approved metal containers in motor vehicles and other designated equipment.
- Store them in flagging kits or racks in engines and cabooses.
- Do not leave them on floors, seats, or walkways.
- Keep them away from high temperatures, open flames, combustibles, and locations where they may become wet.
- Store them, when possible, in a locked compartment not intended for passenger occupancy where unauthorized persons cannot obtain them.

- At fixed facilities, keep fusees and torpedoes in original shipping containers, and store in a flammable storage cabinet meeting NFPA standards. Do not store other flammable or nonflammable material in the same cabinet. Store the minimum amount needed, but no more than a 60-day supply.

S-13.8.2 Disposing of Damaged Fusees and Torpedoes

Do not use fusees and torpedoes that have been soaked in water, oil, or otherwise damaged. Dispose of them appropriately.

S-15.0 Oxygen and Fuel Gas

S-15.1 Storing Gas Cylinders

Follow these requirements for storing gas cylinders:

1. Store oxygen, acetylene, and fuel gas cylinders with the valve end up.
2. When oxygen, acetylene, and fuel gas cylinders are not in use or when they are empty, close their valves tightly and put the protective cap in place.
3. Secure gas cylinders to protect them from damage. No more than three cylinders may be chained together.
4. Store gas cylinders in a well-ventilated area away from elevators, stairs, and gangways.
5. Separate oxygen cylinders from acetylene and other fuel gas cylinders as follows:
   - Separate them by at least 20 feet.

     or

   - Separate them with a noncombustible barrier at least 5 feet high with a fire resistance rating of at least a 1/2 hour.

     Exception: This does not apply to cylinders in use or ready for immediate use. Secure these cylinders in suitable racks or cabinets on trucks or in fixed locations.
6. Store oxygen cylinders at least 20 feet away from flammable material, especially oil, grease, paint, or any substance that could cause or intensify a fire. Do not store, use in, or convey oxygen through a paint shop or any paint storehouse.
7. Do not store gas cylinders near heat sources such as furnaces or boilers. In locations with extreme temperatures, screen gas cylinders stored outdoors from the sun.
8. Store empty and full gas cylinders separately. Mark empty cylinders as EMPTY or MT.

S-15.2 Testing for and Handling Leaks

S-15.2.1 Testing for Leaks

When testing for leaks, use soapy water with a nonfat base. Do not use an open flame.

S-15.2.2 Handling Leaks

If a welding gas cylinder is leaking:

1. Remove the cylinder to an open area away from possible ignition sources.
2. Allow the cylinder to drain completely.
3. Close the valve.
4. Tag the cylinder indicating the defect.
5. Return the cylinder to the supplier.

S-15.3 Mixing Gases

Do not mix gases in a cylinder or refill a cylinder.

S-15.4 Handling and Transporting Gas Cylinders

When handling or transporting gas cylinders:

1. Do not handle oxygen cylinders with oily or greasy hands or gloves.
2. Securely chain or clamp gas cylinders with valve ends up.
3. Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use.
4. Do not remove or change numbers or marks stamped on gas cylinders.
5. Gas cylinders may be difficult to carry by hand because of their shape, smooth surface, and weight. Gas cylinders may be rolled on their bottom edge but never dragged.
6. Follow these lifting restrictions:
   a. Do not lift a compressed gas cylinder with an electromagnet.
   b. Do not lift a gas cylinder by its valve cap.
   c. When using a crane or derrick to lift a gas cylinder, secure it to the crane hook with a cylinder sling or place it in a cradle or suitable platform.
7. Contact the gas supplier when you are unsure of how to properly handle a compressed gas cylinder or its contents.

When transporting compressed gas cylinders in a company vehicle on other than BNSF property:

1. Secure cylinders tightly with a chain, strap or equivalent device, and close cylinder valve.
2. Always secure cylinders in a closed compartment when available. Cylinders must not be placed or transported in a passenger-carrying compartment.

S-15.5 Changing Gas Cylinders

Before changing or disconnecting a gas cylinder, close the cylinder valve and individually drain hoses to remove any gas mixture. Do not open a cylinder valve unless the cylinder is secured.

S-20.0 Work Environment

S-20.1 Protection for Openings

Keep covers on drop pits, manholes, or similar openings. When necessary to remove the covers, use the proper barricades or guard rails to protect the opening.

Do not step or jump across pits, manholes, or similar openings.

S-20.2 Clearances and Obstructions

S-20.2.1 Overhead and Side Obstructions

Do not contact overhead or side obstructions on or near the right of way.

S-20.2.2 Communication/Signal Wires

Do not touch broken or sagging communication and signal wires, power lines, and guy wires. Repair wires and power lines only if you are qualified to do so. Do not use metal or metal-reinforced tape near wires.

S-20.3 Confined Space

Consider all confined spaces hazardous unless proven otherwise. All employees and subcontractors must have a permit before entering a permit-required confined space.

S-20.4 Machine Operation

Unauthorized persons must not be on hoists, machines, or any shop machinery, or distract employees operating such equipment.

S-20.5 Office Environment

S-20.5.1 Office Equipment Arrangement

Arrange office equipment to keep aisles and emergency exits clear.

S-20.5.2 Filing Cabinets and Desks

Arrange contents of filing cabinets to balance the cabinet.

Distribute contents throughout the cabinet rather than in the top drawer; place the heavier materials in the bottom drawer.

Arrange the material neatly and keep the cabinet and desk drawers closed while unattended.

Do not use the top of cabinets for storage.

S-20.5.3 Chairs

Do not scoot across floors or stand on chairs with casters. Keep all chair legs on the floor.

S-20.5.4 Cords

In walking areas, encase the telephone or electrical cords in cord protectors, or properly secure them.

S-20.5.5 Paper Cutters

Use paper cutters and other office equipment carefully, keeping body parts clear. Close and secure the paper cutter blade after use.

S-20.5.6 Reaching Overhead

Use a ladder or step stool to reach overhead objects.

S-21.0 Personal Protective Equipment and Clothing (PPE)

S-21.1 Personal Protective Equipment Requirements

All BNSF employees, contractors and their agents, visitors, and vendors must wear the following equipment while on BNSF property:

- Hard hats with minimum six-point suspension.

  Exception: If the hard hat currently being worn has fewer than six points of suspension, it may continue to be used until it is worn out or damaged. The replacement hard hat must have a minimum six-point suspension.

- Safety glasses with permanently mounted side shields and authorized by BNSF. Authorized tints for safety glasses are Rose #1 and #2 and Grey #1 indoors; Rose #1 and #2 and Grey #1, #2 and #3 outdoors. No other tinting is permitted. Mirror-like lenses and amber ("shooters") lenses are prohibited.
- Safety boots.
- Hearing protection (ear plugs/ear muffs) when entering designated hearing protection areas, while performing designated jobs/activities, or in situations where the noise requires you to raise your voice during normal conversation at a distance of 3 feet.

- Hand protection when there is a risk of exposure to harmful substances, punctures, severe abrasions, lacerations or cuts, chemical or thermal burns, high voltage, vibration, temperature extremes, or infectious biological agents.
- Enhanced-visibility work wear (reflective lime green, yellow, or orange) when working at derailment sites, grade crossings, on work trains, or at intermodal facilities. At intermodal facilities, checkpoint employees must wear enhanced-visibility vests. Roadway workers, when working on or near track, must wear at least one item of high-visibility, orange work wear. (At night, the work wear must be retro-reflective.) The following items meet high-visibility requirements: radio waist belt/harness, radio belt, striping, welding jacket, hard cap/hat with reflective markings, and hard cap/hat with high-visibility cover.

Exceptions

- Personal protective equipment (PPE) is not required in offices, automobiles on paved surfaces, or passenger-carrying rail cars.
- Hard hats: Not required for Train, Yard, and Engine (TY&E) employees except when performing work service with Maintenance of Way, at derailments, or as directed by supervisor. Not required in vehicles or equipment with overhead protection.
- Safety boots and safety glasses: Not required when excepted by contractual agreements.

Off-the-Job-Use

Employees are encouraged to use BNSF-provided personal protective equipment (PPE) off the job.

Other

Additional personal protective equipment, such as face shields, fall protection, welding jackets, etc., may be required by supervisors and/or as good safety practice warrants. See the PPE Chart for task-/exposure-specific personal protective equipment requirements and recommendations.

S-21.1.1 Approved Equipment

BNSF employees must use personal protective equipment approved by the company. Replace and discard any PPE that no longer provides protection. Refer to the PPE Chart for requirements and recommendations.

S-21.2 Personal Protective Clothing Requirements

All BNSF employees, contractors and their agents, visitors, and vendors, working in other than an office environment, must wear long pants and waist-length shirts with sleeves at all times. Clothing must not interfere with vision, hearing, or use of hands and feet.

- Do not wear jewelry, wrist watches, finger rings, long watches or key chains, key rings, or other suspended jewelry when they present a hazard around machinery or electrical lines and equipment.
- Hair must be secured out of the way if it could become entangled in machinery or obscure your vision.

S-21.2.1 Special Protective Clothing

Wear protective clothing when the potential for chemical or physical injury to the body exists.

S-21.2.2 Safety Boots

Safety boots must meet the following criteria:

- Leather or leather-like upper.
- Sturdy non-leather sole that will resist puncture.
- 3/8- to 1-inch defined instep.
- Rounded toe.
- Above ankle (5-inch height as measured from inside boot).

- Minimum ANSI Z41.1—75-pound (100 pounds in Canada) impact and compression class toe.
- Chemical resistant.
- Lace-up.

S-21.2.3 Protective Gloves

Wear protective gloves where the potential for chemical or physical injury to the hands exists. Use the PPE Chart and Work Glove Selection Guide to select the appropriate glove for the task. When selecting chemical-resistant gloves, check with your supervisor.

S-21.3 Respirator Selection and Use

Refer to the Respiratory Protection Chart to determine which task requires use of respirators. Your supervisor, safety manager, or the Industrial Hygiene group may specify additional tasks or activities not listed that require the use of respirators. For appropriate respirator selection, contact Industrial Hygiene.

S-21.3.1 Respiratory Protection Program

All BNSF employees who use a respirator must comply with the practices and procedures outlined in the Respiratory Protection program. If you use a respirator, even if such use is voluntary, you must:

- Be trained and fit-tested annually for the specific make and model of the respirator used.
- Be medically qualified annually.
- Be clean-shaven where the respirator seal meets the face.
- Inspect your respirator prior to use.
- Clean and properly store respirator following use.

S-21.4 Dark Lens Eye Protection

Except when welding or operating a torch, do not wear dark lens goggles or glasses at night or when working inside buildings/shops.

Photo-grey or transition lenses are not to be worn by personnel operating mobile equipment from outdoor to indoor locations, or by personnel who perform similar tasks requiring critical activity or fast reaction to visual stimuli.

S-21.5 Hearing Protection

Wear hearing protection if you work in the following areas:

- On a locomotive under load.

  Exception: When all doors and windows are closed, hearing protection is not required inside the control compartment of GE locomotives B40-8W, C40-8W, B40-8, and C44-9W, and EMD locomotives GP60M, SD60M, SD70M, and SD70MAC.
- Within 100 feet of humping or retarder operations.
- In a high-noise area required by posted notice or special instructions.
- In an area where continuous noise requires you to raise your voice to be heard at a distance of 3 feet.

Annual hearing conservation training and audiometric testing is mandatory for employees required to wear hearing protection on the job. Regardless of noise exposure, you are encouraged to participate in the hearing conservation program.

S-21.30 Personal Protective Equipment and Clothing Chart (PPE)

PPE Chart X = Required equipment # = May be required based on task and materials O = Recommended additional equipment	Hearing Protection	See Eye & Face Protection Chart	Protective Handwear (See Work Glove Selection Chart)	See Respiratory Protection Chart	Welder's Jacket or Sleeves	Spats, Leggings	Disposable Overalls	Rubberized Apron	Remarks/Special Requirements
Banding materials		X	X						
Breaking frozen material, (ice, ground, gravel, cinders, ballast, taconite, etc.) with hand tools		X	X						
Climbing poles and *rail/work equipment*		X	X						
Cutting rivets, bolts, or cotter keys, splitting nuts, etc.	X	X	X	#		#			
Dusty conditions		#		#			#		
Electrical hazard		X	#						Lineman's gloves required when working with high voltage (over 600 volts).
Fueling and sanding locomotives	X	X	O				O		
Hammer (punch)	X	X	O	#	#				Tool holder must be used.
Hand tools	O	X	O	#					
Handling chemicals or refrigerants, or in greasy conditions		X	X	#				#	
Handling or servicing storage batteries		X	X	O	X				
Intermodal facility - outside of offices	#	X	#						Enhanced visibility workwear must be worn. Checkpoint employees must wear enhanced visibility vests.
Lifting and carrying		X	O						
Striking, or striking with, hardened tools and fastenings	#	X	X	#		#			
Visitors	#	X	#						Wear PPE according to what the person performing the task is wearing.
Spraying/general use of cleaning agents; follow manufacturer's instructions.									

S-21.31 Eye and Face Protection Chart (PPE)

Eye and Face Protection Chart			
	Type of safety eyewear and facewear to be worn (properly tinted lenses must be used as required)		
	Basic Requirements	**More Severe Exposure**	**Remarks/ Special Requirements**
Banding materials	Safety glasses		
Breaking frozen ground, gravel, cinders, ballast, taconite, etc., with hand tools	Safety glasses or monoshield goggle	Faceshield over impact goggle	
Climbing poles and rail equipment	Safety glasses		
Cutting rivets, bolts, cotter keys, splitting nuts, etc.	Safety glasses	Impact goggle; or face shield over safety glasses	When working overhead, wear impact goggle and faceshield.
Dusty conditions	Safety glasses	Impact or monoshield goggle	
Electrical hazard	Safety glasses		
Fueling and sanding locomotives	Splash or monoshield goggle; or faceshield over safety glasses	Faceshield over splash goggle	
Hammer (punch)	Safety glasses	Faceshield over safety glasses or impact goggle	
Hand tools	Safety glasses	Impact goggle	
Handling chemicals or refrigerants, or in greasy conditions	Splash or monoshield goggle	Faceshield over splash goggle	
Handling or servicing storage batteries	Faceshield over splash goggle		
Intermodal facility	Safety glasses		
Lifting and carrying	Safety glasses		
Spraying and general use of chemicals	Splash goggle	Faceshield over splash goggle	
Striking, or striking with, hardened tools and fastenings	Safety glasses	Impact goggle	
Visitors exposed to eye hazards	Safety glasses	Impact goggle	Employee in charge may require that additional equipment be worn.

S-21.32 Work Glove Chart (PPE)

Work Glove Selection Guide									
X = Preferred glove O = Acceptable alternative	Brown Jersey	Canvas	Grip	Leather Palm	Vinyl-Coated Knit-Lined	Leather Driver's	Leather Mitten	Chemical Resistant	Cut Resistant
Banding material						X			X
Breaking or cutting frozen material (ice, ground, gravel, cinders, ballast, taconite, etc.) with hand tools		O	O	X	X	X			O
Climbing poles and rail/work equipment				O	O				
Cutting rivets, bolts, or cotter keys, splitting nuts, etc.			O	X		X			O
Fueling and sanding locomotives					O			X	
Hammer (punch)				O		X			X
Hand tools	O	O	O	O	O	O			O
Handling chemicals								X	
Handling/servicing storage batteries								X	
Intermodal facility	O	O	O	X	O	X	X	X	X
Lifting and carrying		O	X	X	O	X			X
Spraying or general use of cleaning agents								X	
Striking, or striking with, hardened tools and fastenings			X	O	X				O

S-21.33 Respiratory Protection Chart (PPE)

Respirators Used at BNSF X = see footnote 3 O = see footnote 4	Air Purifying Cartridges to Use with Reusable Half or Full Mask					
	Multi-Contaminant/ P100	P100-HEPA	Powered Air Purifying (PAPR)		Atmosphere Supplying	
			P100-HEPA	Multi-Contaminant/ P100	Supplied Air	Supplied Air Blasting Helmet
Asbestos (footnote 1)		X	X		X	
Ballast, sand, and taconite dust (visible)		X	X			
Dust or mist (nuisance)		O				
Pesticide/insecticide application	O					

1. Cutting, drilling, or otherwise disturbing asbestos-containing materials.
3. Required company-wide for operation or material. Specific selection will depend on protection factor of respirator, concentration of chemical agent, and individual's physical condition. Consult Industrial Hygiene for specific selection.
4. This would be an appropriate selection if a respirator is not required at a specific location but an individual would prefer to wear a respirator.
NOTE: This chart is for informational purposes only. It is NOT a guide for selecting respirator protection. Industrial Hygiene will determine the correct respirator configuration based on material, exposure, and task. Consult Industrial Hygiene for information on materials or operations not listed in this chart.

S-23.0 Railroad Radio Rules

S-23.1 Transmitting

Any employee operating a radio must do the following:

- Before transmitting, listen long enough to make sure the channel is not being used.
- Give the required identification.
- Not proceed with further transmission until acknowledgment is received.

S-23.2 Required Identification

Employees transmitting or acknowledging a radio communication must begin with the required identification. The identification must include the following in this order:

For base or wayside stations:

- Name or initials of the railroad.
- Name and location or other unique designation.

For mobile units:

- Name or initials of the railroad.
- Train name (number), engine number, or words that identify the precise mobile unit.
- If communication continues without interruption, repeat the identification every 15 minutes.

Short Identification

After making a positive identification for switching, classification, and similar operations within a yard, fixed and mobile units may use a short identification after the initial transmission and acknowledgment.

S-23.3 Repetition

An employee who receives a transmission must repeat it to the person transmitting the message, except when the communication:

- Concerns switching operations.
- Is a recorded message from an automatic alarm device.

  or

- Is general and does not contain any information, instruction, or advice that could affect the safety of a railroad operation.

S-23.4 Over

The employee transmitting must say, "Over" to the employee receiving the transmission when the communication is complete and a response is expected.

S-23.5 Out

The employee transmitting must give the required identification and say, "Out" to the employee receiving the transmission when the communication is complete and no response is expected.

S-23.6 Communication Not Understood or Incomplete

An employee who does not understand a radio communication or who receives a communication that is incomplete must not act upon the communication and must treat it as if it was not sent.

Exception: An employee who receives information that may affect the safety of employees or the public or cause damage to property must take the safe course. When necessary, stop movement until the communication is understood.

S-23.7 Monitoring Radio Transmissions

Radios in attended base stations or mobile units must be turned on to the appropriate channel with the volume loud enough to receive communications. Employees attending base stations or mobile units must acknowledge all transmissions directed to the station or unit.

S-23.8 Acknowledgment

An employee receiving a radio call must acknowledge the call immediately unless doing so would interfere with safety.

S-23.9 Misuse of Radio Communications

Employees must not use radio communication to avoid complying with any rule.

S-23.10 Emergency Calls

Emergency calls will begin with the words "Emergency," "Emergency," "Emergency." These calls will be used only to cover initial reports of derailments, collisions, storms, washouts, fires, track obstructions, property damage, or injury to employees or the public. Emergency calls must contain as much complete information on the incident as possible.

All employees must give absolute priority to an emergency communication. Unless they are answering or aiding the emergency call, employees must not send any communication until they are certain no interference will result.

When monitoring marine radios to allow water traffic to pass under or through railroad bridges, the words "Mayday" will be used by marine traffic for distress calls and "Pan-Pan" for urgency signals. Absolute priority is to be given over other communications when heard.

S-23.11 Prohibited Transmissions

Employees must not transmit a false emergency or an unnecessary or unidentified communication. Employees must not use indecent language over the radio. Employees must not reveal the existence, contents, or meaning of any communication (except emergency communications) to persons other than those it is intended for, or those whose duties may require knowing about it.

S-23.12 Fixed Signal Information

Employees must not use the radio to give information to a train or engine crew about the name, position, aspect, or indication displayed by a fixed signal, unless the information is given between members of the same crew or the information is needed to warn others of an emergency.

S-23.13 In Place of Hand Signals

When the radio is used instead of hand signals, information must include the direction and distance to be traveled.

Movement must stop within half of the distance specified unless additional instructions are received.

S-23.14 Transmitting Track Warrants and Track Bulletins

When transmitted by radio, track warrants and track bulletins must be transmitted according to applicable operating rules and the following:

- The train dispatcher must state that a track warrant or track bulletin will be transmitted.
- The employee must inform the train dispatcher when ready to copy. An employee operating the controls of a moving engine may not copy track warrants or track bulletins. In addition, track warrants or track bulletins must not be transmitted to the crew of a moving train if the conductor, engineer, or train dispatcher feels that the transmission could adversely affect the safe operation of the train. Within ABS territory, when train is operating on a block signal indication requiring movement at restricted speed or prepared to stop short of next signal, the train must be stopped before a track warrant extending the existing main track authority is copied.
- The employee receiving track warrants or track bulletins must copy them in writing using the format outlined in the operating rules.

S-23.15 Phonetic Alphabet

If necessary, a phonetic alphabet (Alpha, Bravo, Charlie, etc.) will be used to pronounce clearly any letter used as an initial, except initial letters of railroads.

S-23.16 Assigned Frequencies

The railroad must authorize any radio transmitters used in railroad service. Radio transmitters must operate on frequencies the Federal Communications Commission assigns the railroad. Employees are prohibited from using other transmitters or railroad frequencies not assigned to that particular territory.

S-23.17 Radio Testing

Employees must test the radios at the beginning of each shift to verify that the radios are working.

The radio test must include an exchange of voice transmissions with another radio. The test must confirm the quality of the radio's transmission.

S-23.18 Malfunctioning Radio

Malfunctioning radios must not be used. As soon as possible, notify each crew member and the train dispatcher or other affected employees that the radio is not working.

S-23.19 Blasting Operations

Employees must not operate radio transmitters located less than 250 feet from blasting operations.

S-23.20 Internal Adjustments

Employees are prohibited from making internal adjustments to a railroad radio unless they are specifically authorized by the FCC or hold a current Certified Technicians Certificate. Employees authorized to make adjustments must carry their FCC operator license, Certified Technicians Certificate, or verification card while on duty.

S-23.21 Mobile Radio Access System (MARS)

MARS is a radio system. Employees using the system must avoid using the MARS for personal business, including:

- Phone calls home.
- Access to tape-recorded crew lineup information.

S-25.0 Job Tools

S-25.1 Job Safety Briefing

Who

All individuals involved in a task.

What

A two-way communication tool to ensure that every team member is alert and focused on the job, knows what is to be done, and knows how it will be accomplished. If you see a better way to do the job or are not confident about what you will be doing, talk about it.

Why

To ensure that the job is done right the first time: without injuries or damage, and meeting BNSF standards.

When

At the beginning of the job or at any time during the job as conditions change or new tasks are started.

Where

On the job, at the work site, in the locker room, or wherever the whole crew can get together.

How

The following elements are essential to any job safety briefing:

- Statement of job.
- Assignment of tasks and responsibilities.
- Identification of existing and potential hazards.
- Required tools, equipment, and materials.
- Necessary safeguards and procedures.
- Feedback and questions.

When participating in a job safety briefing, be sure you leave the briefing knowing the answers to these questions:

- What will be doing?
- What is the plan of attack?
- What are the hazards?
- What safeguards must be used?
- What do I do if a hazard emerges?
- What special conditions should I watch for?
- When should we stop and re-brief?

Make room for special conditions: If the job is complex enough, brief it in portions. What portions work best? What changes in job conditions require a re-briefing?

Follow up: Each person must check frequently to see that the job is proceeding according to the plan as discussed in the job safety briefing and that any hidden hazards are identified and addressed. How do we make sure everyone stays alert?

S-25.2 Stretches

Overview

Check with your physician before beginning a new exercise program, or if you have had recent joint trouble, muscle problems, or surgery.

- Don't bounce.
- Keep the stretch mild and comfortable.
- Relax muscles as you stretch.
- BREATHE, don't hold your breath.
- Hold your stretch until tension releases, and then go further into another mild stretch.
- You should NEVER feel pain during or after a stretch.
- Stretch before you work, before any physical exertion and periodically to relieve muscle tension.
- A good rule of thumb is to stretch every 20 to 30 minutes.
- Don't forget to stretch both sides of the body when stretching.
- Tension for the initial stretch should release within 60 seconds. If it doesn't, reduce the intensity of the stretch slightly.

Benefits

- Increases range of motion, reducing risk of injury near joint limits.
- Warms muscles, reduces internal friction, and "resets" discs prior to activity.
- "Pre-fuels" muscles with oxygen before activity.
- Helps muscles relax and reduces soreness after activity.

Back of Leg

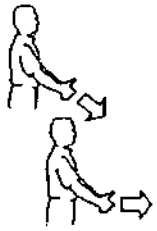
Put one foot forward, on heel. Bend back knee slightly. Bend forward at hips with straight back. Support upper body with hands on your bent knee. Arch your back slightly. Gently move your butt straight back to put tension on the back of leg.

Using chair for support, bend at the hips and keep the three natural curves of your back. Continue to bend forward at the hips until you feel mild tension in the muscles at the back of the leg.

Front of Hip

Place one foot forward. Keep your feet parallel to each other.Do not arch your back. Rotate your butt under until you feel mild tension in the front of hip of the straight leg.

Upper Back



Cup your hands together in front of you. With elbows slightly bent, move your cupped hands down. Move your cupped hands away from your body until you feel mild tension.

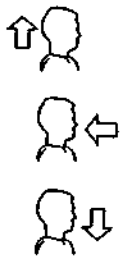
Foreman

Slowly bend or extend your wrist. You can do this either with or without a gentle pull from the opposite hand. Stretch until you feel mild tension in the forearms.

Shoulder and Arm

Let your arms hang comfortably at your sides. Slowly rotate your hand and arm outward until you feel mild tension. Rotate your arm and hand in the other direction until you feel mild tension. Repeat 5 times.

Back of Neck

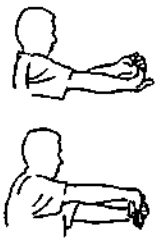


Stretch up as tall as you can through your spine. Tuck chin into neck. Lower your chin slightly until a mild stretch is felt. Hold until tension goes away.

Side of Neck

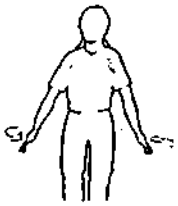
Stand or sit up with "Tall" posture. Tip ear toward shoulder. Hold mild stretch until tension goes away. Keep head tipped and rotate chin down towards shoulder. Hold until tension goes away. Lower chin towards shoulder. Hold until tension goes away.

Chest



Slowly round your shoulders and arms forward and back. Do 5 to 10 times each. Hold mild stretch in either position until stretch releases (up to 60 seconds).

Upper Arm and Lower Back



Stand up tall, stretching rib cage away from hips. Stretch your elbow upwards. Hold your stretch until tension goes away. Bend SLIGHTLY to opposite side, if needed, to increase stretch.

Tips for People Leading Stretches

Tell everyone that we have a new stretching routine to start using. It is based on some of the stretches we have used before and has been updated to cover all the major body areas, using techniques that should be both convenient and effective. When leading group stretches, be sure no one is bouncing or using extreme twisting motions as they stretch. You may want to diplomatically provide some corrective suggestions to people you see who seem to be having trouble understanding or doing any of the stretches.

Remind people that stretching is not a competition to see who can do the most or go the farthest. People have different levels of flexibility, and we need to respect these differences in ourselves, allowing each person to experience benefits at their own pace. It took your whole life to reach the level of flexibility (or inflexibility) you now have, so you should expect benefits to be gradual as you stretch regularly over time.

Remind people to check with their physician if they have particular problems with stretching, and to do only what they feel comfortable doing in the meantime.

S-26.0 Policies

S-26.1 Conflict of Interest

No officers or employees of the company may have personal interests which might conflict or appear to conflict with the interests of the company or its affiliates or which might influence or appear to influence their judgment in performing their duties. The outside activities and affairs of all officers and employees should be conducted so as to avoid loss or embarrassment to the company and its affiliates.

Employees must not engage in another business or occupation that would create a conflict of interest with their employment on the railroad or would interfere with their availability for service or the proper performance of their duties.

This policy is designed to foster a standard of conduct which reflects credit in the eyes of the public on the company, its officers, and its employees, and which protects the reputation and financial well-being of the company. There is no intent to interfere with the personal interests or activities of officers and employees.

S-26.3 Medical Examinations

The Medical Department will determine when medical examinations are necessary, the content of such examinations, and requirements for participation as the needs arise. Employees subject to these examinations must follow any and all requirements as issued.

S-26.4 Sexual Harassment

Employees on duty or on railroad property must not sexually harass others. Sexual harassment includes unwelcome sexual advances, requests for sexual favors, or other verbal or physical sexual conduct given under the following conditions:

1. An individual must submit to the conduct as a term or condition of employment.
2. If an individual submits to or rejects the conduct, that action is used to influence decisions affecting the individual's employment.

   or

3. The conduct interferes with an individual's work performance or creates an intimidating, hostile, or offensive work environment.

Employees who feel they have been sexually harassed must contact their manager, local Employee Relations, or Corporate Employee Relations.

S-26.6 Smoking

It is BNSF's policy to completely prohibit smoking on all enclosed properties by employees, customers, vendors, and guests. Outdoor smoking should not interfere with non-smokers' rights to clean air as they enter and leave buildings.

"Smoking" will mean inhaling, exhaling, carrying, or burning any lighted pipe, cigar, cigarette, or other item which emits smoke.

"Enclosed property" will mean all BNSF- owned or leased office space or buildings, shops, automobiles, rail or work equipment vehicles, locomotives, cabooses, and all other railroad rolling stock.

"Employee" will mean all exempt and scheduled employees and other persons working for BNSF as consultants, private contractors, temporary employees, or in similar capacities.

S-26.7 Telecommunication Usage

Objective

The objective of this policy statement is to provide guidance in the efficient and effective use of BNSF telecommunications systems.

Scope

This policy applies to all users of BNSF telecommunications, including, but not limited to, the BNSF network, cellular phones, 800 service, telephone calling cards, and facsimile transmissions. Contractors are considered "users" within the context of this document.

Policy

General

In order to meet the needs of our customers and minimize expense to the company, use of telecommunications services should be restricted to business communications. Personal use should be limited to necessary and urgent matters.

Telecommunications must arrange for all telephone, pager, and cellular services and equipment at all BNSF locations, as well as designate the desired providers of such services and equipment.

It is each user's responsibility to become familiar with the various features of the BNSF telephone system, and acquire the necessary skills to obtain maximum benefit from the telephone features in the execution of their jobs. It is also the responsibility of each user to utilize the most cost-effective service available. Telecommunications must make appropriate training and documentation available to the user community to facilitate the efficient and cost-effective use of the system features.

It is the responsibility of each department to establish usage expectations and guidelines within their respective departments, as well as to monitor compliance with the guidelines. This should include monthly self-assessment within the department by evaluating reports provided by telecommunications and/or service vendors.

Telecommunications must provide department heads with summary reports and access to detailed information to assist them in governing the utilization of services.

Each user is responsible for the reimbursement of charges associated with the personal use of company telecommunications facilities. The method of reimbursement must be addressed in instructions accompanying detailed statements of charges.

It is the responsibility of each department to monitor compliance with the reimbursement provisions of this policy.

Each user is responsible for the security of the telecommunications equipment, calling cards, and passwords provided for their use. The loss of any such item should be reported to Telecommunications immediately.

Misuse of BNSF's telecommunications system or services may result, without limitation, in termination of employment, suspension, or other disciplinary action.

Public Telephone Network and Long Distance Service

The BNSF telephone network must be used whenever possible for intra-company communications. The public telephone network should be used only when a desired location is not accessible through the BNSF network.

Calls placed through the public network are to be dialed direct. Operator assistance must be avoided whenever possible.

Directory Assistance should be used only when a listing is not available from a published directory or such a directory is not available.

Calls to "pay-per-call services" (1-900, 976-, etc.) and 1-800 calls that are charged back must not be made.

800 Service

Calls to BNSF's various 800 numbers, while provided at no cost to the calling party, are paid for by the BNSF. Therefore, 800 numbers must not be used when calls can be placed using the BNSF network. Furthermore, local telephone numbers should be used rather than 800 numbers whenever possible.

Users provided with 800 numbers to access the BNSF network should use this service only from locations where local access to the network is not available.

Cellular Phones

All cellular phones provided by BNSF must be obtained through Telecommunications, subsequent to written department head approval. Any transfer or reassignment of company-provided cellular equipment must be handled through Telecommunications.

Each user must review the detailed statement of charges for cellular service on a monthly basis, and take action to report billing errors, unauthorized usage, and further seek to reduce service costs by optimizing use, considering business needs.

Telephone Calling Cards

Telecommunications will issue telephone calling cards to employees, subsequent to written department head approval.

Each user must review the detailed statement of calling card charges on a monthly basis and take action to report billing errors and unauthorized use to Telecommunications.

Facsimile Machines

Facsimile transmissions will utilize the BNSF network whenever possible. Programmable facsimile machines must be programmed with BNSF network numbers to maximize the economy of the network.

Telephones associated with facsimile machines must be used only for fax-related purposes.

Modems

Modems will utilize the BNSF network whenever possible. Modem communication software must be programmed with BNSF network numbers to maximize the economy of the network.

Telephones associated with modems must be used only for data communications-related purposes.

Foreign Equipment

Devices not provided by Telecommunications must not be connected to any network location without first consulting with Telecommunications.

Voice Messaging (Phone Mail)
A separate policy governing the use of the Phone Mail system is available from Telecommunications.

The Phone Mail system must not be used for business purposes not directly related to BNSF.

Each user is responsible for maintaining Phone Mail security by utilizing a unique and confidential password. Users must not attempt to gain access to mailboxes for which they are not authorized.

Pagers
All pagers provided by BNSF must be obtained through Telecommunications, subsequent to written department head approval. Any transfer or reassignment of company-provided pagers must be handled through Telecommunications.

Audio and Video Teleconferencing
Audio and Video Teleconferencing are available and may be used as an alternative to travel. The use of these services must be arranged for by Telecommunications.

S-26.8 Complete and Accurate Reporting of All Accidents, Incidents, Injuries, and Occupational Illnesses Arising from the Operation of the Railroad

The Burlington Northern Santa Fe (BNSF) Railway is committed to complete and accurate reporting of all accidents, incidents, injuries, and occupational illnesses arising from the operation of our railroad. Harassment or intimidation of any person that is calculated to discourage or prevent such person from receiving proper medical treatment or from reporting an accident, incident, injury, or illness has not and will not be permitted or tolerated.

The BNSF requires all employees to take a responsible, safe approach to their duties in safeguarding the public and corporate trust. Steps taken to enhance a sense of personal responsibility for safe work practices, including training, coaching, and counseling employees found to have engaged in unsafe work practices or rules violations, is not a violation of this Internal Control Policy (ICP).

Further, holding employees accountable, through a reasonable discipline program, for rules violations reinforces the serious nature of their actions. This good faith assessment of discipline, in compliance with the BNSF "Policy for Employee Performance Accountability," does not violate this ICP. The BNSF Labor Relations Team should be contacted if any doubt exists about the application of the BNSF "Policy for Employee Performance Accountability."

BNSF Safety Rules require timely reporting of all injuries and incidents. Every employee has an absolute right and obligation to report injuries and incidents to the appropriate BNSF authority. At no time shall any employee be subjected to harassment or intimidation to discourage or prevent such person from receiving proper medical treatment or from reporting an accident, incident, injury or illness. Reporting determinations are the sole purview of the BNSF Director of Reporting and Analysis.

Any employee who feels he or she has been the subject of harassment or intimidation in violation of the Corporate reporting policies is encouraged to use the Burlington Northern Santa Fe Internal Complaint Resolution Procedure without fear of harassment or reprisal. Employees who report violations of this policy will not be subject to harassment or reprisal for making the report.

Officers of the company hold a position of trust with respect to the execution of their duty to appropriately apply all company policies. Violation of that trust will be viewed as a serious breach of trust and, if such allegations are sustained through the Resolution Procedure, will constitute cause for significant penalty and possible dismissal.

S-26.9 Equal Employment Opportunity Policy and Program

Burlington Northern Santa Fe's commitment to Equal Employment Opportunity and Affirmative Action is shaped by our philosophy to treat individuals with respect and dignity; maintain an atmosphere free from harassment in which every person can contribute to the maximum of his or her potential; and foster an Equal Employment Opportunity work environment. Our Affirmative Action Programs protect all groups, including Minority and Female Business Enterprises, specified by such orders and regulations and are based on applicable laws, regulations and Executive Orders prohibiting employment discrimination.

All employment decisions and personnel actions including those related to hiring, compensation, benefits, promotions, transfers, layoffs, recall from layoffs, termination's, company-sponsored training, education, tuition assistance, and social and recreational programs shall be administered in accordance with the principle of equal employment opportunity and made solely on the basis of job-related criteria without regard to race, color, religion, sex, age, national origin, sexual preference, disability, or veteran status.

I cannot stress enough how we all must actively participate in implementing our Affirmative Action Policy and Program. All job applicants and employees need and desire an equal opportunity to demonstrate their qualifications for employment or advancement. At Burlington Northern Santa Fe, qualified minorities and females will be afforded these opportunities whenever they exist.

If there is ever any indication of non-support of this policy or failure to implement our Affirmative Action Policies, appropriate management personnel will personally intervene and initiate measures to correct any procedure or decision that is not in compliance with the purpose and spirit of this Equal Employment Opportunity Policy and Program.

The Senior Vice President, Employee Relations, is designated as the Corporate EEO Compliance Executive. It is the responsibility of each Division Superintendent and Departmental Vice President (or equivalent) to see that all aspects of our Affirmative Action Programs are implemented within their respective divisions and departments throughout Burlington Northern Santa Fe.

Signed by Robert D. Krebs
President and Chief Executive Officer

S-26.10 Vietnam Era Veterans and Disabled Veterans Policy

Burlington Northern Santa Fe's commitment to Equal Employment Opportunity and Affirmative Action is shaped by our philosophy to treat individuals with respect and dignity; maintain an atmosphere free from harassment in which every person can contribute to the maximum of his or her potential; and foster an Equal Employment Opportunity work environment. Our Affirmative Action Programs are based on applicable laws, regulations, and Executive Orders prohibiting employment discrimination. One facet of our Affirmative Action Program focuses on our concern and commitment for the qualified Vietnam Era veteran or disabled veteran employee or applicant.

All employment decisions and personnel actions including those related to hiring, compensation, benefits, promotions, transfers, layoffs, recall from layoffs, termination's, company-sponsored training, education, tuition assistance, and social and recreational programs shall be administered in accordance with the principle of equal employment opportunity and made solely on the basis of job-related criteria without regard to status as a Vietnam Era veteran or disabled veteran.

I cannot stress enough that we all must actively participate and work to implement our Affirmative Action Policy and Program. All executives, managers and supervisors should understand that we look to them for leadership and responsibility in adhering to our Equal Employment Opportunity objectives. All individuals need and desire an equal opportunity to demonstrate their qualifications for employment and advancement. At Burlington Northern Santa Fe, qualified Vietnam Era veterans and disabled veterans will be afforded these opportunities whenever they exist. Reasonable accommodations will be made when they do not create an undue hardship on our operations.

If there is ever any indication of non-support of this policy or failure to implement our Affirmative Action Policies, appropriate management personnel will personally intervene and initiate measures to correct any procedure or decision that is not in compliance with the purpose and spirit of the Equal Employment Opportunity Policy and Program.

The Senior Vice President, Employee Relations, is designated as the Corporate EEO Compliance Executive. It is the responsibility of each Division Superintendent and Departmental Vice President (or equivalent) to see that all aspects of our Affirmative Action Programs are implemented within their respective divisions and departments throughout Burlington Northern Santa Fe.

Signed by Robert D. Krebs
President and Chief Executive Officer

S-26.11 Qualified Disabled Individuals Policy

Burlington Northern Santa Fe's commitment to Equal Employment Opportunity and Affirmative Action is shaped by our philosophy to treat individuals with respect and dignity; maintain an atmosphere free from harassment in which every person can contribute to the maximum of his or her potential; and foster an Equal Employment Opportunity work environment. Our Affirmative Action Programs are based on applicable laws, regulations, and Executive Orders prohibiting employment discrimination. One facet of our Affirmative Action Program focuses on our concern and commitment for the qualified disabled employee or applicant.

All employment decisions and Human Resources actions including those related to hiring, compensation, benefits, promotions, transfers, layoffs, recall from layoffs, termination's, company-sponsored training, education, tuition assistance, and social and recreational programs shall be administered in accordance with the principle of equal employment opportunity and made solely on the basis of job-related criteria without regard to disability status.

I cannot stress enough that we all must actively participate and work to implement our Affirmative Action Policy and Program. All executives, managers and supervisors should understand that we look to them for leadership and responsibility in adhering to our Equal Employment Opportunity objectives. All individuals need and desire an equal opportunity to demonstrate their qualifications for employment and advancement. At Burlington Northern Santa Fe, qualified disabled individuals will be afforded these opportunities whenever they exist. Reasonable accommodations will be made when they do not create an undue hardship on our operations.

If there is ever any indication of non-support of this policy or failure to implement our Affirmative Action Policies, appropriate management personnel will personally intervene and initiate measures to correct any procedure or decision that is not in compliance with the purpose and spirit of this Equal Employment Opportunity Policy and Program.

The Senior Vice President, Employee Relations, is designated as the Corporate EEO Compliance Executive. It is the responsibility of each Division Superintendent and Departmental Vice President (or equivalent) to see that all aspects of our Affirmative Action Programs are implemented within their respective divisions and departments throughout Burlington Northern Santa Fe.

Signed by Robert D. Krebs
President and Chief Executive Officer

S-27.0 Programs

To learn more about when and where you can get involved in these programs, contact your supervisor or safety manager.

S-27.1 Asbestos Control

The Asbestos Control program works to provide the safe handling and eventual elimination of asbestos-containing material (ACM) at BNSF. Its elements include the identification and labeling of existing ACM, training, error-monitoring, use of specific work practices, use of the necessary equipment and materials, material substitutions using less hazardous materials, and the use of experienced ACM removal contractors.

S-27.2 Back Conservation

The Back Conservation program fosters a healthy lifestyle for BNSF people around the clock. The program's training component promotes an understanding of how the back works and of how nutrition, rest, activity, and conditioning contribute to a pain-free back. The program's quality-improvement component continually seeks, studies, and acts upon recommendations for modifications of work practices and equipment.

S-27.3 Bloodborne Pathogens Exposure Control

The Bloodborne Pathogens Exposure Control program provides information, training, equipment, safe work practices, and immunizations necessary to minimize exposure and subsequent ill effects. The intended audience is BNSF people who, by the nature of their jobs, have reasonable potential of skin, mucous membrane, or parenteral contact with blood or other potentially infectious materials.

S-27.4 Confined Space

BNSF's Confined Space program guides BNSF people who are involved in confined space activities. Confined spaces include, but are not limited to, sewers, tanks, underground utility vaults, covered hopper cars, and some pits and excavations. The program's safe work practices and training include criteria for identifying and classifying confined spaces, the hazards of confined space work, the precautions to be taken when entering or occupying a confined space, and the maintenance and use of the instruments and equipment used to safely perform confined space work. Employees who perform confined space-related activities must maintain current status in Confined Space training.

S-27.5 Electrical Safety

The Electrical Safety program was developed for BNSF people who work with or around electrical-powered equipment or energized systems, but who are not electricians. Program content includes the fundamentals of electricity and how it affects the human body, hazardous locations, methods for preventing electrical shock, electrical safety issues specific to various facilities, and emergency procedures in case of electrical shock.

S-27.6 Exposure Assessment

Periodic employee exposure assessments are conducted by Industrial Hygiene to evaluate employees' exposures to chemical, physical, or biological agents. These assessments are performed to determine if new materials or a change in tools or work practices increases health or safety risks. These assessments also keep employees informed about and alert to safety and health in their work environment.

S-27.8 Forklift Safety

The Forklift Safety program stresses safety in the performance of material-handling duties, and it introduces new employees to the history and operations of material-handling equipment. The training illustrates safe operational practices as well as some of the special techniques required to maneuver and operate in a warehouse or similar environment. Special effort is made to make operators aware of the extra alertness required when operating material-handling equipment around personnel on foot and to avoid collisions with other material-handling equipment and other hazards that might be encountered.

S-27.9 Hazard Communication

The Hazard Communication program teaches BNSF people to recognize chemical hazards found at work and at home, to know the labeling requirements for containers holding chemicals and the precautionary measures they can take to avoid injury and illness. Employees also learn how to obtain and read a Material Safety Data Sheet (MSDS) which details health and safety information on chemical substances. The program includes formal training, a written policy, access to MSDS in the workplace, and container labeling.

S-27.10 Hazardous Materials Training

In accordance with Subpart H, Part 172 of Title 49, Code of Federal Regulations, hazardous materials employees must receive appropriate training every two years. Hazardous materials employees are those employees who have job functions that can either affect or be affected by the transportation of hazardous materials. Those employees who are affected by the transportation of hazardous materials must receive awareness and safety training. Those employees who handle and transport hazardous materials must receive function-specific training in addition to awareness and safety training. Hazardous materials employees employed on or before July 2, 1993, must have received training prior to October 1, 1993. Those employed after July 2, 1993, must receive the training within 90 days after employment.

S-27.11 Hearing Conservation

The Hearing Conservation program focuses on the prevention of hearing loss that could be caused by noise both on and off the job. This program has four parts: identification and assessment of on-the-job noise exposure, educational sessions on the causes of hearing loss and precautionary measures, annual audiometric evaluations, and implementation of noise control and hearing protection measures.

S-27.13 Lockout/Tagout (LOTO)

The LOTO program was developed to protect BNSF people from possible injury caused by sudden movement, startup, or release of energy in equipment, machinery, or systems during servicing, maintenance, or calibration. The program features BNSF's LOTO practice, which defines requirements and helps participants develop their sight-specific Hazardous Energy Control Plan (HECP). Contact your supervisor or Safety Manager to obtain a copy of your local HECP.

S-27.14 Policy for Employee Performance Accountability

The Policy for Employee Performance Accountability replaces the Progressive Discipline Policy, Progressive Intervention, and other current discipline programs. The Policy's goal is to eliminate all rule violations through coaching, counseling, and training. The policy applies to all operating and non-operating scheduled employees, as well as those employees in Accounting, Customer Service and Support, and Information Services.

Under this policy, most rule violations will be addressed according to standard practices that reflect the employee's work record and the nature of the rule violation. Employees may be able to "work off" a portion of a suspension through training. Strict limits are placed on the amount of discipline that may be issued at each level. Supervisors must consult with the Manager of Discipline before issuing any substantial discipline. Dismissal cases are subject to review by a board of senior management representatives. Employee feedback about the Policy for Employee Performance Accountability is welcomed.

S-27.15 Respiratory Protection

The Respiratory Protection program was developed for BNSF people to prevent inhalation of airborne contaminants which could cause irritation, respiratory problems, or other illness. The program offers a selection of respiratory protection devices and provides training on each device's effective use, limitations, and maintenance. Fit testing is provided for all devices to verify adequate seals for particular devices. Individuals required to wear respiratory protection are also evaluated medically to verify their physical fitness to use a respirator.

S-27.16 Safety Risk Evaluation

Safety Risk Evaluation is a continuous safety improvement program whose goal is to assure understanding of and commitment to safe working practices by all BNSF people. Designed for use in safety marathons or briefings and in toolbox meetings, the program presents key performance criteria on various subjects related to major craft activities. Safety Risk Evaluation can also be used in a standard training setting. Interaction among participants essential to program success. The Safety Risk Evaluation manual is available from your supervisor.

S-27.17 Temperature Extremes

BNSF's Heat Stress Prevention Program is an awareness program that outlines the signs, symptoms, and prevention methods of heat-related illnesses, such as heat stroke, heat exhaustion, heat cramps, and heat fainting.

S-28.0 General Responsibilities

S-28.1 Safety

Safety is the most important element in performing duties. Obeying the rules is essential to job safety and continued employment.

S-28.1.1 Maintaining a Safe Course

In case of doubt or uncertainty, take the safe course.

S-28.1.2 Alert and Attentive

Employees must be careful to prevent injuring themselves or others. They must be alert and attentive when performing their duties and plan their work to avoid injury.

S-28.1.3 Accidents, Injuries, and Defects

Report by the first means of communication any accidents; personal injuries; defects in tracks, bridges, or signals; or any unusual condition that may affect the safe and efficient operation of the railroad. Where required, furnish a written report promptly after reporting the incident.

S-28.1.4 Condition of Equipment and Tools

Employees must check the condition of equipment and tools they use to perform their duties. Employees must not use defective equipment or tools until they are safe to use. Employees must report any defects to the proper authority.

S-28.1.5 Inspection After Derailment

After derailed equipment has been rerailed, employees must check the condition of the track to ensure that it is safe for the equipment to proceed.

S-28.2 Personal Injuries and Accidents

S-28.2.1 Care for Injured

When passengers or employees are injured, do everything possible to care for them.

S-28.2.2 Witnesses

If equipment is involved in personal injury, loss of life, or damage to property, the employee in charge must immediately secure the names, addresses, and occupations of all persons involved, including all persons at the scene when the accident occurred and those that arrived soon after. The employee in charge must secure the names regardless of whether these persons admit knowing anything about the accident.

The employee in charge must also obtain the license numbers of nearby automobiles. When necessary, other employees can assist in obtaining this information, which must be included in reports covering the incident.

Where signaling devices are provided or a flagman is on duty, the employee in charge and assisting employees must try to determine who, among the witnesses, can testify whether the signaling devices were functioning properly or if the flagman was performing his duties properly.

When possible, obtain the names of witnesses who can testify about the bell and whistle signals.

S-28.2.3 Equipment Inspection

If an accident results in personal injury or death, all tools, machinery, and other equipment involved, including the accident site, must be inspected promptly by the foreman, another person in charge of the work, or other competent inspectors. The inspector must promptly forward to his manager a report of the inspection. The report must include the condition of the equipment and the names of those making the inspection.

The person in charge must secure and maintain custody of the equipment involved, until the Claims Department is contacted and determines disposition.

S-28.2.4 Mechanical Inspection

When engines, cars, or other equipment are involved in an accident that results in personal injury or death, the equipment must be inspected before it leaves the accident site.

A mechanical department employee must further inspect the equipment at the first terminal. This employee must promptly report inspection results to the proper manager.

S-28.2.5 Reporting

A. Injuries to Employees

All cases of personal injury, while on duty or on company property, must be immediately reported to the proper manager and the prescribed form completed.

If after the initial report of an injury, employees seek medical attention for a work-related injury, they must contact the appropriate supervisor and update their status.

A personal injury that occurs while off duty that will in any way affect employee performance of duties must be reported to the proper manager as soon as possible. The injured employee must also complete the prescribed written form before returning to service.

B. Injuries to Non-Employees

All injuries to non-employees (passengers, trespassers, etc.) on company property that do not result from an on-track equipment accident must be immediately reported to the proper manager and the prescribed form completed.

C. Employees with Information Concerning Injuries

Employees with information concerning an accident or injury to themselves, another employee, or a non-employee must immediately report the information to the proper manager and complete the prescribed form.

D. On-Track Equipment Accidents

All accidents (collisions, derailments, rail-highway grade crossing accidents, etc.) involving on-track equipment must be immediately reported to the proper manager and the prescribed form completed.

E. Other Accidents Involving Damage or Loss

All other accidents (theft, vandalism, company vehicle accidents, fires, etc.) involving damage or property loss that do not result from on-track equipment accidents must be immediately reported to the proper manager and the prescribed form completed.

S-28.2.6 Statements

Except when authorized by the proper manager:

- Information concerning accidents or personal injuries that occur to persons other than employees may be given only to an authorized representative of the railroad or an officer of the law.
- Information about the facts concerning the injury or death of an employee may be given only to the injured employee, an immediate relative of the injured or deceased employee, an authorized representative of the railroad, or an officer of the law.
- Information in the files or in other privileged or confidential reports of the railroad concerning accidents or personal injuries may only be given only to an authorized representative of the railroad.

S-28.2.7 Furnishing Information

Employees must not withhold information, or fail to give all the facts to those authorized to receive information regarding unusual events, accidents, personal injuries, or rule violations.

S-28.3 Rules

S-28.3.1 Rules, Regulations, and Instructions

Safety Rules. Employees must have a copy of, be familiar with, and comply with all safety rules issued in a separate book or in another form.

General Code of Operating Rules. Employees governed by these rules must have a current copy they can refer to while on duty.

Hazardous Materials. Employees who in any way handle hazardous materials must have a copy of the instructions or regulations for handling these materials. Employees must be familiar with and comply with these instructions or regulations.

Air Brakes. Employees whose duties are affected by air brake operation must have a copy of the rules and instructions for operating air brakes and train handling. Employees must know and obey these rules and instructions.

Timetable/Special Instructions. Employees whose duties are affected by the timetable/special instructions must have a current copy they can refer to while on duty.

Train Dispatchers and Control Operators. The train dispatchers and control operators must have a copy of the rules and instructions for train dispatchers and control operators. They must be familiar with and obey those rules and instructions.

Classes. Employees must be familiar with and obey all rules, regulations, and instructions and must attend required classes. They must pass the required examinations.

Explanation. Employees must ask their supervisor for an explanation of any rule, regulation, or instruction they are unsure of.

S-28.4 Carrying Out Rules and Reporting Violations

Employees must cooperate and assist in carrying out the rules and instructions. They must promptly report any violations to the proper supervisor. They must also report any condition or practice that may threaten the safety of trains, passengers, or employees, and any misconduct or negligence that may affect the interest of the railroad.

S-28.5 Drugs and Alcohol

The use or possession of alcoholic beverages while on duty or on company property is prohibited. Employees must not have any measurable alcohol in their breath or in their bodily fluids when reporting for duty, while on duty, or while on company property.

The use or possession of intoxicants, over-the-counter or prescription drugs, narcotics, controlled substances, or medication that may adversely affect safe performance is prohibited while on duty or on company property, except medication that is permitted by a medical practitioner and used as prescribed. Employees must not have any prohibited substances in their bodily fluids when reporting for duty, while on duty, or while on company property.

S-28.6 Conduct

Employees must not be:

1. Careless of the safety of themselves or others.
2. Negligent.
3. Insubordinate.
4. Dishonest.
5. Immoral.

6. Quarrelsome.

   or

7. Discourteous.

S-28.6.1 Suitable Language

Employees on duty must refrain from using boisterous, profane, sexist, or vulgar language.

S-28.7 Altercations

Employees must not enter into altercations with each other, play practical jokes, or wrestle while on duty or on railroad property.

S-28.8 Appearance

Employees reporting for duty must be clean and neat. They must wear the prescribed uniform when required.

S-28.9 Respect of Railroad Company

Employees must behave in such a way that the railroad will not be criticized for their actions.

S-28.10 Games, Reading, or Electronic Devices

Unless permitted by the railroad, employees on duty, must not:

- Play games.
- Read magazines, newspapers, or other literature not related to their duties.

  or

- Use electronic devices not related to their duties.

S-28.11 Sleeping

Employees must not sleep while on duty. Employees reclined with their eyes closed will be in violation of this rule.

S-28.12 Weapons

While on duty or on railroad property, employees must not have firearms or other deadly weapons, including knives with a blade longer than 3 inches. Employees may possess these weapons only if they are authorized to use them to perform their duties, or if they are given special permission by the designated manager.

S-28.13 Reporting and Complying with Instructions

Employees will report to and comply with instructions from supervisors who have the proper jurisdiction. Employees will comply with instructions issued by managers of various departments when the instructions apply to their duties.

S-28.14 Duty—Reporting or Absence

Employees must report for duty at the designated time and place with the necessary equipment to perform their duties. They must spend their time on duty working only for the railroad. Employees must not leave their assignment, exchange duties, or allow others to fill their assignment without proper authority.

Employees must not be absent from duty without proper authority. Except for a scheduled vacation period, authorized absence in excess of ten (10) calendar days must be authorized by formal leave of absence, unless current agreement differs.

S-28.15 Subject to Call

Employees subject to call must indicate where they can be reached and must not be absent from their calling place without notifying those required to call them.

S-28.16 Hours of Service Law

Employees must be familiar and comply with the requirements of the federal hours of service law. Employees are expected to use off-duty time so they are prepared for work.

If an employee is called to report for duty before legal off-duty time has expired, before accepting the call to work, the employee must notify the individual making the call that off-duty time has not expired.

A. Notification

When communication is available, employees must notify the train dispatcher or another authority of the time the law requires them to be off duty. Employees must provide notification early enough that they may be relieved, or transportation provided, before they exceed the hours of service.

B. Exceeding the Law

Employees must not exceed the hours of service law without proper authority. However, they must not leave trains, engines, or cars on the main track without proper protection. Employees must secure trains properly and, if possible, before they exceed the hours of service. Except as provided by this paragraph, employees are then relieved of all duties.

S-28.17 Unauthorized Employment

Employees must not engage in another business or occupation that would create a conflict of interest with their employment on the railroad or would interfere with their availability for service or the proper performance of their duties.

S-28.18 Care of Property

Employees are responsible for properly using and caring for railroad property. Employees must return the property when the proper authority requests them to do so. Employees must not use railroad property for their personal use.

S-28.18.1 Company Vehicles

Drivers of company vehicles must:

1. Unless authorized, must not use company vehicles for personal business or for commuting to or from a personal residence.
2. Not install or carry radio receivers or other accessories or appliances in the company vehicle without the proper authority.

S-28.19 Alert to Train Movement

Employees must expect the movement of trains, engines, cars, or other movable equipment at any time, on any track, and in either direction.

Employees must not stand on the track in front of an approaching engine, car, or other moving equipment.

Employees must be aware of location of structures or obstructions where clearances are close.

S-28.20 Occupying Roof

Employees whose duties require them to occupy the roof of a car or engine must do so only with proper authority and when the equipment is standing.

S-28.21 Not Permitted on Equipment

Unauthorized persons must not be permitted on equipment.

S-28.21.1 Unauthorized People

When an employee sees someone who should not be on BNSF property, the employee should notify the railroad police or railroad supervisor.

S-28.22 Altering Equipment

Without proper authority, employees must not alter, nullify, change the design of, or in any manner restrict or interfere with the normal function of any device or equipment on engines, cars, or other railroad property, except in the case of an emergency. Employees must report to the proper supervisor changes made in an emergency.

S-28.23 Clean Property

Railroad property must be kept in a clean, orderly, and safe condition. Railroad buildings, facilities, or equipment must not be damaged or defaced. Only information authorized by the proper manager or required by law may be posted on railroad property.

S-28.23.1 Avoid Littering

Do not throw articles from any of the following:

- Locomotives.
- Cars.
- Moving equipment.
- Company motor vehicles.
- Doors and windows of buildings.

S-28.24 Credit or Property

Unless specifically authorized, employees must not use the railroad's credit and must not receive or pay out money on the railroad account. Employees must not sell or in any way get rid of railroad property without proper authority. Employees must care for all articles of value found on railroad property and promptly report the articles to the proper authority.

S-28.24.1 Proper Use of Postage

Employees may not use company postage for personal mail.

S-28.25 Gratuities

Employees must not discriminate among railroad customers. Employees must not accept gifts or rewards from customers, suppliers, or contractors of the railroad unless authorized by the proper manager.

S-28.26 Divulging Information

Employees who make up, handle, or care for any of the following must not allow an unauthorized person to access them or disclose any information contained in them:

- Correspondence.
- Reports.
- Books.
- Bills of Lading.
- Waybills.
- Tickets.
- Statistics.

- Electronic mail.
- Any document marked as "Confidential."

Employees are to ensure that data on the company's financial performance and documentation supporting transactions are kept confidential.

S-28.26.1 Requirements for Disclosing Company Information

A. Definition of Company Information

Company information consists of all information concerning the company and its employees, customers and suppliers.

B. Proper Disclosure

Company information belongs solely to the company and is considered confidential. Employees may disclose company information externally only for legitimate business purposes and only if the supervisor approves. Employees must use the normal authorization channels to disclose company business.

Without proper authorization, employees must not:

- Access, use, retain, modify, or distribute company information.

  or

- Use company computing and telecommunications equipment.

Unauthorized users of company equipment or information may receive disciplinary or legal action.

S-28.26.2 Monitoring of Company Information

Without notifying the user, BNSF may at any time monitor or record access to company information or computing and telecommunications equipment.

Any information electronically collected, stored, processed, or transmitted on company computing and telecommunications equipment is the property of BNSF. BNSF may at any time monitor or record such information on BNSF equipment.

S-28.27 Fire

Employees must take every precaution to prevent loss and damage by fire.

Employees must report promptly to the train dispatcher any fires seen on or near the right of way, unless the fires are being controlled. If there is danger of the fire spreading to a bridge or other structure, crew members must stop their train and help extinguish the fire.

Cause of fire, if known, must be promptly reported.

S-28.61 Encroachment

Encroachment on railroad property, including building occupancy or the unauthorized dumping or storage of material, is prohibited.

When observing outside parties performing work that may encroach on the right-of-way, report the location and the nature of work to the proper authority.

S-28.61.1 Authorized on Railroad Property

Persons must be authorized to be on railroad property, which includes:

- Buildings.
- Facilities.
- Repair tracks.
- Team tracks.

- Other railroad property.

Persons authorized to be on railroad property must wear protective equipment where required.

S-28.62 Legal Summons

A. Requirement to Report Summons to Proper Authority

If an employee receives a summons, complaint, or any other legal papers that references the business of Burlington Northern Santa Fe or any of its subsidiaries, that person must immediately contact all of the following:

- The appropriate General Claims Department Manager for the area where the action originated.
- Vice-President Law.

B. Contents of Report

When contacting the above individuals, the person who received the legal papers must:

1. Submit a written report with the following information:
   a. Names of people involved in the action.
   b. Court where the action is filed.
   c. Brief statement of the case, when possible.
2. Mail the legal papers immediately to the Law Department and include his or her name, title, and date and time of service.

S-40.0 Glossary

As used in this book, the following definitions apply.

accident: An unplanned and sometimes injury-causing or damaging event which interrupts the normal progress of an activity.

approved: 1. Sanctioned, endorsed, accredited, certified, or accepted as satisfactory by a duly constituted and nationally recognized authority or agency. 2. Acceptable according to BNSF policy.

Asbestos-Containing Material (ACM): Any material that contains asbestos.

authorized: A person who is approved or assigned by BNSF to perform a specific type of duty or duties or to be at a specific location(s) at the job site.

banding: Strap or straps used to secure material.

capacity: The allowable load limit for any lifting or storing device as determined by the manufacturer, regulation, or both.

certified: Has met the requirements of federal, state, or local laws, or of company-approved programs, and has been granted a certificate.

compliance: The act of obeying the rule or the law.

designated: A person who is approved or assigned by BNSF to perform a specific type of duty or duties or to be at a specific location(s) at the job site (same meaning as "authorized").

dust collector: A bag house system for controlling emissions.

enhanced-visibility work wear: Personal protective clothing that is either accented with or constructed entirely in reflective lime green, yellow, or orange material.

environment: The water, air, land, and all plants, humans, and animals living therein, and the inter-relationships which exist among them.

fusee: A red flare used for flagging purposes.

hand truck: A small, rectangular barrow with a pair of handles at one end, a pair of small, heavy wheels at the other, and a projecting edge to slide under a load.

hazardous material: A substance or material which is capable of posing an unreasonable risk to health, safety, and the environment.

impact goggles: Safety eye wear that meets ANSI Z87.1 specifications.

incident: An undesired event that, under slightly different circumstances, could have resulted in personal harm or property damage. Any undesired loss of resources. Sometimes referred to as a "near miss," such as when a collision is avoided.

inspect: To examine officially in a critical, detailed manner.

intoxicants: Mind-altering chemicals including alcohol and drugs. Can also include some prescription and over-the-counter (OTC) medications.

job safety briefing: A communication tool used by professionals to make sure that everyone involved in a task knows what is to be done, how the task is to be accomplished, and how to mentally prepare to accomplish it. Job safety briefings must be conducted before beginning work activities and whenever there is a change in conditions or work activity.

Lockout/Tagout (LOTO): Procedures that involve tagging and locking systems so that no one can inadvertently activate the circuit, system, or equipment that is temporarily out of service.

Material Safety Data Sheet (MSDS): A form, provided by the manufacturer or supplier, describing the chemical and physical hazards of a substance.

motor vehicle: A motor-driven conveyance primarily designed for operation other than on rail. Some motor vehicles, such as hy-rails, are also equipped to operate on rail.

operator: The person who "runs" and so must maintain control of mechanized equipment or a motor vehicle.

Personal Protective Equipment (PPE): Any material or device worn to protect a person from exposure to or contact with any harmful substance or force.

Potential Asbestos-Containing Material (PACM): A material not yet tested for asbestos content, but, on visual inspection, similar to materials known to contain asbestos. Contact Industrial Hygiene for guidance on testing PACM.

proper authority: 1. Those individuals who are qualified by virtue of their expertise or their position of leadership to approve, certify, or sanction. 2. Having secured approval for acting in a particular manner.

qualified: A person who, by possession of a recognized degree, certificate, or professional standing, or who by knowledge, training, and experience, has successfully demonstrated his/her ability to perform the task or solve or resolve problems relating to the subject matter, the work, or the project.

three-point contact: Bodily contact consisting of two hands and one foot or two feet and one hand.

trained: Has participated in learning event(s) appropriate to the topic. Learning events include, but are not limited to, one-on-one coaching on the job, job safety briefings, tool box or marathon meetings, and formal programs.

transport: The movement of goods and materials in commerce.

unauthorized modification: Improper use of tools and/or equipment for the job task. Unauthorized modifications include actual physical alteration of tools or equipment and use of tools or equipment for other than their intended purpose.

unsafe condition: Any physical state which results in a reduction in the degree of safety normally present in an activity.

witness: An individual who has, from personal observation, knowledge of an event.

work environment: The physical location, equipment, materials processed or used, and the kinds of operations performed in the course of an individual's work, whether on or off the company's premises.

DRAFT 11/4/01 SETTLEMENT NEGOTIATION DOCUMENT

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION VIII

IN THE MATTER OF:	ADMINISTRATIVE ORDER ON CONSENT FOR REMOVAL ACTION
Burlington Northern Santa Fe Property Libby Asbestos Site Libby, Montana	U.S. EPA Region VIII CERCLA Docket No. ____
Burlington Northern Santa Fe Railroad, Respondent	Proceeding Under Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622

11. EPA's toxicologist has analyzed the data resulting from EPA's investigations and has concluded that the presence of the asbestos a the Site may present an imminent and substantial endangerment. The Assistant Regional Administrator for the Office of Ecosystem Protection and Remediation has determined that the presence of the asbestos a the Site may present an imminent and substantial endangerment in the Action Memorandum dated August 17, 2001. The data and documents supporting this finding, including the Action Memorandum, are contained in an administrative record dated _____, and its supplement dated _____. The administrative record and its supplement are incorporated by reference into this Order.

12. Respondent owns a railyard within the Site. Respondent recently implemented its own investigations to determine if yard activities would entrain asbestos fibers into the air; the results confirmed that such activities can entrain high levels of asbestos fibers.

13. EPA and Respondent agree that further sampling and analysis is necessary to determine if response actions are necessary at the Property.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

14. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, EPA has determined that:

a. The Libby Asbestos Site, including the Property, is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at the Site and at the Property, as identified in the Findings of Fact above, includes a "hazardous substance" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. The Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. The Respondent is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is liable for performance of response action and for response costs incurred and to be incurred at the Property. Respondent is the "owner" of the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1).

e. The conditions described in Paragraph 10 the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility as defined by Section 101(22) of CERCLA, 42 U.S.C.§ 9601(22).

f. The response action required by this Order is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Order, will be considered consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

Libby, Montana
Asbestos Air Sample Results
Samples were collected on April 24, 2001

Sample ID	Type	Location	Sample Duration (minutes)	Sample Result (F/CC)	Comments
101	Personal	Stuart Hart	349	<0.0013*	ND, Tamper operator
102***	Personal	George Gray	378	<0.062*	ND, Regulator operator
103	Personal	Chuck Guthrie	350	<0.0011*	ND, Regulator operator,foreman
104	Area	Pick-up truck cab	390	<0.0011*	ND, Middle of front seat
105***	Area	Regulator	43	<0.53**	ND, Above broom, east end of yard
106	Personal	George Gray	46	<0.0082**	ND, Regulator operator,main line in yard
107	Personal	Stuart Hart	24	<0.016**	ND, Tamper operator, main line in yard
108	Area	Regulator cab	43	0.18**	Regulating in west end of yard
109	Area	Regulator	11	0.087**	Brooming in the yard
110	Area	Tamper	47	0.031**	Near tamper tynes, in yard east of bridge,
111***	Area	Regulator cab	27	0.77**	West yard brooming
112	Area	Regulator plow	29	0.1*	Plowing in center of yard,
114	Area	Regulator	40	0.095**	Plowing west end of yard, sample near plow
115***	Area	Regulator	16	14**	Brooming center to west end of yard
116***	Area	Regulator	20	1.1**	Plowing and sweeping west end of yard
117	Area	Decon trailer	110	<0.0008*	ND, Clean room, four people showered out
118	Area	Decon trailer	18	<0.0052*	ND, Dirty room, two people showered out
119	Blank	NA	NA	ND	ND, No asbestos detected
200	Area	Amtrak depot	208	0.00064*	Regulator passed by @ 14:30
201	Area	Libby yard	194	0.0087*	South edge of parking lot
1	Personal	Roger Renshaw	352	<0.0012*	ND, Changing switch & shoveling rock,1319/1320
2	Personal	Loyde Miller	351	0.0013*	Changing switch & shoveling rock,1319/1320
3	Personal	Kerry Tunison	354	<0.0013*	ND, Changing switch & shoveling rock,1319/1320
4	Area	Section truck cab	348	<0.0014*	ND, Center of truck cab, 1319/1320
5	Personal	Loyde Miller	30	<0.013**	ND, Shoveling rock on main line
6	Personal	Roger Renshaw	30	<0.015**	ND, Shoveling rock on main line

OSHA = Occupational Safety and Health Administration
* = OSHA regulates asbestos at 0.1 f/cc as an 8-hour time weighted average
** = OSHA regulates asbestos at 1.0 f/cc as a 30-minute Short Term Exposure Limit
*** = Overloaded sample was re-deposited for analysis.
NA = Not Applicable
ND = None detected
F/CC = Fibers per cubic centimeter of air

BN001589

Libby, Montana
Asbestos Air Sample Results
Samples were collected on April 25, 2001

Sample ID	Type	Location	Sample Duration (minutes)	Sample Results (F/CC)	Comments
200	Area	Yard	142	0.00097*	East of section house
201	Area	Amtrak depot	67	0.0013**	NE corner, regulator was brooming
202	Area	Yard parking lot	143	0.0017*	South edge of parking lot
203	Personal	Beth Regan	47	0.036**	Walking near regulator during yard brooming
204	Area	Amtrak depot	208	0.00043*	NE corner
205	Personal	Beth Regan	200	<0.0021*	ND, Walking near tamper in yard
206	Area	Yard parking lot	123	<0.0008*	ND, North side of lot near main line
207	Area	Yard	118	<0.00078*	ND, East of section house
1	Personal	Stuart Hart	46	0.047**	Operating tamper, Trk #2, yard MP 1319
2	Area	Tamper front	42	0.011**	Front end of tamper, Trk #2, yard MP 1319
101***	Area	Regulator front	22	1.2**	Brooming east yard
102***	Area	Regulator cab	240	0.22*	Brooming east yard
103	Area	Regulator rail	25	0.41**	Brooming east yard
104***	Area	Regulator skirt	21	<1.3**	ND, Broming east yard
105	Personal	George Gray	240	0.0055*	Regulator operator brooming yard
106***	Area	Regulator front	12	0.6**	Brooming in yard
107***	Area	Regulator skirt	10	2.6**	Brooming east yard Trk#2
108	Area	Regulator rail	10	0.64**	East yard, Trk #2
109***	Area	Regulator skirt	11	9.6**	Brooming east yard, Trk #2
110***	Area	Regulator front	11	7.2**	Brooming in east yard
111	Area	Regulator rail	10	0.77**	East yard, Trk #2
112	Area	Regulator skirt	15	0.53**	Brooming east yard, Trk #2
113***	Area	Regulator front	13	3.1**	Brooming east yard,Trk #2
114	Area	Regulator rail	9	0.53**	East yard, Trk #2
115***	Area	Regulator front	32	<0.83**	ND, Brooming
116***	Area	Regulator skirt	30	<0.88**	ND, Brooming main,1318-1319.2
117	Area	Regulator rail	33	<0.013**	ND, Brooming main,1318-1319.2
118	Area	Regulator	30	0.016**	Brooming main in yard, 1316-1318
119	Area	Regulator front	31	<0.016**	Brooming main 1316-1318
120	Area	Regulator rail	29	<0.015**	ND, Brooming 1316-1318
121	Area	Regulator rail	20	0.35**	Plowing Trk#2,east yard
122	Area	Regulator skirt	20	0.53**	ND, Plowing Trk #2, east yard
123	Area	Regulator front	20	0.19**	Plowing Trk #2,east yard
124***	Personal	George Gray	27	2.6**	Brooming yard, Trk #2
125	Blank	NA	NA	ND	ND

OSHA = Occupational Safety and Health Administration
NA = Not applicable
* = OSHA regulates asbestos at 0.1 f/cc as an 8-hour time weighted average
ND = None detected
** = OSHA regulates asbestos at 1.0 f/cc as a 30-minute Short Term Exposure Limit
*** = Overloaded sample was re-deposited for analysis

BN001590

EXHIBIT 182.125

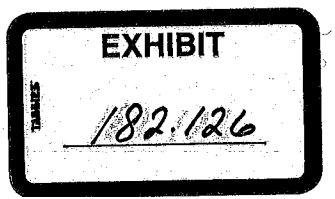
W.R. GRACE & CO.
LIBBY, MONTANA
MINE - MILL OPERATIONS
DUST SURVEY REPORT - 1975

LOCATION/AREA SAMPLED	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
River Car Loading	2.28	3.42	1.14	0.57		1.14	0		1.71	1.71	0.5	
5th Fl. Screen Plant	4.0	1.14	0	0.57		2.85	----		2.85	.57		
5th Fl. Screen Plant	4.0	0.57	1.14	1.71		0.57	----		0.57	3.99		
4th Fl. Screen Plant	2.9	0.57	0	2.85		1.14	----		0	1.71		
3rd Fl. Screen Plant	3.42	0.57	1.14	0		0.57	----		0	0.57	0.5	
2nd Fl. Screen Plant	2.85	0	0.57	1.14		0.57	----		0.57	0.57		
1st Fl. Screen Plant	5.13	0	0.57	3.99		1.14	----		3.99	0.57	2.8	
Foreman's Office	5.13	3.99	1.14	1.14		2.85	0.57		1.14	1.14	2.2	0.2
Tunnel Below Bins	19.38	13.11	7.98	22.23		23.94	12.54		0.57	9.12	2.2	
Export Bagging	6.84	2.28	6 84	6.84		2.85	----		----			1.
Export Car Loading	2.85	2.85	4.56	6.27		2.85	----		----			1.7
Machine Shop	0	2.85	0.57	1.14		1.14	1.14		1.71	0.57		1.1
10th Fl. Wet Mill	0.57	8.55	1.14	3.99		4.56	1.14		1.71	2.85	1.71	5.5
7th Fl. Wet Mill	4.0	6.84	0.57	2.28		5.70	5.13		4.56	3.42	2.85	
5th Fl. Wet Mill	2.85	2.85	0.57	1.14		8.55	3.42		2.85	1.71		
4th Fl. Wet Mill	3.42	5.13	0.57	1.14		3.99	1.71		3.42	1.71	3.99	
3rd Fl. Wet Mill	19.95	9.12	1.14	3.99		6.27	2.28		1.71	5.13		
2nd Fl. Wet Mill	1.71	20.52	0	1.71		1.71	1.14		0.57	6.27	0.57	
4th Fl. East Wet Mill	1.14	6.84	1.71	3.99		2.85	2.28		1.71	1.27		
4th Fl. West Wet Mill	2.28	9.12	9.69	3.42		5.70	1.14		1.71	1.14		
3rd Fl. East Wet Mill	0.57	1.14	1.14	3.42		1.71	1.14		3.42	1.71		
3rd Fl. West Wet Mill	0.57	5.13	5.70	2.85		3.99	4.56		0.57			
2nd Fl. East Wet Mill	0.57	0	2.28	1.14		6.27	3.99		2.28	057	057	
2nd Fl. West Wet Mill	1.71	10.26	7.98	2.85		5.13	5.13		2.28			
1st Fl. East Wet Mill	3.42	8.55	1.14	1.14		3.42	2.85		0	1.71		
1st Fl. West Wet Mill	0.57	6.84	9.12	3.4		2.85	1.14		2.28			

SOURCE EMISSIONS

Results of Surveys - 1975

Mine -	High	Low	Average
Drilling & Blasting			
Drills	11.97	1.5	5.84
Loading Haul Units			
Shovels	1.14	0.57	0.76
Loaders			0.48 (1 san
Hauling - Road Use			
Haul Units	4.56	0.35	1.47
Dump			0.57 (1 san
Dump Dozing (Dozer)	5.13	0.9	2.79
Transfer Point	5.13	0.57	1.91
Dumping			
Screening			
Conveying			
Waste Hopper & Removal			
Conveying to O.S.&B.	4.56	0.57	2.63
Stacking			
Reclaiming			
Conveying to 1000 T Bin			
Filling			
Emptying			
Conveying to Wet Mill- All Floors	20.52	0.57	3.49
High Prob. Screens			
Screening			
Extractor			
Dryer			
Feeding			
Discharge			
Mill Traffic - People			
Clean up Water System			
Skipping System			
Conveyor			
Conc. Bins			
Skip Car Loading	1.71	0.9	1.39
Skip Travel			
Lower Ore Bins			
Skip Dump			
Discharging			
Haul Road Traffic			
Conc. Trucks			0.57 (1 san
Screen Plant - All Floors	3.99	0.57	1.66
Dumping			
Conveying			
Screening			
Hauling to Storage			
Haul Truck	1.96	0.23	1.24
Open Bins			
Loading Hoppers			
Tunnel & Conveying	23.94	2.2	12.25
Car Loading			
Bag House Discharging			
#5 Dumping			
Hauling to Bag Plant			



Results of Surveys - 1975

	High	Low	Average
Bagging	11.3	1.1	5.43
Car Loading	6.8	2.3	4.06
Bag House Discharging			
Service Areas			
Garage	2.2	0.38	(2 samples
Sheet Metal Shop	3.99	0.57	1.73
Machine Shop	2.85	0.57	1.26
Warehouse			
Research			0.57 (1 sa
Other office Areas			
Vehicle Traffic			
Outside Locations			
Mine General Area	0.9	0.38	
E. of Mine - Reflector			2.0 (1 sam
Tub Gulch - W of Mine			0.6 (1 sam
Highway 37 - Between Mine & Libby			1.8 (1 sam
Downtown Libby			
New Penney's Store			0.67 (1sam
St. Regis Office Area			1.5 (1 sam
Hospital Area			1.1 (1 sam

EXHIBIT 182.125

W.R. GRACE & CO.
LIBBY, MONTANA
MINE - MILL OPERATIONS
DUST SURVEY REPORT - 1975

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5th Fl. Screen Plant	4.0	1.14	0	0.57		2.85	----		2.85	.57		
5th Fl. Screen Plant	4.0	0.57	1.14	1.71		0.57	----		0.57	3.99		
4th Fl. Screen Plant	2.9	0.57	0	2.85		1.14	----		0	1.71		
3rd Fl. Screen Plant	3.42	0.57	1.14	0		0.57	----		0	0.57	0.5	
2nd Fl. Screen Plant	2.85	0	0.57	1.14		0.57	----		0.57	0.57		
1st Fl. Screen Plant	5.13	0	0.57	3.99		1.14	----		3.99	0.57	2.8	
Foreman's Office	5.13	3.99	1.14	1.14		2.85	0.57		1.14	1.14	2.2	0.2
Tunnel Below Bins	19.38	13.11	7.98	22.23		23.94	12.54		0.57	9.12	2.2	
Export Bagging	6.84	2.28	6 84	6.84		2.85	----		----			1.
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7th Fl. Wet Mill	4.0	6.84	0.57	2.28		5.70	5.13		4.56	3.42	2.85	
5th Fl. Wet Mill	2.85	2.85	0.57	1.14		8.55	3.42		2.85	1.71		
4th Fl. Wet Mill	3.42	5.13	0.57	1.14		3.99	1.71		3.42	1.71	3.99	
3rd Fl. Wet Mill	19.95	9.12	1.14	3.99		6.27	2.28		1.71	5.13		
2nd Fl. Wet Mill	1.71	20.52	0	1.71		1.71	1.14		0.57	6.27	0.57	
4th Fl. East Wet Mill	1.14	6.84	1.71	3.99		2.85	2.28		1.71	1.27		
4th Fl. West Wet Mill	2.28	9.12	9.69	3.42		5.70	1.14		1.71	1.14		
3rd Fl. East Wet Mill	0.57	1.14	1.14	3.42		1.71	1.14		3.42	1.71		
3rd Fl. West Wet Mill	0.57	5.13	5.70	2.85		3.99	4.56		0.57			
2nd Fl. East Wet Mill	0.57	0	2.28	1.14		6.27	3.99		2.28	057	057	
2nd Fl. West Wet Mill	1.71	10.26	7.98	2.85		5.13	5.13		2.28			
1st Fl. East Wet Mill	3.42	8.55	1.14	1.14		3.42	2.85		0	1.71		
1st Fl. West Wet Mill	0.57	6.84	9.12	3.4		2.85	1.14		2.28			

SOURCE EMISSIONS

Results of Surveys - 1975

Mine -	High	Low	Average
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Loading Haul Units			
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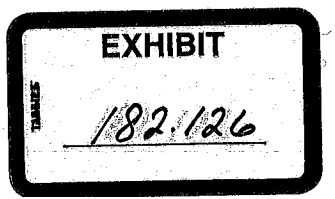
Dump			0.57 (1 san
Dump Dozing (Dozer)	5.13	0.9	2.79
Transfer Point	5.13	0.57	1.91
Dumping			
Screening			
Conveying			
Waste Hopper & Removal			
Conveying to O.S.&B.	4.56	0.57	2.63
Stacking			
Reclaiming			
Conveying to 1000 T Bin			
Filling			
Emptying			
Conveying to Wet Mill- All Floors	20.52	0.57	3.49
High Prob. Screens			
Screening			
Extractor			
Dryer			
Feeding			
Discharge			
Mill Traffic - People			
Clean up Water System			
Skipping System			
Conveyor			
Conc. Bins			
Skip Car Loading	1.71	0.9	1.39
Skip Travel			
Lower Ore Bins			
Skip Dump			
Discharging			
Haul Road Traffic			
Conc. Trucks			0.57 (1 san
Screen Plant - All Floors	3.99	0.57	1.66
Dumping			
Conveying			
Screening			
Hauling to Storage			
Haul Truck	1.96	0.23	1.24
Open Bins			
Loading Hoppers			
Tunnel & Conveying	23.94	2.2	12.25
Car Loading			
Bag House Discharging			
#5 Dumping			
Hauling to Bag Plant			



Results of Surveys - 1975

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Service Areas			
Garage	2.2	0.38	(2 samples
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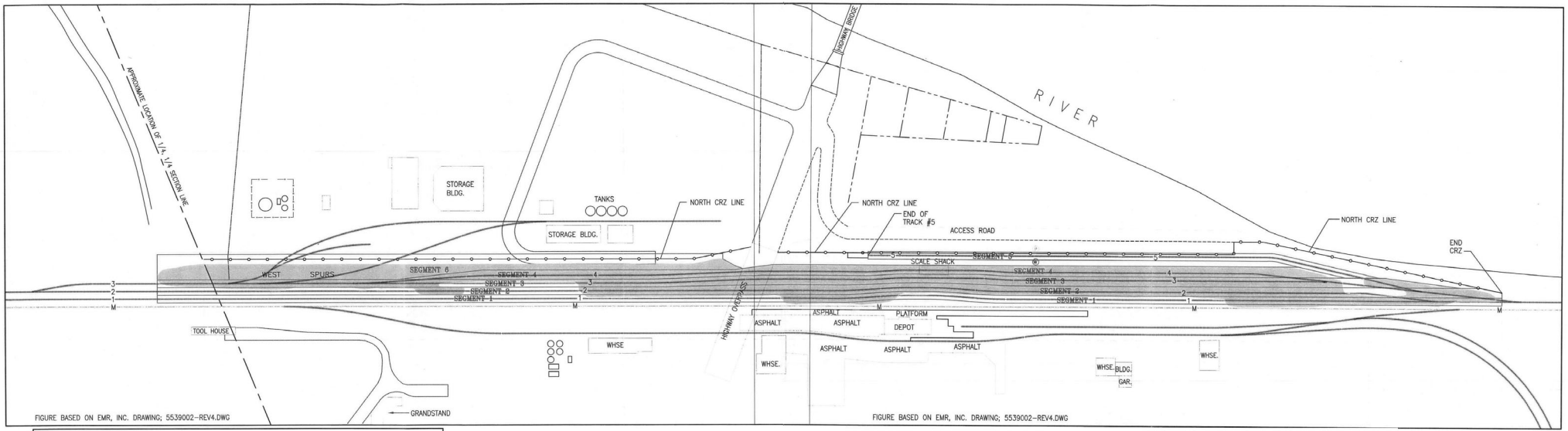
Machine Shop	2.85	0.57	1.26
Warehouse			
Research			0.57 (1 sa
Other office Areas			
Vehicle Traffic			
Outside Locations			
Mine General Area	0.9	0.38	
E. of Mine - Reflector			2.0 (1 sam
Tub Gulch - W of Mine			0.6 (1 sam
Highway 37 - Between Mine & Libby			1.8 (1 sam
Downtown Libby			
New Penney's Store			0.67 (1sam
St. Regis Office Area			1.5 (1 sam
Hospital Area			1.1 (1 sam



LEGEND

- SEGMENT 1 — RESPONSE ACTION SEGMENTS
- ZONE OF VISIBLE MICA FLAKES
- FENCE
- 1 — RAILROAD TRACKS WITH ASSIGNED NUMBER
- M — MAIN LINE RAILROAD TRACKS (3–4" DIAMETER QUARTZITE BALLAST AT LEAST 1–FOOT DEEP
- CONTAMINANT REDUCTION ZONE (CRZ) FOR ERM WORK IN 2003

0 50 100
APPROXIMATE SCALE IN FEET

N

Kennedy/Jenks Consultants

THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY
LIBBY, MT

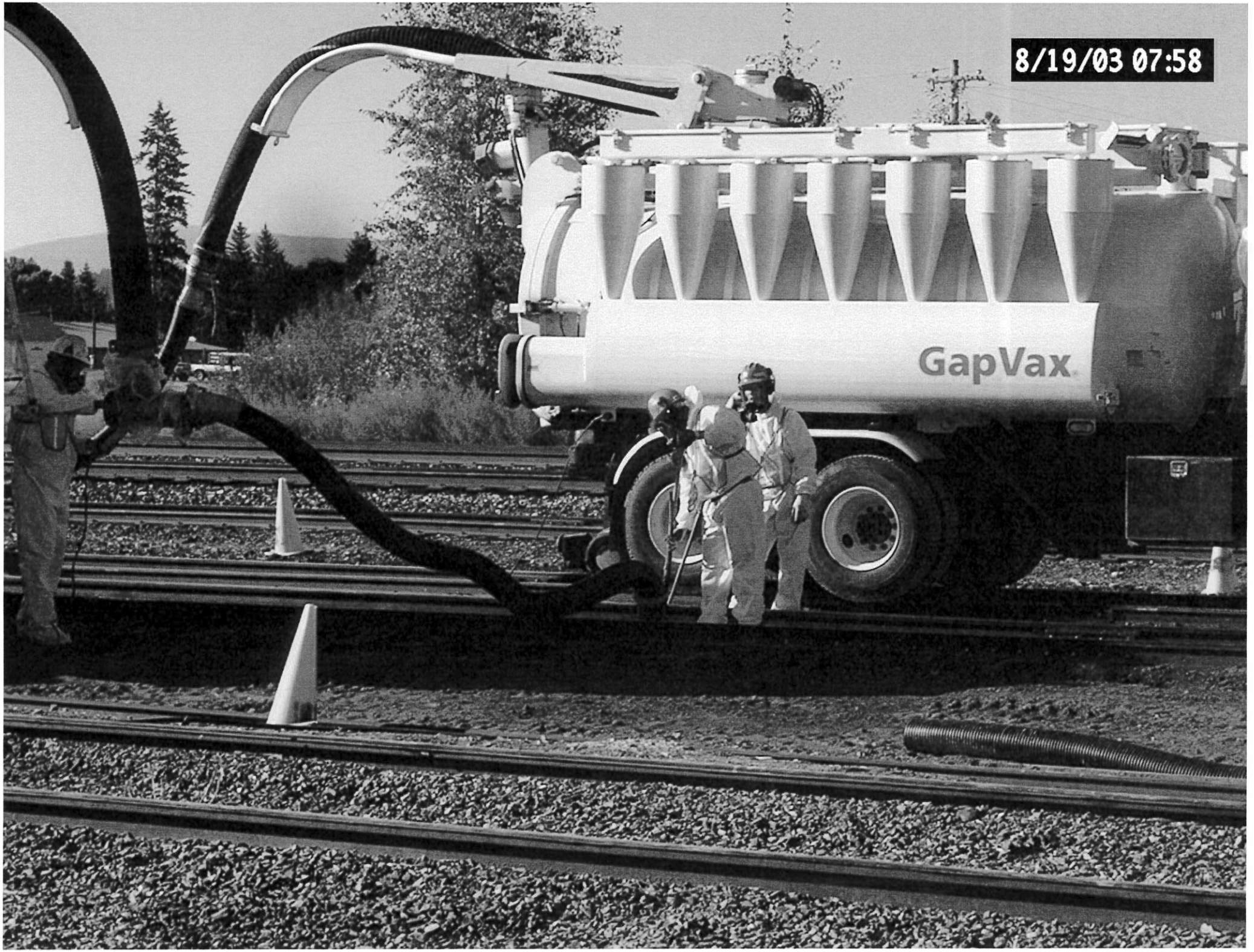
SITE MAP WITH RESPONSE ACTION SEGMENTS (EAST HALF)

046022.11/P04SK002

FIGURE 2

KJSub014606


PRODUCTS
MILWAUKEE WI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GapVax

Brent Wetsch vs.
BNSF Railway Company

TRANSCRIPT OF JURY TRIAL
Vol. 2
June 05, 2018
4th JDC, Cause No. DV-16-1146

Martin-Lake & Associates, Inc.
Experience DOES Matter
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406.543.6447 - mla@martin-lake.com
www.martin-lake.com

Original File Vol. 2 2018-6-5 Larson (Wetsch).txt
Min-U-Script® with Word Index

Page 325

we have wide swathes of this town where nothing had to be done at all. Thank goodness.
Here is another picture as we get into downtown. Wide swathes of this brown area where nothing had to be done, but then you have these spots in here where people used that stuff--they brought it home, they did whatever--that had some localized contamination and they had to clean these up.
Now, that tells you that this was not some horrible situation where you could not walk through town without dying. This was a situation where if you were one of these folks that were in a property that interacted in a specific way with this bad material, then you might have an issue and you probably did.
Then we got some more data. This is another way of looking at a lot of the sampling that EPA has put together. This is another report from the EPA that has come out. And what we see here is kind of a bigger view. And this is heading out of town towards the mine, okay, along the Kootenai River. Here's the highway here. And then this is the river here, obviously.
All of these red spots are like hot spots

Page 326

where they encountered something that read high enough that they are concerned about it when it came to asbestos. And we see all this stuff here where, you know, along the highway and then in these kind of residential areas and stuff where they found things they had to address.
What do we see here, though? This is BNSF tracks. Nothing. Well, one, two. Why? Because BNSF is never interacting with that waste product. BNSF was never interacting with that raw ore. BNSF was only hauling, in closed hopper cars, this refined vermiculite product.
Here's some more samples that were shown--or that were taken back then that ended up in the EPA's report. This is in town. Here's the railroad tracks right here. All these green dots of samples that were taken that came back non-detect. No asbestos found at all. And when we zoom in on that railroad spur, what do we see? Over and over and over again, there wasn't a concern, thank goodness, on the railroad property.
BNSF didn't just rely on EPA to go out and tell us it was okay, though. BNSF, when they got wind of this, even though all this sampling was coming back and saying there is not a concern,

Page 327

they went out and did their own. They hired their own engineering firms. Companies called EMR and Kennedy-Jenks, to come in and do testing and then to do some cleanup that we'll talk about.
What they did when they came in, they didn't just go do a few samples here and there. This is an excerpt out of one of their work documents. These little squares here, right here, that's a 50-foot square. They gridded the entire property with 50-foot squares, and then did samples like you see these Xes, five samples in each 50-foot square, and did the whole yard, every bit of it.
And what did they find? Time and time again, nothing. Non-detect, non-detect, non-detect. I'm not going to tell you every single one of these is a non-detect because that wouldn't be true. I'll find some here in a minute. Every now and then you might find a really low percentage of asbestos in the soil somewhere.
At the end of the day when they did all this, they found two sets of samples in one corner of the northeast part of the yard that would even rise to the level of being needed to be cleaned

Page 328

up. How do we know that? Because we have the results and then we compare them to this.
This is another page out of EPA documents for Libby. And this is, when all their experts came in, and engineers, and decided, all right, this is how we're going to approach cleanup in the town of Libby. This is what we're going to clean up to. It's called a clearance standard. So if you have a highly contaminated property, you are going to go in and you are going to clean up and remove soil until you get down to what this clearance standard says is safe for use.
Now, what we see here is we have transportation corridors, so that would apply to BNSF. It says, "No Libby amphibole soil concentrations of Bin C." All right? By the way, the same standard that we use for parks and schools, Bin C, Bin 2. B2 or Bin C. If we go down to the bottom, we see what Bin C means. And it means Libby amphibole detected at levels greater than or equal to 1 percent.
So what that means is if you have contaminated property in Libby, even if it was the school or the park, once you got down to a 1 percent or less asbestos level, they determined

Page 329

that was safe, you could walk on it, you could play in it, you could go to school in it and it's not going to harm anybody. And that's what properties up there across town have been cleaned up to. People are buying them and moving into them now.

BNSF, I mentioned, had two samples that would rise to that level. Two, in that one corner of the yard. Every other sample was either non-detect or trace in all those 50-foot grids all the way across this property.

What did BNSF do? Well, they approached it the same way they approached all their buildings when they did the survey of those buildings. I heard Mr. Ekstrom tell you guys yesterday that BNSF was ordered to clean their yard. That's false. That's just not true. BNSF chose to clean up their yard. And they cleaned up all of it until it got to zero. If there was a sample that even showed .25 percent somewhere, they kept going until it was zero.

So when you see information about, oh, they pulled out 18,000 pounds, or whatever it was, of soil and stuff like that, it's because they were going to zero. And this is an area that we

Page 330

learned the soil has a natural existing percentage of asbestos in it regardless of the mine. So getting down to zero ain't easy, but that's what they did. They took out all those ties, cleaned them off, took out the rail, took out the soil until everything was zero, just like all the buildings.

How is it that all the soil samples came back so low when Mr. Ekstrom told you yesterday that there was 70 years of spillage going all over the rail yard? Well, folks, that's just not an accurate statement either. You guys heard that the mine closed in 1990, about a decade before the time Mr. Wetsch claimed that he worked there.

But if we go back to the 1920s or '30s or '40s when that vermiculite concentrate might have had a little bit more asbestos in it, we're talking decades and decades ago.

And I mentioned there is a track department at BNSF, right? And those track folks are out there every day maintaining and replacing track. They have equipment that goes in there and undercuts it, digs out the soil. It goes in there and replaces and cleans the ballast. Goes in there and replaces ties. You don't just leave

Page 331

ties forever. They have a program in place where there's a system we're going to replace these ties on these intervals. Constantly. It's a rolling thing. Same thing with ballast and track.

Going back to way back when, in the '20s, '30s, '40s, '50s, we had what's called jointed rail. So little pieces of rail that were just kind of stuck together and you would kind of bounce over them as you went.

Over time technology developed to allow them to do what's called continuous molded rail. So all that rail get replaced and all those ties get replaced and all that ballast gets replaced. There is not 70 years of spillage going on at all.

When Mr. Wetsch got out there, there was nothing out there. You might find a little bit of vermiculite here and there if you looked for it. You might find some in a little low spot around a switch. But that's it.

So it's no wonder that if you have a small amount of product that had virtually no asbestos in it, that you would get results like this.

Folks, Mr. Wetsch never hauled vermiculite product at all. He never went to the

Page 332

mine. He never worked in the mine. He never loaded a car of it. He worked there years later. He never lived there in Libby. He never interacted with this waste. He never interacted with that ore. He rode in his train through town sometimes without even stopping. And there was trains doing that all day every day as I mentioned, including Amtrak.

And then the time he actually spent in Libby working on the ground, if we were to add it all together over the course of a decade, would amount to about a month. Working in an area that doesn't have a harmful level of asbestos in it.

We know this. We know that he was safe. We know that the other folks that were working in similar jobs to him were safe because BNSF also looked at that, too. We didn't just stop with the soil sampling. We went beyond that. We went and looked in the air. I told you BNSF hired these engineering firms. They came in, this is from 2001, and they even looked at all kinds of people doing different types of jobs to determine if they had any kind of airborne concern. We know there is nothing in the soil, but let's check this anyway. And what did we see? Time and time

INITIAL POLLUTION REPORT
LIBBY ASBESTOS
Libby, Lincoln County, Montana

I. HEADING

Date:	September 29, 2003
Site Name:	Libby Asbestos Site (BNSF Cleanup OU6)
From:	James Christiansen, RPM
To:	Kevin Mould, EPA Headquarters
POLREP No.:	#7 for Libby Asbestos, initial POLREP for OU6, BNSF railyard

II. BACKGROUND

Site No.:	BC
Response Authority:	CERCLA
CERCLIS No:	MT0009083840
NPL Status:	Added to NPL: 10/23/02
Action Memorandum Status:	Approved 5/23/00
Action Memorandum Amendment:	08/13/01
Action Memorandum Amendment:	05/09/02

Start Date (OU 06 - BNSF) PRP - Lead:	08/13/03
Completion Date*:(OU 06 - BNSF) PRP - Lead:	TBD

III. SITE INFORMATION

A. Incident Category

PRP-Lead

B. Site Description

The Libby Asbestos Site includes an inactive vermiculite mine located in northwestern Montana. Vermiculite mining at Zonolite Mountain (the "mine") was commenced by the Universal Zonolite Company in the 1920s. In 1963, W.R. Grace acquired the property and continued operations until September, 1990.

The processed ore was trucked down the Rainy Creek Road to a Screening Plant, which separated the milled ore into several sizes. Subsequently, the screened ore was moved by conveyor belt across the Kootenai River and shipped either to the Export/Expansion Plant (Libby) or across the country by rail.

This initial POLREP concerns the Burlington Northern Santa Fe (BNSF) Rail

Yard in Libby. Sampling shows that asbestos, a hazardous substance, is present in soil, raw ore, ore-concentrate and other soil-like materials at various locations in and around the community of Libby including the BNSF railyard. Visible vermiculite has been found along the tracks and within the railyard and analytical results have shown asbestos levels in soil from 2-5%.

1. Site Location

The BNSF Railyard encompasses about 20 acres and is located in Section 7, Township 30 N, Range 31 W of Lincoln County, Montana. A total of six railroad tracks trending east-west are present along with associated buildings and siding platforms. The BNSF railyard is immediately adjacent to the former W.R. Grace Export Plant in downtown Libby.

2. Description of Threat

The ore body from which the vermiculite ore was mined contains significant occurrences of amphibole asbestos. Processing of the vermiculite ore, with amphibole asbestos intermixed, caused high dust and airborne releases of fine asbestos fibers. These fine asbestiform fibers have been linked to certain kinds of lung disease and abnormalities.

The Acting Assistant Administrator, Office of Solid Waste and Emergency Response has determined that the presence of the asbestos at the Site may present an imminent and substantial endangerment in the Action Memorandum.

C. Preliminary Assessment/Site Inspection Results

BNSF implemented its own investigations to determine if yard activities would entrain asbestos fibers into the air. Baseline monitoring along the track conducted by BNSF has found the highest concentrations measured during the sweeping ranges from 7 to 14 f/cc in air. A total of 22 surface soil samples collected along the railroad tracks and its railyard ranged from a trace to less than 1% fibrous amphibole asbestos by weight. In addition, visible unexpanded vermiculite remained at Tracks #1, #2 and #3.

IV. RESPONSE INFORMATION

A. Situation

Asbestos contaminated materials were hauled and shipped through the railyard, and spilled into the soil for decades. The soil around the tracks and under the ballast is contaminated and needs to be removed.

BNSF has agreed to perform the cleanup at the Libby railyards and its tracks

under an Administrative Order on Consent (AOC) to address the high levels of asbestos. The BNSF's work plan and sampling plan were approved on October 25, 2002. Cleanup began on August 13, 2003. Unfortunately, cleanup was not achieving satisfactory results, so work was stopped on August 21, 2003 and BNSF is reevaluating cleanup options. Work is expected to begin again in spring 2004. EPR-SR is overseeing the cleanup.

B. Enforcement

An Administrative Order on Consent (AOC) was entered into between the U.S. EPA and the Burlington Northern and Santa Fe Railway Company (BNSF) effective August 19, 2002. This AOC provides for the performance of a removal action by BNSF and the reimbursement of certain response costs incurred by the United States at or in connection with the BNSF property comprising the Libby railyard in Libby, Montana.

V. COST INFORMATION

The estimated cost of the cleanup is expected to be approximately $1,500,000.

VI. DISPOSITION OF WASTES

The materials, contaminated with asbestos, will be disposed at the Lincoln County Landfill Cell.

2003 Soil Sample Laboratory Analytical Data
The Burlington Northern and Santa Fe Railway Company
Vermiculite Remediation
Libby, Montana
EMR Project: 5539.003

Sample ID	Type	Sample Collection Date	Depth (inches)	Color	Latitude	Longitude	Asbestos	Mica	Asbestos Type	Purpose
T3-00001	Grab	08/13/2003	3-6	Brown	48.39417	115.54592	ND	20%	NA	Test
T4-00001	Grab	08/13/2003	3-6	Brown/Red	48.39417	115.54592	ND	10%	NA	Test
BN-38000	**Composite**	**08/15/2003**	**NA**	**Brown/Red**	**NA**	**NA**	**2%**	**10%**	**Tremolite/Actinolite**	**Clearance**
BN-38001	Discreet	08/15/2003	3-6	Brown	38.39415	115.54572	2%	10%	Tremolite/Actinolite	Clearance
BN-38002	Discreet	08/15/2003	3-6	Brown/Red	48.39424	115.54587	ND	0%	NA	Clearance
BN-38003	Discreet	08/15/2003	3-6	Red	48.39438	115.54559	2%	10%	Tremolite/Actinolite	Clearance
BN-38004	Discreet	08/15/2003	3-6	Red	48.3943	115.54572	<1%	10%	Tremolite/Actinolite	Clearance
BN-38005	Discreet	08/15/2003	3-6	Brown	48.39428	115.54597	2%	10%	Tremolite/Actinolite	Clearance
BN-39000	**Composite**	**08/18/2003**	**NA**	**Brown**	**NA**	**NA**	**2%**	**20%**	**Tremolite/Actinolite**	**Clearance**
BN-39001	Discreet	08/18/2003	3-6	Brown	48.39433	115.54609	2%	10%	Tremolite/Actinolite	Clearance
BN-39002	Discreet	08/18/2003	4-7	Red	48.39436	115.54616	ND	0%	NA	Clearance
BN-39003	Discreet	08/18/2003	6-9	Brown	48.39437	115.54628	2%	8%	Tremolite/Actinolite	Clearance
BN-39004	Discreet	08/18/2003	3-6	Red	48.3944	115.54607	ND	10%	ND	Clearance
BN-39005	Discreet	08/18/2003	3-6	Red	48.39444	115.54622	<1%	0%	Tremolite/Actinolite	Clearance
BN-40000	**Composite**	**08/18/2003**	**NA**	**Brown**	**NA**	**NA**	**2%**	**10%**	**Tremolite/Actinolite**	**Clearance**
BN-40001	Discreet	08/18/2003	4-7	Brown	48.39443	115.54646	2%	10%	Tremolite/Actinolite	Clearance
BN-40002	Discreet	08/18/2003	4-7	Brown	48.39448	115.54658	2%	0%	Tremolite/Actinolite	Clearance
BN-40003	Discreet	08/18/2003	3-6	Red	48.39453	115.5467	3%	15%	Tremolite/Actinolite	Clearance
BN-40004	Discreet	08/18/2003	4-7	Red	48.39445	115.54647	<1%	10%	Tremolite/Actinolite	Clearance
BN-40005	Discreet	08/18/2003	4-7	Red	48.39453	115.54657	<1%	0%	Tremolite/Actinolite	Clearance
BN-00123	Grab	08/20/2003	8-12	Brown/Red	48.39437	115.54611	ND	5%	NA	Investigation
BN-00124	Grab	08/20/2003	17-20	Black	48.39437	115.54611	ND	15%	NA	Investigation
BN-00125	Grab	08/20/2003	8-11	Black	48.39467	115.54724	ND	0%	NA	Investigation
BN-00126	Grab	08/20/2003	12-15	Brown	48.39467	115.54724	ND	0%	NA	Investigation
BN-00127	Grab	08/20/2003	8-12	Brown	48.39522	115.54896	ND	0%	NA	Investigation
BN-00128	Grab	08/20/2003	10-13	Brown	48.3957	115.55038	ND	0%	NA	Investigation
BN-00129	Grab	08/20/2003	6-9	Brown	48.39624	115.55187	ND	0%	NA	Investigation
BN-00130	Grab	08/20/2003	12-15	Brown	48.39674	115.55379	ND	10%	NA	Investigation
BN-00131	Grab	08/20/2003	8-11	Brown	48.39716	115.55538	ND	5%	NA	Investigation
BN-00132	Grab	08/20/2003	17-20	Brown	48.39716	115.55538	ND	10%	NA	Investigation

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KJSub021044

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KJSub021252

KJSub021515

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Analysis of Vermiculite for Asbestos and Screening for Vermiculite from Libby, Montana

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ABSTRACT

There is general agreement that a negative finding using the usual bulk microscope analysis for building materials without any pre-treatment of the vermiculite is not reliable. Preparation procedures involving sedimentation, grinding and total matrix reduction with acid/base dissolution have been used to improve the ability to find asbestos if present in vermiculite ores and products. This article contains information on most of the available methods for vermiculite analysis based on an extensive review of published articles, government reports and other documents. The limited data in the published articles concerning the major vermiculite sources in the Enoree district in South Carolina; Louisa County, Virginia; Palabora, South Africa; and Xinjiang Province in China strongly suggest that commercially available non-Libby vermiculite is not contaminated with amphibole asbestos to the extent of the vermiculite from Libby, Montana. Differentiating Libby vermiculite insulation from other commercial sources can be done reliably and inexpensively with a routine chemical barium test as long as the insulation sample is not a mixture of Libby vermiculite and other materials. A qualitative transmission electron microscopy (TEM) analysis of a filtration of the fibers suspended in water from a sample of vermiculite attic insulation (VAI) that was prepared using the sedimentation procedure appears to be a reliable method of confirming Libby vermiculite.

Keywords: vermiculite; asbestos; tremolite; chrysotile; amphibole; richterite; winchite; mesothelioma, light microscopy; polarized light microscopy (PLM); scanning electron microscopy (SEM); transmission electron microscopy (TEM); X-ray diffraction (XRD); Libby, Montana; Enoree, South Carolina; Louisa County, Virginia; Xinjiang Province, China; Palabora, South Africa; U.S. Environmental Protection Agency (EPA); U.S. Geological Survey (USGS); McCrone Associates; vermiculite attic insulation (VAI); Zonolite; Zonolite attic insulation (ZAI); spray-on fireproofing-vermiculite (SOF-V); ASTM-International; Cincinnati Method; Alexandria Method; Beard-Shaul Method; barium (Ba).

INTRODUCTION

This article originated as a part of a section on vermiculite analysis in a chapter on environmental forensic microscopy (1). The intent was to compile and publish information about the many methods and procedures used to analyze vermiculite for asbestos content and to distinguish between vermiculite from Libby and non-Libby sources.

According to the U.S. Environmental Protection Agency (EPA) vermiculite is a naturally occurring mineral composed of shiny flakes resembling mica (2). When heated to a high temperature, flakes of vermiculite expand into accordion-like books as much as eight to 30 times their original size (Figures 1–2). The expanded vermiculite is a lightweight, fire-resistant and odorless material. Sizes of vermiculite particles range from very fine to large (coarse) pieces nearly an inch long and may be observed as both single flakes and books (Table 1) (3). The expanded product is commonly used as insulation, in building

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Figure 1. Expanded vermiculite from Libby, MT. The inch ruler is shown for scale.

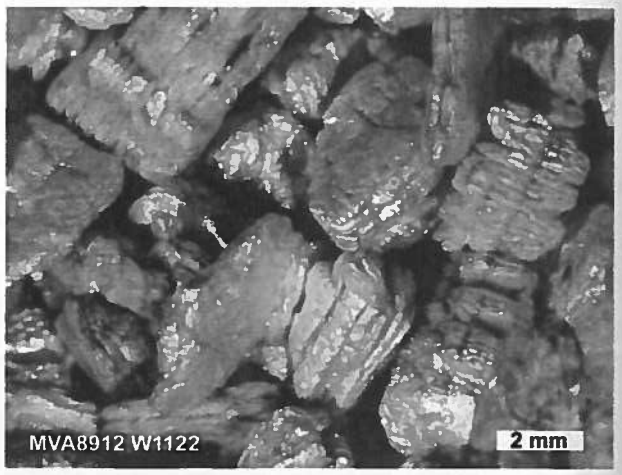

Figure 2. A close-up image shows the accordion feature of expanded vermiculite from Libby, MT.

Table 1. Typical Sizes, Densities and Names of Expanded Vermiculite

Sizes			Densities			Grades or Sizes
MM	IN	N.A.	KG/ CU M	LB/ CU FT	U.S. System	International
16	5/8	Down	56–72	3.5–4.5	N.A.	Premium (6)
8	5/16	Down	64–85	4.0–5.0	1	Large (4)
4	5/32	Down	72–90	4.5–5.5	2	Medium (3)
2	0.08	Down	75–112	4.7–7.0	3	Fine (2)
1	0.04	Down	80–144	5.0–9.0	4	Super fine (1)
0.5	0.02	Down	90–160	5.6–10.0	5	Micron (0)

Note: These sizes and values are given for general information purposes only. All manufacturers do not necessarily produce all these grades.
N.A. — not applicable
Source: www.vermiculite.net

products and as a soil amendment.

In November 1978, a commercial user of vermiculite from the Libby mine reported to the EPA and Occupational Safety and Health Administration (OSHA) that the user's employees were suffering adverse health effects. The user surmised that the problems may have been related to asbestos in the vermiculite (4). The general public became aware of the concern starting in 1999, when the national media reported that asbestos disease among the miners, families and residents of Libby was related to the nearby Libby vermiculite mine (5–10). This mine was the source of more than 70% of all vermiculite sold in the U.S. from 1923 to 1990. Uses of the expanded vermiculite from Libby commercially known as Zonolite (Figure 3), included insulation for attics and walls, spray-applied fireproofing such as Monokote, and certain garden products. A mortality study by the Agency for Toxic Substances and Disease Registry (ATSDR), for the 20-year period ending in 1998, showed that mortality in the Libby community resulting from asbestosis was approximately 40–60X higher than expected (11). ATSDR also found that mesothelioma mortality was elevated.

A detailed sampling and analyses of amphibole-rich rock from the Libby (Rainy Creek) vermiculite

deposit was performed by Meeker and others of the U.S. Geological Survey (USGS) (12). They found a range of amphibole compositions, determined from electron probe microanalysis and X-ray diffraction analysis. Those minerals that were found in their fibrous habits, in order of decreasing abundance, are winchite, richterite, tremolite, edenite, magnesio-arfvedsonite and possibly magnesioriebeckite.

Two types of analytical procedures are needed for vermiculite: one to measure the concentration of asbestos present and another to classify the vermiculite as most likely having come from Libby. A method with specific sample preparation procedures for the determination of the concentration of asbestos in vermiculite is needed because vermiculite differs from building materials that might contain asbestos. It is also necessary that the method be more sensitive than the usual 1% level often used for bulk building materials. Research has shown that Zonolite attic insulation (ZAI) with low levels of asbestos can release significant levels of asbestos fibers into the air if handled improperly (13). This is in line with the study of Addison et al., 1988 that reported: "It has been shown that as little as 0.001% of asbestos in loose clay soil can produce around 0.1 fibre per ml (0.1 fibers/cc) of asbestos in the air" (14).

In addition to a method to quantitate the concentration of asbestos in a vermiculite sample, there is a need for an inexpensive, scientifically valid method to classify vermiculite as being consistent or inconsistent with coming from the Libby mine. While the EPA report of 2000 (15) stated that previous geological studies had established that asbestiform minerals were present at two non-Libby commercial vermiculite mines located in the Enoree district of SC and one mine in Louisa County, VA, Gunter et al., 2005 (16) stated that the major vermiculite sources in the Enoree district, Palabora mine in South Africa and Xinjiang Province in China do not appear to contain significant amounts of asbestos when compared to the Libby ore. An EPA document reported that amphibole types found at Libby are not known to be found in vermiculite from the domestic vermiculite insulation mine source in Louisa County, VA (17).

In 2005, the USGS surveyed 101 vermiculite ore samples from their archives (18). During analyses using scanning electron microscopy (SEM), energy dispersive X-ray elemental spectroscopy (EDS) and X-ray diffraction (XRD) methods, significant levels of fibrous amphiboles — including winchite, richterite, tremolite, actinolite and/or riebeckite — were found in the vermiculite deposits in Colorado, Wyoming,

Photo by William M. Ewing

Figure 3. A bag of Zonolite attic insulation found in an attic.

Idaho and North Carolina. Specifically, the positive samples came from vermiculite deposits in the Gold Hill district in Latah County, ID; the Converse County, WY deposit; the Addie district in Jackson County, NC; and two Colorado vermiculite districts, the Gem Park Complex and Powderhorn district in Gunnison County. However, none of these deposits were considered to be a significant source of commercially used vermiculite.

EARLY ANALYSIS METHODS OF ASBESTOS IN VERMICULITE

In the 1950s, Bassett used XRD and optical microscopy to identify asbestos that occurred in many thin (approximately 1 inch), white asbestos veins that cut through the pyroxenite, when he characterized the vermiculite deposit in Libby (19).

In the 1970s, W.R. Grace & Company used XRD and polarized light microscopy (PLM) to analyze

Jan. 13, 1976

Density variations of ray
Vermiculites and Trem. ites

TABLE I

Mineral	Optical Properties n_α	$n_\beta - n_\gamma$	Pleochroism	Density (g/cc)	X-ray Main Peaks d (hkl)
Biotite	1.569	1.609	x < y = z x = light brown y = z = green brown	2.8 - 3.4	10.1 (001), 3.37 (003)
Hydrobiotite	1.545	1.582	x < y = z x = light brown y = z = moderate brown	2.5 - 2.8	12.4 (002), 3.53 (007)
Vermiculite	1.525 - 1.561	1.545 - 1.581	x < y = z x = light brown y = z = moderate brown to red brown	2.2 - 2.5	14.2 (002), 2.62 (200)
Tremolite	1.599	1.613 - 1.625	massive acicular or fibrous	2.9 - 3.2	8.38 (110), 3.12 (310

Figure 4. A table of optical properties and X-ray data for analysis of vermiculite compiled by Julie Yang of W.R. Grace & Company.

vermiculite for tremolite from their Libby mine (20); see Figure 4 (21). In a 1980 letter to the Consumer Product Safety Commission (22), W.R. Grace reported that the average level of asbestiform tremolite in vermiculite ore being shipped to exfoliating plants was 0.5% dry weight, and for the expanded vermiculite products, the level of contamination was on average at or below the lowest level of reliable detectability, 0.2% dry weight.

In 1976, the American Vermiculite Corporation requested that Atlanta Testing and Engineering Company (ATEC) analyze a sample of crude vermiculite ore from the Palabora mine in South Africa (23). ATEC did not see any fibrous material by the unaided eye and then used XRD and electron diffraction analysis to determine that very small thin fibers present were attapulgite, not chrysotile. No asbestos was reported in their analysis results.

A 1977 EPA-sponsored study of asbestos fibers in discharges from selected mining and milling activities by Stewart et al. of McCrone Associates used a transmission electron microscopy (TEM) method and found asbestiform amphibole fibers in the vermiculite tailings around the Libby mine (24). The 1980 EPA draft document, "Priority Review Level 1, Asbestos-Contaminated Vermiculite" (25), that mentions the results of the 1977 McCrone study also noted that: "After mining, vermiculite is processed to remove impurities, however, attempts to remove all contaminants have been unsuccessful and tremolite asbestos remains as a contaminant in the vermiculite obtained from the Libby mine at a concentration of at least 1%." This suggests an assumed detection limit at the time for vermiculite asbestos analysis of at least 1%.

In 1980, E.J. Chatfield and G.M. Lewis (26) published an analytical technique for measuring asbestos fibers in vermiculite. According to the published article, crude vermiculite ore was initially inspected by stereomicroscopy, representative vermiculite flakes were cleaved and carbon replicas of their surfaces were examined by TEM, and water washings were inspected for fibers by TEM. After exfoliation in a muffle furnace, vermiculite was put in water and the sinking fractions analyzed for fibers. Aqueous dispersions of particulate were prepared for TEM by the carbon-coated polycarbonate filter technique used in the preparation of water samples. The procedures were tested on a sample of Palabora No. 3 (medium) vermiculite. No amphibole fibers were detected, indicating a level less than 0.007 ppm. No chrysotile fibers were positively identified in the material. Vermiculite scrolls were present and described as an interference to chrysotile analysis.

The 1985 EPA report on "Exposure Assessment for

Asbestos-Contaminated Vermiculite" did not contain any methodology specifics or any results for the analysis of bulk samples of vermiculite for asbestos (27).

Moatamed et al. (28) reported in 1986 on the petrographic analyses of vermiculite ores from Montana, Virginia and South Africa for the presence of amphibole contamination. They reported fibrous actinolite in unexpanded Montana vermiculite ore at a maximum concentration of 2.0% and in the expanded ore at a maximum concentration of 0.6%. They also found actinolite in the Virginia vermiculite ore but at a lower concentration, and in what they classified as mostly cleavage fragments with low length-to-width ratios. South African ore was reported to contain rare anthophyllite fibers also with low aspect ratios.

In January 2000, the EPA Region 10 office in Seattle began testing a limited number of lawn and garden products that contained vermiculite to see if these products were contaminated with asbestos (15). The investigators visited nine retail stores in the Seattle metropolitan area that sell lawn and garden products. Sixteen different vermiculite products were selected from store shelves and purchased. The investigators made the decision to analyze the samples using the usual PLM bulk test method for determination of asbestos in building materials (29) but added steps in the preparation of the samples that included sieving, rinsing and floatation as described below. The residues of the preparations of the samples were also analyzed by TEM.

The PLM analysis for the 2000 EPA report was done by Manchester Environmental Laboratory, located in Port Orchard, WA. In the initial preparation steps, the vermiculite was separated through a series of USA Standard Testing Sieves (sizes No. 10 and No. 35) so the fine material could be segregated from the larger particles of vermiculite. The laboratory also used a rinsed residue technique to isolate the asbestos in vermiculite. To prepare the rinsed residue, a 40 ml subsample of vermiculite was placed into a beaker. The vermiculite was rinsed with 80 ml of deionized water. After the vermiculite floated to the surface, 7 ml of water was extracted from the bottom of the beaker using a syringe and was injected into a crucible. The crucible was covered and placed in a drying oven at 680° C for two to three days until all the water had evaporated. The residue that remained in the bottom of the crucible was then scraped out and placed onto a microscope slide for PLM analysis. Using a Nikon Optiphot Pol microscope at 400X magnification, the sample was scanned for the presence of fibers with an aspect ratio greater than five to one (5:1). Cleavage fragments were not counted as fibers. Straight, needle-like fibers that were identified as possible actinolite/tremolite fibers were checked for diagnostic optical properties such as angle of extinction, sign of elongation and central-stop dispersion staining.

The TEM analysis was done by Lab/Cor, Inc. in Seattle. The subsamples of garden products were weighed on an analytical balance (0.1 mg sensitivity), ashed in a muffle furnace at 480° C to remove the organic component and weighed again. After a brief dissolution of the acid soluble component in concentrated hydrochloric acid, the suspension was immediately diluted in about 20 ml of 0.2 μm filtered deionized water, and filtered through a dry pre-weighed 0.1 μm poly-carbonate (PC) filter. After drying, the filter was weighed again and processed using a preparation technique described in a draft EPA report by Yamate (30). Fibers of any length with an aspect ratio of at least 5:1 and proper mineral structure and chemistry were counted as regulated asbestos. Some cleavage fragments may have been counted in this analysis.

The results of the Region 10 investigation were that five of the 16 vermiculite products tested were positive for asbestos. With the exception of a bag of Zonolite Chemical Packaging Vermiculite, none of the sources of the vermiculite in the garden products were known. Analyses of duplicate quality assurance samples of Zonolite vermiculite using the TEM method found 0.10% and 2.79% asbestos for two samples of the same material.

The EPA 2000 garden products document (15) contained a summary table of analytical results of a 1982 Midwest Research Institute report (31) on the percent of asbestos in raw, beneficiated and exfoliated vermiculite ore. Those results are reproduced in Table 2.

Also present in the EPA 2000 garden products document (15), is a description of vermiculite analyses done by EMSL Analytical, Inc. for EPA contractor Versar, using a grinding preparation technique (32, 33). For PLM analysis, samples were first ground to a level where the vermiculite plates were barely visible. Point count PLM analysis was performed on 400 points (50 points on each of each slides). For TEM analysis, the sample was ground further until the vermiculite plates were no longer visible to the eye. The potting soil samples were ashed (due to their high organic content) prior to grinding, recording their weight before ashing. Subsequently, 0.01 g of powder was added to 100 ml of water, sonicated, and an aliquot of 5 ml was filtered onto a 47 mm filter, which was then prepared for TEM analysis. For each sample, three areas

Table 2. Results of Vermiculite Analyses from the 1982 Midwest Research Institute Report

Mines	Vermiculite Samples	Sample No.	Total Asbestiform Fibers	
			Estimated Contents %	Mineral Types
W.R. Grace, Libby, Montana	Head Feed (raw ore)	291-1	21–26	Tremolite-Actinolite
	Beneficiated Grade 1	270-1	4–6	Tremolite-Actinolite
	Beneficiated Grade 2	276-1	4–7	Tremolite-Actinolite
	Beneficiated Grade 3	259-1	2–4	Tremolite-Actinolite
	Beneficiated Grade 4	282-1	0.3–1	Tremolite-Actinolite
	Beneficiated Grade 5	264-1	2–4	Tremolite-Actinolite
W.R. Grace, Enoree, South Carolina	Mill Feed (raw)	436-1	<1	Mixed, Tremolite-Actinolite
	Beneficiated Grade 3	430-1	<1	Mixed, Tremolite-Actinolite
	Beneficiated Grade 4	433-1	<1	Mixed, Tremolite-Actinolite
	Beneficiated Grade 5	427-1	<1	Mixed, Tremolite-Actinolite
	Beneficiated Grade 3	439-1	<1	Mixed, Tremolite-Actinolite
	Beneficiated Grade 4	442-1	<1	Mixed, Tremolite-Actinolite
Patterson, Enoree, South Carolina	Beneficiated Ungraded	573-1	<1	Mixed, Tremolite-Actinolite

Source: U.S. Environmental Protection Agency (Ref. 15).

were sampled and analyzed from the filter (i.e., the center, the edge and in between). This was done to counter any variation in radial distribution of particulates. The TEM analysis was performed by observing 10 grid openings for each of the three TEM grids at 2,000X magnification and three grid openings for each of the three TEM grids at 20,000X magnification. Cut-offs of fibers sizes were observed to avoid counting twice. The mass of the observed fibers was then calculated, and following its extrapolation to the whole filter and to the whole mass of 0.01 g, the asbestos percent count was determined.

Based on the results of the initial bulk analyses by EMSL, five samples that tested positive for asbestos content using the initial TEM approach were further analyzed using two additional techniques, the SOP 2000 (33) and Superfund Method (34). The SOP 2000 method was expected to provide a more refined estimate of the asbestos content of these materials. This method involved sample preparation (i.e., grind-

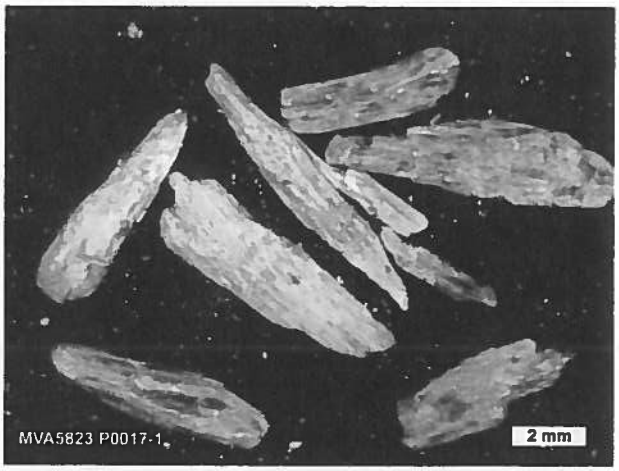

Figure 5. A stereomicroscope image shows amphiboles in the sinks from a Libby sample (Cincinnati Method).

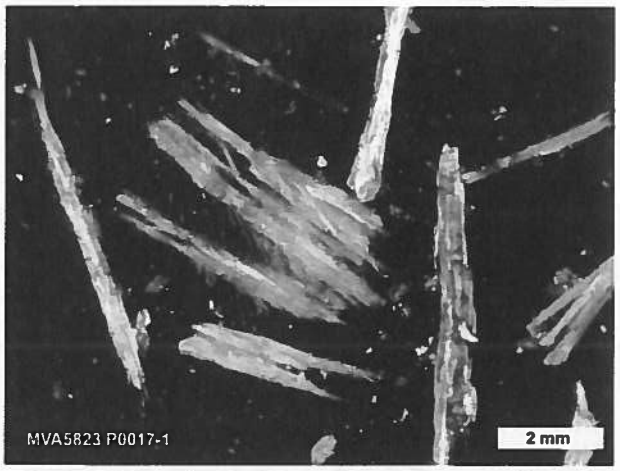

Figure 6. A stereomicroscope image shows fibrous amphiboles in the sinks from a Libby sample (Cincinnati Method).

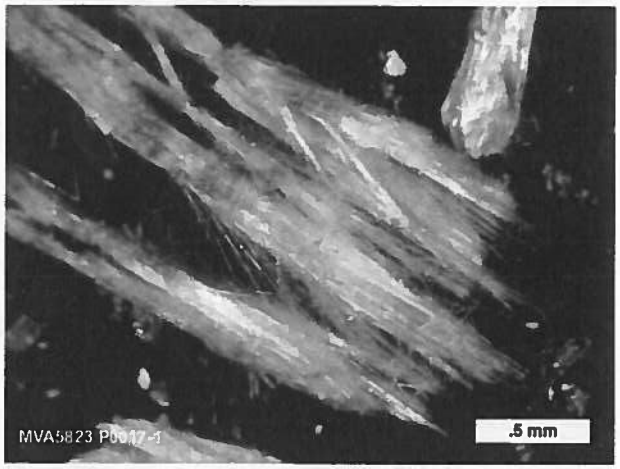

Figure 7. A higher magnified image shows fibrous amphiboles in the sinks from a Libby sample (Cincinnati Method).

ing and sieving the sample to obtain a distribution of particle sizes), screening with a scanning electron microscope to ensure that asbestos fibers had been removed from the vermiculite plates and analysis by PLM at 100X magnification. The method included recording fibers with a 3:1 aspect ratio that fit the criteria for asbestiform given in Appendix A of EPA/600/R-93/116 (29). The TEM examination was performed at 10,000X magnification. The asbestos percent obtained by PLM and TEM were added to obtain total asbestos content.

In 2000, Wylie and Verkouteren's mineralogical examination of two samples of asbestiform amphibole from Libby (35), using methods described previously (36), concluded that the specimens were composed of winchite-asbestos with one sample close to richterite in composition.

CINCINNATI METHOD: THE ANALYSIS OF VERMICULITE FOR ASBESTOS CONTENT

Because vermiculite is a difficult matrix for asbestos analysis, Wayne Toland of EPA Region 1 laboratory in Boston contracted with Eric Chatfield of Chatfield Technical Consulting to prepare a report on an analytical method for determination of asbestos in vermiculite and vermiculite-containing products. Chatfield's draft method released in 2000 (37) involved using water to density-separate the lighter vermiculite that floats from the denser amphibole particles that sink to the bottom with other material. Stereomicroscopy was used to pick out the suspect amphibole particles that were then analyzed by PLM. The confirmed amphibole asbestos particles were weighed, and a weight percent was determined for the sample.

On July 17–18, 2003, the EPA convened a meeting of experts to consider an analytical method for bulk analysis of vermiculite. Based on Chatfield's previous work, the "Cincinnati Method," EPA/600/R-04/004 was published in 2004 (38). In EPA/600/R-04/004, vermiculite attic insulation (VAI) samples are processed using water to separate the "floats," "sinks" and "suspended particles" fractions. The method contains the procedures for making two measurements of amphibole in VAI. Optical microscopy is used to analyze the sinks fraction because denser particles that sink to the bottom may contain large amphibole fiber bundles. Electron microscopy is used to analyze the suspended par-

Table 3. Results of MVA Scientific Consultants Analyses of "Sinks" Using the Cincinnati Method

Subsample Identification	P0017-1	P0017-2	P0017-3	Mean
Date of Analysis	01/28/04	01/28/04	01/28/04	—
Analyst	BT	BT/WH	BT/WH	—
Initial Weight of Subsample (dry weight)	10.9748 g	10.3097 g	10.8645 g	—
Weight Loss on Drying (if applicable)	N.A.	N.A.	N.A.	—
Weight of Sinks	3.8857 g	2.0152 g	2.5188 g	—
Weight of Hand-Picked Fibrous Amphibole	0.8893 g	0.3889 g	0.7229 g	—
Assumed Sensitivity of the Balance	0.0001 g	0.0001 g	0.0001 g	—
Identity of Fibrous Amphibole by PLM Central-Stop Dispersion Staining in 1.605 RI Oil	Actinolite[a]	Actinolite[a]	Actinolite[a]	—
Identity of Fibrous Amphibole by PLM Refractive Indices	a/t/w/r[b] α~1.623 γ~1.640	a/t/w/r[b] α~1.623 γ~1.640	a/t/w/r[b] α~1.623 γ~1.640	—
Identity of Fibrous Amphibole by SEM-EDS	Winchitic[c]	Winchitic[c]	Winchitic[c]	—
Weight % of Fibrous Amphibole in the Original Subsample	8.1%	3.8%	6.6%	6.2% Standard Deviation = 2.2%

N.A. — not applicable

[a]Dispersion staining colors determined by the analyst to be most consistent with actinolite when in 1.605 refractive index (RI) liquid; the RI oil commonly used by commercial laboratories for identification of the amphiboles: anthophyllite, actinolite and tremolite.

[b]Refractive index values are within the range of literature values for several amphiboles, including actinolite, tremolite, winchite and richterite.

[c]X-ray spectra generally consistent with sodic-calcic group. Based on chemistry, the analyst determined the best match to be winchite.

ticle fraction because fine amphibole fibers are suspended in the water.

As part of the validation of the Cincinnati Method, VAI samples collected by the USGS were sent to several laboratories, including MVA Scientific Consultants, in January 2004. All the samples were described as grab samples of a larger amount of VAI collected by the USGS in Libby. At MVA, the sample was first divided into four separate subsamples using the cone and quartering technique. Four replicate subsamples of approximately 10 g each were produced from the original one-gallon zip-lock bag of material. One subsample was sent to an industrial hygienist, who sent it to a routine asbestos laboratory for analysis. Three subsamples were analyzed at MVA; they were dried for two hours at 100 degrees and weighed using a Mettler balance. Following the methods described in EPA/600/R-04/004, the denser particles (sinks) were separated from the less dense particles (floats). The sinks were dried overnight on a hot plate at 60° C and weighed. The sinks were examined by stereomicroscopy with a Zeiss Stemi 2000 stereomicroscope. Probable amphibole particles were picked with tweezers (Figures 5–7). The total weight of amphibole particles

Table 4. Results of Fibrous Amphibole in "Suspended Particles Fraction" from Libby Vermiculite Sample P0017

Subsample Identification	P0017-1	P0017-2	P0017-3	Mean
Date of Analysis	1/29/04	1/29/04	1/29/04	—
Analyst	AH	AH	AH	—
Initial Weight of Subsample (dry weight)	10.9748 g	10.3097 g	10.8645 g	—
Volume of Suspension	1000 ml	1000 ml	1000 ml	—
Volume Filtered	1 ml	1 ml	1 ml	—
Volume Filtered for Mass Determination	1 ml	1 ml	1 ml	—
Weight of Filtered Material	0.00033 g	0.00015 g	0.00052 g	—
Effective Filtration Area	923 mm^2	923 mm^2	923 mm^2	—
Area Examined	0.054 mm^2	0.054 mm^2	0.054 mm^2	—
Magnification	20,600X	20,600X	20,600X	—
Number of Fibrous Amphibole Particles Counted	23	7	11	—
Concentration of Fibrous Amphibole Particles in Original Subsample (fibers/gm)	35,821,000	11,605,000	17,306,000	21,577,333 Standard Deviation = 12,660,446

with some evidence of fibrous nature was determined for each subsample. Representative fiber bundles were then analyzed by PLM with an Olympus BH-2 polarized light microscope and by SEM using a JEOL 6500 coupled with a Noran Vantage EDS system.

The average weight percent determined from the analyses of the sinks from three replicates of the USGS VAI sample was 6.2% (RSE = 0.4). Individual values are given in Table 3. Several fibrous amphibole species were found with the analytical PLM method applied. A comparison of the refractive indices results, found in this USGS sample of Libby vermiculite, with various values in the literature was previously published by Millette and Bandli (39).

The subsample sent to the routine asbestos laboratory for analysis was reported as less than 1% tremolite asbestos and <1% non-asbestiform tremolite. The routine asbestos laboratory's results report stated that the analytical method used was either EPA 600/R-93/116 (29) or EPA 600/M4-82-020 (40), as applicable. It also stated, "Percentages are visual estimates based on sample volume."

The suspended particle fractions were prepared from the three VAI subsamples using the water suspensions after the floats and sinks had been removed. The suspensions were brought up to a volume of 1 l and sonicated for 2 minutes. The suspensions were then agitated by bubbling filtered oxygen for 1 minute through the liquid using a 10 ml glass pipette at a flow rate of approximately 4 l per minute. One and 10 ml aliquots of each suspension were removed and filtered through 0.2 μm pore-size polycarbonate filters. The filters were prepared and analyzed following the standard procedures as described in ISO 13794 (41). Analyses were performed on a Philips 420 transmission electron microscope with an Oxford INCA X-ray analysis system.

The average concentration of fibrous amphibole in three replicates of the suspended particles fractions of the USGS VAI sample was 22 million fibers per gram (RSE = 0.6). Individual values are given in Table 4. A range of EDS spectra were obtained from the amphibole fibers.

A sample of South African (Palabora) vermicu-

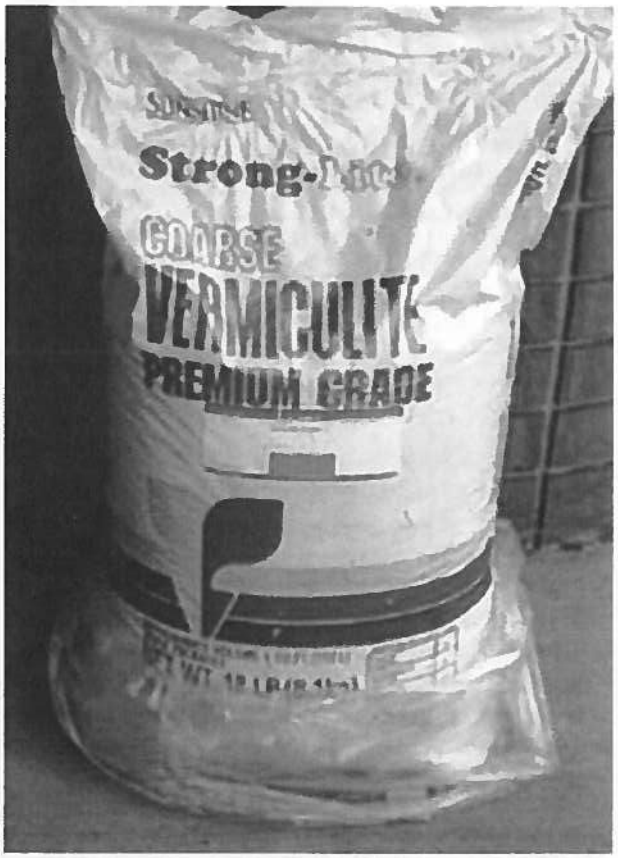

Figure 8. A bag of vermiculite from the Palabora mine in South Africa. No asbestos was found in a sample from this bag analyzed by PLM and TEM.

lite was purchased by MVA directly from a chemical supply house (Figure 8) and analyzed using the preparation and microscopy methods as described in EPA/600/R-04/004. No asbestos was found by either PLM or TEM. The TEM analytical sensitivity was less than 0.00001%. Information about the asbestos content of the South African vermiculite was requested from the chemical supply house. They sent copies of seven certificates titled, "Certificate of Analysis-Fibre Identification in Bulk Material," prepared by IOM Consulting Limited, Edinburgh, U.K. in 2006 for large, medium, fine, superfine, micron, RSU and DDM grades of Palabora vermiculite. The certificates stated that the samples had been "analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG248" (42). No asbestos fibers were detected. Negative results for Palabora vermiculite are reported in the EPA draft document of 1980 (25) that cites the work of Chatfield and Lewis, 1979 (43) and Wisenbaker and Arnold, 1976 (23) and states that no positive identification of asbestos was made in samples of vermiculite from the Palabora mine by these electron microscopy studies.

NEW YORK STATE HEALTH DEPARTMENT TEST METHODS FOR ASBESTOS IN VERMICULITE SPRAY-ON FIREPROOFING

In 2014, Zucker and Kelly (44) announced the imminent availability of two New York State Department of Health (NYS DOH) ELAP-approved methods for the detection and quantitation of asbestos content in spray-on fireproofing that contains vermiculite (SOF-V) to be used after Oct. 31, 2014. NYS DOH developed Method 198.8 (45) as a polarized light microscope method for identifying and quantifying asbestos in bulk samples of sprayed-on fireproofing containing vermiculite. The method involves preparation steps of gravimetric matrix reduction of at least 3 g, including ashing for 10 hours at 485° C to remove the organic materials and acid treatment (2 M hydrochloric acid) to remove gypsum and cement from SOF-V. Heavy liquid centrifugation (using either an aqueous solution of lithium metatungstate or sodium polytungstate) is used to separate particles with densities exceeding 2.75 g/cc that include any amphibole. Analysis is done by PLM and point counting (400 points). Reliable and routine discrimination between the various amphiboles present in vermiculite from Libby is not possible by PLM; therefore, the fibers are identified as "amphibole asbestos." Under NYS DOH 198.8, amphibole asbestos includes the minerals, richterite and winchite.

NYS DOH has also officially certified method LAB.055.1 (46) developed by RJ Lee Group (RJLG) for the analysis of spray-on fireproofing that contains vermiculite (SOF-V). As described in an RJLG ex-ample report (47) Method Lab.055.1 (patent pending 13/918,071) is a two-level process. In Level 1, the vermiculite-containing material is rinsed with water and mild HCl, and then ashed at 480 °C. The residual material is analyzed by PLM. Level 1 analysis is for the detection and quantification of chrysotile. If amphibole asbestos is observed, it is noted in the report but not quantified. For the Level 2 analyses for amphibole fibers, separate samples are prepared by ashing at 480° C and hydrochloric acid (HCl)/sodium hydroxide (NaOH) digestion. The procedure is similar to the Addison and Davies procedure (48), published in 1990 and used by Millette et al., (49), that performs ashing

at 600° C and digestion with 2 N sulfuric acid followed by 4 N sodium hydroxide. In these processes, chrysotile, vermiculite, cellulose, mineral wool and acid soluble materials such as gypsum and carbonate are removed. Both PLM and SEM are employed in Method Lab.055.1 to estimate the total regulated and non-regulated amphibole asbestos content. The asbestos content is estimated using the arithmetic mean of the PLM and SEM results.

OTHER METHODS FOR QUANTIFYING THE AMOUNT OF ASBESTOS OR AMPHIBOLE IN VERMICULITE

The 2014 ISO bulk asbestos method 22262-2 (50) states that a large proportion of constituents such as exfoliated vermiculite or expanded perlite can be separated by flotation. The method then goes on to describe procedures to use distilled water to float exfoliated vermiculite so that the sedimented particles can be extracted for analysis. The ISO document also describes how vermiculite, wollastonite, attapulgite and sepiolite represent a group of materials that can be dissolved using sequential refluxing in acid and alkali with a reference to the Addison and Davies procedure (48). A vermiculite sample is placed in a muffle furnace and maintained at a temperature of 600° C ± 10° C for a minimum period of 10 hours. The residue is then boiled in 2 mol/l sulphuric acid or 2 mol/l hydrochloric acid for 1 hour. After twice washing and centrifuging at a minimum speed of 2,800 rpm the residue is boiled in 4 mol/l sodium hydroxide in a reflux assembly for an hour. After an additional double washing and centrifuging, the centrifugate is extracted for analysis. ISO 22262-2 specifies using ISO 22262-1 (51) to identify any asbestos, if present, in the final residue. If amphibole asbestos is identified, it can be quantified by PLM, SEM or TEM as specified in Clause 14 of ISO 22262-2.

The CARB 435 Method (52) promulgated by the California Air Resources Board for the analysis of serpentine aggregate has been investigated as a method for vermiculite analysis. Vermiculite is milled in the same way a rock or ore sample is handled, followed by PLM analysis using a point count procedure (53).

Gunter and Sanchez have determined the amount of amphibole present in several vermiculites using XRD (54, 55). The vermiculite samples are prepared initially using a coffee grinder to reduce particle size. Then the material is sieved to –120 mesh. Four grams of each –120 mesh sample are put in a McCrone Micronizing Mill with 25 ml of acetone and milled for 12 minutes to further reduce and homogenize the grain size. The milled material is subjected to a cation exchange in 100 ml of 1 M KCl for 24 hours (the effect of this step exchanges K in the inner layers of the sheet silicates, in essence collapsing the vermiculite and hydrobiotite inner layers into spacing similar to biotite). A Siemens D5000 X-ray diffractometer with CuKα radiation at 40 kV and 30 mA was used. Two separate scans were made for each sample. The first scan is over the 2θ range, 2° to 45°, with 9 s/step, and 0.02° steps. This scan is referenced as the long 2θ scan. The second scan, referenced as the short 2θ scan, is over the 2θ range, 9.5° to 11.5°, with 180 s/step and again 0.02° steps. This short scan is specifically over the 2θ region that overlaps the 110-amphibole diffraction peak and takes 4 hours to run. To quantify the amount of amphibole present in each sample, the area of the 110-amphibole peak, was measured using the D5000 system software. The results of XRD analysis from an expanded vermiculite from a bag of Zonolite attic insulation was 0.11% amphibole. The XRD result for a sample of Black Gold vermiculite (Palabora) was below the detection limit of 0.05 to 0.10% for their method. Other vermiculite product samples were less than 0.92% amphibole. Although XRD does not provide information as to whether or not the amphibole particles are fibrous, it can be used as a screening tool to see if the vermiculite is below a specific level of amphibole content.

ALEXANDRIA METHOD-SCREENING VAI FOR LIBBY

On Feb. 17–18, 2004, the EPA convened a workshop on VAI in Alexandria, VA. The purpose of the meeting was to develop a cost-effective method to help an owner of vermiculite insulation to determine whether or not the insulation is composed of vermiculite mined in Libby. The 2006 draft "Alexandria Method" (56) utilizes essentially the same density separation preparation procedure as the Cincinnati Method but only uses TEM to analyze the very small elongated particles of amphibole in the suspended fraction. The purpose of the analysis is to determine if the amphiboles are consistent with Libby amphiboles. The Libby amphiboles are chemically and mineralogically very similar and collectively referred to in the Alexandria Method as Libby amphiboles (LA). Technically, they include any one of several double chain silicate minerals, including principally winchite, richterite, tremolite, magnesioriebeckite, edenite and magnesio-arfvedsonite, which have been found in the

vermiculite mine at Libby. (12).

Basically, the preparation procedures in the Alexandria Method (TEM fibrous amphibole method) involve stirring a sample of vermiculite into a beaker of liquid. The suspension is allowed to stand so that the vermiculite can float and the heavy particulate can settle out. If present, particles of fibrous amphibole will be suspended in the liquid column. A portion of the suspension is collected with a pipette and prepared by either a drop mount or filtration procedure. With the drop-mount procedure, a drop of suspension is placed on a carbon-coated electron microscope grid. Filtration is done with an MCE or polycarbonate filter that is prepared in the standard direct way to provide a TEM grid for analysis. TEM analysis is done following the standard ASTM D6281 (57). EPA conducted validation exercises with seven laboratories (three commercial, one state and three different agencies in the federal government), which successfully analyzed a sample of commercial vermiculite from Libby. This same group of laboratories successfully analyzed a sample of Palabora vermiculite, which was spiked with 0.01% Libby amphibole powder and blended.

John H. Smith of the EPA's Fibers and Organics Branch, Office of Pollution Prevention and Toxics, continued the development of the Alexandria Method and presented a 2011 version (17) as the Beard-Shaul Method (in honor of Michael E. Beard and Glenn M. Shaul, EPA legends in asbestos analysis). Smith's reasons behind the need for a qualitative method that classified a sample of vermiculite as to whether or not its source was Libby were the following:

1. The Libby amphibole can be found in vermiculite insulation in elongated microscopic particles that have similar properties to particles, which are regulated as asbestos under the Toxic Substances Control Act and the Clean Air Act.

2. The EPA considers some amphibole particles of the size sought in this method to be the source of asbestos disease (58).

3. Libby amphibole has been regulated as asbestos as part of activities conducted in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (59).

The Beard-Shaul method used TEM to analyze the very small elongated particles of amphibole in a drop mount of the suspended fraction of a vermiculite sample mixed in water. To generate the drop mount, a drop of the suspension is placed on a TEM grid and dried. The method also has a TEM filter analysis option. Drop mount grid preparations are not considered appropriate to report a negative result due to the uneven distribution of the dried particulate debris. The TEM filter method is more time consuming in preparation, but negative results using this preparation method are considered more definitive. A "New York Minute Method" for detecting asbestos in VAI is discussed by Getman and Webber but not yet finalized as a formal method, also uses a TEM drop-mount procedure (60).

The EPA conducted a test of the Beard-Shaul method using 10 commercial laboratories analyzing 10 samples, including Zonolite, vermiculite from other sources, and blind duplicates. Unfortunately, there was a mix-up in the numbering of the blind duplicates, and the results of the test were inconclusive.

After Smith retired in December 2011, work on the Beard-Shaul method did not continue at the EPA. However, under the auspices of ASTM-International Subcommittee D22.07, a task group headed by Jeanne Spencer of Reservoirs Environmental Inc., has taken up the challenge of developing this method into an ASTM Standard (61).

THE BARIUM TEST TO CLASSIFICATION VERMICULITE FROM LIBBY

After investigating several ways of differentiating Libby vermiculite from vermiculites coming from other major commercial sources, Gunter collaborated with Meeker at the USGS in Denver and others to determine how elemental chemical compositional data obtained by X-ray fluorescence spectroscopy (XRF), with appropriate statistical methods, could be used to source vermiculite products back to their original mines (16). Cluster analysis was required for complete source determination, but barium (Ba), and to a lesser extent, chromium (Cr) and vanadium (V), could be used directly as element markers to differentiate a Libby verses a non-Libby source. Wright and Palmer, 2008 also found that statistical analysis of the geochemical data from vermiculite ore was a useful technique for determining the ore's provenance (62).

In 2011, MVA was asked to review the Gunter/Meeker study along with other information pertaining to the measurement of certain elements contained in vermiculite. The review confirmed that there is a distinct difference in barium content between Libby, and most of the different vermiculite sources studied. The Gunter/Meeker data tables contained some data from samples that are probably Libby but actually might not be. Table 5 contains data for barium concentration only for those samples that appear to have

Table 5. Data for Barium Concentrations Only for Those Samples that Appear to Have a Known Providence

Vermiculite Source	Sample	Barium ppm
Libby, Montana	Li1UI	2640
	Li2UI	2639
	Li1GS	2550
	Li2GS	2510
	Li3GS	2120
South Africa	SA1GS	643
	SA2GS	432
	SA1UI	424
	SA3GS	370
	SA4GS	366
	SA5GS	359
South Carolina	SC5UI	2570
	SC1GS	1640
	SC4UI	1109
	SC2UI	1105
	SC1UI	1071
	SC3UI	1070
	SC2GS	999
	SC3GS	998
	SC6UI	297
China	Ch3GS	1020
	Ch1GS	869
	Ch2GS	725

Source: Gunter, 2005 (Ref. 16)

a known providence: Libby, South Africa, South Carolina or China. The data in Table 5 supports the same conclusion shown in Gunter's tables, but it is easier to see that above a level of 1,500 ppm barium there are no false negatives and only a few false positives (i.e., the method tends to error on the side of assigning a Libby source to a non-Libby sample and does not assign a non-Libby source to a Libby sample).

Later in 2011, MVA was asked to test the validity of the barium test by analyzing 10 known ZAI samples by both the bulk chemistry procedure and the detection of Libby amphibole by TEM. Subsamples of the ZAI were sent to Paradigm Environmental Services in Rochester, NY to be tested for barium using the USEPA SW-846 Method 3050B (63) for the acid digestion of sediments, sludges and soils and USEPA SW-846 6010C (64) for inductively coupled plasma-atomic emission spectrometry. The samples were also screened for Libby amphibole using the draft TEM Alexandria Method (17). Each representative sample of ZAI was weighed, suspended in 200 ml of water, stirred for approximately 1 minute and left to settle. For this particular study, there was a modification from the Alexandria Method, where the settling time was reduced

Table 6. TEM Results (Alexandria Method) and Barium Levels for 10 Zonolite Attic Insulation Samples

Client ID Sample Numbers	MVA Sample Numbers	Sample Wt. for Preparation for TEM Analysis (g)	TEM Results for Libby Amphibole	Sample Wt. for Barium Analysis (g)	Barium Results (mg/kg)
SLG1	X0571	7.180	Positive	2.175	818
SLG2	X0572	4.985	Positive	2.235	2,270
SLG3	X0573	6.005	Positive	2.460	2,940
SLG4	X0574	4.825	Positive	1.700	2,270
SLG5	X0575	7.545	Positive	2.630	2,400
SLG6	X0576	6.760	Positive	2.330	2,110
SLG7	X0577	4.285	Positive	2.040	2,400
SLG8	X0578	7.040	Positive	2.170	2,830
SLG9	X0579	7.210	Positive	2.205	3,060
SLG10	X0580	4.620	Positive	1.615	2,420 M*

*M = Matrix spike recoveries outside QC limits. Matrix bias indicated.

to 5 minutes instead of 15 minutes. An aliquot from each sample was filtered using 47 mm diameter, 0.2 μm pore-size, PC filters. The TEM analysis was performed with a Philips CM 120 transmission electron microscope equipped with an Oxford INCA energy dispersive X-ray spectrometer. Fibers were identified as Libby amphiboles based on comparison with the spectra presented in EPA/600/R-04/004 (39).

Libby amphiboles were detected in each of the 10 samples. Samples X0572–X0580 contained barium levels above 2,000 ppm. Sample X0571 contained a barium level below 1,000 ppm, which is not consistent with a Libby vermiculite source. TEM results and barium levels for each sample can be found in **Table 6**.

A close examination by light microscopy of the sample that had a value for barium of 880 ppm showed that it contained approximately 50% wood fiber by volume in the form of small, thin particles in addition to the vermiculite. This was consistent with additional information obtained from the sampler: "The home originally featured sawdust insulation in the attic space."

The analysis results of Sample X0571 (SLG1) show a potential problem with the process for the homeowner who simply scoops some vermiculite attic insulation into a baggie and sends it off for barium analysis. They could get a false negative result if the insulation is mixed with something other than Libby vermiculite.

DISCUSSION

As described here, there are several methods to analyze for the concentration of asbestos in vermiculite. There is general agreement that a negative finding using the usual bulk PLM analysis for building materials without any pretreatment of the vermiculite is not reliable. The methods that contain preparation procedures involving sedimentation or total matrix reduction with acid/base dissolution increase the chances for reliable analyses of asbestos concentration.

There are numerous studies of Libby vermiculite and general agreement that it contains amphibole asbestos fibers of several mineral types. Some data suggest that a variation in amphibole content for different areas of the Libby mine is likely, and there is some evidence of a reduction in levels in exfoliated material over the years that can be attributed to improved processing techniques. It is evident that at least some of the variation in results is due to the different analysis methodologies used.

There is some agreement that commercially used non-Libby vermiculite is not contaminated with asbestos to the extent of the Libby material and some data showing a lack of asbestos contamination of the vermiculite from the Palabora mine in South Africa. Actual analysis data is limited in the published articles providing results for the major vermiculite sources in the Enoree district in SC; Louisa County,

VA and Xinjiang Province in China.

Differentiating Libby vermiculite insulation from other commercial sources can be done reliably and inexpensively with the barium concentration test as long as the insulation sample is not a mixture of Libby vermiculite and other materials. This method has been adopted by the Zonolite Attic Insulation Trust fund as a way for homeowners to determine if they qualify for financial assistance in removing vermiculite attic insulation (65). A qualitative TEM analysis of the fibers suspended in water from a VAI sample prepared using the sedimentation procedure appears to be a reliable method of confirming Libby vermiculite, considering the limited range of possible commercial sources that existed during its years of use.

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DISPOSITION PAPER
FOR
ASBESTOS-CONTAMINATED VERMICULITE

AUGUST 1982

CHEMICAL CONTROL DIVISION
OFFICE OF TOXIC SUBSTANCES

REPORT-42

B. Exposure Assessment

More recently, in February 1982, Versar, Inc., under contract to OTS, prepared an interim final exposure assessment for asbestos-contaminated vermiculite throughout most of its life cycle.[22] Human exposures to vermiculite were estimated during mining and milling, processing, transporting, and during commercial and consumer uses. Sources of information included data found in the vermiculite industry records, information in the PRL-1 report, monitoring data obtained by EPA, and a number of other sources.

Exposure to asbestos in asbestos-contaminated vermiculite occurs primarily through inhalation; ingestion and dermal absorption seem to be insignificant routes, although ingestion of asbestos may follow initial inhalation. The exposure assessment was designed to provide inhalation exposure estimates for use in a risk analysis and subsequent regulatory action, if indicated. The focus was on occupational and consumer exposures. Some high-exposure occupational groups identified included rail workers transporting raw ore, miners, and exfoliators. These three types of occupational exposure were estimated at levels of 4.0×10^{11} fibers per year, 1.7×10^{10} fibers per year, and 8.3×10^{8} fibers per year, respectively. These exposures affect a relatively small population. A much larger number of persons may inhale asbestos during trade or consumer use of vermiculite products, but are expected to receive lower exposures.