HB 258

<TARGET><BILL>HB 258</BILL><SUBJECT>HB 258</SUBJECT><COMM>SFIN27</COMM></TARGET>

SENATE FINANCE COMMITTEE REPORT

DATE: 4/6/12

FURTHER:

DATE TURNED
IN TO OFFICE: _____

Finance Committee considered CS FOR HOUSE BILL NO. 258(FIN)

HB 258-NATURALLY OCCURRING ASBESTOS

"An Act directing the Department of Transportation and Public Facilities to develop and implement standards and operating procedures, to evaluate site-specific use plans, and to designate project areas concerning gravel or other aggregate material containing naturally occurring asbestos; authorizing use on an interim basis of gravel or other aggregate material containing naturally occurring asbestos for certain transportation projects and public facilities; providing immunity for the state and for landowners, extractors, suppliers, transporters, and contractors for certain actions or claims arising in connection with the use of gravel or aggregate material containing naturally occurring asbestos in certain areas; requiring contractors to report certain asbestos- related data to the Department of Transportation and Public Facilities; and providing for an effective date."

and recommends:

[✓] be **replaced** with **SCS** CSHB258 (FIN) [✓] *Same Title* [ ] *Technical Title Change* [ ] *New Title/SCR No.*_____

[ ] adopt **previous SCS** _____ (_____) [ ] *Same Title* [ ] *Technical Title Change* [ ] *New Title/SCR No.*_____

[ ] attached amendment(s)

[✓] adopt SFIN _____ Letter of Intent / Leg Findings

[ ] further referral to _____ Committee

Dept Abbr.	
ADM	LEG
CED	LAW
COR	LWF
CRT	MVA
EED	DNR
DEC	DPS
DFG	REV
GOV	DOT
DHS	UA

NEW FISCAL NOTE(S)				
Dept.	Fiscal	Indet.	Zero	FN #

PREVIOUS FISCAL NOTE(S)				
Dept.	Fiscal	Indet.	Zero	FN #
DOT	X			7
DEC	X			6
DNR			X	5
LAW			X	4
DHS	X			3
LWF			X	1

[ ] **APPROPRIATION - no fiscal note**

SIGNATURES AND RECOMMENDATIONS:	PRINTED LAST NAME	DO PASS	DO NOT PASS	NO REC	AMEND
	Thomas	✓			
	Egan	✓			
	McGuire	✓			
	Ellis	X			
CO-CHAIR:	Hoffman	✓			
CO-CHAIR:	Stedman	✓			

Representative Reggie Joule

Alaska State Legislature District 40

LEGISLATIVE FINDINGS AND PURPOSE

The Legislature finds that

(1) gravel or similar aggregate material is constantly in demand for major construction and maintenance of state and local transportation projects and public facilities and for all types of construction by public and private entities;

(2) naturally occurring asbestos may be found in sources of gravel and similar aggregate material throughout the state;

(3) while airborne asbestos fibers are a significant threat to workplace safety and public health and are subject to close regulation by federal and state authorities under U.S.C. 7401 - 7671q (Clean Air Act) and 15 U.S.C. 2601 - 2692 (Toxic Substances Control Act), use of materials containing naturally occurring asbestos in construction projects may be regulated by states;

(4) in communities that do not have sources of gravel or similar aggregate material that is free of naturally occurring asbestos, costs of construction are substantially increased because of the necessity of locating alternative sources of gravel or similar aggregate material and transporting that material to distant construction and maintenance sites; and

(5) a recent study suggests that, with careful use and close adherence to appropriate control strategies, state and local transportation projects and public facilities may be safely completed using sources of gravel or similar aggregate material that contains naturally occurring asbestos; the study recommends that the Department of Transportation and Public Facilities establish standards and operating procedures through a statewide process that will apply to the use of gravel and aggregate material that contains asbestos by the department and by any public or private entity.

It is the purpose of this Act

(1) to authorize and direct the Department of Transportation and Public Facilities to develop, implement, and, as circumstances may require or indicate, modify standards and operating procedures to allow the use in the construction and maintenance of transportation projects and public facilities in certain areas of the state of gravel or aggregate material that contains naturally occurring asbestos, with the expectation that use of that material in a manner that is consistent with those standards and procedures may avoid significant risk to human

health and eliminate significantly higher costs of construction and maintenance of projects and facilities associated with using only construction material that is free of asbestos;

(2) to establish that a person that uses gravel that contains naturally occurring asbestos in certain areas of the state may prepare specific project plans that conform to requirements of this Act and the department's standards and operating procedures; and

(3) to shield persons and the state, including its agencies, officers, and employees, under certain conditions, from liability based on exposure to naturally occurring asbestos.

(4) This Act creates a voluntary program in certain areas of the state and provides civil immunity for the use of gravel or other aggregate material that contains naturally occurring asbestos for contractors meeting the requirements of the program; nothing in this Act mandates a contractor to submit a site-specific plan or to adhere to the requirements of a plan approved by the department.

(5) Because neither the state nor the federal government has established a scale assigning a specific risk level to a corresponding amount of naturally occurring asbestos, this Act accepts 0.25 percent by mass, the minimum detectable amount of asbestos under the California Air Resources Board Method 435, as the baseline for the presence of naturally occurring asbestos in gravel or other aggregate material. Health risks resulting from asbestos exposure vary according to the level, type, and duration of exposure. While exposure to very small concentrations of asbestos may pose some health risk, there is not a practical way to prevent all exposure to asbestos for residents in close proximity to deposits that contain naturally occurring asbestos. The intent of this act is to establish a sensible analytical threshold for detection of naturally occurring asbestos in gravel or other aggregate material and to establish appropriate exceptions for the use of gravel or other aggregate material that contains naturally occurring asbestos for certain public facilities and transportation projects involving unusual circumstances, including projects in remote locations or in regions where gravel or other aggregate material free from naturally occurring asbestos is not reasonably available.

FISCAL NOTE

STATE OF ALASKA
2012 LEGISLATIVE SESSION

Bill Version: CSHB 258(TRA)
Fiscal Note Number: 1
(H) Publish Date: 3/2/12

Identifier (file name): HB258-DOLWD-LSS-2-17-12
Title: Naturally Occurring Asbestos
Sponsor: Representative Joule
Requester: House Transportation

Dept. Affected: Labor and Workforce Development
Appropriation: Labor Standards and Safety
Allocation: Occupational Safety and Health
OMB Component Number: 970

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	FY13 Appropriation Requested	Included in Governor's FY13 Request	Out-Year Cost Estimates				
OPERATING EXPENDITURES	**FY13**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**
Personal Services							
Travel							
Services							
Commodities							
Capital Outlay							
Grants, Benefits							
Miscellaneous							
TOTAL OPERATING	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

FUND SOURCE		(Thousands of Dollars)						
1002	Federal Receipts							
1003	GF Match							
1004	GF							
1005	GF/Prgm (DGF)							
1037	GF/MH (UGF)							
1178	temp code (UGF)							
TOTAL		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

POSITIONS							
Full-time							
Part-time							
Temporary							

CHANGE IN REVENUES							

Estimated SUPPLEMENTAL (FY12) operating costs _____ *(separate supplemental appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Estimated CAPITAL (FY13) costs _____ *(separate capital appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Why this fiscal note differs from previous version (if initial version, please note as such)

Not applicable, initial version.

Prepared by: Grey Mitchell, Director — Phone: 465-4855
Division: Labor Standards and Safety — Date/Time: 2/17/12 2:36 PM
Approved by: Click Bishop, Commissioner — Date: 2/17/2012
Department of Labor and Workforce Development

(Revised 1/17/2012 OMB)

FISCAL NOTE #1

STATE OF ALASKA
2012 LEGISLATIVE SESSION

BILL NO. CSHB 258(TRA)

Analysis

The proposed legislation intends to require the Alaska Department of Transportation and Public Facilities to establish standards and operating procedures in connection with public construction and maintenance projects to allow for the use of gravel or aggregate containing a limited amount of naturally occurring asbestos in a manner that avoids significant human health risks while mitigating significantly higher costs associated with using only gravel or aggregate that is 100 percent free of asbestos. The proposed legislation also intends to require users of gravel or aggregate containing a limited amount of naturally occurring asbestos to prepare project plans that demonstrate conformance with established standards and to shield providers of gravel or aggregate containing a limited amount of asbestos from liability under certain conditions.

There is no anticipated financial impact to the department as a result of this legislation. Existing resources would be used to provide consultative assistance to the Department of Transportation and Public Facilities in establishing and implementing standards for the use of aggregate or gravel that contains a limited amount of naturally occurring asbestos. Electronic means of communication will be utilized to avoid the need for travel.

FISCAL NOTE

STATE OF ALASKA
2012 LEGISLATIVE SESSION

Bill Version	**CSHB 258(TRA)**
Fiscal Note Number	**3**
(H) Publish Date	**3/2/12**

Identifier (file name)	HB258-DHSS-EPI-02-21-12	Dept. Affected	Health and Social Services
Title	Naturally Occurring Asbestos	Appropriation	Public Health
		Allocation	Epidemiology
Sponsor	Representative Joule		
Requester	House Transportation Committee	OMB Component Number	296

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	FY13 Appropriation Requested	Included in Governor's FY13 Request	Out-Year Cost Estimates				
OPERATING EXPENDITURES	**FY13**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**
Personal Services	15.0		15.0				
Travel	2.6		1.4				
Services	3.5		3.5				
Commodities	0.2		0.2				
Capital Outlay							
Grants, Benefits							
Miscellaneous							
TOTAL OPERATING	**21.3**	**0.0**	**20.1**	**0.0**	**0.0**	**0.0**	**0.0**

FUND SOURCE		(Thousands of Dollars)						
1002	Federal Receipts							
1003	GF Match							
1004	GF	21.3		20.1				
1005	GF/Prgm (DGF)							
1037	GF/MH (UGF)							
1178	temp code (UGF)							
TOTAL		**21.3**	**0.0**	**20.1**	**0.0**	**0.0**	**0.0**	**0.0**

POSITIONS							
Full-time							
Part-time							
Temporary							

CHANGE IN REVENUES							

Estimated SUPPLEMENTAL (FY12) operating costs 0.0 *(separate supplemental appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Estimated CAPITAL (FY13) costs 0.0 *(separate capital appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Why this fiscal note differs from previous version (if initial version, please note as such)

Not applicable. Initial version.

Prepared by	Ward B. Hurlburt, M.D., MPH /Chief Medical Officer-Director	Phone	269-6680
Division	Public Health	Date/Time	2/21/12 11:00 AM
Approved by	Nancy Rolfzen, Assistant Commissioner	Date	2/21/2012
	DHSS Finance & Management Services		

(Revised 11/18/2011 OMB)

FISCAL NOTE #3

STATE OF ALASKA
2012 LEGISLATIVE SESSION

BILL NO. CSHB 258(TRA)

Analysis

The purposes of the bill include: A) a mandate for the Department of Transportation and Public Facilities (DOT & PF) to develop and implement standards and operating procedures that would allow the use of aggregate materials that contain naturally occurring asbestos; B) a requirement that users of material that contains naturally occurring asbestos should conform to the standards and procedures established by DOT & PF; and C) a shelter from liability based on exposure to naturally occurring asbestos. In addition to procedure development, the bill directs the DOT & PF to adopt a soil based standard of 0.25 percent asbestos by weight for materials not free of naturally occurring asbestos.

Section 4 of this bill adds a new section AS 44.42.022 requiring the Department of Transportation & Public Facilities to consult with the Department of Health and Social Services to develop and implement standards to regulate the use of gravel conrtaining naturally occurring asbestos for use in construction, transportation, and public facility projects. The Department of Health and Social Services has provided and will continue to play a supportive and consultative role in this discussion through technical review of scientific studies and a review of previous epidemiological and toxicological work in the state. This environmental health consultation will require 0.1 FTE Health Program Manager III. The Division will use an existing position to fulfill this work. Additional costs are for office supplies, administrative overhead, and in-state travel (more in Year 1 than Year 2).

FISCAL NOTE

STATE OF ALASKA
2012 LEGISLATIVE SESSION

Bill Version: CSHB 258(FIN)
Fiscal Note Number: 4
(H) Publish Date: 3/29/12

Identifier (file name): HB258CS(FIN)-LAW-CIV-03-28-12
Title: Naturally Occurring Asbestos
Sponsor: Representative (s) Joule
Requester: (H) Finance

Dept. Affected: Law
Appropriation: Civil
Allocation: Transportation Section
OMB Component Number: 2214

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	FY13 Appropriation Requested	Included in Governor's FY13 Request	Out-Year Cost Estimates				
OPERATING EXPENDITURES	**FY13**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**
Personal Services							
Travel							
Services							
Commodities							
Capital Outlay							
Grants, Benefits							
Miscellaneous							
TOTAL OPERATING	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

FUND SOURCE		(Thousands of Dollars)						
1002	Federal Receipts							
1003	GF Match							
1004	GF							
1005	GF/Prgm (DGF)							
1037	GF/MH (UGF)							
1178	temp code (UGF)							
TOTAL		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

POSITIONS							
Full-time							
Part-time							
Temporary							

CHANGE IN REVENUES							

Estimated SUPPLEMENTAL (FY12) operating costs _____ *(separate supplemental appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Estimated CAPITAL (FY13) costs _____ *(separate capital appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Why this fiscal note differs from previous version (if initial version, please note as such)

Not applicable, initial version.

Prepared by: Sheila Bugbee, Administrative Officer — Phone 465-3675
Division: Administrative Services — Date/Time 3/28/12 1:00 PM
Approved by: Michael C. Geraghty, Attorney General — Date 3/28/2012
Department of Law

(Revised 1/17/2012 OMB)

FISCAL NOTE #4

STATE OF ALASKA
2012 LEGISLATIVE SESSION

BILL NO. CSHB 258(FIN)

Analysis

CSHB 258(FIN) directs Department of Transportation and Public Facilities to develop and implement standards for the use of gravel and other aggregate materials containing a defined level of naturally occurring asbestos as well as defining project areas where it may be economically unreasonable to use gravel and other materials that do not contain naturally occurring asbestos. The bill also provides immunity from suit to certain landowners and contractors who transport and use this material in the defined project areas, provided they have site specific plans concerning that use which are approved by Department of Transportation and Public Facilities in accordance with regulations promulgated by Department of Transportation and Public Facilities and after consultation with the Department of Health and Social Services, the Department of Natural Resources, the Department of Labor and Workforce Development and the Department of Law. The Department of Law will be tasked to assist in the drafting of a regulatory framework to carry out the provisions of CSHB 258(FIN).

The fiscal impact for the Department of Law will be zero.

FISCAL NOTE

STATE OF ALASKA
2012 LEGISLATIVE SESSION

Bill Version: **CSHB 258(FIN)**
Fiscal Note Number: **5**
(H) Publish Date: **3/29/12**

Identifier (file name): HB258CS(FIN)-DNR-MLW-03-28-12
Title: NATURALLY OCCURRING ASBESTOS
Sponsor: Rep. Joule
Requester: (H) FIN

Dept. Affected: Dept. of Natural Resources
Appropriation: Land & Water Resources
Allocation: Mining, Land & Water
OMB Component Number: 3002

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	FY13 Appropriation Requested	Included in Governor's FY13 Request	Out-Year Cost Estimates				
OPERATING EXPENDITURES	**FY13**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**
Personal Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Travel							
Services							
Commodities							
Capital Outlay							
Grants, Benefits							
Miscellaneous							
TOTAL OPERATING	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

FUND SOURCE		(Thousands of Dollars)						
1002	Federal Receipts							
1003	GF Match							
1004	GF							
1005	GF/Prgm (DGF)							
1037	GF/MH (UGF)							
1178	temp code (UGF)							
TOTAL		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

POSITIONS							
Full-time							
Part-time							
Temporary							

CHANGE IN REVENUES							

Estimated SUPPLEMENTAL (FY12) operating costs 0.0 *(separate supplemental appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Estimated CAPITAL (FY13) costs 0.0 *(separate capital appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Why this fiscal note differs from previous version (if initial version, please note as such)

This fiscal note has been revised to reflect a zero fiscal impact due to changes made in House Finance. Instead of a database monitoring system, DNR's role is now to consult with DOT/PF on regulations relating to naturally occuring asbestos in gravel.

Prepared by: Brent Goodrum, Director
Division: Mining, Land & Water
Approved by: Daniel S. Sullivan, Commissioner
Department of Natural Resources

Phone: 907-269-8625
Date/Time: 3/28/12 1:00 PM
Date: 3/28/2012

(Revised 1/17/2012 OMB)

FISCAL NOTE #5

STATE OF ALASKA
2012 LEGISLATIVE SESSION

BILL NO. CSHB 258(FIN)

Analysis

This legislation requires the Department of Transportation and Public Facilities (DOTPF) to work in consultation with DNR and other Departments to develop monitoring and mitigation plans for projects, that are for a transportation facility, including a public highway, airport, or pipeline or railroad track bed, or a public work in response to a Plan of Operation submitted by an applicant for immunity under this legislation. This legislation also requires the Department of Transportation and Public Facilities (DOTPF) to work in consultation with DNR and other departments to develop implementing regulations for this program.

DNR anticipates that it will use existing staff to provide support to DOTPF and does not anticipate any financial or resource impacts from this legislation.

FISCAL NOTE

STATE OF ALASKA
2012 LEGISLATIVE SESSION

Bill Version: **CSHB 258(FIN)**
Fiscal Note Number: **6**
(H) Publish Date: **3/29/12**

Identifier (file name): HB258CS(FIN)-DEC-AQ-03-28-12
Title: Naturally Occurring Asbestos
Sponsor: Representative Joule
Requester: House Finance Committee

Dept. Affected: Environmental Conservation
Appropriation: Environmental Health
Allocation: Air Quality
OMB Component Number: 2061

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	FY13 Appropriation Requested	Included in Governor's FY13 Request	Out-Year Cost Estimates				
OPERATING EXPENDITURES	**FY13**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**
Personal Services	0.0		0.0	0.0	0.0	0.0	0.0
Travel	7.8		8.2	0.7	0.7	0.7	0.7
Services	20.0		20.0	10.0	10.0	10.0	10.0
Commodities	0.0		0.0	0.0	0.0	0.0	0.0
Capital Outlay	0.0		0.0	0.0	0.0	0.0	0.0
Grants, Benefits	0.0		0.0	0.0	0.0	0.0	0.0
Miscellaneous	0.0		0.0	0.0	0.0	0.0	0.0
TOTAL OPERATING	**27.8**	**0.0**	**28.2**	**10.7**	**10.7**	**10.7**	**10.7**
FUND SOURCE			(Thousands of Dollars)				
1002 Federal Receipts	0.0		0.0	0.0	0.0	0.0	0.0
1003 GF Match	0.0		0.0	0.0	0.0	0.0	0.0
1004 GF	27.8		28.2	10.7	10.7	10.7	10.7
1005 GF/Prgm (DGF)	0.0		0.0	0.0	0.0	0.0	0.0
1037 GF/MH (UGF)	0.0		0.0	0.0	0.0	0.0	0.0
1178 temp code (UGF)	0.0		0.0	0.0	0.0	0.0	0.0
TOTAL	**27.8**	**0.0**	**28.2**	**10.7**	**10.7**	**10.7**	**10.7**
POSITIONS							
Full-time	**0**		**0**	**0**	**0**	**0**	**0**
Part-time	**0**		**0**	**0**	**0**	**0**	**0**
Temporary	**0**		**0**	**0**	**0**	**0**	**0**
CHANGE IN REVENUES	**0.0**		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Estimated SUPPLEMENTAL (FY12) operating costs 0.0 *(separate supplemental appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Estimated CAPITAL (FY13) costs 0.0 *(separate capital appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Why this fiscal note differs from previous version (if initial version, please note as such)

Additional contractual costs associated with CS HB 258(FIN) for consultation on project monitoring and mitigation plans were added.

Prepared by: Alice Edwards, Director — Phone: (907) 465-5109
Division: Air Quality — Date/Time: 3/28/12 11:53 AM
Approved by: Lynn Kent — Date: 3/28/2012
Deputy Commissioner

(Revised 1/17/2012 OMB)

FISCAL NOTE #6

STATE OF ALASKA
2012 LEGISLATIVE SESSION

BILL NO. CSHB 258(FIN)

Analysis

The Department of Environmental Conservation (DEC) is tasked with consulting with the Department of Transportation & Public Facilities (DOT&PF) on the development of standards and operating procedures to allow the use of gravel or aggregate material that contains naturally occurring asbestos in transportation and public facilities construction projects.

Travel:
The Division of Air Quality will assign staff to consult with DOT&PF and other listed agencies to establish interim standards and develop standard operating procedures. Membership will require travel to multiple planning and public meetings during FY2013 and FY2014, with annual meetings occurring thereafter.

Contractual:
The Division will use contractual services to review and provide input to DOT&PF on site specific monitoring and mitigation plans required under Section 4, Article 3A of the bill. Contractual costs are based on ten plan reviews during the first two years and five plan reviews each year thereafter. Given that several years worth of projects have been on hold in the Northwest Arctic region, DEC assumes there will be more work in the first two years of the program to catch up those projects with a lower number of projects in future years.

FISCAL NOTE

STATE OF ALASKA
2012 LEGISLATIVE SESSION

Bill Version: **CSHB 258(FIN)**
Fiscal Note Number: **7**
Publish Date: **3/29/12 (H)**

Identifier (file name): HB258CS-DOT-STWD-3-27-12
Title: Naturally Occurring Asbestos
Sponsor: Representative Joule
Requester: H (FIN)

Dept. Affected: DOT&PF
Appropriation: Design, Engineering & Construction
Allocation: Stwd Design & Engineering Services
OMB Component Number: 2357

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	FY13 Appropriation Requested	Included in Governor's FY13 Request	Out-Year Cost Estimates				
OPERATING EXPENDITURES	**FY13**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**
Personal Services	117.6		117.6	58.8	58.8	23.5	23.5
Travel	35.0		20.0	10.0	5.0	5.0	5.0
Services	50.0		52.5	52.5	2.5	2.5	2.5
Commodities	7.5		0.5	0.5	0.5	0.5	0.5
Capital Outlay							
Grants, Benefits							
Miscellaneous							
TOTAL OPERATING	**210.1**	**0.0**	**190.6**	**121.8**	**66.8**	**31.5**	**31.5**
FUND SOURCE			(Thousands of Dollars)				
1002 Federal Receipts							
1003 GF Match							
1004 GF	210.1		190.6	121.8	66.8	31.5	31.5
1005 GF/Prgm (DGF)							
1037 GF/MH (UGF)							
1178 temp code (UGF)							
TOTAL	**210.1**	**0.0**	**190.6**	**121.8**	**66.8**	**31.5**	**31.5**
POSITIONS							
Full-time	**1.0**		1	0.5	0.5	0.2	0.2
Part-time							
Temporary							
CHANGE IN REVENUES							

Estimated SUPPLEMENTAL (FY12) operating costs _____ *(separate supplemental appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Estimated CAPITAL (FY13) costs _____ *(separate capital appropriation required)*
(discuss reasons and fund source(s) in analysis section)

Why this fiscal note differs from previous version (if initial version, please note as such)

updated to reflect loss of database requirement, more travel in the intial years and lower personnel costs in the future.

Prepared by: Brenda Hewitt, Legislative Liaison — Phone: 465-4772
Division: Department of Transportation and Public Facilities — Date/Time: 3/27/12 11:00 AM
Approved by: Marc Luiken, Commissioner — Date: 3/27/2012

(Revised 8/17/2011 OMB)

FISCAL NOTE #7

STATE OF ALASKA
2012 LEGISLATIVE SESSION

BILL NO. CSHB 258(FIN)

Analysis

This act requires the Department of Transportation and Public Facilities (DOT&PF) to develop and implement standards on a project-by-project basis for the use of gravel containing naturally occurring asbestos (NOA) when there is no economically reasonable alternative source of "clean" gravel. The Department is also required to develop testing methodologies and procedures for indemnification.

Additionally, DOT&PF is to approve private contractor plans for the use of naturally occurring asbestos in construction projects in Alaska. DOT&PF will only approve the plans. Liability rests with the contractor to comply with the DOT&PF plan if they seek future immunity, under certain circumstances, from illnesses that may arise from worker exposure to limited amounts of naturally occurring asbestos.

The Department will hire an Engineer/Architect I to oversee contractors, work with other departments on the development of regulations, policies, procedures and laboratory methodology as well review project plans to insure they are in compliance with appropriate policies, standards and that all applicable analysis is also in compliance with the newly developed analytical methodologies. Travel is necessary to attend meetings, work with other agencies, laboratories and consultants and travel to sites. ($35.0)

The initial set up costs for a new staff is $7.5. Ongoing costs of $2.5 for core departmental services and $0.5 for supplies.

The Department will contract with technical and regulatory consultants with NOA expertise to develop the regulations, standards, procedures, and testing methodologies ($50.0/year for FYs 13, 14, 15). The Department assumes all NOA testing will be done by the contractors or material site owners.

First Year

Personal Services		
	Salary and benefits for Engineer/Architect I range 22	117.6
Travel		35.0
Services		50.0
	Consultants (NOA specialists)	
Commodities		7.5
TOTAL first year		$210.1

SENATE CS FOR CS FOR HOUSE BILL NO. 258(FIN)

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWENTY-SEVENTH LEGISLATURE - SECOND SESSION

BY THE SENATE FINANCE COMMITTEE

Offered:
Referred:

Sponsor(s): REPRESENTATIVES JOULE, Tammie Wilson, Johnson, Pruitt

A BILL

FOR AN ACT ENTITLED

"An Act directing the Department of Transportation and Public Facilities to develop and implement standards and operating procedures, to evaluate site-specific use plans, and to designate project areas concerning gravel or other aggregate material containing naturally occurring asbestos; authorizing use on an interim basis of gravel or other aggregate material containing naturally occurring asbestos for certain transportation projects and public facilities; providing immunity for the state and for landowners, extractors, suppliers, transporters, and contractors for certain actions or claims arising in connection with the use of gravel or aggregate material containing naturally occurring asbestos in certain areas; requiring contractors to report certain asbestos-related data to the Department of Transportation and Public Facilities; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* **Section 1.** AS 09.65 is amended by adding a new section to read:

Sec. 09.65.245. Immunity for certain persons supplying or using gravel or other aggregate material; limitations on asbestos-related actions against defendants. (a) Notwithstanding AS 09.50.250, a civil action or claim for damages or costs alleging a death, injury, illness, disability, property damage, or any other damages resulting from the use of gravel or other aggregate material that contains naturally occurring asbestos may not be brought against a defendant, including a contractor meeting the requirements of the program or the state and its agencies, officers, and employees,

(1) based on the ownership of land within an area designated by the Department of Transportation and Public Facilities under AS 44.42.400(b) or (c) from which gravel or other aggregate material is extracted that, when tested using a bulk method prescribed by the Department of Transportation and Public Facilities by regulation, is determined to have a content equal to or greater than 0.25 percent naturally occurring asbestos by mass; or

(2) for an act or omission occurring in the course of extracting, supplying, transporting, or using gravel or other aggregate material containing naturally occurring asbestos within an area designated by the Department of Transportation and Public Facilities under AS 44.42.400(b) or (c) when the act or omission was in compliance with the requirements of AS 18.31.250 or AS 44.42.410(b), as applicable, and AS 44.42.410(a) and (d) and applicable regulations developed under AS 44.42.420.

(b) A civil action or claim based on noncompliance with the requirements of AS 18.31.250 or AS 44.42.410(b), as applicable, and AS 44.42.410(a) and (e) and applicable regulations developed under AS 44.42.420 for damages or costs alleging an asbestos-related death, injury, illness, or disability or alleging asbestos-related property damage or any other asbestos-related damages may only be brought against a defendant that has direct control over or responsibility for compliance with the requirements of AS 18.31.250 or AS 44.42.410(b), as applicable, and AS 44.42.410(a) and (e) and applicable regulations developed under AS 44.42.420.

(c) Notwithstanding AS 09.50.250, a civil action or claim for damages or costs

alleging an asbestos-related death, injury, illness, or disability or alleging asbestos-related property damage or any other asbestos-related damages may not be brought against any state agency or officer or employee of the state for an act or omission occurring in the course of designating a project area under AS 44.42.400(a) or (b), approving a site-specific use plan, or developing or approving a monitoring plan or a mitigation plan under AS 44.42.410.

(d) In this section, "naturally occurring asbestos" has the meaning given in AS 44.42.430.

*** Sec. 2.** AS 18.31 is amended by adding new sections to read:

Article 2A. Naturally occurring asbestos.

Sec. 18.31.250. Use of materials containing naturally occurring asbestos. (a) A principal construction contractor or, in the absence of an identified principal construction contractor, person having legal authority for the design and construction of a project may qualify for immunity in a civil action under AS 09.65.245(a)(2) for the use of gravel or other aggregate material that, when tested using a bulk test method prescribed by the Department of Transportation and Public Facilities by regulation, is determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass.

(b) To qualify for the immunity provided under AS 09.65.245(a)(2), before initiating a construction project not subject to AS 44.42.410(b) that is within an area designated by the Department of Transportation and Public Facilities under AS 44.42.400(b) or (c) and that will use gravel or other aggregate material that contains naturally occurring asbestos, the principal construction contractor or, in the absence of an identified principal construction contractor, the person having legal authority for the design and construction of the project, shall prepare and submit to the Department of Transportation and Public Facilities specific project plans demonstrating compliance with the standards adopted by the department under AS 44.42.420 and the requirements of the site-specific use plan under AS 44.42.410. Before extraction of gravel or other aggregate material may begin, the plan must be approved and returned to the contractor by the department.

(c) To preserve the immunity provided under AS 09.65.245(a)(2), the

principal construction contractor or, in the absence of an identified principal construction contractor, the person having legal authority for the design and construction of the project, shall adhere to the site-specific use plan approved by the department and the monitoring and mitigation plan created by the department.

Sec. 18.31.260. Presence of naturally occurring asbestos. The state shall consider 0.25 percent by mass, the minimum detectable amount of asbestos under the California Air Resources Board Method 435, as the baseline for the presence of naturally occurring asbestos in gravel or other aggregate material.

*** Sec. 3.** AS 44.42 is amended by adding new sections to read:

Article 3A. Use of Materials Containing Naturally Occurring Asbestos.

Sec. 44.42.400. Administration and designated areas. (a) The department shall designate a single employee who reports to the commissioner to oversee the duties assigned to the department in AS 44.42.400 - 44.42.430 and to serve as the point of contact for inquiries related to projects using gravel or other aggregate material containing naturally occurring asbestos.

(b) An area that includes land within a municipality or community may be designated by the department as an area in which certain landowners and contractors are granted immunity under AS 09.65.245(a) for causing asbestos-related injuries only if the municipality or community requests that designation. A municipality or community may request to become an area designated by the department under this subsection by submitting an application to the department. The department may approve an application received under this subsection only after reviewing tests documenting the presence of naturally occurring asbestos in that area, analyzing the effect of the presence of naturally occurring asbestos on construction projects in the area, considering the availability of gravel or other aggregate material free from naturally occurring asbestos in the area, and soliciting public input from residents in the affected municipality or community. The department may require a municipality or community that applies to become a designated area to provide the department with tests documenting the presence of naturally occurring asbestos, information related to the effect of the presence of naturally occurring asbestos on construction projects in the area, information related to availability of gravel or other aggregate material free

from naturally occurring asbestos, and other information relevant to the application. After designating an area after approval of an application under this subsection, the department shall notify, including through signage, potentially affected persons that the area has been designated as an area where immunity may be granted under AS 09.65.245(a) for certain landowners and contractors causing asbestos-related injuries.

(c) In places that do not include a municipality or community, the department may designate an area in which certain landowners and contractors are granted immunity under AS 09.65.245(a) for causing asbestos-related injuries. Before designating an area under this subsection, the department shall document the presence of naturally occurring asbestos in that area, analyze the effect of the presence of naturally occurring asbestos on construction projects in the area, consider the availability of gravel or other aggregate material free from naturally occurring asbestos in the area, and solicit public input from potentially affected persons. After designating an area under this subsection, the department shall notify, including through signage, potentially affected persons that the area has been designated as an area where immunity may be granted under AS 09.65.245(a) for certain landowners and contractors causing asbestos-related injuries.

(d) In this section, "community" means a place in the unorganized borough, in a borough, or in a unified municipality that is not incorporated as a municipality, that is not a reserve, and in which 25 or more individuals reside as a social unit.

Sec. 44.42.410. Site-specific use plan. (a) To qualify for the immunity provided under AS 09.65.245(a)(2), a contractor intending to use, within an area designated by the department under AS 44.42.400(b) or (c), gravel or other aggregate material that, when tested using a bulk test method prescribed by the department in regulation, is determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass, shall, after consulting with the owner of the land on which the gravel or other aggregate material containing naturally occurring asbestos will be placed, submit a site-specific use plan to the department that

(1) describes the manner in which the proposed use of gravel or other aggregate material that contains naturally occurring asbestos conforms to the standards adopted under AS 44.42.420(b);

(2) demonstrates how the proposed construction operation and maintenance practices comply with those that are required and those that are minimally acceptable, as described in AS 44.42.420(b)(5), and otherwise meet requirements of law applicable to the handling of compounds that contain asbestos;

(3) outlines the efforts that will be made, as a component of long-term maintenance on the completed project or facility, to ensure that human health and air quality are not compromised by the use of the gravel or other aggregate material that contains naturally occurring asbestos;

(4) describes how the gravel or other aggregate material to be used can be contained underneath the project or buried so that asbestos fibers cannot become airborne or otherwise transferred outside of the project area, except as provided in (5) and (6) of this subsection;

(5) if the requirements in (4) of this subsection are economically unreasonable, describes how the gravel or other aggregate material to be used will be sealed, including chip sealing or mixing with asphalt, in order to prevent asbestos fibers from becoming airborne or otherwise transferred outside of the project area, except as provided in (6) of this subsection; and

(6) if the requirements under (4) and (5) of this subsection are economically unreasonable, describes how the gravel or other aggregate material will be used in order to prevent asbestos from becoming airborne or otherwise transferred outside of the project area, including how the gravel or other aggregate material will be used in order to prevent asbestos from becoming airborne because of vehicle traffic, road maintenance, or grading, if applicable.

(b) To qualify for and preserve the immunity provided under AS 09.65.245(a)(2), the department, in its operating procedures applicable to a project that is a transportation facility, including a public highway, airport, or pipeline or railroad track bed, or a public work, as that term is defined in AS 35.95.100, and for which the contractor intends to use, within an area designated by the department under AS 44.42.400(b) or (c), gravel or other aggregate material that, when tested using a bulk testing method prescribed by the department in regulation, is determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass,

shall require that

(1) the contractor submit a plan that details the use of gravel or other aggregate material in the construction or maintenance of the transportation project or public facility in accordance with the requirements of (a) of this section and regulations developed under AS 44.42.420;

(2) before the extraction of the gravel or aggregate material containing naturally occurring asbestos may begin, the plan be approved and returned to the contractor by the department;

(3) the contractor adhere to the monitoring, mitigation, and site-specific use plans.

(c) The department shall review each submitted site-specific use plan and shall work toward approving or disapproving the plan, taking into consideration the construction season in the project location.

(d) The department may not approve a plan for construction with gravel or other aggregate material determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass unless

(1) the department determines that it is economically unreasonable to undertake the construction project with gravel or other aggregate material free from naturally occurring asbestos; and

(2) the completed project will not use gravel or other aggregate material containing naturally occurring asbestos for a surface application except if the material to be used for the surface application is treated or bound with a surface compound, including chip seal or asphalt, approved by the department.

(e) On receiving a plan that meets the requirements of (a) and (d) of this section and the regulations adopted under AS 44.42.420, the department, in consultation with the Department of Environmental Conservation, the Department of Health and Social Services, the Department of Natural Resources, the Department of Law, and the Department of Labor and Workforce Development, shall develop a monitoring and mitigation plan for the project. If the site-specific use plan is approved, the monitoring and mitigation plan developed by the department shall be attached to the site-specific use plan. To qualify for the immunity provided in AS 09.65.245(a)(2),

the party that has direct control over or responsibility for the monitoring or mitigation shall comply with the monitoring or mitigation plan developed by the department.

(f) On approval of a site-specific use plan, the department

(1) shall provide to the contractor a copy of the approved site-specific use plan that includes

(A) the monitoring and mitigation plan developed under (e) of this section;

(B) a requirement that all asbestos-related data collected by the contractor during or after construction be submitted to the department; and

(C) recommended methods for reducing exposure to airborne asbestos fibers;

(2) shall provide a copy of the site-specific use plan, including the monitoring and mitigation plan, to the mayor or manager of a municipality affected by the use of gravel or other aggregate material containing asbestos; and

(3) may provide to the contractor copies of the United States Occupational Safety and Health Administration, United States Mine Safety and Health Administration, and United States Environmental Protection Agency recommended practices for handling and use of gravel or other aggregate material containing naturally occurring asbestos.

(g) Within 60 days after completing a project in accordance with a site-specific plan approved by the department, the contractor shall record in the recording district where the property is located a document that includes a description of the affected property, a reference to the most recent recorded conveyance of that property, and a notice indicating the presence of naturally occurring asbestos, and stating that subsequent interest holders may have legal obligations with respect to preventing the naturally occurring asbestos from becoming airborne or otherwise transferred outside of the project area. The contractor shall provide written notification to the department and the landowner that the document has been recorded.

(h) The contractor shall submit to the department the results of any monitoring or testing performed in accordance with the site-specific use plan and any mitigation measures undertaken.

Sec. 44.42.420. Regulations. (a) The department, after consultation with the Department of Environmental Conservation, the Department of Health and Social Services, the Department of Natural Resources, the Department of Law, and the Department of Labor and Workforce Development, shall prescribe in regulation a bulk testing method for gravel or other aggregate material containing naturally occurring asbestos.

(b) The department, after consultation with the Department of Environmental Conservation, the Department of Health and Social Services, the Department of Natural Resources, the Department of Law, and the Department of Labor and Workforce Development, may adopt regulations under AS 44.62 (Administrative Procedure Act) to implement AS 44.42.400 - 44.42.430, including regulations revising statewide standards on the use in the construction and maintenance of transportation projects and public facilities of gravel or aggregate material that, when tested using a bulk test method prescribed by the department by regulation, is determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass. The regulations adopted under this subsection must include

(1) procedures for completing site investigations and characterizations of proposed projects, including the development and description of appropriate laboratory practices;

(2) procedures for reviewing design alternatives and preparing and evaluating appropriate comparative cost analyses that consider the use of gravel or other aggregate material that does not contain naturally occurring asbestos;

(3) procedures for evaluating human health concerns arising out of gravel or other aggregate material that contains naturally occurring asbestos and documentation of methods and means to be used during periods of handling of the gravel or other aggregate material to ensure compliance with appropriate workplace safety and air quality standards relating to the project and to ensure the health and safety of communities affected by construction projects that use gravel or other aggregate material containing naturally occurring asbestos;

(4) procedures for preparing designs and design specifications for facilities involving use of gravel or other aggregate material that contains naturally

occurring asbestos;

(5) procedures for outlining construction operation and maintenance practices that are required and those that are minimally acceptable to meet requirements of law applicable to the handling of compounds that contain asbestos;

(6) procedures for processing, reviewing, and approving or disapproving site-specific use plans and area designation requests received under AS 44.42.400(b) in a uniform manner;

(7) guidelines to analyze the cost of a project;

(8) guidelines for determining whether the cost associated with the use of gravel or other aggregate material free from naturally occurring asbestos under AS 44.42.410(d) is economically unreasonable;

(9) guidelines for determining whether the cost associated with burying or sealing gravel or other aggregate material containing naturally occurring asbestos under AS 44.42.410(a)(2) and (3) is economically unreasonable;

(10) guidelines for establishing areas designated under AS 44.42.400(b) or (c) that take into account the effect on human health in and around the designated area and environmental factors affecting the transfer of asbestos fibers within and outside of a designated area.

Sec. 44.42.430. Definitions. In AS 44.42.400 - 44.42.430,

(1) "contractor" means the principal construction contractor, or in absence of an identified principal construction contractor, the person having legal authority for the design and construction of the project;

(2) "naturally occurring asbestos" means chrysotile, amosite, crocidolite, fibrous tremolite, fibrous anthophyllite, and fibrous actinolite asbestos-containing material that has not been processed in an asbestos mill and that, when tested using a bulk method prescribed by the Department of Transportation and Public Facilities by regulation, is determined to have a content equal to or greater than 0.25 percent naturally occurring asbestos by mass.

*** Sec. 4.** The uncodified law of the State of Alaska is amended by adding a new section to read:

INTERIM PROJECT AUTHORIZATION. (a) Notwithstanding AS 44.42.400(a) and

(b), added by sec. 3 of this Act, the Department of Transportation and Public Facilities may, on a temporary basis, designate a limited number of areas in the state in which certain landowners and contractors are granted immunity under AS 09.65.245(a) for causing asbestos-related injuries where an inability to complete construction projects has been demonstrated because of lack of gravel or other aggregate material free from naturally occurring asbestos. After designating an area on a temporary basis, the department shall notify, including through signage, potentially affected persons that the area has been designated as an area in which immunity may be granted under AS 09.65.245(a) for certain landowners and contractors causing asbestos-related injuries. Notwithstanding AS 18.31.250, added by sec. 2 of this Act, the Department of Transportation and Public Facilities may approve a limited number of appropriate construction projects until the development and implementation of initial standards under AS 44.42.420 and the administrative requirements of AS 44.42.400, added by sec. 3 of this Act, for projects not subject to AS 44.42.410(b), if, under (b) of this section, the Department of Transportation and Public Facilities prepares and adopts interim standards and requires its contractors to prepare site-specific plans for the use of gravel or other aggregate material that, when tested using the bulk method prescribed in sec. 5 of this Act, is determined to have a content equal to or greater than 0.25 percent naturally occurring asbestos by mass in transportation projects and public facilities. The department shall apply the standards developed under (b) of this section to a person described in AS 18.31.250 for a project that is not subject to AS 44.42.410(b).

(b) Notwithstanding AS 44.42.400(a) and (b), added by sec. 3 of this Act, the Department of Transportation and Public Facilities may, on a temporary basis, designate a limited number of areas in the state in which certain landowners and contractors are granted immunity under AS 09.65.245(a) for causing asbestos-related injuries where an inability to complete construction projects has been demonstrated because of lack of gravel or other aggregate material free from naturally occurring asbestos. After designating an area on a temporary basis, the department shall notify, including through signage, potentially affected persons that the area has been designated as an area where immunity may be granted under AS 09.65.245(a) for certain landowners and contractors causing asbestos-related injuries. Notwithstanding AS 44.42.410(b), added by sec. 3 of this Act, the Department of Transportation and Public Facilities may approve a limited number of appropriate

transportation projects and public facilities until the development and implementation of initial standards under AS 44.42.420 and the administrative requirements of AS 44.42.400, after consultation with the Department of Environmental Conservation, the Department of Health and Social Services, the Department of Labor and Workforce Development, and appropriate federal agencies. The Department of Transportation and Public Facilities may prepare and adopt interim standards and operating procedures and may require of its contractors the preparation of site-specific plans for the use of gravel or other aggregate material that when tested using the bulk method prescribed in sec. 5 of this Act, is determined to have a content equal to or greater than 0.25 percent naturally occurring asbestos by mass.

(c) The authority granted by (a) and (b) of this section expires December 31, 2013.

*** Sec. 5.** The uncodified law of the State of Alaska is amended by adding a new section to read:

INTERIM STANDARDS FOR APPLICATION OF ASBESTOS BULK TESTING. Until the Department of Transportation and Public Facilities adopts and prescribes a method of bulk testing under AS 44.42.420(a), added by sec. 3 of this Act, the department shall use California Air Resources Board Method 435, Determination of Asbestos Content of Serpentine Aggregate, adopted on June 6, 1991, as that standard has effect on the effective date of this Act, as the basis for determining the asbestos content of a bulk sample or for interim use as authorized by sec. 4 of this Act.

*** Sec. 6.** This Act takes effect immediately under AS 01.10.070(c).

ADOPTED 4/13/12

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SENATE CS FOR CS FOR HOUSE BILL NO. 258( )

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWENTY-SEVENTH LEGISLATURE - SECOND SESSION

BY

Offered:
Referred:

Sponsor(s): REPRESENTATIVES JOULE, Tammie Wilson, Johnson, Pruitt

A BILL

FOR AN ACT ENTITLED

"An Act directing the Department of Transportation and Public Facilities to develop and implement standards and operating procedures, to evaluate site-specific use plans, and to designate project areas concerning gravel or other aggregate material containing naturally occurring asbestos; authorizing use on an interim basis of gravel or other aggregate material containing naturally occurring asbestos for certain transportation projects and public facilities; providing immunity for the state and for landowners, extractors, suppliers, transporters, and contractors for certain actions or claims arising in connection with the use of gravel or aggregate material containing naturally occurring asbestos in certain areas; requiring contractors to report certain asbestos-related data to the Department of Transportation and Public Facilities; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* **Section 1.** AS 09.65 is amended by adding a new section to read:

Sec. 09.65.245. Immunity for certain persons supplying or using gravel or other aggregate material; limitations on asbestos-related actions against defendants. (a) Notwithstanding AS 09.50.250, a civil action or claim for damages or costs alleging a death, injury, illness, disability, property damage, or any other damages resulting from the use of gravel or other aggregate material that contains naturally occurring asbestos may not be brought against a defendant, including a contractor meeting the requirements of the program or the state and its agencies, officers, and employees,

(1) based on the ownership of land within an area designated by the Department of Transportation and Public Facilities under AS 44.42.400(b) or (c) from which gravel or other aggregate material is extracted that, when tested using a bulk method prescribed by the Department of Transportation and Public Facilities by regulation, is determined to have a content equal to or greater than 0.25 percent naturally occurring asbestos by mass; or

(2) for an act or omission occurring in the course of extracting, supplying, transporting, or using gravel or other aggregate material containing naturally occurring asbestos within an area designated by the Department of Transportation and Public Facilities under AS 44.42.400(b) or (c) when the act or omission was in compliance with the requirements of AS 18.31.250 or AS 44.42.410(b), as applicable, and AS 44.42.410(a) and (d) and applicable regulations developed under AS 44.42.420.

(b) A civil action or claim based on noncompliance with the requirements of AS 18.31.250 or AS 44.42.410(b), as applicable, and AS 44.42.410(a) and (e) and applicable regulations developed under AS 44.42.420 for damages or costs alleging an asbestos-related death, injury, illness, or disability or alleging asbestos-related property damage or any other asbestos-related damages may only be brought against a defendant that has direct control over or responsibility for compliance with the requirements of AS 18.31.250 or AS 44.42.410(b), as applicable, and AS 44.42.410(a) and (e) and applicable regulations developed under AS 44.42.420.

(c) Notwithstanding AS 09.50.250, a civil action or claim for damages or costs

alleging an asbestos-related death, injury, illness, or disability or alleging asbestos-related property damage or any other asbestos-related damages may not be brought against any state agency or officer or employee of the state for an act or omission occurring in the course of designating a project area under AS 44.42.400(a) or (b), approving a site-specific use plan, or developing or approving a monitoring plan or a mitigation plan under AS 44.42.410.

(d) In this section, "naturally occurring asbestos" has the meaning given in AS 44.42.430.

*** Sec. 2.** AS 18.31 is amended by adding new sections to read:

Article 2A. Naturally occurring asbestos.

Sec. 18.31.250. Use of materials containing naturally occurring asbestos. (a) A principal construction contractor or, in the absence of an identified principal construction contractor, person having legal authority for the design and construction of a project may qualify for immunity in a civil action under AS 09.65.245(a)(2) for the use of gravel or other aggregate material that, when tested using a bulk test method prescribed by the Department of Transportation and Public Facilities by regulation, is determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass.

(b) To qualify for the immunity provided under AS 09.65.245(a)(2), before initiating a construction project not subject to AS 44.42.410(b) that is within an area designated by the Department of Transportation and Public Facilities under AS 44.42.400(b) or (c) and that will use gravel or other aggregate material that contains naturally occurring asbestos, the principal construction contractor or, in the absence of an identified principal construction contractor, the person having legal authority for the design and construction of the project, shall prepare and submit to the Department of Transportation and Public Facilities specific project plans demonstrating compliance with the standards adopted by the department under AS 44.42.420 and the requirements of the site-specific use plan under AS 44.42.410. Before extraction of gravel or other aggregate material may begin, the plan must be approved and returned to the contractor by the department.

(c) To preserve the immunity provided under AS 09.65.245(a)(2), the

principal construction contractor or, in the absence of an identified principal construction contractor, the person having legal authority for the design and construction of the project, shall adhere to the site-specific use plan approved by the department and the monitoring and mitigation plan created by the department.

Sec. 18.31.260. Presence of naturally occurring asbestos. The state shall consider 0.25 percent by mass, the minimum detectable amount of asbestos under the California Air Resources Board Method 435, as the baseline for the presence of naturally occurring asbestos in gravel or other aggregate material.

*** Sec. 3.** AS 44.42 is amended by adding new sections to read:

Article 3A. Use of Materials Containing Naturally Occurring Asbestos.

Sec. 44.42.400. Administration and designated areas. (a) The department shall designate a single employee who reports to the commissioner to oversee the duties assigned to the department in AS 44.42.400 - 44.42.430 and to serve as the point of contact for inquiries related to projects using gravel or other aggregate material containing naturally occurring asbestos.

(b) An area that includes land within a municipality or community may be designated by the department as an area in which certain landowners and contractors are granted immunity under AS 09.65.245(a) for causing asbestos-related injuries only if the municipality or community requests that designation. A municipality or community may request to become an area designated by the department under this subsection by submitting an application to the department. The department may approve an application received under this subsection only after reviewing tests documenting the presence of naturally occurring asbestos in that area, analyzing the effect of the presence of naturally occurring asbestos on construction projects in the area, considering the availability of gravel or other aggregate material free from naturally occurring asbestos in the area, and soliciting public input from residents in the affected municipality or community. The department may require a municipality or community that applies to become a designated area to provide the department with tests documenting the presence of naturally occurring asbestos, information related to the effect of the presence of naturally occurring asbestos on construction projects in the area, information related to availability of gravel or other aggregate material free

from naturally occurring asbestos, and other information relevant to the application. After designating an area after approval of an application under this subsection, the department shall notify, including through signage, potentially affected persons that the area has been designated as an area where immunity may be granted under AS 09.65.245(a) for certain landowners and contractors causing asbestos-related injuries.

(c) In places that do not include a municipality or community, the department may designate an area in which certain landowners and contractors are granted immunity under AS 09.65.245(a) for causing asbestos-related injuries. Before designating an area under this subsection, the department shall document the presence of naturally occurring asbestos in that area, analyze the effect of the presence of naturally occurring asbestos on construction projects in the area, consider the availability of gravel or other aggregate material free from naturally occurring asbestos in the area, and solicit public input from potentially affected persons. After designating an area under this subsection, the department shall notify, including through signage, potentially affected persons that the area has been designated as an area where immunity may be granted under AS 09.65.245(a) for certain landowners and contractors causing asbestos-related injuries.

(d) In this section, "community" means a place in the unorganized borough, in a borough, or in a unified municipality that is not incorporated as a municipality, that is not a reserve, and in which 25 or more individuals reside as a social unit.

Sec. 44.42.410. Site-specific use plan. (a) To qualify for the immunity provided under AS 09.65.245(a)(2), a contractor intending to use, within an area designated by the department under AS 44.42.400(b) or (c), gravel or other aggregate material that, when tested using a bulk test method prescribed by the department in regulation, is determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass, shall, after consulting with the owner of the land on which the gravel or other aggregate material containing naturally occurring asbestos will be placed, submit a site-specific use plan to the department that

(1) describes the manner in which the proposed use of gravel or other aggregate material that contains naturally occurring asbestos conforms to the standards

adopted under AS 44.42.420(b);

(2) demonstrates how the proposed construction operation and maintenance practices comply with those that are required and those that are minimally acceptable, as described in AS 44.42.420(b)(5), and otherwise meet requirements of law applicable to the handling of compounds that contain asbestos;

(3) outlines the efforts that will be made, as a component of long-term maintenance on the completed project or facility, to ensure that human health and air quality are not compromised by the use of the gravel or other aggregate material that contains naturally occurring asbestos;

(4) describes how the gravel or other aggregate material to be used can be contained underneath the project or buried so that asbestos fibers cannot become airborne or otherwise transferred outside of the project area, except as provided in (5) and (6) of this subsection;

(5) if the requirements in (4) of this subsection are economically unreasonable, describes how the gravel or other aggregate material to be used will be sealed, including chip sealing or mixing with asphalt, in order to prevent asbestos fibers from becoming airborne or otherwise transferred outside of the project area, except as provided in (6) of this subsection; and

(6) if the requirements under (4) and (5) of this subsection are economically unreasonable, describes how the gravel or other aggregate material will be used in order to prevent asbestos from becoming airborne or otherwise transferred outside of the project area, including how the gravel or other aggregate material will be used in order to prevent asbestos from becoming airborne because of vehicle traffic, road maintenance, or grading, if applicable.

(b) To qualify for and preserve the immunity provided under AS 09.65.245(a)(2), the department, in its operating procedures applicable to a project that is a transportation facility, including a public highway, airport, or pipeline or railroad track bed, or a public work, as that term is defined in AS 35.95.100, and for which the contractor intends to use, within an area designated by the department under AS 44.42.400(b) or (c), gravel or other aggregate material that, when tested using a bulk testing method prescribed by the department in regulation, is determined to have

a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass, shall require that

(1) the contractor submit a plan that details the use of gravel or other aggregate material in the construction or maintenance of the transportation project or public facility in accordance with the requirements of (a) of this section and regulations developed under AS 44.42.420;

(2) before the extraction of the gravel or aggregate material containing naturally occurring asbestos may begin, the plan be approved and returned to the contractor by the department;

(3) the contractor adhere to the monitoring, mitigation, and site-specific use plans.

(c) The department shall review each submitted site-specific use plan and shall work toward approving or disapproving the plan, taking into consideration the construction season in the project location.

(d) The department may not approve a plan for construction with gravel or other aggregate material determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass unless

(1) the department determines that it is economically unreasonable to undertake the construction project with gravel or other aggregate material free from naturally occurring asbestos; and

(2) the completed project will not use gravel or other aggregate material containing naturally occurring asbestos for a surface application except if the material to be used for the surface application is treated or bound with a surface compound, including chip seal or asphalt, approved by the department.

(e) On receiving a plan that meets the requirements of (a) and (d) of this section and the regulations adopted under AS 44.42.420, the department, in consultation with the Department of Environmental Conservation, the Department of Health and Social Services, the Department of Natural Resources, the Department of Law, and the Department of Labor and Workforce Development, shall develop a monitoring and mitigation plan for the project. If the site-specific use plan is approved, the monitoring and mitigation plan developed by the department shall be attached to

the site-specific use plan. To qualify for the immunity provided in AS 09.65.245(a)(2), the party that has direct control over or responsibility for the monitoring or mitigation shall comply with the monitoring or mitigation plan developed by the department.

(f) On approval of a site-specific use plan, the department

(1) shall provide to the contractor a copy of the approved site-specific use plan that includes

(A) the monitoring and mitigation plan developed under (e) of this section;

(B) a requirement that all asbestos-related data collected by the contractor during or after construction be submitted to the department; and

(C) recommended methods for reducing exposure to airborne asbestos fibers;

(2) shall provide a copy of the site-specific use plan, including the monitoring and mitigation plan, to the mayor or manager of a municipality affected by the use of gravel or other aggregate material containing asbestos; and

(3) may provide to the contractor copies of the United States Occupational Safety and Health Administration, United States Mine Safety and Health Administration, and United States Environmental Protection Agency recommended practices for handling and use of gravel or other aggregate material containing naturally occurring asbestos.

(g) Within 60 days after completing a project in accordance with a site-specific plan approved by the department, the contractor shall record in the recording district where the property is located a document that includes a description of the affected property, a reference to the most recent recorded conveyance of that property, and a notice indicating the presence of naturally occurring asbestos, and stating that subsequent interest holders may have legal obligations with respect to preventing the naturally occurring asbestos from becoming airborne or otherwise transferred outside of the project area. The contractor shall provide written notification to the department and the landowner that the document has been recorded.

(h) The contractor shall submit to the department the results of any monitoring or testing performed in accordance with the site-specific use plan and any mitigation

measures undertaken.

Sec. 44.42.420. Regulations. (a) The department, after consultation with the Department of Environmental Conservation, the Department of Health and Social Services, the Department of Natural Resources, the Department of Law, and the Department of Labor and Workforce Development, shall prescribe in regulation a bulk testing method for gravel or other aggregate material containing naturally occurring asbestos.

(b) The department, after consultation with the Department of Environmental Conservation, the Department of Health and Social Services, the Department of Natural Resources, the Department of Law, and the Department of Labor and Workforce Development, may adopt regulations under AS 44.62 (Administrative Procedure Act) to implement AS 44.42.400 - 44.42.430, including regulations revising statewide standards on the use in the construction and maintenance of transportation projects and public facilities of gravel or aggregate material that, when tested using a bulk test method prescribed by the department by regulation, is determined to have a content equal to or greater than 0.25 percent of naturally occurring asbestos by mass. The regulations adopted under this subsection must include

(1) procedures for completing site investigations and characterizations of proposed projects, including the development and description of appropriate laboratory practices;

(2) procedures for reviewing design alternatives and preparing and evaluating appropriate comparative cost analyses that consider the use of gravel or other aggregate material that does not contain naturally occurring asbestos;

(3) procedures for evaluating human health concerns arising out of gravel or other aggregate material that contains naturally occurring asbestos and documentation of methods and means to be used during periods of handling of the gravel or other aggregate material to ensure compliance with appropriate workplace safety and air quality standards relating to the project and to ensure the health and safety of communities affected by construction projects that use gravel or other aggregate material containing naturally occurring asbestos;

(4) procedures for preparing designs and design specifications for

facilities involving use of gravel or other aggregate material that contains naturally occurring asbestos;

(5) procedures for outlining construction operation and maintenance practices that are required and those that are minimally acceptable to meet requirements of law applicable to the handling of compounds that contain asbestos;

(6) procedures for processing, reviewing, and approving or disapproving site-specific use plans and area designation requests received under AS 44.42.400(b) in a uniform manner;

(7) guidelines to analyze the cost of a project;

(8) guidelines for determining whether the cost associated with the use of gravel or other aggregate material free from naturally occurring asbestos under AS 44.42.410(d) is economically unreasonable;

(9) guidelines for determining whether the cost associated with burying or sealing gravel or other aggregate material containing naturally occurring asbestos under AS 44.42.410(a)(2) and (3) is economically unreasonable;

(10) guidelines for establishing areas designated under AS 44.42.400(b) or (c) that take into account the effect on human health in and around the designated area and environmental factors affecting the transfer of asbestos fibers within and outside of a designated area.

Sec. 44.42.430. Definitions. In AS 44.42.400 - 44.42.430,

(1) "contractor" means the principal construction contractor, or in absence of an identified principal construction contractor, the person having legal authority for the design and construction of the project;

(2) "naturally occurring asbestos" means chrysotile, amosite, crocidolite, fibrous tremolite, fibrous anthophyllite, and fibrous actinolite asbestos-containing material that has not been processed in an asbestos mill and that, when tested using a bulk method prescribed by the Department of Transportation and Public Facilities by regulation, is determined to have a content equal to or greater than 0.25 percent naturally occurring asbestos by mass.

*** Sec. 4.** The uncodified law of the State of Alaska is amended by adding a new section to read:

INTERIM PROJECT AUTHORIZATION. (a) Notwithstanding AS 44.42.400(a) and (b), added by sec. 3 of this Act, the Department of Transportation and Public Facilities may, on a temporary basis, designate a limited number of areas in the state in which certain landowners and contractors are granted immunity under AS 09.65.245(a) for causing asbestos-related injuries where an inability to complete construction projects has been demonstrated because of lack of gravel or other aggregate material free from naturally occurring asbestos. After designating an area on a temporary basis, the department shall notify, including through signage, potentially affected persons that the area has been designated as an area in which immunity may be granted under AS 09.65.245(a) for certain landowners and contractors causing asbestos-related injuries. Notwithstanding AS 18.31.250, added by sec. 2 of this Act, the Department of Transportation and Public Facilities may approve a limited number of appropriate construction projects until the development and implementation of initial standards under AS 44.42.420 and the administrative requirements of AS 44.42.400, added by sec. 3 of this Act, for projects not subject to AS 44.42.410(b), if, under (b) of this section, the Department of Transportation and Public Facilities prepares and adopts interim standards and requires its contractors to prepare site-specific plans for the use of gravel or other aggregate material that, when tested using the bulk method prescribed in sec. 5 of this Act, is determined to have a content equal to or greater than 0.25 percent naturally occurring asbestos by mass in transportation projects and public facilities. The department shall apply the standards developed under (b) of this section to a person described in AS 18.31.250 for a project that is not subject to AS 44.42.410(b).

(b) Notwithstanding AS 44.42.400(a) and (b), added by sec. 3 of this Act, the Department of Transportation and Public Facilities may, on a temporary basis, designate a limited number of areas in the state in which certain landowners and contractors are granted immunity under AS 09.65.245(a) for causing asbestos-related injuries where an inability to complete construction projects has been demonstrated because of lack of gravel or other aggregate material free from naturally occurring asbestos. After designating an area on a temporary basis, the department shall notify, including through signage, potentially affected persons that the area has been designated as an area where immunity may be granted under AS 09.65.245(a) for certain landowners and contractors causing asbestos-related injuries. Notwithstanding AS 44.42.410(b), added by sec. 3 of this Act, the Department of

Transportation and Public Facilities may approve a limited number of appropriate transportation projects and public facilities until the development and implementation of initial standards under AS 44.42.420 and the administrative requirements of AS 44.42.400, after consultation with the Department of Environmental Conservation, the Department of Health and Social Services, the Department of Labor and Workforce Development, and appropriate federal agencies. The Department of Transportation and Public Facilities may prepare and adopt interim standards and operating procedures and may require of its contractors the preparation of site-specific plans for the use of gravel or other aggregate material that when tested using the bulk method prescribed in sec. 5 of this Act, is determined to have a content equal to or greater than 0.25 percent naturally occurring asbestos by mass.

(c) The authority granted by (a) and (b) of this section expires December 31, 2013.

*** Sec. 5.** The uncodified law of the State of Alaska is amended by adding a new section to read:

INTERIM STANDARDS FOR APPLICATION OF ASBESTOS BULK TESTING. Until the Department of Transportation and Public Facilities adopts and prescribes a method of bulk testing under AS 44.42.420(a), added by sec. 3 of this Act, the department shall use California Air Resources Board Method 435, Determination of Asbestos Content of Serpentine Aggregate, adopted on June 6, 1991, as that standard has effect on the effective date of this Act, as the basis for determining the asbestos content of a bulk sample or for interim use as authorized by sec. 4 of this Act.

*** Sec. 6.** This Act takes effect immediately under AS 01.10.070(c).

Representative Reggie Joule
Alaska State Legislature District 40

Sponsor Statement for HB 258
Naturally Occurring Asbestos in Gravel

HB 258 authorizes and regulates the use of gravel or aggregate material that contains naturally occurring asbestos (NOA). There are documented cases of NOA being found in several areas of the state, including Juneau, along the Dalton Highway and Ambler. Discovery of NOA in local gravel pits has delayed and, in Ambler's case, halted construction projects. The use of NOA in construction projects may be regulated by states. Virginia and California have been regulating NOA for many years. With the passage of HB 258, the discovery of NOA in local gravel sources and the cost of transporting non-NOA gravel and material will not impact the success and completion of construction projects and important future state infrastructure in Rural Alaska.

Several large projects are on the state's horizon that will require the use of large amounts of gravel. These large projects are in mineral rich areas of the state critical to the future development of Alaska. Most notably, it is estimated that the gas pipeline alone may use 50 to 60 million cubic yards of new gravel. Many miles of the Dalton Highway will be reconstructed in support of the project, requiring additional gravel. In Rural Alaska, almost all airport construction and upgrades require material from local gravel sources; a new small airport can use up to 25,000 cubic yards of gravel. The use of NOA gravel and materials should be resolved before it becomes an issue during the actual construction process of any of these large future projects.

HB 258 directs the Department of Transportation and Public Facilities to develop and implement statewide regulations and standard operating procedures (SOP) to allow for the use of NOA for both State and private construction projects. HB 258 will balance the needs of moving Alaska forward; building critical infrastructure, completing construction projects while protecting the health of Alaskan workers and communities.

Representative Reggie Joule
Alaska State Legislature District 40

HB 258 Use of Naturally Occurring Asbestos

CSHB(FIN) v.G

Sectional Analysis

Section	Statute	Change	Purpose or Effect
1	Uncodified Law	Add new section	Legislative Findings and Purpose
2	AS 09.65	Add new section AS 09.65.245	**Liability Immunity** Creates immunity on civil action or claims for civil damages for alleged asbestos related death, injury, illness or disability in specific circumstances to certain persons and the State Liability Immunity is provided for Gravel pit owners. Liability Immunity is provided to persons exacting, supplying, transporting or using gravel or aggregate material containing NOA if the following apply: 1) Gravel or aggregate material contains 0.25 % by mass. 2) The use of gravel was in compliance with Department's SOP If not in compliance, lawsuits can only be brought against those that have direct control or responsibility for the compliance requirements A lawsuit cannot be brought against the State for the approval of plan
3	AS 18.31	Add New section AS 18.31.250	**The use of NOA material in private construction projects** The use of NOA material must: 1) Is 0.25% by mass tested using bulk test method prescribed by Department of Transportation and Public Facilities 2) In order for a private contractor to use NOA and the project is not state project the principal contractor/person of legal

			authority for the project must: a. Prepare and submit specific plans demonstrating compliance with DOT&PF SOP b. Approval by DOT&PF must be granted before the extraction and use of gravel occurs
	18.31	Add new section AS 18.31.260	**Presence of naturally occurring asbestos** .25% by mass the minimum detectable amount as the baseline for the presence of NOA according to the testing using CARB 435
4	44.42	Add new section AS 44.42.400	**Use of Materials – Administration** 1) The Department of Transportation shall designate one employee in the Commissioner's Office to oversee the duties in AS 44.42.400 – 44.42.430 and be the point of contact for all projects using NOA gravel. The individual 2) A NOA Delineation Zone will be established by the following: a. Community/ municipality request b. State delineation in absence of a community 3) The State is required to review application, testing results and collect public input before delineating a zone. The State can also require additional information as necessary to make a determination. 4) After the delineation zone is created DOT is required to notify, to include signage, affected person in the area.
	44.42	Add new section AS 44.42.410	**Use of Materials – Site Specific Use** A contractor that intends to use identified and tested NOA gravel shall submit a site specific plan to DOT&PF to include the following: 1) Describe the manner in the contractor's plan conforms to the standards adopted by DOT&PF 2) Demonstrate how the contractor's plan

			of construction and maintenance practices comply and meets all laws applicable for handling NOA gravel 3) Outlines the long term maintenance on the completed project and dedicated responsibility of ensuring human health and air quality are not compromised by the use of NOA gravel 4) Describe how NOA gravel will used and contained underneath or buried under the project so asbestos fibers cannot become airborne or transferred outside the project area 5) If requirements in complying with previous subsection (4) are economically unreasonable, plan will describe how the NOA gravel will be used and sealed from the surface including chip sealed or mixed with asphalt to prevent fibers from become airborne or transferred outside the project area 6) If requirements in complying with previous subsections (4) and (5) are economically unreasonable, plan will describe how the NOA gravel will be used to prevent fibers from become airborne or transferred outside the project area, to include the transference through vehicle traffic. DOTP&F in its operating procedures applicable to a project that is defined by AS 35.95.100 and intends to use NOA gravel shall: 1) The contractor responsible for the project prepare and submit a plan conforms to the standards and requirements adopted by DOT&PF developed under AS 44.42.420 2) The plan must be approved before extraction of NOA gravel The use of NOA gravel is only approved through a submitted construction plan when it is determined that it is economically unreasonable to use NOA free gravel After the contractor has submitted the site specific plan to

			DOT&PF and the plan has been approved through regulations and standards adopted by DOT&PF with consultation from DEC, DHSS, and DLWF DOTP, DOL, DNR will return a monitoring and mitigation plan with the site specific plan to the contractor. To qualify for the immunity provided in AS 09.65.245 the party that has direct control or responsibility for the project will have comply with mitigation and monitoring plan developed by DOTP&F. On approval of the site specific plan DOT&PF will do the following: 1) Return a copy of the approved plan to the contractor including; a. The monitoring and mitigation plan under AS 44.42.410 (d) b. Recommend methods for reducing exposure to airborne fibers c. Copies of the US OSHA Mine Safety and Health Administration & EPA recommended practices for handling and use of gravel material containing NOA After construction is complete the contractor will record on the title of the construction project land title a recording of the project. The contractor shall submit to the department the results of any testing performed in accordance with the site specific plan and any mitigation measures undertaken
	44.42	Add new section AS 44.42.420	**Regulations** DOTP&F will consult with DEC, DHSS, DLWF, DOL, DNR to develop, implement, and revise statewide standards to regulate the use of NOA gravel in transportation projects and public facilities DOT&PF are required to follow the Administrative Procedure Act to implement regulations and SOP's
	44.42	Add new section AS 44.42.430	**Definitions** "Contractor" "Naturally Occurring Asbestos"
5	Uncodified Law	Add new section	**Interim Project Authorization** Authorizes that certain areas be delineates NOA zones during the Interim

			Authorizes certain projects to move forward on projects with a site specific plan approved by interim standards established by DOT&PF with consultation from DEC, DHSS, DLWF, DOL, DNR Interim Project Authorization ends December 31, 2013
6	Uncodified Law	Add new section	**Interim Standards for Bulk Testing** Until DOTP&F adopts and prescribes a method of testing the department shall use California Air Resources Board Method 435
7	AS 01.10.70	Effective Date	**Immediately**

Representative Reggie Joule
Alaska State Legislature District 40

Changes Between HB258(TRA) 27-LS0400\T & HB258 (FIN) LS-0400\G

- **Page 3 Lines 11-12, Page 4 Lines 7-8, Page 5 Lines 2-3**
  - Intent languages describing the state immunity to include agencies, officers and employees

- **Page 3 Lines 16-30 & Page 4 Lines 13-14**
  - Intent languages that establishes an analytical threshold at .25% by mass volume as naturally occurring asbestos(NOA) gravel and intent language offered by DHSS on exposure to NOA and public health

- **Page 4 Lines 15-21**
  - Clarifies the scope of immunity provided

- **Page 6 Lines 10-31 thru Page 7 Lines 1-19**
  - Allows for DOT&PF to create NOA delineation zones through the request of a the community; or in the absence of a community the State can determine a NOA zone

- **Page 8 Lines 20-23**
  - Includes the impact of vehicle and vehicle traffic to the requirements of determining the transference of airborne asbestos

- **Page 9 Line 28**
  - Requires DOT&PF to send the approved site specific plan not just the received site specific plan

- **Page 10 Line 9**
  - Allows the option for DOT&PF to send the copies of certain material instead of requiring DOT&PF to send material

- **Page 10 Line 31 & Page 11 Lines 1-8**
  - Provides DOTP&F required regulatory authority provided under the Administrative Procedure Act to write the necessary regulations

- **Page 11 Lines 30-31**
  - Requires DOTP&F to establish regulations that include specific components of the site specific plan

- **Page 12 Lines 2-12**
  - Adds additional regulations requirement to define economically reasonable and the impact of the public health

- **Page 12 Lines 17-22**
  - Defines "Naturally Occurring Asbestos"

- **Page 12 Lines 27-31**
  - Allows for the determination of certain temporary NOA Delineation Zones while DOT&PF write the regulations

- **Page 14 Line 5**
  - Changes the expiration date for the interim projects to Dec. 31, 2013 so DOT&PF can have enough time for the regulatory process

Representative Reggie Joule
Alaska State Legislature District 40

Ambler Major Construction Projects Delayed/On Hold due to Naturally Occurring Asbestos

1. **Airport Extension ***
2. **Replace Grizzly Bridge ***
3. **Solid Waste Site ***
4. Riverbank Erosion in of front of town
    a. Impacting power lines AVEC/OTZ
5. North and South Loop Replacements
6. Existing Roads maintenance
7. School playground
8. Future home sites

(*)Reflects Legislative Priority for Ambler

AIP Project Schedule
2011-2013
FAA Airports Division, Alaskan Region
(Last saved: August 15, 2011)

http://www.faa.gov/airports/alaskan/aip/media/aip_project_list.pdf

STATE OF ALASKA - NORTHERN REGION

AMBLER AFM

Project: Extend primary and crosswind runways, clear runway visibility zone, expand runway safety areas, construct new apron, construct new SREB, and relocate airport access road. Project delayed until a suitable material source can be found that does not contain asbestos.

Construction Start: 2014

Likely Completion Date: 2015

Sponsor/POC: AKDOT Ryan Anderson 451-5129

Airports POC: Matt Freeman, 271-5455

ATO POC: Ed Vey, 271-3056

FAA Flight Procedures POC: Kyle Christiansen, 271-5187

NAS Impacts: Existing VASI's.

AVN Impacts: Update all IAP's. Need new runway data by end of 2006.

STATE OF ALASKA

DEPARTMENT OF LAW

OFFICE OF THE ATTORNEY GENERAL

SEAN PARNELL, GOVERNOR

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April 6, 2012

Representative Reggie Joule
Alaska State Legislature
State Capitol
Juneau, Alaska 99801

Senator Donald Olson
Alaska State Legislature
State Capitol
Juneau, Alaska 99801

Subject: HB 258/SB 180 (Naturally Occurring Asbestos)
Explanation of Immunity

Dear Representative Joule and Senator Olson,

In speaking with your staff regarding HB 258 and SB 180 (naturally occurring asbestos), it appears that there may be a misunderstanding about the need for state immunity within this legislation. Currently, the House Finance CS for HB 258 provides immunity to the state, and the Senate Judiciary CS for SB 180 eliminates state immunity, except for individual employees under certain circumstances outlined in the legislation. The misunderstanding appears to be that the immunity provided in the House Finance CS for HB 258 is not necessary. This is incorrect. This letter is meant to clarify the legal parameters and consequences if state immunity is not included in the final versions of HB 258 or SB 180.

Existing immunities for the state and state employees **are not** equivalent to the immunity found in the House Finance CS for HB 258. This is true for three reasons. First, in the absence of a specific provision in statute expressly providing immunity for the state for the functions outlined in proposed AS 44.42.400 and .410, a determination of state immunity or potential liability would generally require more case development, discovery, and costly litigation. Second, there would be less certainty about the application of immunity under existing law to Department of Transportation and Public Facilities' (DOTPF's) execution of the responsibilities created by this legislation. Third, the express exclusion of the state from the immunity in the Senate Judiciary's CS for SB 180, specifically in AS 09.65.245(b), means that the state could have potential exposure

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that private parties and municipalities may not have, relating to ownership of land with naturally occurring asbestos (NOA) gravel or the state's own extraction, supply, transport, or use of NOA gravel. These reasons are explained in more detail below.

Discretionary Immunity and Its Applicability

The Alaska Tort Claims Act (AS 09.50.250) waives sovereign immunity for the State of Alaska with certain exceptions. One such exception is for "discretionary functions." Under AS 09.50.250,

> an action [against the state] may not be brought if the claim (1) is an action for tort, and is based upon an act or omission of an employee of the state, exercising due care, in the execution of a statute or regulation, whether or not the statute or regulation is valid; or is an action for tort, and based upon the exercise or performance of the failure to exercise or perform a discretionary function or duty on the part of a state agency or an employee of the state, whether or not the discretion is abused.

HB 258 and SB 180 set out a number of actions DOTPF would be required to take in order to carry out the requirements of proposed AS 44.42.400-.430. Broadly, DOTPF would be tasked with the following:

- Designating an area in which certain private contractors and landowners may be granted immunity for causing asbestos-related injuries;
- Adopting regulations regarding procedures for evaluation of site-specific use plans of material containing NOA (to include developing guidelines to determine when the cost for alternatives is "economically unreasonable");
- Approving or disapproving such site-specific use plans based on the above guidelines;
- Developing monitoring and mitigation plans for all approved site-specific use plans;
- Providing copies of all site-specific use plans, including the monitoring and mitigation plans, to the mayor or manager of an affected municipality; and
- If NOA is involved in a DOT project in a designated area, developing a site-specific plan for that project.

The Supreme Court of Alaska identifies discretionary acts or functions "by examining whether the act or function can be described as 'planning' or 'operational'." Acts or functions occurring at the planning level, including policy-making, are entitled to immunity as discretionary functions under AS 09.50.250; those that are merely ministerial or operational are not. *Dep't of Transp. & Pub. Facilities v. Sanders* 944 P.2d 453, 456 (Alaska 1997). If a court found that DOTPF's tasks under the

bills fell under the "planning" and "operational" categories, those actions would be immune as discretionary functions. However, to the extent that a court decided that a ministerial act was potentially responsible for a plaintiff's injury, the discretionary function immunity of AS 09.50.250 would not apply.

Liability of State Employees For the Approval of Plans

There is also an issue of state employee liability, as the discretionary function immunity in AS 09.50.250 applies only to the state (and state agencies), not to claims against individual state employees. Absent express immunity language covering employees, an action could potentially be brought against a state employee for performing duties under this legislation. Although the Senate Judiciary CS for SB 180 maintains immunity for state employees in relation to ownership or extraction of NOA gravel under AS 09.65.245, the Senate Judiciary version does not provide immunity for their involvement in the site designation and planning process. It is possible that official immunity (created by Alaska Supreme Court precedent) may protect a state official or employee who was sued, but that would depend on the circumstances and is not assured.

Immunity Exclusion for State's Actions as Owner or Contractor

In the Senate Judiciary CS, AS 09.65.245(b) expressly says that the state is not covered by the immunity in (a) – so even if DOTPF follows its own site use plan and monitoring/mitigation plan, the immunity in this legislation would not apply to the state. This means that private owners and contractors would be immune for activities for which the state would not have the same immunity.

Conclusion

In summary, the testimony that has been provided by the Department of Law on HB 258 and SB 180 was not meant to imply that the state is otherwise immune for all actions and responsibilities set forth in the bills, regardless of whether immunity for the state is expressly provided in the bill. To the contrary, the testimony was only that some state functions covered by the bill **may be** immune under existing law. However, without the immunity in the House Finance CS for HB 258, the state would still be open to potential liability with respect to ownership or use of NOA gravel and possibly other functions imposed by this legislation, and the ultimate determination of immunity would depend on the circumstances of each case.

If you have any further questions in relation to immunity, please feel free to contact Assistant Attorney General Susan Cox.

Sincerely,

MICHAEL C. GERAGHTY
ATTORNEY GENERAL

By:
Cori Badgley
Assistant Attorney General
Legislative Liaison, Civil Division

Cc: Senator Bert Stedman
Senator Lyman Hoffman
Saritha Anjilvel
Susan Cox
Heather Brakes
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Asbestos Exposure – Ambler
Public Health Evaluation and Assessment
Interim Report

May 20, 2005

John P. Middaugh, M.D.
Scott Arnold, Ph.D.

Introduction

Many individuals, agencies, and stakeholders have been working together to evaluate the significance of the discovery in the fall of 2003 of naturally occurring asbestos in the gravel pit at Ambler. Several meetings have been hosted by the Northwest Arctic Borough to share information and identify steps needed to develop recommendations for the community.

Public Health Findings

The Alaska Division of Public Health has been working with the Maniilaq Health Center, Maniilaq Association, the Alaska Native Tribal Health Consortium, and several national asbestos experts to obtain information on the medical and public health significance of the presence of asbestos in Ambler.

Inhalation of asbestos fibers is the primary route of human exposure. The likelihood of developing asbestos-related diseases is related to the length of exposure and the concentration of asbestos.

We performed a medical records search to determine if any asbestos-related diseases have ever been identified in residents of Ambler, Kobuk, Shungnak, and Kiana.

- We reviewed all death certificates from 1980 to the present to see if there were any residents of Maniilaq villages who had died with any asbestos-related diagnosis. There were no residents with any asbestos-related diagnoses on the death certificate.

- We reviewed the State Cancer Registry and the Alaska Native Tumor Registry to see if there were any asbestos-related cancers that had been diagnosed and reported from any residents of Ambler, Kobuk, Shungnak, and Kiana. There were no residents who had been diagnosed with mesothelioma from any of these villages dating back to 1970. There were no reported cases of lung cancer from Ambler, Kobuk, or Shungnak dating back to 1970. There were 5 reported cases of lung cancer, all from the village of Kiana. These 5 cases occurred from 1984 to 2003, and they included 4 different cell types of lung cancer.

- We reviewed computerized medical records in the RPMS medical record system. There were no residents of the 4 villages who ever had been diagnosed with any asbestos-related disease.

- We reviewed existing chest x-rays from 128 residents from the 4 villages who were 50 years and older – 28 of these residents were from Ambler. Because of the past epidemics of tuberculosis and other common pulmonary diseases, there were many abnormalities. An expert, certified nationally as a chest x-ray reader for asbestos-related disease, reviewed these x-rays on behalf of the Maniilaq Association and the Alaska Division of Public Health.
  - Of the 28 residents of Ambler whose chest x-rays were reviewed, 2 had pleural changes that were probably caused by prior exposure to asbestos.
  - Of the 100 residents of Kobuk, Shungnak, and Kiana whose chest x-rays were reviewed, 7 had pleural changes that might have been caused by prior exposure to asbestos.
  - The asbestos-related changes were in the form of pleural plaques, and their appearance suggests that they were due to asbestos exposure many years ago, possibly due to occupational exposure.

- After receiving the information from reading the chest x-rays, a medical epidemiologist from the Section of Epidemiology visited Maniilaq, reviewed all available medical records, and with the help of a local interpreter, interviewed the patients who were still living and who agreed to be interviewed.
  - Several of the residents described past employment working in mines.
  - Many of the residents worked in mining many years ago, and they were unable to provide detailed information that would enable specific characterization of exposure to asbestos.
  - Of the 9 people with pleural plaques suspicious for asbestos exposure, 1 recalled working in an asbestos mine, 1 worked with asbestos as a construction worker, 1 was repeatedly exposed to high levels of mine dust while washing her husband's clothing, 1 refused interview, 2 had other medical conditions not-related to asbestos that definitively explained the x-ray findings, and the results for the remaining 3 were inconclusive because they had non-asbestos related lung diseases but these diseases did not definitively account for the x-ray changes.
- There are no medical tests to determine the amount of asbestos a person has been exposed to during their lifetime.
- There are no medical tests that are uniquely specific to identifying asbestos-related disease, but general clinical tests of lung function and chest x-rays are used to diagnose the disease and its impact. It is particularly difficult to identify mild cases.
- Persons who are exposed to asbestos have a greatly increased risk of developing asbestos-related disease if they smoke tobacco.

Asbestos Deposits in the Kobuk River Area

- Asbestos has been documented to be naturally present in the Kobuk valley for at least one century, and archaeologists have evidence that asbestos has been used by Alaska Natives for hundreds of years.

- Twelve asbestos deposits have been identified in the Ambler/Shungnak/Kobuk area.
- Asbestos mining occurred near Shungnak in the 1940s. Approximately 45 tons of tremolite asbestos was mined from Asbestos Mountain near the head of Dahl Creek in the 1940s.
- Approximately one ton of chrysotile asbestos was removed near Dahl Creek in 1945.
- Limited development of asbestos deposits on Bismark Mountain, Jade Mountain, and Cosmos Creek also occurred in the 1940s.
- Local Alaska Natives were employed to mine and develop these asbestos deposits in the 1940s.

Environmental Sampling Near Ambler

Since the discovery of naturally occurring asbestos in the Ambler gravel pit during the fall of 2003, several sampling efforts have occurred (Table 1). Gravel from the Ambler gravel pit has been used throughout Ambler for roads, housing and building pads, and the airport runway for 30 to 40 years.

- The unprocessed soil from the easternmost portion of the gravel pit contains trace amounts of asbestos (<1%). The sieved processed soil remaining in the gravel pit contains 5% to 10% asbestos. Pure chysotile asbestos has also been identified in the gravel pit.
- Chrysotile asbestos has been detected in air samples within the school at 0.01 fibers/cubic centimeter. For comparison, the OSHA standard based on an 8-hour time weighted average is 0.1 fibers/cubic centimeter.
- Asbestos concentrations ranged from trace amounts (<1%) to 5% in samples of gravel used for construction that came from the Ambler gravel pit.
- Chrysotile asbestos was found in soil used to cover the gravel at the new Ambler school, although in very low levels.
- Asbestos was not detected in three ambient air samples collected last year near the road in Ambler.
- In an effort to locate a new, asbestos-free gravel pit site, the Alaska Department of Transportation and Public Facilities investigated 7 candidate material sites adjacent to the Ambler and Kobuk Rivers over an approximately 10 mile area. Of the 40 soil samples collected from the proposed new material site, 17 contained trace amounts (<1%) of asbestos. Of the 30 samples collected from the other 6 candidate sites, 12 samples contained trace amounts to 1% asbestos.

Planned Construction Activities

- Several major construction projects important to the village have been on hold until the extent of asbestos could be determined and its significance assessed:
  - Runway repairs at the airport
  - New sewage lagoon
  - New washeteria with underground piping to the new sewage lagoon

- The Alaska Native Tribal Health Consortium (ANTHC) engineers are proceeding with construction planning, including provisions to protect workers from asbestos exposure in accordance with Occupational Safety and Health Administration (OSHA) requirements.

- Based upon the characteristics of the planned construction projects, ANTHC believes that all of the construction projects can be accomplished within OSHA standards for worker protection.

Summary and Public Health Recommendations

- Additional public health medical record and chest x-ray reviews will be needed, but they will not provide much additional information to assist in deciding on construction this summer.
- There would be minimal increase in risk to residents from marginal exposure to asbestos as a result of any of the proposed construction activities if they were to proceed this summer. The asbestos that is present has been present for decades, and now that it is known to be present, construction projects can take precautions to minimize airborne dust and worker exposure can be controlled to OSHA standards.
- Deferring the construction projects carries risks to the community. The community needs to have a sound airport runway, a functioning sewage lagoon, and a working water and sewer system.
- With use of personal air monitors, worker safety and health can be protected if the proposed construction proceeds.
- Ambient air monitoring during construction will enable monitoring of community exposures.
- Additional soil testing in Ambler is essential to determine if asbestos is present other than from past use of gravel from the Ambler gravel pit.
- Soil testing in Kobuk, Shungnak, and Kiana should be done to determine if asbestos is present in the villages.
- Given the long history of use of gravel from the gravel pit, it is unlikely that Ambler will ever be asbestos-free in the future. However, the low concentrations of asbestos to which the residents will be exposed are unlikely to pose a significant threat to the public's health. The Alaska Division of Public Health will continue to assist the community to assess the extent of past, present, and future health hazards and, if necessary, develop practical risk management approaches.

Table 1. Recent Sampling for Asbestos in the Ambler area.

Agency	Year	Sample location	Number of samples	Amount of asbestos
Alaska Department of Transportation and Public Facilities	2003	Ambler gravel pit	3	1 to 10%
Department of Labor and Workforce Development	2003	Under school-original soil	2	not detected
		Near school from gravel originating from the gravel pit	3	< 1%
		Gravel pit	2	<1%
		Gravel pit	1	pure chrysotile mineral
		Wipe samples inside of school	3	asbestos detected
		Air sample	1	0.01 fibers/cc
NANA (prepared by Stevens Exploration Management Corp.)	2004	Ambler gravel pit	visual examination of screened reject	5 to 10 % asbestos
		Gravel pit-easternmost portion	3	<1%
Alaska Native Tribal Health Consortium	2004	Lagoon test hole	2 composite	not detected
		Sand/gravel from the Redstone Ave stockpile,WTP and washeteria pad, and lift station	3	0.75% to 5%
		WTP and washeteria pad	1 composite	1.7%
		Ambler borrow pit	1 composite	1.46%
Alaska Department of Environmental Conservation	2004	Air samples collected July and August for Total Suspended Particulates (TSP)	The 3 filters with the highest TSP	not detected
		Soil sample from the school yard	1	asbestos detected
Alaska Department of Transportation and Public Facilities	2005	Seven material sites were investigated	Proposed site-40 samples	17/40 samples-asbestos detected at <1%
			Six other sites-five samples each	12/30 samples-asbestos detected <1% to 1%

Representative Reggie Joule
Alaska State Legislature District 40

Department of Law & Department Labor and Workforce Development Answers on Worker's Compensations Claims and HB 258 Immunity

From: Scavera, Paula D (DOL)
Sent: Tuesday, March 20, 2012 9:59 AM
To: Badgley, Cori M (LAW); Brodie Anderson
Cc: Anjilvel, Saritha R (LAW)
Subject: RE: HB 258 (naturally occurring asbestos) - Immunity and Work

After reviewing HB 258 within the Department (including the Workers' Compensation Division), the Department agrees with the Department of Law's assessment of the bill. Thank you. Paula Scavera

---

From: Badgley, Cori M (LAW)
Sent: Tuesday, March 20, 2012 7:43 AM
To: Anderson, Brodie (LAA)
Cc: Anjilvel, Saritha R (LAW); Scavera, Paula D (DOL)
Subject: HB 258 (naturally occurring asbestos) - Immunity and Work

Brodie,

Per our discussion, we asked our immunity experts about worker's compensation, and it turns out that as worker's compensation is considered a benefit rather than a claim, it is typically NOT affected by immunity statutes. We are looking into this further with the specific immunity language in the bill in mind, but I wanted to let you know that this is our initial conclusion.

Department of Labor might also have some thoughts on worker's compensation from an administration and policy point of view.

Thanks!

Cori Badgley
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Legislation and Regulations Section
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STATE OF ALASKA
DEPT. OF HEALTH & SOCIAL SERVICES

Alaska Commission on Aging

SEAN PARNELL, GOVERNOR

P.O. BOX 110693
JUNEAU, ALASKA 99811-0693
PHONE: (907) 465-3250
FAX: (907) 465-1398

April 6, 2012

The Honorable Johnny Ellis, Chair
Senate Rules Committee
Alaska State Capitol, Room 119
Juneau, AK 99801-1182

Subject: Support for HB 78, Incentives for Certain Medical Providers

Dear Chair Ellis:

The Alaska Commission on Aging (ACoA) supports HB 78, a bill to establish a loan repayment program to build Alaska's health care workforce by increasing the recruitment and retention of targeted health care professionals in urban and rural, underserved communities. This bill is authored by Representative Herron and co-sponsored by Representatives Edgmon, Feige, Millett, and Tuck.

Alaska, as with the rest of the nation, is experiencing a shortage of health care workers as fewer students are entering the health care profession and many of those already working in health care are preparing for retirement. Alaska is one of five states that does not offer a state-sponsored loan repayment program for health care professions. As a result, our hospitals, clinics, and communities lose potential health care workers to other states that incentivize their workforce with loan repayment programs.

Access to quality health care is a priority for all Alaskans and a critical need for people age 65 years and older. Older Alaskans benefit from regular health care services which enhance their overall health and decrease the need for expensive, intensive treatment and emergency visits.

Alaska continues to lead all states with the fastest growing senior population currently comprising about 12 percent of our state's population and is projected to increase by five to six percent each year until 2020. The graying of Alaska's population is creating substantial shifts for workforce, particularly in the health care and long-term support service sectors, as demand increases and providers are reaching retirement age. If older Alaskans are unable to find a health care provider, they may be forced to leave the state in search of access to health care professionals. As a result, Alaska could suffer from a loss of retirees, who contribute more than $1.7 billion to the state's economy in addition to their significant volunteer service, caregiving activities, and community leadership.

ACoA supports HB 78 and believes that the proposed legislation will help to build a qualified health care workforce who will be available to meet the health care needs of older Alaskans. Please feel free to contact Denise Daniello, ACoA's executive director, by phone (465-4879) or email (denise.daniello@alaska.gov) should you have questions or require additional information about our position. Thank you.

Sincerely,

Sharon Howerton-Clark
Chair, Alaska Commission on Aging

Sincerely,

Denise Daniello
ACoA Executive Director

Cc: Senator Kevin Meyer
Senator Lyman Hoffman
Senator Bert Stedman
Senator Gary Stevens
Representative Bob Herron, Sponsor

NWALT Northwest Arctic Leadership Team

The Honorable Reggie Joule
House of Representatives
Alaska State Capitol
Juneau, AK 99801-1182

January 31, 2012

Dear Representative Joule:

The Northwest Arctic Leadership Team (NWALT) writes in support of House Bill 258. As you know, NWALT is a partnership of the Northwest Arctic Borough, Maniilaq Association, the Northwest Arctic Borough School District and NANA Regional Corporation. It is our charge to maximize resources and reduce duplication of efforts to address issues affecting the people of Northwest Alaska while honoring and perpetuating our Iñupiat cultural heritage.

Enactment of HB 258 is essential for completion of long-needed construction and public works projects in the Upper Kobuk Valley, most of which have been put on hold for over a decade due to naturally occurring asbestos (NOA) in the local gravel sources. Projects delayed in Ambler add up to over $10 million and include:

1. Airport runway extension and upgrades to Grizzly Bridge, which are necessary to reach the airport (the last improvement to the airport was in 1991 and to Grizzly Bridge was in 1976)
2. Upgrades to water and sewer services (last improvements in 1973 and 1982 respectively)
3. Building of new homes (last new homes completed in 1991 by the Northwest Inupiat Housing Authority)
4. Upgrades to existing dumpsite (opened in 1976 with no improvements since)
5. To secure the embankment protecting homes from river erosion

In Kobuk, a necessary addition to the school to accommodate students attending high school in the village has been delayed since grades 9-12 were made available in the village five years ago.

The use of NOA-containing material in construction and public works projects in the Upper Kobuk is necessary to the maintenance and improvement of local infrastructure so that residents may have the opportunity to enjoy a quality of life similar to that of residents who have the benefit of NOA-free gravel sources. Additionally, this legislation is a crucial part of the long-term solution to an important issue affecting rural Alaskans across the State, as well as proposed development projects such as the Ambler Mining District Access Project.

We thank you for your advocacy on this important issue.

Representative Reggie Joule
Alaska State Legislature District 40

LEGISLATIVE FINDINGS AND PURPOSE

The Legislature finds that

(1) gravel or similar aggregate material is constantly in demand for major construction and maintenance of state and local transportation projects and public facilities and for all types of construction by public and private entities;

(2) naturally occurring asbestos may be found in sources of gravel and similar aggregate material throughout the state;

(3) while airborne asbestos fibers are a significant threat to workplace safety and public health and are subject to close regulation by federal and state authorities under U.S.C. 7401 - 7671q (Clean Air Act) and 15 U.S.C. 2601 - 2692 (Toxic Substances Control Act), use of materials containing naturally occurring asbestos in construction projects may be regulated by states;

(4) in communities that do not have sources of gravel or similar aggregate material that is free of naturally occurring asbestos, costs of construction are substantially increased because of the necessity of locating alternative sources of gravel or similar aggregate material and transporting that material to distant construction and maintenance sites; and

(5) a recent study suggests that, with careful use and close adherence to appropriate control strategies, state and local transportation projects and public facilities may be safely completed using sources of gravel or similar aggregate material that contains naturally occurring asbestos; the study recommends that the Department of Transportation and Public Facilities establish standards and operating procedures through a statewide process that will apply to the use of gravel and aggregate material that contains asbestos by the department and by any public or private entity.

It is the purpose of this Act

(1) to authorize and direct the Department of Transportation and Public Facilities to develop, implement, and, as circumstances may require or indicate, modify standards and operating procedures to allow the use in the construction and maintenance of transportation projects and public facilities in certain areas of the state of gravel or aggregate material that contains naturally occurring asbestos, with the expectation that use of that material in a manner that is consistent with those standards and procedures may avoid significant risk to human

health and eliminate significantly higher costs of construction and maintenance of projects and facilities associated with using only construction material that is free of asbestos;

(2) to establish that a person that uses gravel that contains naturally occurring asbestos in certain areas of the state may prepare specific project plans that conform to requirements of this Act and the department's standards and operating procedures; and

(3) to shield persons and the state, including its agencies, officers, and employees, under certain conditions, from liability based on exposure to naturally occurring asbestos.

(4) This Act creates a voluntary program in certain areas of the state and provides civil immunity for the use of gravel or other aggregate material that contains naturally occurring asbestos for contractors meeting the requirements of the program; nothing in this Act mandates a contractor to submit a site-specific plan or to adhere to the requirements of a plan approved by the department.

(5) Because neither the state nor the federal government has established a scale assigning a specific risk level to a corresponding amount of naturally occurring asbestos, this Act accepts 0.25 percent by mass, the minimum detectable amount of asbestos under the California Air Resources Board Method 435, as the baseline for the presence of naturally occurring asbestos in gravel or other aggregate material. Health risks resulting from asbestos exposure vary according to the level, type, and duration of exposure. While exposure to very small concentrations of asbestos may pose some health risk, there is not a practical way to prevent all exposure to asbestos for residents in close proximity to deposits that contain naturally occurring asbestos. The intent of this act is to establish a sensible analytical threshold for detection of naturally occurring asbestos in gravel or other aggregate material and to establish appropriate exceptions for the use of gravel or other aggregate material that contains naturally occurring asbestos for certain public facilities and transportation projects involving unusual circumstances, including projects in remote locations or in regions where gravel or other aggregate material free from naturally occurring asbestos is not reasonably available.

NWALT Northwest Arctic Leadership Team

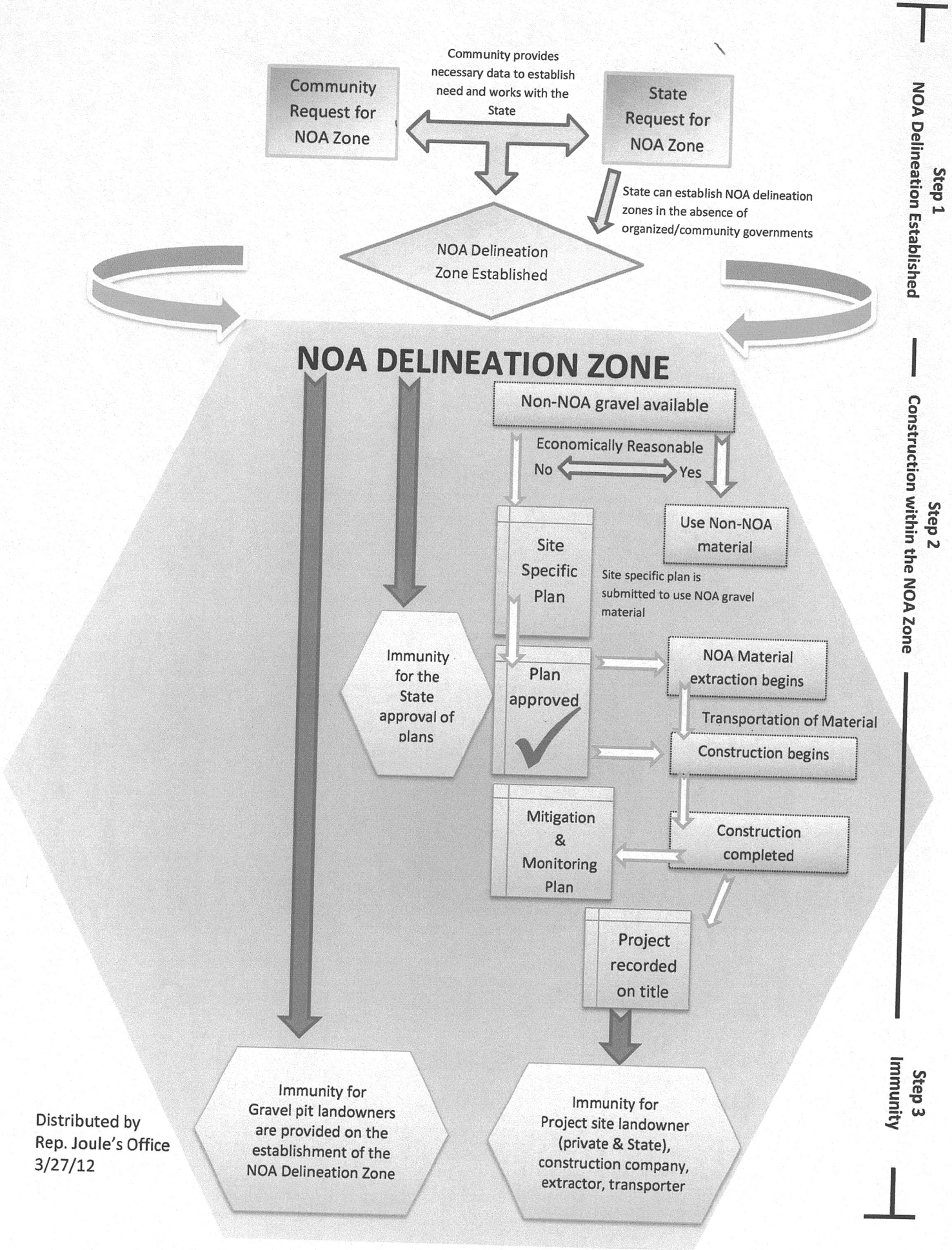
Sincerely,

Siikauraq Martha Whiting
NWALT Co-Chair
Mayor
Northwest Arctic Borough

Marie N. Greene
NWALT Co-Chair
President/CEO
NANA Regional Corporation

Ian Erlich
President/CEO
Maniilaq Association

Norm Eck, Ph.D.
Superintendent of Schools
Northwest Arctic Borough School District



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3/27/12

Naturally Occurring Asbestos in Alaska and Experiences and Policy of Other States Regarding its Use

A joint project
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Nortech

September 2009

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Front cover photo: Asbestos at material site MS 105 on the Dalton Highway

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3. Excel file with USGS 2009 Alaska Resource Data File is available electronically from the authors.

EXECUTIVE SUMMARY

Naturally Occurring Asbestos (NOA) occurs in mineral deposits in Alaska. Some localities in Alaska do not have gravel sources that are NOA-free, which impacts the cost of heavy construction projects such as roads and airports. Because airborne asbestos fibers are a significant human health risk, mining and industrial use of asbestos is rare in the United States. Disposition of existing asbestos materials in industry and buildings is tightly regulated by federal and state authorities. The use of NOA is not regulated by federal agencies or most states. Determining if NOA can be safely used in heavy construction materials and what can or should be done with NOA materials that are already in place are complex questions. The ultimate answer depends on propensity for the NOA in each scenario to actually release asbestos fibers that may be inhaled by humans, which in turn depends on the amount and type of asbestos mineral, how it is handled in processing, and how it is maintained. Practical analysis of this depends on laboratory analysis, as well as regulation or control of operations. Implementation of these requires stakeholder education and cooperation and agency oversight. This report summarizes these from the perspective of the Alaska Department of Transportation (ADOT).

Some key points:

- NOA is present in many states, but only a few have regulations governing its use.
- There are many regions in Alaska that have minerals in surface rocks that may contain asbestos and asbestos has been discovered in many locations in Alaska.
- Gravel is constantly in demand for heavy construction projects, if a major project, such as the gas pipeline is built, it will require very large quantities of gravel
- All future material site exploration should consider the possibility of encountering NOA, and those areas indicated by mapping as possible NOA minerals should be carefully investigated.
- California, which does have NOA regulations, uses a threshold asbestos concentration, below which the material is not considered NOA. If the material is NOA, regulations cover its use. Virginia is similar.
- Starting with a site-specific plan and then covering the material and reducing dust are key features of those regulations, if NOA is over the threshold asbestos content.
- We present a review of dust suppression and capping techniques, many of which might be useful, depending on the situation.
- Education of the public and worker training are important components of any NOA plan.

The key conclusion is that NOA can be used in many projects, but precautions are needed, especially a plan for its use. Considering the importance of NOA to ADOT's mission we recommend that the ADOT take the lead in a statewide effort to develop an appropriate NOA policy and program by coordinating a stakeholders working group effort. NOA programs in other states were developed with input from industry, public health, environmental and state organizations and agencies. The outputs of the NOA programs included source characterization, geologic mapping, standardized operating procedures (SOP), program exemption procedures, and local authority. Successful implementation of a NOA program will require significant commitment and change in industry, operational, management, design and construction practices for use of NOA materials. To insure comprehensive input and facilitate stakeholder "buy in," the statewide working group should include federal and state, and local government, as well as industry, community and public health interested parties.

Here we assume that in order for projects that must use NOA to proceed, the ADOT must have a standard or SOP that contains the goals and guidelines that the ADOT must follow in order to use NOA safely. The SOP in turn would require a specific action plan for each project. Of course other project owners could use the ADOT's SOP. Thus, the ADOT's goal with the NOA working group is to develop an SOP that is directed towards ADOT projects, but also satisfies the goals the various stakeholders. We note here that protecting the public health and safety is the overarching goal the ADOT's operations, but the ADOT's approach via building safe roads and airports is different than, for example, the EPA's approach of limiting public exposure to carcinogens. The goals and charges of all the agencies can be reconciled into a workable SOP, but the coordination effort should not be underestimated.

Here is a putative outline of the SOP required for safe use of NOA and the steps likely required to garner wide stakeholder approval of the SOP.

1. The SOP includes
    a. site investigation and characterizations
        i. Laboratory practices
    b. review of design alternates to use non-NOA materials
        i. Cost analysis
    c. evaluation of human health concerns and agency involvement
    d. designs that use NOA
        i. typical drawings and specifications
    e. acceptable construction practices
        i. typical contract provisions
        ii. QA/QC
    f. acceptable and required O&M practices
        i. State forces
        ii. Local forces
    g. O&M and other issues related to in-place NOA

h. the administrative procedures for the entire process, including lines of authority and approval authority
    i. interagency communications
    ii. documentation

2. For each project or situation
    a. a site specific NOA plan
    b. including outline construction specifications or O&M procedures
    c. public involvement and education
    d. QA/QC

However to be successful, the SOP must be acceptable to

- The agencies who may have some jurisdiction or be involved
- The DOT design, construction and O&M staff and experts
- The contractors and material site owners and suppliers
- The general public
- Involved and concerned public.

Thus, we recommend the ADOT take the lead and develop a NOA Action Plan that involves a consultant to the DOT. Here are the main steps of that Action Plan that will lead to a workable SOP:

- Outline the SOP
- Contact all interested parties and notify them of the Action Plan and request a statement of their interest
- Meet with all the major players and discuss the issues – either at a roundtable or individually
- Prepare a draft of the SOP and an example Site Specific Plan for ADOT review
- Distribute the draft to interested stakeholders
- Hold a meeting to review the draft and discuss comments and changes
- Determine if new laws or regulations are needed
- If not, the ADOT promulgates the SOP
- If new laws or regulations are needed, ADOT starts the process.

INTRODUCTION

Asbestos is a term for naturally occurring silicate minerals with long, thin fibrous crystals that were historically mined and utilized in a wide-variety of manufactured products because of favorable chemical and physical properties. By the 1980s inhalation of asbestos fibers was found to be a human carcinogen responsible for diseases such as asbestosis, mesothelioma and lung cancer and the mining and use of asbestos in manufactured products was banned. While mining and manufacturing has since ended in the United States, Naturally Occurring Asbestos (NOA) is a constituent of some rocks and soils existing in varying types and quantities in several locations throughout the nation including Alaska. The United States Occupational Safety and Health Administration (OSHA) regulates asbestos exposure in the workplace; however, federal regulations do not address non-occupational exposure from NOA. Due to the lack of regulatory guidance associated with NOA, some states with substantial NOA concerns, such as California, have implemented state-wide regulations controlling the use of soils with NOA.

Due to geography, land mass, limited road systems and relatively sparse and scattered population centers within Alaska, NOA has not been a historical concern for the state. However, over the past several years NOA has been encountered in Alaska and has impacted state projects (e.g. Dalton Highway, Ambler, etc). Meanwhile the Alaska Department of Transportation & Public Facilities (ADOT) has an ever-increasing demand for gravel and rock to construct and repair the state's roads and airports. Large construction projects such as the proposed gas line or railroad extension will require gravel and rock source development.

The ADOT contracted with the Institute of Northern Engineering (INE) of the University of Alaska Fairbanks through the Alaska University Transportation Center to report on the available background information in Alaska and a literature search of information from other states that have similar NOA issues. INE contracted with Nortech Environmental, an Alaska consulting firm, to provide expertise in asbestos issues in Alaska, and to perform the literature search and consultations with other states.

This paper reviews NOA background, analytical issues, policies and regulations that have been considered and/or implemented by other authorities involved with NOA and who have developed NOA policy options. Identified NOA control strategies and technologies are evaluated and analyzed according to their effectiveness, enforcement, affordability and consistency with emerging US standards and ADOT programs. The literature is clear that NOA gravels can be used safety with proper workforce training, understanding and implementation of appropriate control strategies and technology. Implementation of effective Alaskan NOA policies, including development of any SOP to deal with NOA,

will require program consensus, including an educational component, and must involve all stakeholders in the NOA issue (resource owner, owner, designer, contractor, local, regional and state government, and communities) in a holistic approach.

BACKGROUND

Asbestos History

The word 'asbestos' is of Greek origin and has the meaning "inextinguishable" or "indestructible." Today asbestos is the commercial term for a group of silicate minerals consisting of magnesium, calcium and iron all with fibrous tendencies. The favorable properties of asbestos were known and utilized by the ancient Greeks and Romans, Europeans throughout the Middle Ages, and most of the industrial world by the modern era. Asbestos was added in manufactured material for thermal and electrical insulation as well as for strength and chemical stability. These favorable traits lead to the continued use of asbestos in manufactured products through the industrial expansion of the 20th Century. By mid-1960 a high frequency of respiratory disease within the asbestos mining, manufacturing, shipbuilding and construction industries began to gain the attention of medical researchers.

Asbestos is naturally occurring in many parts of the world and was historically mined as raw ore. After the ore was segregated, the asbestos was broken down into fibers and fiber bundles during a milling process, and then further refined depending on the use. Asbestos was included in the manufacture of thermal piping insulation and spray-applied fireproofing as well as resilient floor coverings, acoustical materials, gaskets, plaster, vermiculite, joint compound, wall board, roofing products, industrial mastics, textile and friction productions such as automotive brakes.

In mineralogy, the word 'asbestos' describes a series of magnesium silicate minerals that naturally occur in fibrous form or 'asbestiform.' The six varieties of recognized asbestos minerals comprise two mineralogical groups: serpentines and amphiboles. The only variety of serpentine asbestos is chrysotile or 'white asbestos,' while the amphibole group has five mineral varieties: amosite or 'brown asbestos' (cummingtonite-grunerite asbestos), crocidolite or 'blue asbestos' (riebeckite asbestos), anthophyllite asbestos, tremolite asbestos and actinolite asbestos. Amosite and crocidolite are the trade names used for the asbestos varieties of the cummingtonite-grunerite and riebeckite series respectively. The name 'Amosite' originated as an acronym for "Asbestos Mines of South Africa."

Chrysotile is the predominant asbestos variety used commercially in the United States. Chrysotile has a crystal structure of a sheet of silicate rolled into a straw-like, hollow tube. The property creates a hydrophilic or 'water loving' tendency, and therefore water is often used to reduce airborne chrysotile fiber concentrations during processing and removal activities. Crocidolite and Amosite are the two additional asbestos varieties exclusively mined and intentionally added to commercial products. The other three forms of amphibole asbestos are generally found in trace amounts and are often described as a contaminant in mining operations. The crystal structure of amphiboles is a chain structure of

magnesium and silicon ions that form into long straight fibers. The molecular arrangement makes the amphiboles hydrophobic or 'water fearing' and difficult to wet and therefore, water is somewhat less effective as dust control with this group.

Asbestos has become a serious health and safety concern due to widespread use in manufactured products; many of which are still used today. The primary pathway of exposure for asbestos is inhalation of airborne fibers; ingestion is generally a minor pathway. Particles smaller than 10 µm in aerodynamic diameter, such as asbestos fibers, are known to readily enter the lungs. Asbestos dust may also be ingested directly into the mouth during respiration, hand-mouth contact while eating or smoking, or indirectly by swallowing of mucus. Dermal exposure to asbestos has been known to cause irritation; however, no serious health effects from skin exposure have been identified.

Asbestos is known to cause or contribute to fibrosis and malignancies of the lung and other organs. The U. S. Environmental Protection Agency (EPA) has classified asbestos as a Group A human carcinogen meaning sufficient evidence exists to connect exposure and human carcinogenicity. Exposure to airborne asbestos has been linked to Asbestosis- a debilitating, non-malignant lung disease; mesothelioma – a rare cancer of the chest and abdominal lining, and cancers of the lung, esophagus, stomach, colon and other organs. Other conditions associated with asbestos exposure are build-up of fluid in the lungs known as pleural effusion and deposits in the pleural cavity called pleural plaques.

Data from asbestos work exposure suggests the risks of asbestosis and lung cancer are "dose-dependent" meaning they decrease proportionately with a decrease in total asbestos exposure. Mesothelioma however is not recognized as a dose-response related illness and has been linked to primarily amphibole asbestos exposure.

The time between exposure and resulting disease is known as the latency period, and typically spans between ten and forty years. The age at which asbestos exposure occurs is relatively unimportant for determining the lifetime risk of lung cancer. On the other hand, the age at which asbestos exposure occurs is very important in determining the lifetime risk of developing mesothelioma. The earlier exposure occurs, the more time mesothelioma has to develop; thus the concern for asbestos exposure to school children.[1]

Asbestos exposure and cigarette smoking increases the lung cancer rate significantly above the rate due to either smoking (ten times) or asbestos exposure (five times) alone. A smoker routinely exposed to asbestos experiences a synergistic effect from the two thereby increasing their risk of developing a lung disease by fifty to ninety times more than a person who does not smoke and is not exposed to asbestos. OSHA standards require employers of workers who

are exposed to asbestos to be provided information packets on smoking cessation programs and to ban smoking in all workplaces where any asbestos exposure is possible.

Asbestos Regulations

Although NOA is not regulated per se, here we review the most important asbestos regulations. The EPA regulates asbestos products primarily under three laws:

- Clean Air Act (CAA), at 40 CFR 61 Subpart M – National Emission Standard for a Hazardous Air Pollutant – Asbestos (NESHAP);
- Toxic Substances Control Act (TSCA), at 40 CFR 763 Asbestos; and
- Asbestos Hazard Emergency Response Act (AHERA) which amended TSCA in 1986.

Asbestos is further regulated by several federal agencies and some Alaska agencies.

NESHAP

The asbestos NESHAP regulates the emission of asbestos from the workplace into ambient air primarily during removal activities, building renovation/demolition and associated waste disposal operations. The NESHAP allows no visible emission of asbestos from the workplace during any regulated activity.

Three key NESHAP concepts are 'asbestos-containing material' (ACM), 'friable' material, and 'Regulated ACM' (RACM). A material is defined as ACM if it contains more than 1% asbestos as determined by polarized light microscopy (PLM) analysis. Untested materials identified as suspect by an accredited inspector must be Presumed ACM (PACM). Friable is defined as a material that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. Nonfriable materials are subdivided into Category I nonfriable (packings, gaskets, asphalt roofing products and resilient floor covering) and Category II nonfriable (such as wallboard, cement asbestos products, asbestos-containing plasters, and any nonfriable ACM not listed in Category I). Category II nonfriable ACM are materials that may become friable during handling or disposal.

RACM includes all friable ACM, nonfriable ACM that has become friable, Category II materials that will be made friable by the proposed activity and all Category I materials that will be subjected to operations causing fibers to become airborne. Prior to the demolition or renovation of any non-exempt structure in the United States, the owner or operator of the facility must inspect for the presence of asbestos, including Category I and II non friable ACM. NESHAP requires building owners and operators to notify the EPA (or a designated state agency) before demolishing any non-exempt structure. In addition, it requires a ten day advance notification if scheduled activities will disturb equal or greater than (≥) 260 linear feet on pipes, ≥160 square feet on surfaces and ≥35 cubic feet of debris of RACM. The NESHAP standard also prohibits emissions of asbestos to the outside air and requires emission control procedures and appropriate work

practices during collection, packaging, transportation and disposal of regulated ACM waste.

AHERA

EPA issued regulations pursuant to the 1986 Asbestos Hazard Emergency Response Act (AHERA) in October of 1987. AHERA applies to public, nonprofit private and Defense Department kindergarten to twelfth grade school buildings. It requires them to conduct ACM inspections, develop comprehensive ACM management plans, and select asbestos response actions to deal with asbestos hazards. AHERA established a series of accredited personnel and set the training requirements for each. The AHERA occupational survey does not require inspection of all portions of the school (ie exterior, roof etc) nor the removal of asbestos identified, but does require that schools select and implement an appropriate response action for each identified asbestos hazard. The response action may be encapsulation, enclosure, removal or an approved Operations Maintenance and Repair Program (O&M Program). Encapsulation deals with applying a chemical coating or impregnation of the ACM building material in order to prevent any fiber release, while enclosure consists of sealing the ACM in an airtight structure. O&M Programs and Management in Place (MIP) are generally the most utilized and preferred response method until the ACM has become deteriorated or will be impacted by renovation activities thus requiring removal.

The Asbestos School Hazard Abatement Reauthorization Act (ASHARA) was enacted on November 28, 1990. ASHARA amended AHERA to require accreditation for any person who inspects for ACM in a public or commercial building, or who designs or conducts a response action with respect to friable ACM in such a building. ASHARA does not require building owners to conduct inspections for asbestos-containing materials in public and commercial buildings; however, should the owner decide to conduct an inspection an accredited inspector must be used.

TSCA

EPA's Asbestos Ban and Phase Out Rule (ABPO) (40 CFR 763 Subpart I) was published in the Federal Register on July 12, 1989, under TSCA. The rule was to prohibit the importation, manufacture and processing of 94 percent of all remaining asbestos products in the United States over a period of seven years, beginning in 1990. However, the U.S. Fifth Circuit Court of Appeals vacated most of the ABPO and remanded it to EPA in October 1991. EPA subsequently banned several paper products and has used general TSCA authority to control re-introduction of asbestos products into the market place.

OSHA

OSHA currently has three standards for asbestos exposure. The general industry standard, 29 CFR 1910.1001, applies to all occupational exposures to asbestos in all industries except the shipyard and construction industries. This

standard would apply to workers handling NOA if exposures were above the PELs. The shipyard standard, 29 CFR 1915.100, applies to asbestos exposure in all shipyard work and the construction standard, 29 CFR 1926.1101, applies to asbestos exposure in all construction work, including demolition and building maintenance.

All three standards are similar, with each standard setting two permissible exposure limits (PEL), the time-weighted average (TWA) and the excursion limit (EL). The TWA is 0.1 fiber per cubic centimeter of air (f/cc) averaged over an eight-hour period, while the EL is 1.0 f/cc averaged over a 30-minute period where exposure is likely to be the greatest. Each standard specifies training, medical monitoring and recordkeeping requirements for employers of workers who are exposed to asbestos. Differences exist primarily in the areas of effective dates for worker training, medical monitoring, and in work practices specific to the industry. The construction standard is the most detailed and divides asbestos work into classes, I-IV, based on the type of the material, the work being performed, how the material will be impacted, and the amount of ACM involved in the work. For all construction work scheduled to impact PACM or ACM, a competent person must conduct an initial exposure assessment to determine employee worst-case exposure and to establish the engineering controls, work practices, and personal protective equipment that may be required. The standard also supplements the OSHA Hazard Communication Standard (29CFR 1910.1200 and 29 CFR 1926.59) by requiring building and facility owners to notify prospective contractors and subcontractors, tenants, and the owner's own employees about the presence, location and amount of PACM and ACM in the building. This standard requires owners to conduct asbestos inspection or surveys so that the necessary information is available for compliance with notification requirements. The General Industry Standards would apply to workers handling NOA if there exposure were over the PEL.

DOT

The U.S. Department of Transportation (DOT) regulates the transportation of hazardous materials including friable asbestos under the Hazardous Materials Transportation Act (HTMA). DOT's hazardous materials regulations (HMR) are found at 49 CFR 171-180. These regulations require the proper packaging, labeling, shipping manifests, marking, placarding and trained employees associated with shipping of ACM and waste. Proper shipping papers must accompany asbestos-containing shipments with packages properly marked and labeled with the Class 9 diamond. The markings must include the North American identification number, NA2212, and the proper DOT descriptive name (RQ, Asbestos 9, NA2212, PG III). Laboratory samples in shipment are exempt from the regulations, except for the packaging requirements of 49 CFR 173.4.

MSHA

As of April 29, 2008, the U.S. Department's of Labor Mine Safety and Health Administration (MSHA) revised exposure limits on asbestos for miners. The

ruling changes health standards for asbestos exposure at metal and nonmetal mines, surface coal mines and surface areas of underground coal mines. The new ruling lowered MSHA's permissible exposure limits to match those of OSHA. The previous MSHA PEL of 2.0 f/cc was once the same as OSHA's; however, MSHA has not made continuing amendments to the standard in past years which reduced the PEL to 1.0, 0.5, 0.2 and eventually 0.1 f/cc. In addition, the ruling allowed for Phase Contrast Microscopy (PCM) to analyze airborne asbestos samples and Transmission Electron Microscopy (TEM) to reanalyze samples found to be above the PEL via PCM.

Alaska

The Alaska Department of Labor (ADOL) has adopted, with a few modifications, the federal regulations OSHA for asbestos and asbestos removal activities. Federal government has delegated authority to the Alaska Department of Environmental Conservation (ADEC) to implement federal programs which extend the NESHAP, ASHARA and AHERA requirements and the Alaska Department of Occupation Safety and Health (AKOSH) to oversee worker protection.

Other States

Some states have adapted more stringent AHERA and OSHA type regulations, and in some large metropolitan areas the city regulates asbestos and asbestos abatement directly. Other states such as California have developed statewide policies concerning issues not addressed in Federal regulations such as Naturally Occurring Asbestos (NOA) found in soils and rock.

Relevancy of Regulations

None of these regulations, except California and Virginia, discussed elsewhere, apply directly to NOA as likely to be encountered by the AK DOT. The MSHA and ADOL/OSHA regulations apply regarding worker exposure, if workers were exposed over the PEL. The detailed ADOL/OSHA regulations regarding asbestos demolition and disposal do not apply to NOA.

Naturally Occurring Asbestos

Naturally Occurring Asbestos (NOA) has been generally accepted as the generic term to identify any of the six (Chrysotile, Amosite, Crocidolite, Actinolite, Tremolite, Anthophyllite) varieties of asbestos when encountered in natural geological deposits. Asbestos is not chemically altered through a refining process to obtain the hazardous end product we encounter in manufactured goods; but rather raw asbestos ore is mined and crushed down into a usable form. Consequently, NOA describes the location of asbestos (in situ rock and soil) rather than a variety of asbestos.

The mineralogical community uses the term "asbestiform" to describe the morphology of a mineral which has longitudinal parting and can be split into individual fibers. Not all asbestiform minerals are regulated varieties of asbestos; however, all regulated asbestos are asbestiform. Asbestiform minerals consist of fibers that grow almost exclusively in one dimension, are easily bent and occur as bundles of smaller fibers which are called fibrils. This bundling effect of asbestiform minerals is used as a unique distinguishing feature. Asbestiform minerals are long and thin, with aspect ratios of typically 20:1 to 100:1 or greater. Most asbestiform fibers are less than 0.1 microns in width, and nearly all are less than 0.5 micron. Individual asbestiform fibers are visible only with the aid of a microscope. It is important to note these forms became regulated due mainly to their presence in commercial products and several other asbestiform minerals exist, in addition to the six regulated forms, and may be encountered in natural deposits and pose heath hazards similar to that of the regulated varieties.

Geologic Occurrence of Asbestos Minerals

Metamorphic rocks are the result of the transformation of a protolith (existing rock) in a process called metamorphism during which the protolith is subjected to heat and pressure causing profound physical and/or chemical change. Prior to the transformation, the protolith may begin as sedimentary rock, igneous rock or another older metamorphic rock. A large portion of the Earth's crust is composed of metamorphic rocks which are classified by texture and by chemical and mineral assemblage. They may be formed simply by being deep beneath the Earth's surface, subjected to high temperatures and the great pressure of the rock layers above it. They can be formed by tectonic processes such as continental collisions which cause horizontal pressure, friction and distortion or when rock is heated up by hot molten rock, magma, from the Earth's interior, later referred to as igneous intrusion.

Serpentines (Chrysotile) are a magnesium silicate, while amphiboles are generally iron-magnesium silicates with varying amounts of sodium and calcium. If the protolith contains these chemical components asbestos formation is more likely than those that do not. All rocks which have this chemical composition have the potential to contain amphibole asbestos or serpentine asbestos; however, the non-asbestiform varieties of these minerals considerably more dominant than asbestiform.[2]

Asbestos minerals are generally associated with ultramafic rocks and their metamorphic protolith, including serpentinite (serpentine rock). Ultramafic rocks are those igneous rocks composed mainly of iron-magnesium silicate minerals, such as olivine and pyroxene. They include the rock types dunite, peridotite, pyroxenite, and hornblendite. Ultramafic rocks form in high-temperature and high-pressure environments deep beneath the earth's surface. By the time they are exposed at the earth's surface, ultramafic rocks have typically undergone a type of metamorphism known as serpentinization, a process that alters the

original iron-magnesium minerals to one or more waterbearing magnesium silicate minerals (lizardite, antigorite, chrysotile) that belong to the serpentine mineral group. The mineral chrysotile is often present as asbestos in the resulting rock. Metamorphism of ultramafic rocks and serpentinite may also lead to the formation of amphibole asbestos minerals. Conditions favorable for asbestos formation may occur repeatedly during the metamorphic process and, consequently, it is very common for at least a small quantity of asbestos to be present in metamorphosed ultramafic rock bodies. [3]

While generally associated with serpentinite and ultramafic rocks, chrysotile asbestos may less commonly occur in other rocks that originally contained the minerals olivine and pyroxene. These include metamorphosed mafic plutonic rocks like gabbro or mafic volcanic rocks such as basalt that are commonly associated with ultramafic rocks or serpentinite. Chrysotile and the amphibole forms of asbestos may also form in magnesium-rich limestones and dolomites which are metamorphosed carbonate rocks. The amphibole asbestos minerals are most commonly found in metamorphosed ultramafic rocks, including serpentinite, and in metamorphosed mafic plutonic rocks, metamorphosed mafic volcanic rocks, metamorphosed iron-rich chert, and metamorphosed ironstones. In many of these geologic environments, Asbestos is thought to be more likely found where changes in the geology occur such as near geologic contacts, along dike boundaries, or near inclusions of different rocks or in fault and shear zones where natural fluid flow has been enhanced. [3]

Asbestos minerals may also be found in sedimentary rocks, stream sediments, or soils derived from parent materials that contain asbestos. Alluvial deposits that contain asbestiform materials are likely to be found in any watershed that drains ultramafic rocks.[4]

Soils derived from parent materials that contain chrysotile asbestos and amphibole asbestos may also contain asbestos fibers and are an important potential source of airborne asbestos. Weathering and leaching reduce the amounts of asbestos in soils over time, yet little is known about the rates of weathering and leaching of asbestos in soil environments. Available information suggests that substantial reductions in the amount of chrysotile may take hundreds or thousands of years, depending on the soil environment, and somewhat longer for amphibole asbestos. [2]

NOA in USA

In the United States, the presence of asbestos or asbestiform minerals in rocks has been identified in 20 states, and mined in 17 states in the last 100 years. [5] In addition to known previous mining locations, reports of asbestos or other fibrous minerals has been identified through geological surveys and other miscellaneous encounters. The United States Geological Survey (USGS) has an ongoing effort of compiling these sites and locating them on maps that are available on its web-

site at http://tin.er.usgs.gov/mrds[6]. The sites on these maps give an indication of the major areas of concern, which are most particularly located along the Appalachian and Rocky Mountains as well as in the Western Cordillera. In some of these areas, such as California and Virginia, the NOA issue has been known for some time and local agencies have responded in a variety of ways such as implementing state and local policies and regulations for testing and handling suspect and known NOA. The health risks associated with NOA are based on the potential for exposure. The exposure pathway of greatest concern is through inhalation, which requires the asbestos to become airborne. Experts believe that natural factors such as wind erosion pose little threat to human exposure, but rather disturbance of NOA-containing rock and soil under dry conditions. Because of this health risks are generally quantified though activity-based sampling on a site-specific basis. Below is a list of some areas in the US where NOA has been identified, and local responses to the occurrence:

Virginia

In 1987 the presence of NOA in Fairfax County, Virginia, was brought to the attention of the Fairfax County Air Pollution Control Division (Fairfax APCD) during the construction of an underground parking garage. As a result from the NOA-containing rock being drilled and crushed with no mitigation controls in place, the entire construction project was reportedly covered with NOA-containing dust. Several drill operators experienced itching and skin irritation which through subsequent medical and geological investigations was determined to be caused by tremolite asbestos fibers. The Fairfax County Soil Science Office later performed sampling and found a vein of asbestiform actinolite and tremolite comprising 10.9 square miles. Since the NOA discovery, Fairfax County has implemented NOA-specific policies regarding construction project that will impact soil.[7]

California

Serpentinite is California's official state rock and the source of much of the NOA found there. El Dorado Hills, a community in the Sierra foothills near Sacramento is a community that has had ongoing NOA issues associated with fibrous amphiboles in bedrock and soils since 1999. Reports have indicated that airborne concentrations of asbestos regularly reach levels of concern through non-construction activities such has recreation and gardening. In February 2002, during a construction project at a local school, veins of asbestos-containing minerals were discovered. The school soil was remediated that summer, but in September 2003, the EPA carried out activity-based sampling which involved measuring NOA in the breathing zone during recreational activities around the school which yielded varying results of airborne asbestos concentrations. Results underwent criticism for analysis methods and definition of asbestiform vs non-asbestiform minerals; however, a generally consensus was reached that a potential health risk existed for asbestos exposure existed in the area.[8]

Minnesota

Silver Bay, located on the shore of Lake Superior, served as a processing mill for Northeastern Minnesota's is rich in iron-ore mining operations. Historically the lake not only served as a steady water supply, but also as a dump site for the mine tailings. Amphiboles are known to be present in this area iron-oxide ore, and mineral fibers were later detected in the air and water supply of several towns, including Duluth. In 1975 after ongoing legal battles, the 8th Circuit Court of Appeals instituted the "control-city" standard where air monitoring at Silver Bay was required to yield results equal to or less than the control city; in this case St. Paul. [8]

New Jersey

A milling facility associated with a marble and limestone quarry near Sparta, NJ has been accused of emitting fibrous tremolite in dust generated from milling and quarry activities. The geology of the area suggests that amphibole minerals are present; however, emissions testing illustrated that the tremolite mineral present was non-asbestiform. Samples were later collected from homes in close proximity to the quarry which did not yield conclusive evidence that asbestos had migrated from the quarry or milling operation. Analysis methods and the definition of asbestos were again scrutinized; however, the quarry and milling facility are still operational.[8]

Washington

On Sumas Mountain in western Washington State a major low-moving landslide is occurring in altered serpentinite rock near the headwaters of Swift Creek. The landslide material contains both asbestiform and non-asbestiform lizardite, resulting in chrysotile being the asbestiform mineral of concern. Erosion resulting from the slide releases large quantities of sediment into the drainage and eventually the area river. To prevent flooding, the river is routinely dredged and staged in piles along the river. This staged material has historically been utilized as a local source of fill and has formed an area used for recreational activities. In 2006, the US EPA engaged in activity-based sampling in which three activities involving different levels of disturbance of the dredged material were simulated for this study: loading and unloading of dredged material with heavy equipment, shoveling and raking dredged material over a surface, and recreational activity, such as biking, jogging and walking on the dredged materials. Sampling indicated that a potential health risk regarding airborne asbestos fibers existed for several of the activities. In 2007, the US EPA released a fact sheet warning residents to limit their exposures through avoiding contact with the dredged materials. [8]

Montana

Libby is a small town located in the northwest corner of Montana approximately 35 miles East of Idaho and 65 miles south of Canada. In the 1880's, gold miners discovered vermiculite near Libby, and by 1920 the Zonolite Company had formed and began mining the vermiculite. Vermiculite is used in many common commercial products, including attic insulation, fireproofing materials, masonry fill, and as an additive to potting soils and fertilizers. In 1963, W.R. Grace purchased the Zonolite mining operation which remained in production until 1990.[9] In the fall of 1999, a series of newspaper articles state the ore deposit contained small amounts of asbestiform amphiboles. In response to these articles, the EPA sent an Emergency Response Team to Libby in November 1999 to address the asbestos concerns. The vermiculite ore mined from Libby was contaminated with fibrous amphiboles consisting of tremolite and the asbestiform amphiboles winchite and richterite. [8]Tremolite is a regulated form of asbestos; however, papers by Meeker[10] and Gunter[11] concluded that tremolite made up less than 10% of the amphibole population suggesting the winchite and richterite likely contributed to the increase in asbestos related illness affecting the former Libby miners. Multiple studies yielded results illustrating that rates of lung cancer, asbestosis and mesothelioma were about 2.5 times higher in the Libby miners than expected. [8]

EPA implemented a program to inspect all Libby properties for elevated asbestos levels. Between 2002 and 2003, approximately 3500 properties were inspected, with 12,000 soil samples being collected. As of 2009, the EPA has completed cleanups at over 1100 properties including the vermiculite processing plants and other "highly contaminated" public areas with an estimated 100 large property cleanups scheduled for the 2009 constructed season.[9]

Analytical Methods for Quantifying Asbestos in Soils

Various types of microscopic analysis are used to determine the amount of asbestos present in soils. The most common forms are discussed below. Additionally, variations exist for each method depending on sample preparation and counting methods utilized.

Polarized Light Microscopy (PLM)

PLM analysis is the standard method used to test for the presence or absence of asbestos in building materials. PLM results report a visual estimation of the weight percentage of asbestos in a sample. PLM analysis typically begins by viewing a sample under a stereoscope at 10X – 50X magnification; fibrous sub-samples are then selected to be viewed under a light microscope at 100X – 500X magnification. By correctly interpreting light interactions, analysts can accurately distinguish asbestos from non-asbestos materials (glass, cellulose) as well as

identify the variety of asbestos present. Accuracy of this method depends on the uniformity of the material, the type of analysis and the analyst's experience. "Point Counting" considered more accurate than standard PLM is one variation of the method where the analyst views a set number of grid points and documents the material present. The number of points that have asbestos versus no asbestos determines the percentage of asbestos reported. [12]

Common forms of PLM analysis are not applicable for materials which contain highly varied, non-uniform and non-manufactured materials such as soils, gravels, dusts or large quantities of fibers smaller than 0.25 µm.

Transmission Electron Microscopy (TEM)

TEM is capable of identifying the largest range of asbestos fibers/structures of all Electron Microscopy analysis and can differentiate between asbestos and non-asbestos fibers/structures. TEM is used for air, bulk, dust and soil sampling. TEM analysis utilizes an electron microscope for which the level of magnification can resolve down to10 nanometer (nm) particles and can identify asbestos particles by appearance, chemical composition and crystalline structure. Depending on the variation of TEM analysis results are either a visual estimation of a weight percent, or are "semi-quantitative" based on actually weighing the sample then estimating the weight of asbestos found by the fibers size and density.

In addition to bulk sample analysis, TEM is also used to analyze microvac (ASTM D-5755) and wipe (ASTM D-6480) samples. These sampling techniques are common to quantify asbestos levels in settled dust. Both methods require settled dust to be collected from a known surface area. The laboratory analysis consists of digesting the media (filter or wipe) in solution and analyzing via TEM. Samples can be qualitatively analyzed which yields an "absent" or "present" result for asbestos and notes the types of asbestos observed. Samples can also be analyzed qualitatively for which the solution with the digested media is diluted known magnitudes until asbestos fibers can be accurately counted with the microscope. By using known sampling surface areas, dilution factors and analysis areas, the microscopist can calculate the amount of asbestos structures present per square centimeter (st/cm^2) of dust. While this method is a very useful tool in determining the concentration of asbestos in settled dust, concentrations of asbestos in settled dust are not regulated by any agency since the asbestos is neither airborne nor present in a building material.

TEM allows for more accurate identification of much smaller fibers than PLM analysis. EPA method 600/R-93/116, Section 2.5[13] summarizes the TEM bulk analysis. Many laboratories have developed their own methods to provide a full quantitative analysis of bulk samples via TEM.

Scanning Electron Microscopy (SEM)

SEM is primarily used for asbestos analysis for air and dust samples with the asbestos fibers being identified using their chemical composition and appearance. Asbestos fibers too small to be detected using light microscopy can be seen.[14] SEM can be used to observe particle down to approximately 0.1 µm. SEM has not historically been heavily used for regulatory purposes; however, recently it has become more popular for studying amphiboles in their natural setting.[15]

CARB Method 435

The California Air Resources Board (CARB) adopted a NOA-specific testing method in 1990 known as CARB Method 435. (M435 or CARB 435) California currently requires this method for the analysis of gravels or mineralized soils to detect the presence of asbestos. In this method, the soil/aggregate sample is weighed, dried, milled (crushed to fine powder) and then analyzed by PLM or TEM. The CARB method is designed to detect "loose" asbestos fibers, unlike sieving methods which are used to analyze ACM mixed in soil.[16]

PLM analysis utilizes either a 400 or 1000 point count to obtain a level of detection of 0.25% and 0.1% respectively. The PLM resolution is only accurate down to 0.25 µm; asbestos fibers/bundles smaller than that (specifically amphiboles) will not be detected using PLM. For the CARB 435 TEM Method the sample is weighed, dried, milled, put into suspension and analyzed. Results are given in percent asbestos by mass with sensitivities down to 0.001%.[17]

CARB 435 results are considered representative of the worst case conditions when the NOA aggregate becomes pulverized due to handling, use application or natural conditions.

EPA Region 1 Proprietary Soil Characterization

This is a proprietary method that separates and analyzes the different portions of the sample. PLM or TEM analysis may be used for the final analysis but the method includes observations of the fractions of materials present, classification by particle size and source categories, including organic, man-made, geological and asbestos materials. Since this method does not alter the materials present for analysis, results represents the materials as they exist in their natural setting. EPA Region 1 Soil Characterization provides a visual estimation of the weight percentage.[18]

Analytical Methods for Quantifying Asbestos in Air

Typically asbestos air samples are collected by "pulling" a known rate of air through a 25mm cassette by either an electric or battery operated vacuum pump. The air is forced through either a 0.45 micron (µm) (TEM) or 0.8 µm (PCM) mixed cellulose ester (MCE) filter which is then analyzed for asbestos fibers/structures

by TEM or PLM respectively. The concentration of airborne asbestos is calculated by the density of asbestos present on the filter and the volume of air sampled.

Phase Contrast Microscopy (PCM)

PCM (NIOSH 7400 Method) sampling method is a very common form of determining airborne fiber concentrations using a light microscope. The PCM method counts all fibers meeting the criteria of greater than 5 (µm) in length and 0.3 µm in diameter and meet the 3:1 aspect ratio (whether asbestos fibers or not) and reports results in fibers per cubic centimeter (f/cc) of air. PCM only counts fibers that are present in the fields observed, and does not identify the type of fiber (asbestos, cellulose, fiberglass, ect).[19]

This method is widely used for monitoring airborne fiber concentrations during asbestos removal/impacting projects, including determining OSHA approved worker exposures through a time-weighted average (TWA). TWA's calculate the average concentration of fibers a given worker was exposed to during his/her work shift.

Transmission Electron Microscopy (TEM)

For TEM air sampling analysis, the same collection procedure is used as with PCM sampling, except the cassette filter has a smaller pour size and results are reported in asbestos structures per square millimeter (Str/mm^2).[20] The results are reported in Str/mm^2 since the analysis includes all asbestos particles 0.5 microns and larger in length and may not necessarily be fibers. TEM allows for the analysis of very fine fibers while simultaneously determining their chemical composition and crystalline structure.

TEM Method 7402[21] is typically used when a PCM sample is found to have elevated fiber levels. Method 7402 analyzes a separate piece of the same cassette filter under an Election Microscope, opposed to a light microscope, which allows the analyst to determine if there is actually an elevated level of asbestos fibers, or if the fiber level was elevated due to a high number of miscellaneous fibers meeting the PCM counting criteria. This method is a useful complimentary tool to the PCM 7400 Method.

Elutriator Method

The Elutriator Method (Superfund EPA 540-R-97-028) begins by sieving the soil sample into fine a course fragments. The fine soil fractions are then placed in a closed tumbler chamber where any respirable dust created during tumbling is collected on air cassettes. The cassettes are then analyzed via TEM by ISO 10312[22] counting rules which are designed for samples collected from ambient

conditions, specifically indoors. This method is used to identify the amount of respirable fibers present within a soil sample.[18]

NOA AND EFFECTS ON ALASKAN CONSTRUCTION PROJECT

Historical Alaska NOA Incidents

Alaska has large known deposits of ultramafic and serpentine mineral ore located throughout the state. The documented cases of NOA encounters in the state have been limited and comparatively small. The potential for larger and more serious incidents can be expected to increase as public and professional awareness examine proposed activities with more scrutiny and existing material sites are exhausted and new site are developed. The following is a brief synopsis of several known NOA incidents in Alaska.

Juneau

In 2005, NOA was found to be present in Juneau's city-run Stabler's Point Rock Quarry causing several contractors to stop using the material until additional information and guidance was made available. Stabler's Point consists of the hardest local rock, metamorphosed mafic volcanic rock, which has been known to historically contain NOA. According to a Memorandum issued by the City/Borough of Juneau in 2005, scattered veins of asbestos-containing rock have also been reported in the following Juneau quarries: Lemon Creek, Treadwell, Upper and Lower Fish Creek and Bonnie Brae. The city believes that asbestos is likely to be present in most Juneau areas with high quality rock.[32]

Of the initial samples collected from the Stabler's Quarry two were found to contain tremolite asbestos at 3% and 5%.[33] Later some samples were also found to contain actinolite asbestos.[34] Blasting and rock crushing operations, which are known to release asbestos fibers from rock, had been occurring on a regular basis for several years prior to the discovery of NOA at the quarry. A private consulting firm hired by one of the contractors utilizing the quarry later stated given the presence of asbestos at the quarry, and the limited air sampling performed, it would appear as though workers were occasionally exposed to airborne asbestos levels in excess of workplace exposure standards.[34]

The rock aggregate obtained from the Stabler's Quarry was used for several years on a variety of private and commercial construction projects throughout the Juneau area and was a topic of concern for many local residents. In addition, aggregate collection (blasting) and refining (crushing) methods used were performed under general conditions meaning no methods were implemented to reduce airborne fiber concentrations during work activities. Since the discovery of NOA at the Stabler's Quarry, sampling efforts have been performed as well as requiring the use of wet methods and respirators for quarry workers.

As in most situations, once NOA was discovered activity was stopped until an assessment could be performed. In the Juneau case, the majority of the asbestos-containing gravel aggregate was used in construction projects where it would not be left exposed. The quarry itself implemented engineering controls

such as PPE for workers and the use of wet methods. In addition, attempts were made to focus mining efforts on portions of the quarry which yielded the lowest concentrations of NOA. Material from this mine is currently only used on projects where it will not remain exposed after completion; such as paved road construction. The City of Juneau originally was researching the possibility of implementing local NOA regulations; however, as of yet no regulations have be made.

Dalton Highway

As described by Perkins et al[5] the Dalton Highway (formerly known as the Haul Road) was constructed in the early 1970's and runs adjacent to the Trans-Alaska Pipeline connecting the Prudhoe Bay oil fields of Alaska's North Slope to the state highway system near Fairbanks. Most of the Dalton Highway is unpaved and is primarily utilized by pipeline employees and truckers supplying the oil fields.

In 2000, the Alaska Department of Transportation & Public Facilities (ADOT) awarded a contract to replace culverts and bridge abutments and to add surfacing material to approximately 20 miles of gravel road from Milepost (MP) 90 to 111 on the Dalton Highway. The project utilized surfacing gravel from a material site (MS) located at MP 105. The project contractor constructed a 1 to 2 foot thick gravel pad at MP 107 for a project staging area and temporary housing site since the closest permanent habitation was located approximately 70 miles away. An estimated 30 truckloads of gravel had been removed from MS 105 before workers noticed several large pieces of fibrous material suspected to be asbestos, after which aggregate extraction from this site was terminated.

After ultramafic rock containing actinolite and tremolite asbestos was confirmed at MS 105, concerns about worker exposure on the project site, as well as potential exposure in the temporary living quarters due to cross-contamination arose. Furthermore, questions were raised on how to safely complete the project, as well as address public health concerns for driving on the Dalton Highway. The project contractor retained a consultant to assess the problem, recommend work plan modifications, provide necessary worker training, perform exposure monitoring and reporting.

Results from the assessment included close to 700 breathing zone air samples collected from workers; 3% of which had asbestos fiber concentrations at or near 0.1f/cc per the NIOSH 7400 PCM[19] method. 36 of those samples were additionally analyzed via NIOSH 7402[21] (modified TEM analysis) which illustrated approximately 40% of the fibers observes were asbestos. Results concluded that workers who impacted the material the greatest, such as bulldozer and grader operators, were at the highest risk of exposure. Asbestos fiber release from rock crushing operations would have presumably been higher. Samples for potential motorist exposure were collected under conditions simulating "worse case scenario" - driving with windows open while following heavy equipment

which produced a visible dust cloud – indicated fiber concentrations well below the OSHA PEL.

The discovery of NOA at MS 105 on the Dalton Highway incurred significant delays and added millions of dollars to the project costs. After the assessment was completed, the MS 105 was abandoned for a MS which yielded non-NOA gravel to complete the project. The new MS was tested for the presence of NOA prior to starting work. Existing portions of road bed constructed with NOA along the project length were identified and capped with NOA-free material. Work practices and method of construction was modified to minimize worker exposure and NOA accessibility.

Similar to Juneau, the NOA concern at Material Site 105 on the Dalton Highway was discovered after workers had begun to remove and use the material. During this project; however, the NOA-containing aggregate was used to construct the gravel pad for temporary living quarters, as well as to resurface approximately 20 miles of the unpaved Dalton Highway. The NOA assessment for this project illustrated that some workers were at risk of being exposed to asbestos above regulatory limits, but motorist traveling down the gravel highway, in a "worse case scenario" were not. Regardless of the remoteness of the area and the low health risk it posed to the public, it was agreed that known NOA-containing gravel on the highway would be capped and work practices would be modified to address NOA exposure concerns during project construction. Equipment and camp facilities were decontaminated and workers were provided training. MS 105 was no longer utilized as an aggregate source for the remainder of the project and has been closed indefinitely as an aggregate source.

Ambler

Ambler is Kowagniut Inupiat Eskimo village located in northwestern Alaska along the North bank of the Kobuk River. Ambler is approximately forty-five miles north of the Arctic Circle, one hundred and forty miles east of Kotzebue and three hundred and twenty miles northwest of Fairbanks.

In 2003, the ADOT was conducting routine soil testing in preparation for a scheduled Ambler project requiring the use of gravel aggregate. Tests results reported the presence of chrysotile asbestos in the aggregate samples taken from the local gravel pit. This was the only available gravel aggregate source for Ambler and consequently had previously been used to construct the community airport, roads and utility systems. The pit is commercially owned by the local development corporation (NANA), who closed and placarded the pit soon after the NOA discovery.

All roads in Ambler, including the airport runways, are finished with unpaved gravel surfaces. All-terrain vehicles (ATV's) are the most prevalent means of transportation and create substantial visible dust, generated from the unpaved

community road surfaces, during summer months. In 2007, the Agency for Toxic Substances and Disease Registry (ATSDR) performed an exposure investigation[35] primarily focused on ATV generated dust and potential asbestos exposure for both ATV riders and the general public. The assessment concluded that exposure to visible dust generated from the Ambler roadways created a higher than average health risk concerning asbestos.

In addition to the asbestos related health concerns, several community projects which require the use of the gravel aggregate have subsequently been put on hold or cancelled. In 2004, a multi- year effort was undertaken by R&M Consultants to locate an aggregate source free of NOA. However, no location within a reasonable distance (15-25 miles) was identified that would definitively yield non-NOA aggregate.[36] Since the NOA discovery in 2003, the gravel pit has been restricted from use. Due to the inability to use gravel for regular maintenance, the Ambler runway began to dilapidate until the crown had lost its vertical rise and ruts and potholes became increasingly prevalent and obnoxious due to lack of drainage and replenishing aggregate. The runway was also a major source of dust emissions from the airplanes prop wash during take off and landing. The runway was operated by ADOT that concluded runway repairs were required to continue safe operations. ADOT also decided due to the NOA concern in the community they would apply a dust-suppressing poly synthetic palliative called Durasoil to the surface of the runway after the repairs were complete. ADOT had experienced positive results using this form, and variety, of dust suppressant in other remote areas of Alaska to control fugitive dust. Since no non-NOA containing aggregate sites were available, the known NOA-containing quarry was utilized as the aggregate source for the runway repairs. A consultant was retained to assist with a Ambler public meeting, the development of NOA project work plan, training of project workers, community relations during construction while oversight, monitoring and project reporting. Monitoring documented a Negative Exposure Assessment (NEA) with no air sampling results exceeding the OSHA PEL at any point during the project.[37]

Since the discovery of chrysotile in the Ambler gravel pit, the following NOA-related investigative efforts have been performed to date:

- **Asbestos at Ambler Material Pit Preliminary Assessment**.[38] Alaska Department of Health & Social Services, Division of Public Health, Section of Epidemiology, October 23, 2003.
    - Chrysotile asbestos discovered in Ambler quarry during routine soil testing.
    - Quarry was closed indefinitely.
- **Limited Health Survey**.[39] Alaska Department of Labor and Workforce Development, Occupational Safety & Health Labor Standards and Safety Division, November 2003.
    - School area soil, interior dust and air samples confirmed Chrysotile NOA

- Recommended material site cap, school cleaning, HEPA filtration and administrative controls to control summer risk

- **Ambler Airport Rehabilitation: Airport Materials Site Investigation**.[36] R&M Consultants. 2004 Geotechnical Report.
  - Soil boring was performed around Ambler area to find an alternative, non-NOA gravel source. Results indicated that no non-NOA gravel source was available within reasonable distance to Ambler.
- **Naturally Occurring Asbestos Summary of Requirements and Recommendations.**[40] Alaska Native Tribal Health Consortium (ANTHC). August 2005
- **Public Health Evaluation and Assessment – Interim Report**.[41] May 20, 2005. Middaugh, John P.
  - Medical records review for residents of Ambler, Kobuk, Shungnak and Kiana, to see if asbestos-related diseases had occurred
  - No asbestos-related diagnoses on death certificate; no mesothelioma cases dating back to 1970
  - On review of chest X-ray, nine people with pleural plaques suspicious for asbestos exposure were identified.
- **Investigation of Possible Environmental Asbestos Exposure in Northwest Alaska – Interim Report**.[42] Chimonas, Marc; Middaugh, John and Arnold, Scott. June 15, 2005: Alaska Division of Public Health
  - Expert review of 130 chest X-rays from villagers 50 and older; interviews conducted
  - Twenty-one individuals with either pleural plaques or pulmonary fibrosis suspicious for asbestos exposure. Some were exposed to asbestos occupationally.
  - Not possible to definitively establish or exclude environmental asbestos exposure as a cause of disease
- **Exposure Investigation Final Report**.[35] Agency for Toxic Substances and Disease Registry. June 2007
  - Chrysotile NOA confirmed in gravel used to construct roads
  - Ambient sampling confirmed airborne NOA, but not likely to be a public health concern
  - Visible airborne dust levels behind four-wheelers exposed trailing riders to a high-level of respiratory exposure and confirmed public health concerns.
- **Federal Aviation Administration, Ambler Airfield, Alaska Winter Exposure Assessment.**[43] ***NORTECH*** Environmental Engineering, Health & Safety. June 2008 Report.
  - FAA technician tasks were performed while personal and area air samples were running. Results indicated area fiber concentrations were below 0.01 f/cc while the personal TWA was below 0.10 f/cc.
  - Frequent cleaning of facilities was recommended.

- **Federal Aviation Administration, Ambler Airfield, Alaska Summer Exposure Assessment**[44] ***NORTECH*** Environmental Engineering, Health & Safety. August 2008 Report.
    - FAA technician tasks were performed while personal and area air samples were running. Results indicated area fiber concentrations were below 0.01 f/cc while the personal TWA was below 0.10 f/cc. Area samples were also collected while planes landed/took off with all results below 0.01 f/cc.
    - Frequent cleaning of facilities was recommended.
- **Ambler Airport Dust Suppression**.[37] ***NORTECH*** Environmental Engineering, Health & Safety in association with R&M Consultants. November, 2008 Report.
    - Utilized NOA-containing gravel to resurface runway using "wet methods" as needed. Palliative applied to runway surface for dust suppression.
    - Personal and area air monitoring illustrated the PEL and clearance concentrations were not exceeded.

In addition to the studies listed above, a *Naturally Occurring Asbestos Dust Control Working Group* has been established as a result of the Ambler NOA. This working group is a consortium of federal, state and local groups who help to manage and oversee NOA-related projects and concerns in Ambler in the interest of public safety. The group consists of the City of Amber, ANTHC, ATSDR, USRD, HIS, Maniilaq, DOH and ADOT.

Ambler is located between the Jade Mountains and the Cosmos Hills; small mountain ranges along the southern slopes of the Brooks Range. The rocks in these mountains are mineral-rich and contain large ore deposits. Bornite, reportedly one of the world's richest copper deposits, exists within these ranges and major jade deposits are found in the Jade Mountains. Serpentine rocks, commonly containing asbestos, have been mapped in both these ranges.[45, 46] An asbestos mine was temporarily operated at Asbestos Mountain in the Cosmos Hills near Kobuk. The asbestos has apparently been eroded from these rocks and transported throughout the area by glaciers, water and wind. Sedimentary deposits have been found with varying concentrations of asbestos throughout the area.[36]

The NOA found in Ambler poses many issues not previously encountered in Alaska. Ambler requires the use of gravel to maintain the limited road system, runway, public utilities and local projects. With no apparent asbestos-free gravel sources within a reasonable distance and only year round air travel access identifying methods to use NOA safety are significant to the regional corporation source owner and local community. ADOT held public meetings in Ambler to obtain feedback, report progress and provide information regarding NOA, asbestos health hazards, risk and effective methods to reduce exposure (avoidance of visible dust clouds, road watering, regular household cleaning to

remove visible dust accumulations, removing footwear prior to entering homes and driving slower on the roads, etc).

Alaskan Construction Projects

The presence of NOA and its effects on construction projects in general, as well as its effects on certain Alaskan Construction projects, are noted in other sections. Here we examine the occurrence of NOA in Alaska and its likely effect on future construction projects. Most heavy construction projects such as dams, roads, airports, pipelines, and railways require large quantities of natural materials, sand, rock, and fill soil. These materials are excavated, processed, and transported to the sites where they are needed. Ideally the transport distance from excavation to installation and the processing steps are minimized. In any case, the excavation, processing, and transport are key cost drivers in most heavy construction projects. If material sources proximate to the project have NOA or are likely to contain NOA, the project owners and designers must make a decision to obtain NOA-free materials further from the project at a greater cost, or to use the NOA materials and make allowances for handing the NOA material in such a manner to keep airborne asbestos fibers and their human health hazards to a minimum. Other sections of this report deal with methods of ameliorating fiber release from NOA-containing materials after they have been installed and regulations in other states that have established standards for NOA materials that establish benchmark concentrations, which, together with prudent work methods, are protective of human health.

This chapter will: examine the need for gravel and similar materials in Alaska, discuss the mineralogy of Alaska with respect to asbestos, present a map of mineral occurrences that may contain NOA and their location with respect to transportation corridors, and examine the implications for projects. Finally we will present some conclusions.

Alaska Gravel Needs

Many heavy construction projects move large quantities of soil within their right of way. These are often called "unclassified materials." Over these are then placed "classified" or "select" materials. The exact definition and qualities of these material are dependent on the particular type of project and its specifications. These materials generally must be imported from off the right of way, usually from special "material sites." Here we will just refer to those imported materials collectively as "gravel." We will discuss them in relation to historical and known current demands for gravel, as well as estimates for future projects.

Highways

Here we discuss some likely gravel needs in the DOT's Northern Region. Currently, for projects on the highway system, there is gravel available, although

it may involve a longer haul distance. Generally, these sources have not been checked for NOA. New sources are needed for the routine maintenance (M&O) activities and routine construction projects. DOT Northern Region used 2 million CY from 64 different material sites in 2007 and 1.6 million CY from 40 different materials sites in 2008.[23] The DOT generally has enough material for maintenance and operations (M&O) and new projects, although most new projects are improvements to existing roads. The large rocks used to armor stream banks and other hydraulic structures is known as "rip rap" and rocks large enough for rip rap are usually scarce.

The Trans Alaska Pipeline System (TAPS) and future 48"Gas Pipeline

The TAPS project used 73 million CY of gravel, total. The workpad required 32 million CY. [24] Of that, the Dalton Highway (Haul Road) required about 13 million CY for its prism. Many access roads to material sites were required for Haul Road construction, and may have been counted in either the Haul Road number or not. Certainly the 225 access roads were counted in the 73 million CY. Thus, if the Haul Road and its material sites were counted in, the TAPS project would have required 50 to 60 million CY of gravel without the Haul Road. The most likely route of the proposed gas line will follow the Dalton Highway and the Alaska Highway, there will not be a major new highway. However we do not believe that Alyeska will allow the gas pipeline to use Alyeska's workpad or construct close to TAPS, therefore new workpads and many new access roads will be required. There will be new camp pads, airports, and compressor stations. Not counting the DOT upgrade work, we estimate that the gas line will need to mine 50 to 60 million CY of new gravel. (Referring the annual DOT usage, the new pipeline will require 25-fold the annual DOT requirement, and most of that in the first year or two of construction).

Special highway construction

If the gas line is built, AK DOT will need to reconstruct many miles of substandard road. Large sections of the Dalton Highway need reconstruction.

Airports

Virtually all airport construction and upgrades require material from local sources. In some locations material is barged in from long distances, but this is expensive. There are about 256 bush airports owned by the ADOT.[25] A new small airport may require 25,000 CY of gravel. In addition, gravel is needed for access roads and maintenance of both the runway and the access roads.

Railroad Extension

There is currently a study regarding extending the Alaska Railroad from Fairbanks to Delta (90 miles) and from Delta through Canada (200 miles).[26] A rough estimate for that yields 14 million CY of fill, gravel, and ballast for the main line. Much of the line would be close to the Alaska Highway. However access roads, camps, and ancillary structures – there will be many bridges – may require another 5 million CY.

Mining and other industry

Mining needs gravel for access roads. Smaller mines generally have some material available on-site, but major new mines will require gravel from outside the mine. Extrapolation from Alyeska's numbers (73 million CY in 800 miles) one could say 91,000 CY per mile of new infrastructure. That would include main road and roads to gravel sources and pads for ancillary structures. Minimizing haul distances is economical, which tends to increase the number of material sites. Two new material sites per mile might be a good estimate.

Balance between Existing and new MS

Most of the smaller scale road maintenance is done with existing gravel sources. The volume is generally not large and the costs of opening a new pit are often greater than the haul costs from a more distant pit. A major project will require a lot of gravel and thus justify the extra costs of opening closer pits. Besides direct costs, safety is an important consideration when hauling of gravel on an active highway, and minimizing the number of construction rigs on a traveled highway is good practice.

Since the existing open material sources are just adequate for current needs, it is clear that many new gravel sources will be needed if any of the major projects come to fruition.

Mineralogy of Alaska with respect to asbestos

"Asbestos" is a commercial term, not the name of a particular chemical or geological rock type. While there are six asbestos types that are regulated due to known human health effects, there are other, similar minerals that are not regulated. Some of these may likewise have adverse health effects. Within minerals of a certain chemistry, some of the mineral may have crystallized into large crystals or masses, while other portions may have crystallized in fibers or bundles of fibers. In general, "Asbestos is defined as certain minerals that have crystallized in a finely fibrous habit, in bundles of easily separable fibers and/or fibers which are composed of smaller diameter fibrils, and with a hair-like elongated shape resembling organic fibers, with exceptionally smooth faces and displaying unusual adamantine or silky luster" [8]

As noted by Gosen[31] asbestos is most commonly defined as the asbestiform variety of several specific, naturally occurring, hydrated silicate minerals. Asbestos typically includes chrysotile, the asbestiform member of the serpentine group, and several members of the amphibole mineral group, including, but not limited to, the asbestiform varieties of (1) riebeckite (commercially called crocidolite), (2) cummingtonite-grunerite (commercially called amosite), (3) anthophyllite (anthophyllite asbestos), (4) actinolite (actinolite asbestos), and (5) tremolite (tremolite asbestos). Other amphiboles are known to occur in the

fibrous or asbestiform habit,[27] such as winchite, richterite[30] and fluoro-edenite,[29,28] but usually they have not been specifically listed in the asbestos regulations. The many different ways that asbestos and asbestiform and other related terms have been described are summarized in Lowers and Meeker.[30]

The geological conditions necessary for the formation of NOA have been reviewed and the rock types known to host NOA include serpentinites, altered **ultramafic** and some **mafic** rocks, dolomitic marbles and metamorphosed dolostones, metamorphosed iron formations, and alkalic intrusions and carbonatites.[31] In summary, there are many types of minerals that might contain asbestos, and these include rock types very common in Alaska.

Map of mineral occurrences that may contain NOA and their location with respect to transportation corridors

Next follows some maps that show the regions of Alaska that may contain asbestos, based on the mineral type. The mineral types are taken from the above reference sources, and the mineral locations are based on the USGS map, *Geologic map of Alaska, U.S. Geological Survey Special Map, by H. M. Beikman, 1980.* In addition, in Appendix 3, is the USGS database of all geological exploration and mining that identified asbestos. These have been mapped along with the transportation corridors identified by ADOT planning. Note the northern region had more detailed planning maps.

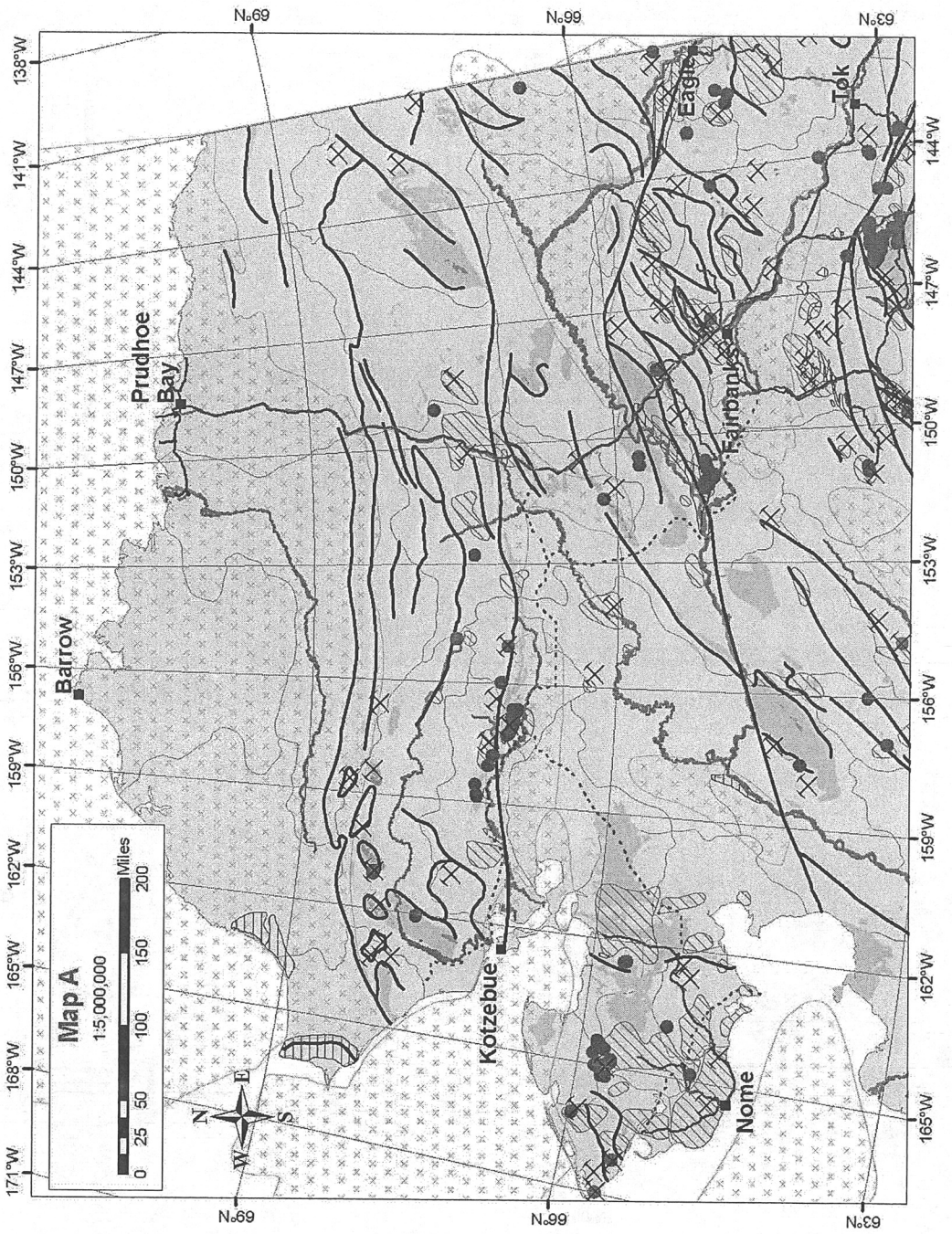
It is important to realize that the map is of the bedrock, or parent material. If the rock erodes, it will move down-gradient via colluvial or alluvial transport. Thus asbestos might be found in sites distant from the origins.

The first map is an index, and the following three maps show greater detail.

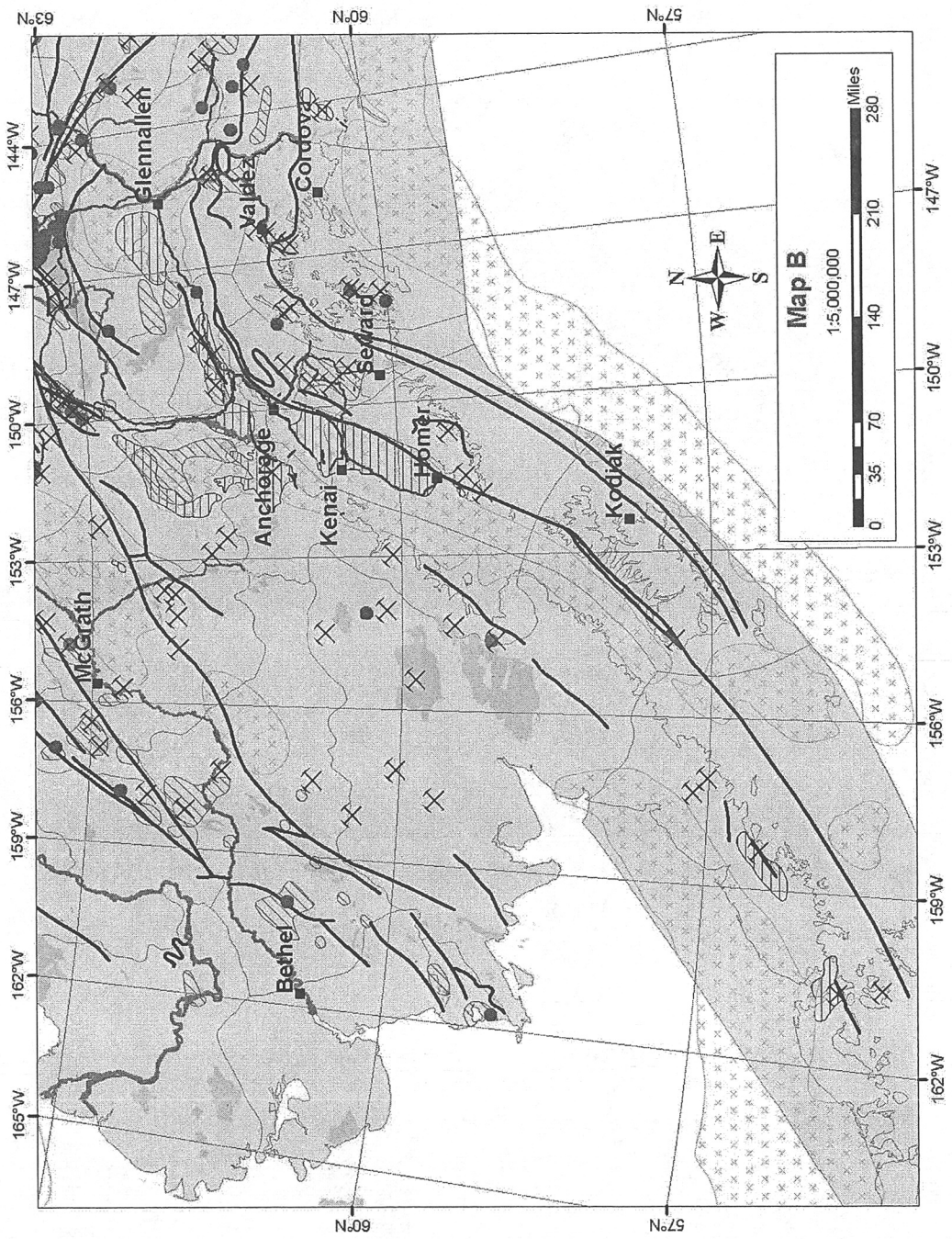
Acknowledgement
The work of Kyle Obermiller, an undergraduate student in UAF's Geological Engineering program on the geological mapping was appreciated and is hereby acknowledged.

ALASKA TRANSPORTATION CORRIDORS AND REGIONS WITH ASBESTOS POTENTIAL IN ROCK SURFACES
Map A
Map B
Map C
Barrow
Prudhoe Bay
Kotzebue
Nome
Fairbanks
Eagle
Tok
McGrath
Glennallen
Anchorage
Valdez
Cordova
Kenai
Seward
Homer
Bethel
Kodiak
Sitka
Ketchikan
Unalaska
Major towns
Significant Metalliferous Lode Deposits
ARDF Rock/Mineral Types With Potential to Host Asbestos
Major roads
Railroads
Trans Alaska Pipeline
Pipeline
Potential Transportation Corridors
Faults
Major Rivers
Coal Fields
Mining Districts
Placer Distrtct
Oil and Gas Basins
Mafics
Ultramafic
Belkman, H.M., 1980, Geologic map of Alaska: U.S. Geological Survey Special Map, 1:2500000 scale, 2 sheets.
Spatial Data provided by the Alaska Department of Naturals Services. Available from: http://dnr.alaska.gov/SpatialUtility/ [Accessed 20 April 2009]
U.S. Geological Survey. 2009. Alaska Resource Data File. Available from: http://mrdata.usgs.gov/mineral-resources/ard/.html [Accessed: 3 March 2009.]
Note:
1. Potential transportation corridors shown were gathered from previous studies and are subject to change.
2. This map shows areas likely to contain natural occurrences of asbestos in Alaska, asbestos occurrences are relatively rare and require ideal asbestos forming conditions.
Miles
0 45 90 180 270 360
1:11,000,000
1:15,000,000
N
S
E
W

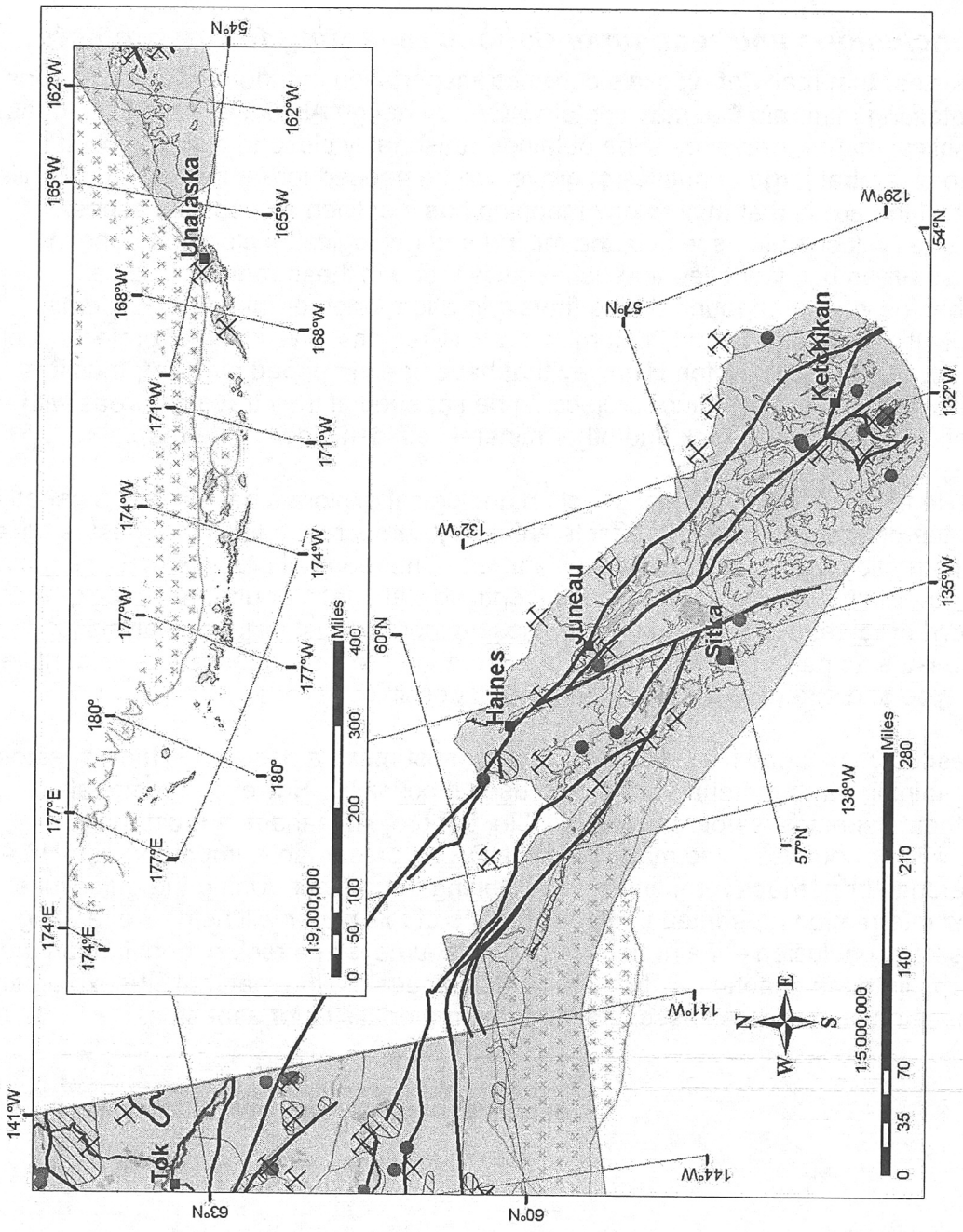
Index Map



Map A, Northern Alaska



Map B South Central



Map C, Southeast and panhandle

Conclusions and recommendations regarding future projects.

It is clear that many of Alaska's current transportation corridors traverse regions containing minerals that may contain NOA. Although Alaska is a huge state, as a practical matter, gravel must be obtained reasonably close to the project. It is also clear that large quantities of gravel will be needed for future projects. While not all the areas that mineralogy mapping has identified as possible asbestos sources will contain asbestos, the mining and geological exploration done in those areas has identified that asbestos is found in these regions. Since asbestos was often found during the exploration for other minerals, it seems likely that asbestos is fairly common in those regions. We know of projects such as Ambler and the Dalton Highway that have been impeded by NOA, thus it is reasonable to expect future projects to be impeded, if they traverse areas with mafic and ultramafic rock and other minerals as identified on the map.

While finding NOA in pre-construction geological exploration is usually a negative for the project, its untoward effects are paltry compared to finding asbestos once construction using the material has started. Therefore all projects that use gravel or other mineral resources in areas identified with mafic or ultramafic rock, or down-gradient or downstream from those minerals must include analysis for asbestos as part of the material site exploration process. If asbestos is identified, its type and extent should be quantified, if possible.

If asbestos is found the project managers must make a decision. Non-asbestos containing earth materials should be used if possible. However if material without asbestos is not readily available, the project managers must make a decision about using the material with NOA or, presumably, importing non-NOA material, or perhaps rerouting or abandoning the project. Using the guidelines and information presented in other sections of this paper will help. Reiterating the key conclusion – if a project's material source is in a region identified on the maps in these chapters as likely to contain asbestos, the material site exploration phase must include an assessment of the material site for asbestos.

Footnote to Chapter
Summary of Asbestos Minerals

Table 1 Summary of minerals where fibrous crystal form or cleavage has generated concern (not an exhaustive list) Mineral Asbestiform or fibrous probability Remarks Serpentine minerals Chrysotile Always Most common type of asbestos; almost the only form mined today Antigorite Rare Amphibole minerals Riebeckite Probable (crocidolite) Previously mined as asbestos in South Africa, Australia and Russia, but not common elsewhere Cummingtonite-grunerite Probable (amosite) Previously mined as asbestos in South Africa. Non-asbestiform habit is common Tremolite-actinolite Probable Widespread occurrence both as asbestiform and non-asbestiform habits, but only rarely mined as abestos Winchite-richterite Probable Rarely encountered Anthophyllite Probable Previously mined as asbestos in Finland and in the eastern USA. Often associated with talc. Arfvedsonite, fluor-edenite, etc. Possible Rarely encountered Zeolites Erionite, mordenite Almost always fibrous Not considered as asbestos, rarely encountered Clay minerals Palygorskite, sepiolite Fibrous habit possible or common Not considered as asbestos, rarely encountered Others Brucite, wollastonite, talc, balangeroite Fibrous habit possible or common Not considered as asbestos, and, except for talc, rarely encountered

Table 1 Summary of minerals where fibrous crystal form or cleavage has generated concern (not an exhaustive list)

Mineral	Asbestiform or fibrous probability	Remarks
Serpentine minerals		
Chrysotile	Always	Most common type of asbestos; almost the only form mined today
Antigorite	Rare	
Amphibole minerals		
Riebeckite	Probable (crocidolite)	Previously mined as asbestos in South Africa, Australia and Russia, but not common elsewhere
Cummingtonite-grunerite	Probable (amosite)	Previously mined as asbestos in South Africa. Non-asbestiform habit is common
Tremolite-actinolite	Probable	Widespread occurrence both as asbestiform and non-asbestiform habits, but only rarely mined as abestos
Winchite-richterite	Probable	Rarely encountered
Anthophyllite	Probable	Previously mined as asbestos in Finland and in the eastern USA. Often associated with talc.
Arfvedsonite, fluor-edenite, etc.	Possible	Rarely encountered
Zeolites		
Erionite, mordenite	Almost always fibrous	Not considered as asbestos, rarely encountered
Clay minerals		
Palygorskite, sepiolite	Fibrous habit possible or common	Not considered as asbestos, rarely encountered
Others		
Brucite, wollastonite, talc, balangeroite	Fibrous habit possible or common	Not considered as asbestos, and, except for talc, rarely encountered

OTHER STATES NOA REGULATIONS

Several large areas of asbestiform mineral deposits exist in the United States. These deposits host both serpentine and/or amphibole minerals in mafic and ultramafic rock formations and have varying concentrations of asbestos. Some states have implemented policies in order to safely address NOA concerns while attempting to limit adverse affects on projects in which NOA-containing rock will be impacted.

Virginia

Fairfax County has adopted a two stage approach for dealing with local NOA. The Fairfax County Health Department, Air Pollution Control Division (Fairfax APCD) oversees the potential public health concern associated with exposure to asbestos generated from construction activities. They enforce the Fairfax APCD Control Requirement Directives 1 and 2 for Construction Activities in Actinolite/Tremolite Soil Sources (CRD 1 and 2). The Virginia Department of Labor and Industry, Occupational Health Division (VDLI) regulates the interior of the construction site as it pertains to employee exposure under the Asbestos Standard, 29 CFR 1926.1101. These two agencies work in concert to control the emissions of asbestos fibers during work activities. The program is founded in the approach of proper disposal and capping of both the NOA source and constructed project. The following is a brief summary of CRD 1 and 2:

Directive 1 – Standards of performance for Actinolite/tremolite soil sources

1. Compliance Plan - A written compliance plan must be submitted to the Fairfax APCD for review and approval before work begins on the construction project.

2. Dust Control - Effective dust control must be practiced at all times.

3. Air Monitoring – Air monitoring must be performed during all phases of earthwork involving actinolite or tremolite containing material and comply with ambient air concentration standards for asbestos.

4. Disposal and Cap - An appropriate, safe, disposal site must be used to dispose of actinolite or tremolite contaminated soils whether they are to remain on site or be removed. All final disposal areas and the finished grade of the developed land shall be covered with six inches of clean compacted material.

5. Notification – Sufficient notice of asbestos shall be given to all employees and contractors on the site in compliance with the OSHA Asbestos Standard (29 CFR 1926.1101).

Directive 2 – Monitoring and Reporting Requirements

1. Monitoring requirements
    a. The monitoring and sample analysis will be conducted by competent personnel and closely supervised by an experienced individual certified with NIOSH 582 course training or equivalent [we should expound on that]
    b. Air monitoring samples will be collected.
    c. Project Reports of the perimeter, area, and personal monitoring results will be submitted to the Fairfax County Health Department.

2. Project Reporting Requirements
    a. A written description of the work activities.
    b. Diagram of the Construction Project.
    c. Air Monitoring Results.
    d. Violations to Directive 1 detected by air monitoring

3. A 24-hour average standard for asbestos ambient air concentrations is calculated

John Yetman was interviewed on the effectiveness of Fairfax County's NOA program, as well as public and commercial response. Mr. Yetman is a Senior Environmental Health Specialist with the Fairfax County Health Department, and has managed the county's NOA program for over 20 years. The NOA program described above has been in effect in Fairfax County since 1993. The NOA found in Fairfax County is typically beneath several feet of clay, so the program is designed exclusively for excavation and soil impacting activities. The soils of Fairfax County have been mapped, with known NOA encompassing 11 square miles of the 400+ square mile county. The geological maps are reportedly accurate to +/- 500 feet. If excavation/soil impacting activities are to occurring within this 11 square mile area, the contractor is required to submit a compliance plan as mentioned above.

The compliance plan describes location and activities associated with the project, dust control methods and worker and public safety controls. If the project is located within the NOA area per the soil map, the contractor is required to have a compliance plan approved through the county health department. If the project site is located within 500 feet of the mapped boundary, the contractor may submit a limited compliance plan which outlines the same requirements as the full plan; however, implementation of the plan is only required if suspect NOA is discovered.

Dust control consists primarily of applying water and/or slowing operations so that no visible dust is present. Air monitoring is required at all times soil impacting activity is occurring which consist of both area and personal sampling using PCM cassettes and analysis. The area monitoring is performed at several points on the perimeter of the "work zone", a term used to describe the area of

the jobsite that has controlled access from the public. Area monitoring is a 24-hour average with the Fairfax County Air Pollution standard being 0.02 f/cc. Personal samples are also collected from workers inside the work zone to determine and 8-hour TWA with a maximum allowable fiber concentration of 0.10 f/cc. All air monitoring is required to be performed by a third party. All air monitoring results are required to be submitted in a final close out report; however, exceedences in airborne fiber concentrations are reported to the county health department immediately. Samples with elevated fiber levels may be further analyzed using Method 7402 which utilizes TEM to determine if the fibers meeting the PCM counting rules are asbestos.

Mr. Yetman explained that NOA-containing soils are encouraged to remain onsite; however, soils can be utilized as fill for other jobsites located within the known NOA area. If soils are removed from Fairfax County, it is strongly recommended the contractor inform the recipient of the possible contamination in the soil, and obtain a signature of acknowledgement.

Directive 1 also requires that 6 inches of clean cap be applied to all disturbed soils within the NOA area. Allowances are made when the soil is to be covered with vegetative-sod, in which case only 3 inches of cap is required.

Mr. Yetman felt that the program has been very successful for the county. He explained that the public and local contractors have become accustom to the NOA requirements, and they very rarely experience issues. He also noted that fiber level exceedences have become less common as contractors have developed effective means for dealing with dust suppression.

The "backbone", as described by Yetman, of Fairfax County's NOA management plan is the county soil map. This is an efficient way to identify if NOA will be a concern for the project, and if a compliance plan is required. Additionally, Mr. Yetman explained that the Health Department makes certain to explain the liability associated with removing NOA-containing material offsite, or outside of Fairfax County, which has seemed to reduce this occurrence.

California

The State of California Air Resources Board (CARB) has implemented regulations designed to significantly decrease the chances that asbestos in soil and rock can become airborne, and thus minimizing public exposure to asbestos. These state regulations are referred to as the Airborne Toxic Control Measures. (ATCM's) The first ATCM applies to surfacing applications and was originally adopted in 1990, but was amended in 2001. The second ATCM applies to construction, grading, quarrying and surface mining operations.

According to the CARB's Implementation Guidance Document for the Asbestos Airborne Toxic Control Measure for Surfacing Applications[47], the first Asbestos

ATCM prohibits the sale or use of restricted material for unpaved surfacing unless it has been tested and found to have an asbestos content that is less than 0.25 percent. The ATCM defines restricted materials as aggregate material extracted from an ultramafic (or ultrabasic) rock unit as shown on referenced geologic maps; ultramafic rock including serpentine; or aggregate material shown to have an asbestos content of 0.25 percent or more; or any mixture containing 10% ultramafic/serpentine materials.

The test method required to determine the asbestos content is either CARB Method 435 or a method approved by the CARB's Executive Officer. If restricted material is being sold or supplied for surfacing purposes, the producer of the material (quarry operator) is required to provide the recipient the following information: the amount of material sold or supplied; the dates the material was sold or supplied, sampled and tested; and a statement verifying that the asbestos content of the material is less than 0.25 percent. Anyone who sells or supplies restricted material, but did not extract the material from the ground, must provide all of the above information with the exception of the date that the material was sampled and tested. If restricted material is being sold or supplied for non-surfacing purposes the supplier must notify the recipient with a warning statement that the material may contain asbestos.

The amended ATCM contains the following surfacing exemptions:

- sand and gravel operations;
- roads located at quarries and mines;
- maintenance operations on existing roads;
- emergency road repairs;
- asphalt and concrete materials;
- landfill operations;
- results of a geologic evaluation;
- steep surfaces with limited access;
- surfacing applications in remote locations;
- roads located at construction sites; and
- riprap (material placed along water course or shoreline to prevent erosion)

The amended ATCM also allows the district authority to require geologic evaluation for the presence of rocks that may contain asbestos and the authority to require testing of any aggregate material for its asbestos content. This authority would typically be exercised if there is credible evidence indicating the potential presence of asbestos outside of an ultramafic rock unit.

There are two possibilities for the regions with mapped mafic or ultramafic rock, either the asbestos content is ≥0.25% or the asbestos content is <0.25. If the asbestos content is <0.25%, the material can be used for surfacing or any other use, if the material has ≥0.25% asbestos, its use is restricted. Minerals taken from mapped areas are restricted and must be tested and certified prior to use. In addition to mapped restricted areas the program includes a number of

exemptions and has district authority to implement regional priorities. The 0.25 threshold was derived from the detection limit per the test method. Since only PLM 400 point count is required, if one fiber is observed in the counting area the sample has 0.25% asbestos. If fibers are observed outside of the counting area, the sample is reported as having "trace" amounts of asbestos present, and be considered <0.25% asbestos.

Any person who sells, supplies, or offers for sale or supply restricted material for non-surfacing applications must provide with each sale or supply a written receipt containing the following statement:

"WARNING!
This material may contain asbestos.
It is unlawful to use this material for surfacing or any application in which it would remain exposed and subject to possible disturbances.
Extreme care should be taken when handling this material to minimize the generation of dust."

Thus, NOA-containing material may be used for construction projects as long as the affected material is not to remain exposed. If NOA-containing aggregate is used for road construction, the dust suppressing method used, such as capping, must be designed to last for an extended period of time (ie greater than 5 years). Asphalt or concrete would suffice as an appropriate method, while water application or other short-term palliatives would not.

If an approved asbestos bulk test method has been used to perform two or more tests on any one volume of aggregate material, whether by the same or a different person, the arithmetic average of these test results shall be used to determine the asbestos content of the aggregate material.

The sampling frequency required for determining the asbestos content of any aggregate material is required to be the following unless the APCO approved an alternate testing frequency.

- Storage Piles and Conveyer Belts – Minimum of 3 random grab samples per 1000 tons
- Aggregate Covered Surfaces – Minimum of 3 random grab samples per
    - 1 mile of road
    - 1 acre of surface area
    - 2 miles or 2 acres of road shoulder

The second ATCM, which applies to construction, grading, quarrying, and surface mining operations was adopted in July, 2002. This ATCM requires more stringent dust control measures at these operations. For example, an approved dust mitigation plan may be required, depending on the size of the project, or proximity to a receptor such as a hospital, school, day care center, work site, business, residence or permanent campground. The requirements for road

construction and maintenance differ somewhat from those for general construction and grading (e.g., development of a shopping center). Other requirements of the proposed ATCM address post-construction stabilization of disturbed areas. These areas must be revegetated, paved, or covered with at least three inches of non-asbestos-containing material. NOA-containing material may be transported if the loads are adequately wetted or covered with tarps.

According to the CARB's Regulatory Advisory: Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying and Surface Mining[48], the second California ATCM applies to road construction and maintenance, construction and grading operations, and quarries and surface mines when the activity occurs in an area where naturally-occurring asbestos is likely to be present according to currently published NOA maps. Areas are subject to the regulation if they are identified on maps published by the department of Conservation as ultramafic rock units or if the Air Pollution Control Officer (APCO) or owner/operator has knowledge of the presence of ultramafic rock, serpentine, or naturally-occurring asbestos on the site. The ATCM also applies if ultramafic rock, serpentine, or asbestos is discovered during any operation or activity.

Road construction and maintenance operations are required to use dust control measures for a specified set of emission sources and prevent visible emissions from crossing the project boundaries. California has local air pollution control or air quality management districts which must also be notified before any work begins. For construction and grading projects that will disturb one acre or less, the regulation requires several specific actions to minimize emissions of dust such as vehicle speed limitations, application of water prior to and during the ground disturbance, keeping storage piles wet or covered, and track-out prevention and removal. Construction projects that will disturb more than one acre must prepare and obtain district approval for an asbestos dust mitigation plan. The plan must specify how the operation will minimize emissions and must address specific emission sources. Regardless of the size of the disturbance, activities must not result in emissions that are visible crossing the property line. Quarries and surface mines must also obtain district approval for an asbestos dust mitigation plan which must address specific emission sources. In addition, they must meet specific opacity standards for certain types of equipment and ensure that there are no emissions visibly crossing the property line.

Records related to the applicability of the regulation or compliance with the specific provisions of the regulation or the asbestos dust mitigation plan must be kept for seven years. The results of any air monitoring or bulk sampling required by the district, any bulk sampling to document the applicability of, or compliance with, the regulation, and any other records specified in the dust mitigation plan must be reported to the district.

The second ATCM has the following exemptions:

- Homeowners and tenants working on their own residential property

- Agricultural operations and timber harvesting
    - Except for the construction of roads and structures in connection with agricultural and timber operations

In addition, districts may grant an exemption under any of the following conditions:

- A geological evaluation demonstrates that ultramafic rock or serpentine is not likely to be found;
- Road construction and maintenance activities in a remote location;
- The processing of rock from an alluvial deposit.
- For emergency road repairs, district notification may be delayed.

CARB's Manager of Emissions Evaluations, Robert Krieger, provided feedback on California's NOA regulations. Mr. Krieger explained that while the state of California has developed the ATCM's, it is the responsibility of the local air pollution district authority to implement and regulate, and the districts have the option of placing more stringent requirements than the ATCM's. While asbestos has several definitions, California has taken a conservative approach that any asbestos exposure is harmful, thus the ATCM's designed to reduce or eliminate asbestos exposure to the public; consequently, imposing the 0.25% standard. Additionally, districts can implement air sampling requirements for projects encountering NOA; the ATCM does not address air monitoring requirements.

Mr. Krieger mentioned that historically when NOA was discovered on a school's property it had been removed. More recently, however, this practice has been determined to be costly and unnecessary. If NOA-containing material is found to be on a school's property, or is used as fill during a construction project, it must be covered with a minimum of 12 inches of clean fill. Projects not on school grounds where NOA-containing material is used a 3 inch layer of clean fill is required.

John Clinkenbeard, a Certified Professional Geologist (C.P.G.) for the State of California, explained the USGS has developed geological maps of the entire state of California available at 1:250,000 resolution. At this resolution, a boundary line on the map is approximately 1,000 feet wide and the smallest area resolution is 25 acres. When the local district authority reviews a construction permit, they reference these maps to evaluate if the proposed project site falls with in areas of known ultramafic or serpentine formations, or an area with known asbestos present. If the project is to occur in an area of concern the ATCM applies. If the project area is outside of the known areas of concern, the project site must undergo a geological evaluation by a third party C.P.G. Evaluations are also used when the project location is close to the boundary line, or the Contractor believes that asbestos is not present. California is presently working on increasing the statewide geological map resolution to 1:100,000; however, this project is not anticipated on being completed for several years. Some districts have funded mapping efforts in order to obtain a 1:24 map resolution.

After discussing NOA in Alaska, Mr. Clinkenbeard referenced Airborne Visual Inferred Spectroscopy (AVIRIS) as a possible geological mapping option. Imaging spectroscopy is a new tool that can be used to map specific materials by detecting specific chemical bonds. As a result it is an excellent tool for environmental assessments, mineral mapping and exploration, vegetation communities/species and health studies, and general land management studies.[49] The AVIRIS technology is aircraft-mounted and can collect data at a rate of 2 square kilometers per second. While this technology may not be feasible for Alaska's entire landmass, project specific uses may prove to be beneficial.

Jeff Wright with the CARB was contacted regarding M435 asbestos testing. The M435 method was developed in 1990 and was designed to detect serpentine asbestos in gravel/soil. The ATCM's requirements result in a large quantity of soil and gravel being tested for the presence of asbestos per M435; therefore, many testing laboratories throughout the state perform this analysis. CARB performed an interlaboratory study of California laboratories which offered the M435 testing. Samples were "spiked" with a known amount of asbestos and sent to the labs for analysis. The results of the study indicated vast discrepancies in the sample results.[50] All the laboratories included in the study were national accredited to analyze asbestos, however; M435 is unique from other test methods and while all the labs where adhering to M435 protocol, several different varieties of milling and homogenizing equipment was used. Mr. Wright explained that increased sample pulverization has been known to decrease asbestos concentrations via PLM analysis because the fibers are reduced in size to the point where they no longer meet the definition of a fiber; in contrast, asbestos concentration results per TEM analysis tend to increase. Because NOA is typically not uniform in samples, after the material has been milled sample homogenization should occur. PLM analysis examines only a small fraction of the sample, and TEM examines approximately one millionth of that, making homogenizing the samples an extremely important process.

Mr. Wright explained that California is in the process of undergoing several changes to M435. The proposed changes are as followed:

- Sampling
    - Bias field sampling per the discretion of the C.P.G.
        - Perform "target sampling" which focuses on areas or materials most likely to contain NOA opposed to "random" sampling in which the NOA may not be sampled
- Processing
    - Formulate a M435 accreditation for testing laboratories
        - California is working with NVLAB to develop an M435 accreditation

        - Require specific equipment to be used for the pulverizing and homogenizing processes
- Analysis
    - Move away from quantitative analysis
        - Results would be reported as "present" or "absent"
    - Additional analysis
        - If PLM observes no asbestos, require the sample to be analyzed via TEM

Other States

The following states either have, or are in the process of implementing NOA regulations: Massachusetts, New Hampshire, Pennsylvania, and Texas.

NOA CONTROL STRATEGIES AND TECHNOLOGIES

The following are a number of NOA control strategies and technologies that can be used to ameliorate asbestos release from NOA and NOA-containing material. After presenting some general information generated by the federal EPA, the items are divided into manage-in-place, dust suppression methods, covering or capping, and road maintenance. Finally, long term maintenance requires some public education.

EPA Facts Sheet: Methods for Reducing NOA Exposure[51]

Below is a list of methods recommended by the EPA to reduce asbestos exposure resulting from NOA. These are general methods, and must be applied on a project-specific basis:

- *Wet road surfaces with water using trucks, hoses, or sprinklers*
- *Wet piles of excavated material and cover them with tarps, plastic sheeting, or other items*
- *Continuously mist the work area*
- *Install wind barriers around the work area*
- *Clean or decontaminate equipment and vehicles to ensure that no equipment or workers track soil out of the work area (a gravel pad, tire shaker, or wheel wash system may be used to clear soil from vehicles)*
- *Wet the work area using a spray system attached directly to rock cutting or drilling equipment, such as a fine-mist sprayer or a variable-rate fogger nozzle*
- *Excavate utility trenches to an adequate depth and backfill them with clean soil so that future repair work will not need excavation into potential NOA-containing materials*
- *When transporting NOA-containing materials, avoid overloading trucks; keep the material below the top of each truck compartment and cover material with a tarp*
- *Limit personnel and vehicle access to the work area*
- *Identify NOA-containing areas with signs*
- *Reduce driving speed*
- *Reduce drilling or excavating speeds*
- *Excavate during periods of calm or low winds*

Roads and Parking with NOA in place and for unpaved roads and parking areas:

- *Cover roads with non-NOA-containing rock, chemical sealants or dust suppressants, chip seals, limestone aggregate, petroleum sealants, or asphalt cement paving*

- *Wet road surfaces with water*
- *Install windbreaks or berms*
- *Reduce driving speed*
- *Avoid dusty areas, especially in windy conditions*

And throughout communities:

- *Cover areas of rock and soil with clean soil, rock, vegetation, or other material*
- *Pave over unpaved walkways, driveways, or roadways containing NOA*
- *Landscape areas with vegetation, such as NOA-tolerant plants, and add a layer of organic mulch or NOA-free soil. Water plants often until they are established to minimize erosion*
- *Water garden areas before digging*
- *Keep windows and doors closed on windy days and during periods when nearby rock or soil may be disturbed, such as during construction*
- *Limit track-in by using entryway (door) mats, and wipe down pets before they enter buildings to reduce the amount of soil tracked indoors*
- *Allow children to play in outdoor areas only if the area has a ground covering, such as wood chips, mulch, sand, pea gravel, grass, asphalt, shredded rubber, or rubber mats*
- *Relocate outdoor activities to areas that do not contain NOA (walk, run, hike, and bike only on paved trails)*
- *Avoid dusty areas, especially in windy conditions*

Manage In Place

The ideal method for managing NOA material is in place and undisturbed; especially if the NOA material is not exposed. Fairfax County, Virginia, for example has a large NOA deposit which exists beneath non-NOA material. Unless this material is required to be impacted through construction or other activities, Fairfax County has taken the position to leave the material in place. NOA does not pose a health risk if it remains in a location where asbestos fibers cannot become airborne; such as beneath non-NOA material.

Separation

A variation on manage-in-place is to separate the NOA from associated non-NOA materials. Separation and excavation of the NOA materials for a source of gravel aggregate might serve as a control method, if the locations are known and the amounts are small. However this method seldom practical, since NOA deposits commonly extend miles, if not hundreds of miles. Excavation is generally only utilized as amelioration method when soils with known NOA are required to be impacted for projection such as road and building construction and utility work. Excavation requires the disturbance of the NOA, hence the potential for airborne exposure.

Dust Suppression

If NOA material is required to be disturbed, dust generating activities should be limited at all times. The most common engineering control used to reduce dust levels, hence airborne asbestos exposure, is the use of water and/or wet methods during NOA-related activities. The following is a list produced by the EPA of engineering and work practices that reduce exposure to NOA on excavation, grading, or utility work at construction sites.[51]

Reducing Vehicle Traffic and/or Speed

Dust emissions from unpaved road surfaces are directly proportional to the number of vehicles traveling on it, thus, reducing the amount of traffic will in turn reduce the amount of dust generated. By implementing weight or use restrictions on vehicles traversing the unpaved road could significantly limit the amount of traffic on a NOA-containing unpaved road and in some circumstances it may be possible to remove an unpaved road, or section of road, from service to the general public. An example of this type of control was recently imposed by the City of Kotzebue, in an effort to reduce particulate matter smaller than 10 microns in diameter (PM_{10}) emissions, where anyone under the age of 14 is prohibited from operating off road vehicles on city streets unless accompanied by an adult on the same vehicle.[52]

The rate at which a vehicle travels on an unpaved surface is also proportional to the amount of dust generated[53] meaning the efficiency of speed reduction as a dust control measure increases as the speed is reduced. For example, if the base speed is 40 miles per hour, a reduction to 20 miles per hour results in a 65% reduction in dust emissions; a further reduction to 15 miles per hour results in an 80% reduction in dust emissions. [54] Vehicular speed reduction can be achieved through posted signage coupled with enforcement and/or roadway manipulation such as speed bumps. The initial implementation of both these methods would be minimal, with immediate results. Major costs associated with these methods include increased travel time and additional law enforcement. While enforcement of these methods may be difficult in some rural Alaska communities, it may be a very practical, enforceable and effective for reducing airborne asbestos at quarries, construction sites and more densely populated areas.

In a best case scenario, at optimal conditions, both of these control methods would still not address the issue of exposed NOA on the roadway. Substantial amounts of dust would still be produced during dry conditions and natural elements such as wind would continue to make asbestos airborne. In most situations, these methods should be either approached as interim responses, or used in combination with other methods.

Water Application

Federal regulations require the use of "wet methods" when impacting ACM's which have potential of releasing asbestos into the air. Due to the moisture, particles/fibers adhere to each other through the surface tension of connecting water droplets and the adhesion of droplets to particles/fibers reducing the amount of emissions released during impact. The same principle applies to NOA-containing unpaved road systems; if they remain wet, dust emissions will be minimal. The easiest and most effective way to accomplish this is direct application of water to the surface of the roadway.

A large water source exists in most communities throughout Alaska. While more heavily populated areas have the required means to extract and apply water in sufficient quantities, many smaller communities do not. Often times some form of water application system can be implemented; however, may be too laborious to continue for long term.[55] In Amber, for example, no water trucks or large tanks were available for water application on so a simple gravity feed system was utilized. This system consisted of 4 - 275 gallon interconnected square plastic containers (totes) placed in the back of a truck which were filled with water from the Kobuk River and attached to a perforated pipe on the back of the truck.[37]

Applying water to surfaces provides effective, but short-term reductions in dust generation with water typically needing to be re-applied ever 0.5 – 12 hours depending on temperature and humidity. It has been determined that regular, light watering is more effective than less frequent, heavy watering.[55]

If the necessary equipment and water source are available, wetting unpaved surfaces can be greatly reduce dust emissions while remaining cost effective. Additionally, if wetting were coupled with one or both of the traffic control methods, evaporation from the roads surface would occur slower and dust emissions would be lower yet. Continuing costs would include equipment maintenance and workers performing the application. If equipment is not available, start up costs could be significant. Wetting is a practical control method to be used as a construction project control method or a short-term solution. Due to water having to be continuously applied to keep the surface moist, alternate long term control strategies should be investigated.

Increasing Moisture Content

The application of deliquescent salts such as calcium chloride, magnesium chloride and sodium chloride (common rock salt) are also implemented as dust control methods. These salts absorb moisture from the atmosphere and when mixed with surfacing soils will keep the treated soils at higher moisture content than untreated soils. For example at 77°F and 90% humidity calcium chloride will absorb more than 17 times its own weight in water.[53] Potential disadvantages to the use of these salts are that roads may become slippery when wet, vehicle corrosion may occur and roads may become more susceptible to freeze and

thaw damage. Additionally, salts applied for dust suppression initially penetrate the roads surface several centimeters, followed by a gradual rise to the surface by capillarity action, making them susceptible to being washed off by rain. Prolonged rainfall will leach the salts from the roadway, potentially impact groundwater and surface water quality, and attract wildlife potentially causing safety concerns. Typically if the proper buffer zone exists between the water and the treated area, water quality impacts will remain minimal.[54] The practical utility of an application of one of these salts is no more than one year.[53] Sodium chlorides generally considered less effective than either calcium or magnesium chloride. Application of these materials is generally required 1-2 times per season.

Several locations in Alaska have utilized calcium chloride for dust control in recent years including Kotzebue, Teck Cominco's Red Dog Mine, and Haines, among other locations.[53] Environmental impacts of chlorides include metal corrosion, and degradation to nearby vegetation, surface, groundwater, and aquatic species.[53] In addition, because calcium chloride can substantially lower the freezing temperature of water, concentrations of the palliative in road soils can change the thermal stability of these soils.[53] This could potentially create issues in areas where extremely heavy loads are forced to wait until the road has completely frozen in order to supply adequate reinforcement such as on the Dalton Highway.

Covering or Capping of Installed NOA

Another common engineering control is to place a cover system (or cap) over the NOA. These materials may include non-NOA soil or rock, concrete, chemical sealants or dust suppressants, chip seals, limestone aggregate, petroleum sealants, asphalt paving, geotextiles, wood chips, mulch, sand, pea gravel, shredded rubber, rubber mats, and vegetation. Several factors, including cover material properties and site characteristics, affect the type of cover system appropriate for a particular area.

Palliatives

The majority of palliatives used on unpaved roads and airfields consist of chemicals designed to bind soil particulates together, formeing larger particles less likely to become airborne. Petroleum-based binders, organic nonpetroleum dust suppressants (lignins), electrochemical stabilizers, synthetic polymer products and pozzuolannic minerals comprise the main palliatives and our discussed further below:

Petroleum-based binders used as capping materials for dust suppression include emulsified asphalts, cutback asphalt (liquid asphalt), dust oils and modified asphalt emulsions.[55] These products are applied to the surface soil as a thin layer of asphalt which binds the soil particles together, consequently

waterproofing the road as well. Some binders increase the mass of fine particulates, instead of binding particles together. Both variations result in decreased emissions. When asphalt is used to bind particles together, the emulsified asphalt, because it is a mixture of asphalt and water in very small droplets, has the capability to penetrate unpaved road surfaces to coat more than just the surface particles, especially if the product is mechanically mixed into the top inch or two of road surface with a grader. Petroleum-based binders that contain fractions of lighter solvents, and especially those containing polycyclic aromatic hydrocarbons (many of which are carcinogens), can contaminate waterways if any migration of these lighter fractions occurs due to runoff.[53]

Organic non-petroleum dust suppressants include lignosulfonates, resins, and vegetable oils. Lignosulfonates originate from lignin, a complex compound which binds wood cells together as a natural polymer. Most commonly lignin is derived from wood fibers during paper manufacturing. Lignosulfonates bind surface soil particles together due to a combination of chemical and physical interactions. Lignosulfonates are known to greatly increase dry strength under dry conditions and retain effectiveness through extended dry periods. Generally 1-2 applications of lignosulfonates are required per season. Lignosulfonates are water soluble and will leach out of, or deeper into, roadway surface with rainfall and may become partially or totally destroyed.[55] These products are also corrosive to aluminum and its alloys unless calcium carbonate is added. Glacial tills contain low levels of clay and have low plasticity; consequently, lignosulfonates may be of limited value in controlling dust emissions from these soils. Furthermore, because lignosulfonates are derivatives of sulfuric acid, leaching may adversely impact watershed areas by affecting the acidity of water sources. Lignosulfonates are reported to not bind well on roads that had been treated previously with chloride compounds.[56]

Electrochemical stabilizers include sulphonated petroleum, ionic stabilizers, and enzymes. These products are intended to neutralize the ionic charges of clay-sized particles, thereby allowing electrostatic forces to bind the particles. Electrochemical stabilizers are generally effective regardless of climatic conditions.[55] To be effective, electrochemical stabilizers need to be worked into the road surface, requiring equipment that may not be available in remote rural communities. The performance of this material is dependent on fine-clay mineralogy which is unlikely to be encountered in most areas of Alaska.

Synthetic polymer products include polyvinyl acrylics and acetates that bind soil particles together and form a semi-rigid film on the road surface. These products are found as either a water soluble liquid or a powder intended to be mixed with water. Because synthetic polymer products are almost exclusively applied as a liquid, the material takes approximately 12-24 hours to cure during which time traffic should be kept minimal on application surfaces until the curing process is complete. Additionally, the product should be applied during a time of year when temperatures will not approach freezing, otherwise the curing process will not

work. The synthetic polymer products "Durasoil" was used as the dust suppressant in Ambler, as well as many other unpaved runways throughout northwest Alaska.[37] Synthetic polymer treatments are generally required once every 3-5 years.

Pozzolanic minerals, such as lime and cement, are typically added to non-plastic road surface material to produce a thin crust by agglomerating with fine dust particles. These stabilizers must be field mixed into the road material and compacted. These surfaces do increase the dry strength of material under dry conditions; however, once hardened it cannot re-harden if disturbed by abrasive forces, such as some off road vehicles and grading. Generally treatment with this method is applied once every ten years.

Gravel Replenishment

Asbestos-containing dust emissions from unpaved surfaces can be reduced by the addition of several inches of non-NOA containing gravel. This action would reduce the concentration of NOA on the surface; therefore, reduce the rate at which asbestos is allowed to become airborne.[57] Gravel provides a hard-wearing surface that shields underlying NOA from the abrasive forces of vehicle wheels. Traffic causes abrasion between the NOA and non-NOA aggregates, however, which over time creates fine dust. The degradation is somewhat dependent upon the hardness of the aggregate. Newly applied gravel will not reduce the strength of vortex airflows behind passing vehicles from entraining loose soil particles into the air. If the road-base is not well-constructed using crushed aggregate, surface gravel will be pushed down into the road surface by traffic, especially during wet conditions. If the road surface does not contain enough fine material of high cohesion to hold surface gravel in place, traffic can also cause surface gravel to be expelled laterally from the road's driving lanes. To be effective over more than a short period of time, new gravel applied to a road should be anchored to the road surface by incorporation into a cohesive surface layer through either well-graded aggregate mixes or by the use of soil adhesives (i.e., palliatives).[53]

In the event the newly applied gravel is lost to the roadway surface through vertical migration into non-cohesive soils, the use of geotextile fabrics may be of benefit. These fabrics are constructed of polymer threads that are very high in tensile strength, and are available in designs that either form.

Paving

Paving includes a variety of surfacing materials with the three general types being bituminous concrete, concrete and chip seals.

The most effective, and expensive, method currently available to control dust emissions from unpaved surfaces is the application of pavement or other durable materials to the road surfaces. Bituminous or Portland concrete provide durable

surface which prevents the abrasion of underlying soils. Bituminous concrete is a hot mixture of asphalt and well-graded aggregate, while Portland concrete is a composite material of cement, water and aggregate. Concrete requires less maintenance and is considered more durable than bituminous surfacing. Both methods are designed to support heavy traffic and unless the roadway typically carries 250 to 500 vehicles per day, the use of either of these paving options will likely not be cost effective.[55] Kotzebue has several roads which typically meet this "traffic quota" on a daily basis, and recently have had some of the main roads paved.[53] These forms of paving are not typically used on secondary roads, and would virtually never be considered for rural Alaska.

Chip seal surfaces, also called macadam, consist of one to three layers of aggregate and asphalt. Asphalt is sprayed over each aggregate layer as it is applied. After all the aggregate layers are in place with asphalt being applied over each individually, a covering of smaller stones is placed on top and then the entire system is compacted with the finished chip seal typically being 1 to 4 cm thick. Applying chip –sealing to an NOA-containing unpaved road would reduce dust emissions into the atmosphere because the chip sealant would bind the surface material. Annual dust control efficiencies of paved surfaces have been estimated by researchers to range from 90 to 99.9 percent.[57] A standard three-layered chip surface at 3.75 cm would be expected to last 10 years before additional surface treatment is required. Most chip seals require a second coat after 1 year and a third in approximately five years.

Durable Surfacing Materials

Fiberglass plates are used in cold climate oilfields to provide temporary road surfaces over native soil. These interlocking plates are typically manufactured in sections that are 14 feet long by 8 feet wide by 2 inches thick. The plates are designed to carry very heavy loads over short distances without the need to construct structural roadbeds in areas like northwestern Alaska, where construction aggregate is in very limited supply. The plates are expensive, costing about $2,000 per plate, but appear to have a significant lifespan.[58].Some questions exists, however, as to whether such plates are skid resistant at the vehicle speeds typical in rural communities.

Road Maintenance

The effectiveness of any dust suppressant applied to a road surface depends upon many factors such as type of road, traffic, intended uses climate, type of dust suppressant, drainage, and available maintenance resources. These factors must be considered together in the proper maintenance of a road that will safely and cost-effectively resist dust generation. For example, if the road surface is not well drained, water will puddle either on the road surface or in adjacent low spots. Standing water will float soil fines to the surface and distribute them across the roadway surface with passing traffic. Standing water adjacent to a roadway has

the potential to saturate the road sub-base, resulting in structural failure as evidenced by potholes. Aggregate in a roadway surface reduces tire forces on fine materials that increases the release of dust from a roadway. The loss of fines in the roadway surface leaves the aggregate unanchored and vulnerable to being pushed to the side of the road by tire forces. The success of palliatives to reduce dust depends on the repair and maintenance of good drainage on and adjacent to the road.[53]

Control Strategies for long term management of in place NOA.

Education

In rural communities throughout Alaska, the availability of law enforcement to assist in applicable dust suppressing methods is likely to be limited or non-existent. Imposing speed limits and vehicle use restrictions in these communities will be most effective if the residents of the community understand their purpose. Education about NOA and its potential health effects is a vital step in obtaining local support for any control method used. Education techniques for NOA-affected areas may include advertising, public meetings, information packets and making available NOA-knowledgeable experts. If residents understand the reasons for implemented controlled methods in their communities, a positive local response can result in social pressure applied throughout to adhere to new policies for the well-being of the community as a whole.

Residents in areas with geology favorable for NOA formation should be educated in basic NOA knowledge. In rural communities with a known NOA issue, such as Ambler, where airborne asbestos fibers from NOA are likely to be present, NOA general housekeeping and personal hygiene techniques should be implemented which requires specific education efforts. Education efforts could be carried out through State agencies or consulting firms with knowledge and experience with NOA. The cost for this effort would include travel to the subject community, preparation of materials (information packets) and potentially on-going assistance as new issues develop; however, these costs will be minimal considering many control methods are dependent on community support. If residents are unwilling to comply with newly imposed policies, any control method is likely to fail or have minimal effect.

Workers and the general public need to be properly educated regarding general housekeeping and persona hygiene practices appropriate for locals with NOA exposure potential. This control technologies include:

- Routine hand and clothes washing
- Boot/shoe removal at work and home
- Wet wiping and/or HEPA vacuum of visible dust accumulations as they develop
- Wet methods
- Controlling or avoiding visible NOA dust

Analysis with Discussion

Introduction

The asbestos standards, such as the training requirements for asbestos workers, were written on the premise of encounters solely in manufactured products. While the EPA has developed several documents to help increase knowledge and prevent exposure resulting from NOA, no Federal regulations have been implemented. This has resulted in several states implementing their own set of regulations and guidance documents. However, of the 20 states where NOA is known to exist, only a few have, or are beginning to, implement NOA regulations. The remaining states (such as Alaska) deal with NOA on a project-specific basis which typically exhibits substantial project delays and increased costs.

While there are limited general recommendations (see EPA NOA dust guidance), recommended NOA amelioration methods need to be selected on a site-specific basis because the exposure is dependent on a vast number of variables related to site specific conditions and work practices chosen for processing/handling. The single most important goal for almost all NOA-containing sites, materials, and systems is to prevent asbestos fibers from becoming airborne to eliminate respiratory exposure to asbestos. Several methods have been utilized to achieve this goal, with the main options being: manage in-place, dust suppression, cover or cap, and excavation/removal of NOA-containing material.

It is clear that gravel sources with NOA are present in Alaska and they have the potential to affect public health, project development and costs. At the same time it is well documented nationally and with Alaskan experience that use of proper NOA control strategies allow the safe employment of NOA materials. While past project experience in Alaska has not documented significant exposure or post project health concerns, NOA has been costly to some projects. This was primarily due to lack of advanced knowledge of NOA's presence, failure to characterize and notify, which resulted in changed conditions and non-competitive contract modifications after the contract has been awarded. Even if NOA is known during the project planning stages, the best course of action may not be clear because there are professional NOA geologic, risk and regulatory interpretations and definitional issues that will generate discussion and require resolution. The successful implementation of a NOA program will therefore require development and needs to involve training and transition for all involved including state, regional corporations, private resource owners, project designers, contractors, operation and maintenance staff, community and local residents.

Resource owners need to better understand their resource, develop the knowledge and marketing expertise to have it properly characterized and categorized for appropriate uses. Designer's need to develop the necessary project specifications requiring resource certification as well as contractor training and experience. Successful contractors need to learn how to develop

competitive work plans for safely utilizing NOA materials on project specific basis. For both companies and citizens in affected areas these changes include learning about the hazards and taking personal responsibility for controlling or avoiding activities creating airborne visible dust as well as implementing life style and work practice changes involving life style modifications such as housing/office boot/shoe removal, utilization of wet methods and HEPA filtration for routine cleaning of visible dust accumulations.

Liability

The liability of ADOT and suppliers of NOA materials may be divided into three:

1. Tort liability to individuals and organizations,
2. Contractors have additional liability to protect their workers and the public from the contractor's operations, and
3. Legal liability to agencies for failure to follow applicable laws and regulations.

Tort

If the ADOT's use of NOA damages an individual or organization, ADOT may incur tort liability. For example, if a resident of a village downwind from an ADOT airport that used NOA in the runway were to die of a disease known to be caused by asbestos exposure, the victims family might sue the ADOT. Although it takes years of heavy asbestos exposure to cause those diseases, and for most asbestos diseases asbestos is a "risk factor" not the sole cause, there are other causes, most notably smoking, sympathetic juries frequently find for the plaintiff, almost regardless of fault. Due to the tort reform movement, Alaska's current tort laws have reduced the windfall aspects of such suits, but they are certainly possible. Here we can suggest little except developing good standards for use of NOA, having review by all agencies concerned with health and environmental safety, then strictly documenting conformance. Such defensive practices will not make such suits impossible, but will make their defense much easier.

The owners of NOA materials sites face essentially the same tort issues as the ADOT. The question if this liability can be handed off from the owner to the ADOT is one that requires legal advice. California has a system of notification and paperwork that would seem to hand that liability off to the purchaser of the materials. We do not know if this has been tested in court. We doubt the CARB has the legal authority to change the state's tort laws. However, as above, conforming to established procedures is often a strong defense.

Contractors' liability

The contractors' liability to follow the state's labor laws regarding occupation health and safety are fairly straight-forward, if the NOA is mentioned in the project bid documents. The contractor's liability to third parties, such as the public, may be more complicated. The contractor's general liability insurance will defend them; however the contractor's insurance company will then try to recover

from the state and/or the material owner. This may be forestalled by appropriate contact terms regarding insurance, but clearly this is a item for expert risk management and legal advice. Finally, if the specifications do not make clear the need to get certain permits and the contractor's operations are impacted, the contractor may try recover from the ADOT for defective specifications.

Liability for laws and regulation compliance

CERCLA and RCRA deal with *wastes.* NOA is not a *waste* thus mining and incorporation of NOA does not come under either of those laws. However, for example, if the NOA mining segregated some materials that had a lot of asbestos from other materials, and thus had small mounds of asbestos materials on the site, might these mounds be waste piles? Here the regulatory standard is 1% asbestos, so if the mounds had less than 1% asbestos, they would not be asbestos under the CERCLA or RCRA regulations. Here the authors have not obtained further clarifications regarding mining and mine waste. While this would be the responsibility of the owner of the NOA materials site, these clarifications should be obtained in the next phase to enhance communications between the ADOT and the material site owners.

California Experiences

The California NOA regulations do address many issues and procedures that may bear on liability. The California NOA regulations separate the "notice requirements" into two categories; material intended for surfacing, and material not intended for surfacing. In addition to the notification variations, material intended for surfacing must have an asbestos content of <0.25% asbestos per the CARB 435 analysis, unless the surfacing application is considered one or more of the 11 surfacing ATCM exemptions. These notification requirements are intended to both "hand-off" liability to the purchasers and produce adequate documentation. (Signage and placard requirements for regulated material are intended more to prevent accidental misuse and/or handling than for recordkeeping or proof of receipt.)

Once the NOA-containing material is in the possession of the purchaser, it is their responsibility to provide adequate protection and training to the employees which handle the material. The end-use of the material is also the purchaser's responsibility at this point. They must insure they not only adhere to all OSHA, EPA, State and Local requirements during handling and transport, but also to their approved site specific Work Plan. The purchaser must also insure the material is approved by the regulating agency for its intended end use. Often the end use of the regulated material will managed by a third party where they would be in responsible charge of obtaining approval, permits, etc., for the materials end use and any required dust control strategies (capping, paving, etc.).

Resource owners and contractors have raised liability concerns regarding the sale and use of NOA materials. In some instances it is understood litigation may

already have been filed against NOA resource owners for the sale and use of NOA materials. This is a real concern that if not properly understood and addressed will impact the safe use of NOA materials and create unnecessary project costs. CERCLA Section 9604 provides for resource owner protection against naturally occurring hazards. Liability for resource processors and/or contractors can be addressed through their compliance with NOA program requirements. It is not possible to prevent all lawsuits and particularly frivolous filed cases. Therefore the effectiveness of the recommended NOA program to be developed will likely be tested legally and provide court interpretation and resolution of liability concerns.

Ambler, for example, is a unique case which would not completely comply with any of the existing 11 surfacing exemptions or the Construction, Grading, Quarrying and Surface Mining ATCM for California. While California's state NOA regulations are undoubtedly the most developed in the United States, it is unlikely the drafters/authors were required to take into account communities such as this. Had similar circumstances existed, certainly specific exemptions would have been established to address this. Alaska can look to, and even adopt, the California NOA regulations; however, scenarios exist in Alaska unlike anywhere else in the United States, and special provisions and/or exemptions will be a necessity of this future rule.

Examples of Liability

In the Swift Creek Washington case where NOA-containing Sumas Mountains would periodically experience landslides which flowed into the Swift Creek River where the material was dredged and staged along the shoreline to prevent flooding. There was no organization deemed the Responsible Party, and several federal, state and local agencies are currently involved in the Swift Creek NOA concern. It was determined that the EPA Superfund program had limitations on spending money on this type of cleanup because the material of concern was naturally-occurring. This makes NOA sites exempt by law from the EPA Superfund program, except where the material was moved by unnatural forces (ie construction, dredging). This caveat allowed the EPA to use funding to assist in the Swift Creek NOA concern.[60]

Libby, Montana, which has been declared an EPA Superfund site, has had ongoing federal cleanup efforts since 1999. In this case, processing mined vermiculite constituted the majority of the contamination; consequently, the asbestos was not viewed as naturally-occurring. In 2003, in a ruling issued by the District Court of Montana, the court said the mining company, W.R. Grace, was liable for costs related to the investigation and cleanup of asbestos contamination in Libby and ruled that the EPA's revised method for calculating indirect, or overhead, costs is appropriate and that those costs may be recovered from W.R. Grace. The ruling meant W.R. Grace was responsible to pay all of the $54.5 million in costs that the EPA incurred through December 31, 2001. Costs incurred after that date were to be resolved in future proceedings if disputed by

W.R. Grace. In May, 2009, W.R. Grace and three individual defendants were acquitted of criminal charges under the Clean Air Act alleging they conspired to conceal the health dangers posed by the contamination.[61]

NOA proposed for use

While NOA materials are known to be present in 20 of the 50 states, only a handful are moving ahead with implementing NOA regulatory control policies. Those states that have implemented NOA regulations have focused their programs on:

- Geologic mapping of "restricted" areas with materials likely to contain NOA
- Compliance level characterization of NOA free materials based on the limit of detection of less than 0.25% asbestos content
- Asbestos characterization sampling for use of materials from restricted areas
- Utilization Compliance Plan Submittal, Review and Approval
    - Source, transport route and work product
- Providing local authority to interpret program requirements site specifically and implement additional testing where necessary.
- Development of necessary program exemptions
    - area wide
    - regional

While education and training with regards to NOA exposure, work practices, and safe uses is key to any program, the submittal and approval of site specific compliance plans for approval by local authorities will insure the long term viability of an effective "living" program for that project's NOA.

NOA site specific work plan might note the availability and cost of NOA-free material as those affect project design options. Control technologies that eliminate or reduce exposure pathways might minimize individual project costs. The remoteness of many Alaska projects and absence of alternative transportation routes may require reasonable exemptions, based on a balance of benefits and risks.

Similarly, the concentration and variety of NOA will play a major role in determining the most cost effective control strategies. While federal regulations are indifferent to the form of asbestos, control methods for NOA should not be. Forms of asbestos that break apart and easily become airborne should be held to a higher standard than those which are tightly bound within a rock matrix. This highlights the importance of developing a consensus standard as well as mapping and sampling efforts to properly characterize specific asbestos materials present as well as the risk. The authors recognize this may be quite difficult in practice, but certain broad guidelines are possible and these may help project planners and designers.

NOA in place - control technologies

NOA control methods should start with the least expensive options first. In general terms there are four control methods: education, wetting, palliatives, and capping.

By itself and together will all the other control methods educational outreach to the staff, industry and general public regarding the hazards and methods of controlling or avoiding airborne dust is almost always advised. Outreach such as encouraging implementing speed controls and restrictions on vehicle use in sensitive areas (i.e., near schools, hospitals, and residential areas) and modifying life style habits to reduce personal exposure are all worthy of consideration.

If a road base lacks adequate drainage, the embankment will be weak and the effectiveness of dust control measures will be limited. Reconstructing unpaved roads to provide good drainage and a solid base is needed for dust palliatives, capping with clean material, or paving to be effective. If the road soils are of poor quality, geotextiles may be a feasible option to add support to the road surface. According to Succarieh,[54] expert professional advice about the road is often needed. The ADOT Local Technical Assistance Program (LTAP) may assist As part of the educational program it is recommended that the ADOT LTAP enhance their NOA knowledge and resources for distribution.

If sufficient equipment and manpower is available, watering roads during high dust periods should be performed; however, this is a short-term effective method of dust control and more long-term control methods should be investigated. Historical monitoring data illustrates that high dust generation rates are greatest during the two-month period following breakup, therefore, short term control measures like watering can provide limited benefits if impacted communities have access to watering equipment.[54]

Another control technology is application of dust palliatives. In order to obtain the greatest benefits from the application of dust palliatives, site-specific investigations of local traffic and soil is required. Investigations should begin with an assessment of the soils used to construct and surface the unpaved roads. The ADOT's LTAP, may assist rural communities with technical assistance and/or training on proper techniques for soil analyses useful in the palliative selection process. [54]

Some deliquescent salts and/or synthetic polymer products may provide adequate levels of dust control on unpaved roads. Again this depends heavily on the soil and traffic conditions in the respective community. These products have been tested in several locations in Alaska and have been demonstrated to provide varying control of dust emissions. Because the successful use of these products is dependent upon a number of factors that vary from community to

community, pilot tests of selected products for a summer season should be undertaken in affected communities before community-wide application is pursued. [54]

Contractor Feedback

Approximately 150 contractors in California who likely encounter NOA were contacted via email and asked to provide general feedback regarding associated California regulations. The email contained 5 basic questions in combination with a short narrative explaining the purpose of the inquiries. Only one of the contractors contacted replied, with limited applicable information. This contractor expressed the following when asked about their opinion on the California NOA regulations:

> *For the most part, the measures taken are reasonable and consist of greater than normal dust control through the use of more water on grade during earth moving operations and trenching.*

The contractor explained equipment "wash systems" are routinely utilized for decontaminating equipment prior to leaving a NOA site. Another precaution was capping the native material with either a hard surface (concrete, asphalt, ect) or "clean" soil. The thickness of the cap varies depending on the perceived threat of the asbestos, and when soil capping is used it is underlain with a warning fabric to prevent excavations being made into the NOA at a later date.

This contractor did not have certified asbestos workers on staff to perform the removal/handling of hazardous materials such as NOA. They stated their employees are trained to look for hazardous while work is being performed, and if material is encountered which may be hazardous it is either avoided or remediated by a qualified contractor. The following quote explains their route of action if hazardous materials are required to be abated:

> *When we do have a situation develop where hazardous materials are present and they need to be remediated then a proper contractor is brought into service under contract with the property owner keeping us out of the loop.*

To close, the contractor states the NOA regulations in California are not "unbearable" but do add additional costs to affected projects.

Future and Plan of Action

The regulatory authority utilized in the states evaluated included a state-wide program that was implemented across at the local, county level. Typically, multiple disciplines are involved including health, environmental and air pollution control divisions of the regulatory authority.

To date the Alaskan documented experiences in Juneau, Dalton and Ambler all involved transportation projects. Fortunately, once identified they were handled appropriately with additional assessment, training and work practice and product use modifications, each demonstrating once it is known, the NOA material can be safely used. However, while the experiences may not have resulted in any significant human exposures, the late identification resulted in changed conditions and costly non-competitive contract modifications. While NOA encounters in Alaska have been comparatively limited, the need for implementation of a state-wide NOA policy is reinforced by the lengthy, problematic and consequently expensive circumstances that have occurred due to lack of standard operating procedure and/or regulatory guidance. Road and pipeline pad construction and maintenance have and will be the largest future use of gravel resources. For these reasons it is recommended and appropriate for ADOT to take the lead in the further evaluation and development of NOA strategy alternatives and program development. It is anticipated and recommended that ADOT develop internal NOA operations and maintenance (O&M) and design standards for ADOT projects. For maximum effectiveness the department's internal policies and SOP for NOA should reflect a statewide, industry and regulatory consensus. These NOA standards will involve awareness education, resource characterization, acquisition, use as well as required training and development of design requirements, contractor's work practices and O&M practices.

It is readily apparent that the NOA concerns go well beyond the ADOT areas of responsibility involving all aspects of the local people, resource use and community. As demonstrated by other states moving to address NOA issues, a more holistic approach to NOA should involve public health, worker, community and environmental protection advocacy. The existing Alaskan "dust working group" comprised of regulatory and government stakeholders appears as a natural technical committee that could be expanded to include industry and be instrumental for the technical information exchange, development of a statewide NOA strategy(s) consensus and facilitate with the implementation of a successful statewide program.

Clearly the ADOT needs an SOP that that tells ADOT planners, designers and operators how to handle NOA, and this SOP will certainly call for a specific plan for each project. However in order for the SOP to be successful, it must be acceptable to all relevant state and federal agencies, and acceptable to all other stakeholders, such a contractors, materials site owners, and affected communities. Thus the first step is for the ADOT to formulate a NOA Action Plan to solicit comments and advice from all stakeholders, develop drafts of the SOP, circulate drafts to all stakeholders, and present the drafts to all stakeholders.

Working Group

Through the development of the NOA Action Plan (AP) the professional and technical issues can be resolved by the stakeholders working group and applied

with state conditions to existing programs developed elsewhere to develop an Alaskan specific program consensus and AP. It is recommended that the working group be comprehensive in make up and include all interested parties or stakeholders. Representatives from government, community and industry should be included. The following is considered a minimum list of known stakeholders that we recommend ADOT consider and include in forming a statewide stakeholder working group.

- BIA
- Alaska Geological Survey
- Denali Commission
- EPA
- ADOT
- ADEC
- DHSS
- Alaska Native Tribal Health Consortium.
- Alaska Tribal Air Call
- Denali Pipeline
- Alyeska Pipeline
- Native Corporations
- Village corporations in areas with NOA
- Community Health Consortium

Coordinating the working group and developing an NOA AP to achieve the goals and targets of these recommendations will require significant commitment and change in operational, management, building and behavioral practices at all levels of agencies and state government. For the AP to be successful, it must have both long term overarching goals and short term, manageable and achievable actions that have short delivery timelines. The statewide working group of stakeholders will be important to providing the forum for technology transfer, alternative strategy consideration, program development and successful implementation of the consensus achieved.

Work of the Working Groups

ADOT's initial working group purpose and scope of work should be fivefold:

- Inform stakeholders on NOA background and needs and solicit participation;
- Define existing NOA control strategies in use;
- Brainstorm actions that best meet all NOA stakeholders unique needs and objectives;
- Develop a Statewide government, industry and community NOA SOP
- Meet and present the SOP to all stakeholders
- Finalize the SOP and develop an example of a site-specific plan for Implementation

How to begin

The California regulations and EPA guidance are a good beginning to any NOA SOP. With some cut and paste and modification for remote projects and Alaskan conditions, those documents could form a draft of the SOP. However caution is needed to not present these or any document to the agencies as a fait accompli. Rather, all stakeholders, especially the relevant agencies, need to help ADOT define the issues and insure the final SOP does not conflict with the charge of any of those agencies

CONCLUSIONS AND RECOMMENDATIONS

This paper reviews NOA background, analytical issues, policies and regulations that have been considered and/or implemented by other authorities involved with NOA and have developed NOA policy options. Based on the analysis of the findings the following conclusions and recommendations have been developed.

- NOA gravels are present throughout the nation and in Alaska which have the potential to impact public health, project development and associated costs.
    - Transportation projects have been adversely impacted by NOA in Juneau, Ambler and on the Dalton Highway.
    - Material site investigations must check for NOA, especially in regions with mineral types likely to contain NOA.
- NOA gravels can be used safety with proper training, understanding and implementation of appropriate control strategies and technologies
    - Technical and regulatory interpretation and definitional issues remain
- Established state NOA programs evaluated have focused their programs on
    - Geologic mapping of "restricted" NOA areas
    - Characterization of NOA free materials based on the analytical procedure's limit of detection of less than 0.25% asbestos content
    - Source characterization sampling from restricted areas
    - If ≥0.25% asbestos, Compliance Plan Submittal and Approval should be required
    - Local authority enforcement to interpret program requirements site specifically and implement additional testing where necessary
    - Development of necessary program exemptions
    - States with NOA programs were developed across public health, environmental and air pollution divisions at the state level and implemented at the local, county level.

It is recommended that ADOT write an action plan to undertake development of a NOA SOP as the lead coordinating entity of a holistic statewide approach that involves all stakeholders and develops a statewide agency, industry and community consensus standard for NOA use. In order to do this, the ADOT should convene a statewide stakeholder's working group to resolve technical issues, work out a consensus on a state wide NOA program.

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Exposure Investigation
Final Report
June 28, 2007

Ambler Gravel Pit
Ambler, Alaska

Exposure Investigations and Site Assessment Branch
Agency for Toxic Substances and Disease Registry

Executive summary

At the request of the Tribal Environmental Department of the Maniilaq Association ATSDR performed an exposure investigation in the City of Ambler, Alaska to determine if riding all terrain vehicles (ATV) on gravel roads lead to significant asbestos exposures for riders and pedestrians along the side of the road. Sampling design and methods included the use of personal air samplers attached to ATV riders while riding 2 ATVs in tandem on a designated section of the airport road. Sampling also included stationary monitors, reference stations, and respirable dust measurements.

The findings indicated:

- Dust levels of health concern
- Asbestos levels of health concern
- ATV riders trailing another ATV are most exposed
- Pedestrians are exposed to asbestos and dust levels of health concern
- Reference sampling indicated airborne asbestos in the community but at a level of risk not likely to be a public health concern
- Asbestos was found in the gravel supplying the roads in Ambler and is suspected of being the major source of road generated asbestos

ATSDR is recommending:

- All access to the gravel pit that supplies road gravel should be closed.
- No gravel from the pit should be used on roads.
- Short-term and long-term solutions to road generated dust and asbestos needs to be developed by appropriate federal, state, city, and tribal governments
- A barrier with clean fill should be put in place where children come into contact with contaminated soil
- Education efforts and material should be developed that target the community and health care workers.

Introduction

Ambler is a city in Northwest Alaska located on the Kobuk River. It is located approximately 40 miles north of the Arctic Circle and 120 miles east of Kotzebue Sound. The 2000 census lists the population as 309. Ambler is located at 67°5'6"N, 157°51'37"W and according to the United States Census Bureau the city has a total area of 10.8 mi^2 (see Figure 1).

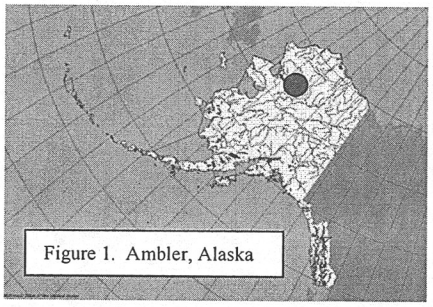

Figure 1. Ambler, Alaska

Francis Chin with the Tribal Environmental Department of the Maniilaq Association originally contacted Richard Kaufmann, Senior Regional Representative, ATSDR Region 10 about asbestos concerns in the City of Ambler, Alaska. Mr. Chin stated in a letter to Mr. Kaufmann that the Maniilaq Association, as the region's health provider, was concerned that the gravel pit that supplies the gravel for the city roads was recently found to contain asbestos. Mr. Chin was particularly concerned about the entrained airborne particulates, including asbestos, arising from roads that are heavily traveled on by "4 wheelers", or 4 wheel all terrain vehicles (ATVs). He was also concerned about funding and indicated that the tribe or City of Ambler had no means to fund a testing project. ATSDR proceeded to contact the Mayor of Ambler and discuss the situation with the city and city council. The city was also primarily concerned with the use of ATVs and the dust they generate in the summer months. Upon review of the data showing the gravel pit contaminated with chrysotile asbestos and review by ATSDR's exposure investigation group, ATSDR agreed to perform a limited exposure investigation of airborne asbestos generated by ATVs driving on contaminated gravel within the City of Ambler.

ATSDR, in collaboration with the EPA's Las Vegas Emergency Response Team designed an activity-based sampling protocol to examine the impact of driving ATVs on roads on the level of asbestos in air. It should be noted:

1) The sampling plan was not designed to examine the extent of contamination within the community or to determine if the soils of yards and public areas contained asbestos.
2) The sampling plan was not intended to determine the "safety" associated with digging and construction activities

for numerous projects within the city (including sewer and water upgrades, lagoon repair, and the building of laundry facilities).

Sampling was performed in a manner to best estimate exposures from air during ATV riding, walking beside the road as an ATV passed, and a one-time reference level in the community. Soil sampling was performed only to determine the presence or absence of asbestos and the extent of contamination and to examine the types and size of fibers that may become airborne.

How ATSDR investigated asbestos in Ambler

We designed an investigation that required both air sampling and soil sampling. Air samples are needed to determine the amount of asbestos present in air that can be breathed in by residents of Ambler, and soil samples are needed to determine the extent of asbestos contamination and fiber morphology (size and mineralogy) present for suspension in air.

Air samples	To determine asbestos air levels air samples were collected in three different areas during three different testing periods. The three areas included: 1) ATV riders. Air samples were collected using personal pumps on 2 ATV riders. One rider trailed the other rider during the sampling to be exposed to dust kicked up from the front ATV. Sampling began at the intersection of Redstone Ave and Zane St. and proceeded NW and back for a 2 hour period (see Figure 1). Riders wore personal pumps and air sampling filters; in addition a Data Ram for detecting total particulates was attached to the trailing ATV (see Figure 2); 2) Areas beside the road during ATV riding. Four stationary air monitors were placed at 0, 333, 666, and 1000 meters along the downwind side of the road. These monitors simulated someone walking down the road as ATVs passed by; and 3) Monitors were placed at 4 locations in the community not directly affected by the ATVs on the road. These monitors provided an estimate of exposures in the community and indirect (blowing dust, tracking dust, etc.) exposures from the road. For greater detail on sampling see Appendix F. To determine total respirable dust levels a Data Ram was

	mounted to the trailing ATV and collected continuous readings of PM10 levels during all activity-based sampling.
Soil samples	Soil samples were collected along the route of activity based sampling (ATV riding) and at the school yard. To prevent biasing the sample locations a computer program randomly selected soil samples along the activity-based sampling route. Samples from the school yard play area were selected to cover all major areas of the play area.

Figure 1

How were the samples analyzed?

Soil samples. Soil samples were analyzed using a method being developed at EPA and MVA Scientific Consultants. This method was employed because the method is more sensitive than other methods and because this method leaves longer fibers intact, as opposed to methods like the California's Air Resources Board method 435 that requires grinding the sample. The method, referred to as the "Comprehensive Soil Method" is described in Appendix A.

Air samples - asbestos. Air samples were analyzed using the International Standards Organization method 10312. The method modification to count fibers with aspect ratios $\geq$ 3:1 was used. This method employs transmission electron microscopy that allows counting of short and thin fibers and captures information about mineralogy and fiber size for each fiber. This is the most sensitive method available and allows ATSDR to examine those fibers that are the most toxic in its analysis.

Air samples – dust. Air samples were collected to measure PM_{10} (particulate matter that has a diameter of 10 μm and less). Testing was performed with a Data-Ram particulate sampler and calibrated to report PM_{10} particulates. The Data Ram was mounted on the trailing ATV in all activity-based sampling events.

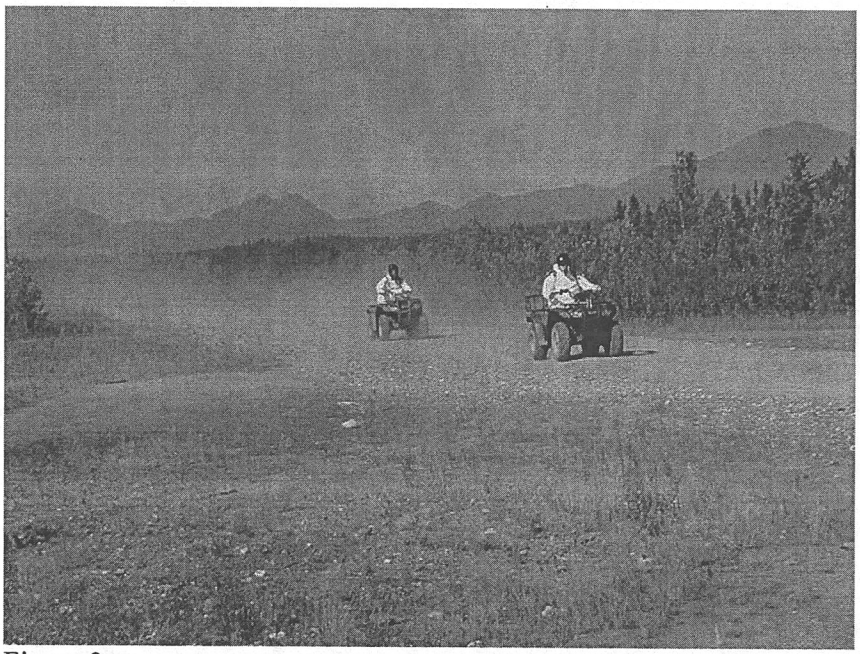

Figure 2.
Activity-based sampling on ATVs. Personal monitors are worn by both riders to collect air samples. Data Ram is attached to the rack on the trailing (green) ATV.

Findings

Soil

Eleven composite soil samples were collected. Seven composite samples were collected along the road (21 discrete samples) and 4 composite samples from within the play area at the local school. Soil samples collected on the road were randomly spaced using sampling software to pick the locations (10). Sets of three collection areas were combined to provide a composite sample. A total of 7 composite samples from the road were analyzed and 4 composite samples from the school yard playground. Samples were analyzed using the Comprehensive Soil Method described in Appendix A. All samples showed chrysotile asbestos with aspect ratios indicating the presence of numerous short fibers and very long fibers (see Table 1). Fibers > 5 um in length are the fibers that are counted for risk purposes while even longer fibers are suggested to be the most toxic. Soil samples demonstrate the presence of long fibers in Ambler but do not show their ability to become airborne.

Sample		% asbestos (weight basis)	Aspect ratio	
			Low	High
Road	1	1.3	3:1	750:1
	2	0.5	2.5:1	100:1
	3	0.5	2:1	90:1
	4	0.6	2:1	53:1
	5	0.6	3:1	800:1
	6	0.5	3:1	37.5:1
	7	0.6	2:1	250:1
Play area	1	0.009	2:1	90:1
	2	0.7	9:1	130:1
	3	0.5	2:1	250:1
	4	0.7	4:1	150:1

Table 1 – The 7 sampling locations on the road were randomly generated (see Appendix A). Samples locations in the play area were selected by accessibility and areas where children played. Asbestos in soil was determined by the procedure reported in Appendix A. All values are reported as a percent weight of the total (all fractions combined). Aspect ratios are a measure of a fibers length to width. Very high aspect ratios indicates long thin fibers. Fibers found in Ambler soils ranged from very short to very long.

Soil samples cannot be used to estimate the risk of contracting an asbestos related disease. They are, however, useful in showing the extent

of contamination, the type of asbestos present (mineralogy), and with the Comprehensive Soil Method some understanding of the morphology of the asbestos that can become airborne.

Ambler soil data indicate widespread asbestos contamination of chrysotile asbestos containing many long thin fibers.

Air -asbestos

Background measurements – True background measurements would require months of sampling under various meteorological conditions at several locations throughout the city. That was not performed here due to time and cost restraints. We collected samples approximately 100 meters from where activity-based sampling was being performed at three separate locations during each of the three sampling events. ATSDR also collected high volume samples at 5 locations throughout town during one morning when no activity-based sampling was being performed. These samples, from all 4 events, are used here as a surrogate for long-term background studies.

Activity-based sampling – Activity based sampling comprised riding ATVs along a 1000 foot section of road on the edge of town. Air monitoring for asbestos was conducted at stationary monitors along the road and with personal pumps on the riders of the lead and trailing ATV. In addition to asbestos measurements dust measurements (PM_{10}) were made on the trailing ATV.

Stationary monitoring.

These samples were collected along side the road while activity-based sampling on ATVs was being conducted. All samples were collected on the downwind side of the road. These samples would simulate exposures to someone walking along side the road as ATVs passed by. Samplers were stationed at 4 points along the 1000 ft of road; 0, 333, 666, and 1000 ft. The 0 and 1000 ft samplers were at the ATV turn around points.

Stationary samples were largely overloaded with dust preventing asbestos measurements on many of the samples. The average asbestos concentration during ATV riding beside the road was 0.212 f/cc. This is a conservative estimates (exposure levels may actually be lower) because the value reflects both direct and indirect analysis. It is well documented that indirect analysis can lead to analytical errors (1). Quite often an indirect analysis breaks up asbestos structures and results in reporting higher numbers of fibers than would be seen with the direct analysis. The indirect method is required when filters are overloaded to dilute the material on the fiber so counting can be performed.

Lead ATV sampling – ATV riding proved to be extremely dusty (see discussion on dust). Dust overloaded the majority of samples to the degree that even the indirect method was not possible. Two samples were able to be analyzed. The average of the two samples was 0.051 f/cc for the lead ATV. This seems to be a reasonable value in that the lead rider, and sampling pump, was usually clear of the major plume of dust being generated by the 2 ATVs. One would expect the exposures on the lead ATV to be less than those beside the road (0.212 f/cc) or that of the trailing ATV (too overloaded to count).

Trailing ATV sampling – No samples were able to be evaluated in the trailing ATVs due to severe dust overloading. Based upon personnel observation and the dispersion characteristics of road dust (4) one would expect exposures on a trailing ATV to be much higher than those collected statically along side the same road. Since the stationary samples showed an average asbestos concentration of 0.212 f/cc one would expect the trailing ATV rider to be exposed to >0.212 f/cc

Air – Dust sampling during ATV riding

Dust - Dust levels were tested in Ambler during activity-based sampling and the following day for comparison purposes. [Note: this document refers to the data collected during no activity as either a surrogate background value or a background value. It should not be considered a true background value because determining such would require testing over several months. However, in this case the surrogate value is believed to be a reasonable estimate of background.] Testing was performed with a Data-Ram particulate sampler and calibrated to report PM_{10} particulates (particles that are 10 µm in diameter or less). Results indicated an average particle diameter of 3.8 µm and an average dust level of 5248 $\mu g/m^3$. Testing results are shown in Table 2 below.

Table 2

Date/time	Type of sampling	Average diameter µm	Average air Concentration ($\mu g/m^3$)
Aug 16, 05 / 14:47	Activity-based	3.7	4260
*Aug 17, 05 / 9:07	Activity-based	3.3	43
Aug 17, 05 /12:48	Activity-based	3.9	6235
Aug 18, 05 / 9:32	Background	0.5	376

* The instrument failed 12 minutes into the sampling event. This data point was not used in calculating averages.

Discussion and Conclusions

Dust	Dust from roadways is a major concern in Ambler. Dust is prevalent during most hours of the day as ATVs continuously travel back and forth across the town. Dust is found on surfaces of all public areas and is a major complaint of residents. This investigation includes dust because dust can both cause adverse health effects and exacerbate the health effects caused by other inhaled substances such as asbestos. Exposure to high dust levels can result in a number of complex lung reactions as well as increase the adverse health consequences of exposure to toxic fibrous particulates such as asbestos. High levels of dust can result in "dust overloading" of the lungs leading to a number of lung reactions. Alveolar macrophages play a key role in the clearance of particulates (including fibers) from the lung. Under high dust loads alveolar clearance rates are reduced causing particulates to reach the interstitium. The particulates interact with macrophages releasing factors that can stimulate fibrosis. Particles sequestered by macrophages may also remain in the lungs because of increased half-life of macrophages in the lungs (2,3). Overloading also leads to pulmonary alveolar proteinosis, a disorder of lung surfactant that can be life threatening. Because of the compromised function of the lungs from dust overloading asbestos fibers cannot be cleared as readily and any asbestos exposure is likely to have an increased likelihood of causing disease. The extent of this possible increase in disease is unknown. Average dust exposure while operating ATVs in this investigation showed an average dust concentration of 5,248 $\mu g/m^3$. Estimates by citizens of Ambler (Robinson, personnel communication) indicate that during the long light hours of summer months individuals will ride ATVs up to 8 – 10 hours per day. The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) publish exposure guidance values for non-regulated particulates (sometimes referred to as nuisance dusts or "inert" dust). These values are for healthy workers and are not appropriate comparison values for communities where sensitive or susceptible individuals (e.g., elderly, young, people with pre-existing disease, asthmatics) may be exposed. They are included here strictly for comparison to the workplace and as unacceptable community exposure level. The EPA publishes a reference value in the

National Ambient Air Quality Standards (NAAQS) for particulate matter 10 μm in size and below (PM_{10}) that includes more sensitive individuals and is more appropriate for the Ambler community. The NAAQS value listed in Table 3 is for exposures of up to 24 hours in length and that are not to be exceeded more than once per year on average over 3 years. Other agency/institution values are listed in Table 3.

Agency/Corp	TLV /Reference value (mg/m^3)	Ambler – Activity based (mg/m^3)	Ambler – no activity (mg/m^3)
NIOSH	15 total	Only PM10 measured	Only PM10 measured
	5 respirable	Est. 2.6	0.376
ACGIH	10 inhalable	Est. 4.5	
	3 respirable	Est. 2.6	
EPA	0.15 total (PM10)	5.2	0.376

Table 3. Table compares reference values to Ambler activity-based samples and no activity samples. Respirable refers to the size fraction of particles that can reach the gas-exchange region of the lung. Inhalable particles reach upper respiratory tract. In general inhalable (larger particles) are less likely to reach the gas-exchange region of the lung and are therefore less likely to cause a toxic response than respirable particles.

For comparison purposes Ambler levels had to be estimated in some cases to the equivalent reference value level (respirable or inhalable). This was accomplished by using the particle's aerodynamic diameter and the mass percent charts in reference 3.

The dust data indicate that dust levels exceed EPA PM10 recommendations by more than 30 times during ATV riding and are approximately 2 times the recommended level during background activities. Dust levels approach workplace guidelines. Ambler dust levels are considered a public health hazard for the community.

Reference samples	The average asbestos level of all the reference samples ("background" samples) collected during activity-based sampling was 0.007 f/cc (computed as phase contrast microscopy equivalent [PCMe]; fibers ≥ 5 μm in length and >0.25 μm in width. All fibers were chrysotile. The average of the high volume sampling was 0.023 f/cc PCMe.

	Unfortunately, the high volume samples were over loaded with dust and required an indirect analysis of the samples. This may account for the discrepancies between high volume sampling and other background measurements. To examine the risk associated with breathing background levels an average of all samples was taken. This resulted in a asbestos level of 0.012 f/cc. Assuming snow coverage from October 15 to May 1 and a 24 hour per day exposure during non-snow covered days and a 60 year exposure a resulting risk of 1×10^{-4} would be estimated (See Appendix B). A 60 year exposure is used because the population of Ambler appears to be fairly stable. This is a conservative estimate because it uses the air values from indirect sampling in computing the mean and assumes no time spent indoors, where levels of most environmental contaminants resulting from an exterior source are usually much lower.
Activity-based scenarios	Unfortunately the severe dust conditions caused overloading of the majority of activity-based samples. However, enough samples were able to be analyzed to draw some broad conclusions and calculate risk for several scenarios (see Table 3).

Scenario	Activity Level	Exposure f/cc PCMe	Integrated Risk Information System (IRIS) Risk
"Background"		0.012	1.1E-03
Lead ATV rider	High	0.051	1.6E-03
	Low	0.051	3.9E-04
Trailing ATV rider	High	>0.212	>1.2E-03
	Low	>0.212	>1.2E-03
Walking	High	0.212	1.2E-03
	Low	0.212	4.0E-04

Table 3

Stationary monitoring

These monitors were placed beside the road to monitor exposures to an individual walking beside the road. The monitors were placed downwind to simulate a worse case. Two walking scenarios (1/2 hour walking/day and 1.5 hours walking/day) were computed. ATSDR noted many people walking in the Ambler community and people walking as far as the airport (approximately 1.5 miles). At the time of the visit there was a gasoline shortage so it is unknown if these walking

	patterns were typical of days when gasoline is not in short supply. The values used here represent the low end of walking durations but assume that not all time spent walking is spent in the dust plume of an ATV. Walking for 1.5 hours per day represents an increased risk of developing asbestos induced lung cancer/mesothelioma of 1.2 x 10^{-03} (or 1.2 in 1000). Walking ½ hour per day results in an increased risk of 4.0 x 10-^{04} (4 in 10,000). Both of these scenarios exceed the EPA's risk range that is commonly thought of as an acceptable range of risk to the community (1 x10^{-04} to 1 x 10^{-06}; or 1 in 10,000 to 1 in 1,000,000). *Lead ATV riders* Lead ATV riders were exposed to an average of 0.051 f/cc. A rider exposed to this asbestos level for 8 hours a day, 168 days/year, for 60 years would have an additional risk for developing mesothelioma and lung cancer of 1.6 x 10^{-03} (or 1.6 in 1000). A rider who only rides 2 hours per day would have a risk of 3.9 x 10^{-04} (or 3.9 in 10,000). Both of these scenarios exceed the EPA's risk range that is commonly thought of as an acceptable range of risk to the community (1E -04 to 1E-06; or 1 in 10,000 to 1 in 1,000,000). *Trailing ATV riders* Because of dust overloading on filters no samples could be analyzed for trailing ATV riders. Trailing ATV rider exposure should exceed both lead rider levels and stationary monitors (dust/asbestos disperses from the riders as it moved toward the stationary monitors). Lead riders would be expected to have less exposure to dust/asbestos than the stationary monitors because for the most part the lead rider is constantly moving into less dusty air (one exception is the two turnaround points at both ends of the course). Trailing ATV riders would be expected to exceed the stationary monitoring risk of 1.2 x 10^{-03} (1.2 in 1000) because the trailing ATV rider spent more time in the dust plume and because the dust concentration is the highest directly over the road (4). Trailing ATV riders are most likely the highest exposed of all the activity-based sampling scenarios. Accurate levels of exposure could not be determined but are considered a public health concern.

Smoking	Many researchers have examined the effects of smoking on the development of asbestos-related disease; particularly bronchogenic carcinomas also known as lung cancer. Hammond et al. (5) performed a study in which age-standardized mortality ratios were examined. The mortality ratio for nonsmoking asbestos workers is approximately 5. The ratio for smokers not exposed to asbestos is approximately 11. This means nonsmoking asbestos workers have 5 times the rate of lung cancer that workers not exposed to asbestos have; and smokers have 11 times the rate of lung cancer as nonsmokers. When Hammond's group examined workers that both smoked and were exposed to asbestos they found a 53 fold increase in lung cancer. This is much greater than would have been predicted by simply adding the two rates together. Several other researchers have found similar effects but not to this magnitude (6,7,8). The large increase in cancer when asbestos exposure and smoking are combined indicates something important is occurring physiologically. There are many theories as to why this is happening. Perhaps one of the more compelling explanations is that smoking stops or slows clearance of asbestos fibers from the lung. This is particularly important to the community of Ambler for a couple of reasons. • Many of the villages in the Ambler area have very high smoking rates, some as high as 50% (9). The rate of smoking in Ambler is not known but personal observation suggests it is much higher than in the U.S. general population. • Dust overloading of the lungs can also decrease clearance and thus could also exacerbate asbestos effects. It has been shown earlier that Ambler has high dust levels in the village's air.

Recommendations

- The gravel from the Ambler gravel pit at the end of the airport road should not be used for road gravel or in any manner that leaves it exposed to the air (buried or in a solid matrix where exposure to asbestos/dust is eliminated may be acceptable).
- The gravel pit should be marked as a hazard and trespassing prevented. A marked barrier at the end of the road would be minimally acceptable.
- A short-term solution for asbestos/dust suppression from the road needs to be implemented. Frequent watering is a possibility for a short-term solution. A good water supply is available, the Kobuk River. Unfortunately the proper watering equipment was not available to the city and is expensive. There may be some ability to modify existing equipment to provide a viable short-term solution. There are other dust suppression technologies that should be explored through engineering consultants.
- A long-term solution to asbestos/dust suppression needs to be developed. This will require the cooperation of many state, local, and tribal governments and engineering groups to devise a solution.
- The school yard needs to have a barrier applied and asbestos free material placed on top of the barrier
- Education material should be provided to the community about asbestos and its health effects. Along with this material education on the importance of proper cleaning of homes for dust/asbestos control needs to be provided to the community. The importance of smoking cessation needs to be a central message to the community.
- ATSDR should, in cooperation with local health care (the Maniilaq Association) devise an health care provider education program that includes reference materials, education materials, and if needed, presentations by ATSDR physicians. Information on the adverse synergistic effects of smoking and asbestos in the development of lung cancer should be provided to the community along with materials and information on how to stop smoking.

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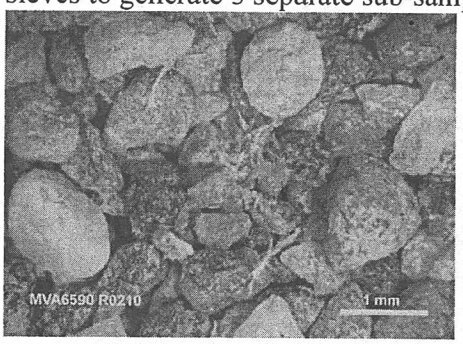
Atlanta, GA

Appendix A --- Comprehensive Soil Method and Random Sampling Points.

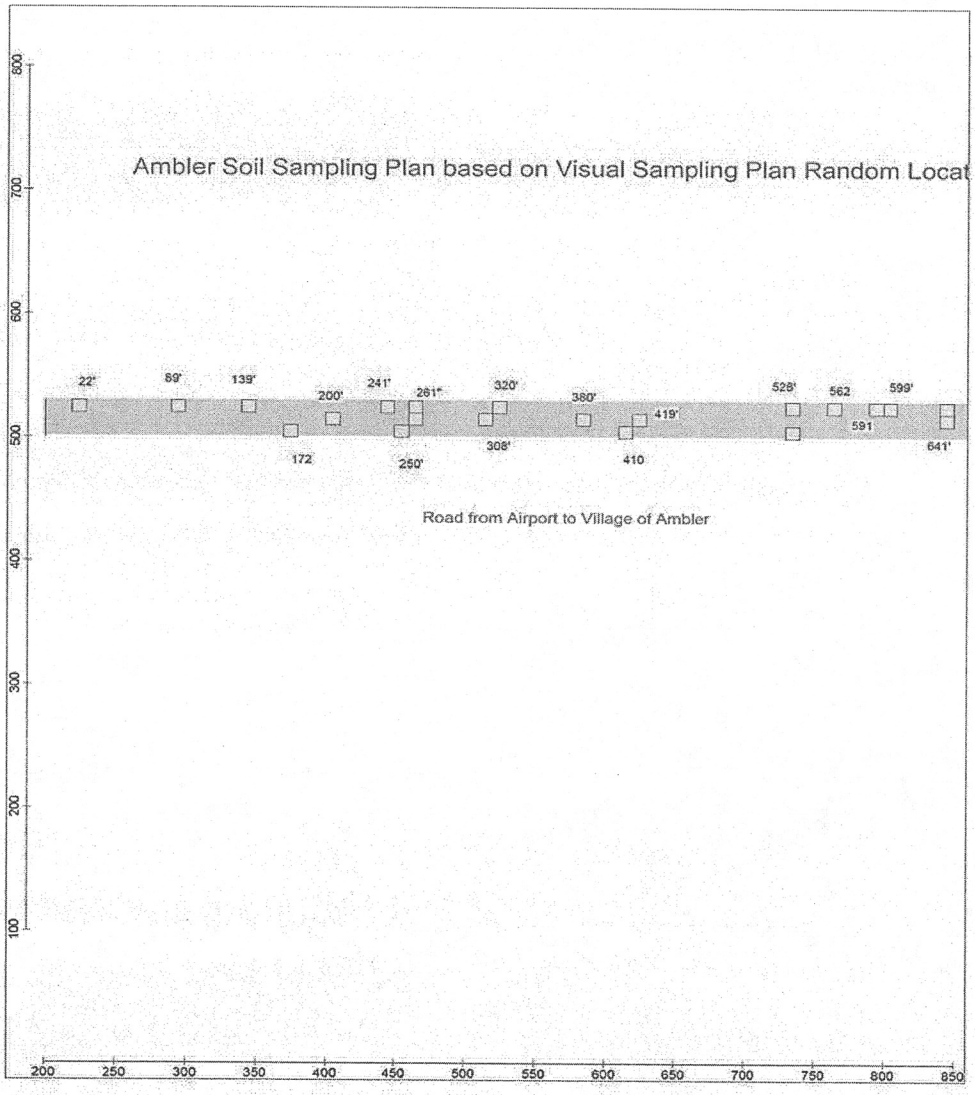
A new method that combines the preparation procedure of wet sieving used in an EPA Region 1 method with polarized light microscopy (PLM) and transmission electron microscopy (TEM) from other soil methods is being developed between Region 8 EPA and MVA scientific consultants. The method involves sieving with 1 mm and 300 μm sieves to generate 3 separate sub-samples for analysis. The coarse fraction (>1 mm) is analyzed by stereomicroscopy and PLM. The intermediate fraction (1 mm to 300 μm) is analyzed by PLM. The TEM analysis usually only occurs if no asbestos is detected by PLM in the 3 fractions. The Comprehensive Soil Method has been tested and shown to be sensitive at levels of asbestos in soils below 0.1%. Information about fiber aspect ratio and size is collected during the PLM and TEM analysis. The results of the analyses of the individual fractions are combined to form one result per sample by weighting the results for each fraction based on the proportion of weight of each fraction. For example, a hypothetical sample with a total weight of 6 grams that has results of: Coarse fraction – 2% in 2 grams, Intermediate fraction of 4% in 3 grams and Fine fraction of 1% in 1 gram would yield a weighted average asbestos percentage of 2.8% ((2x2 + 4x3 + 1x1)/6).



ATSDR selected this method because it:

1) has a low detection level
2) leaves long fibers generally intact (especially compared to CARB 435)
3) gives some idea of the size distribution in the sample

TEM image of chrysotile in the fine fraction of Ambler soil.



Random sampling of soils from the airport road was performed along the activity-based sampling route. Random points were selected using Visual Sampling Plan software (10). Sampling points are represented by squares.

Appendix B – Assumptions and calculations

Assumptions and calculations.

Because ATSDR was asked "what is the risk of being exposed to asbestos from riding ATVs in Ambler?" we looked at this one scenario along with limited surrogate background data. These calculations do not consider the added risk of performing other tasks in Ambler such as digging up streets for projects, working outdoors, playing at the school, etc.

Assumptions			Reference
Unit Risk for lifetime exposure	0.23cc/f		1
Number of days/year with no snow cover	168		2
Number of hours /day riding ATV	High	8	3
	Low	2	
Number of hours/day walking on road	High	1.5	4
	Low	.5	
Number hours/day exposed to background	24 – (event duration)		
Number of years spent in Ambler	60		5

1. From EPA IRIS file. Represents the combined risk of getting lung cancer and mesothelioma from a lifetime (70 years- 24 hours/day) exposure. Less than lifetime exposures are estimated here and adjusted to a lifetime exposure. Technically a unit risk should be calculated for each exposure period because of the models used to calculate the lifetime unit risk. Since that was not possible using the IRIS database less than lifetime exposures are estimates.
2. Interviews with citizens of Ambler suggested snow cover in Ambler from October to mid-May. However some citizens noted that in recent years the weather has warmed and snow cover does not occur for as long a period of time. This observation would be consistent with meteorological data. Therefore the assumption used here assumes snow cover from mid-October until the first of May or 168 days of no snow cover per year.
3. Interviews with citizens of Ambler suggested that in summer months of no snow and long days some individuals would ride ATVs up to 8 hours/day. This was not observed while ATSDR was in Ambler, but the city had a gasoline shortage. A low estimate of exposure was 2 hours/day with the mean expected to be closer to the low estimate.
4. This was based on observation and the distance to the dump, cemetery and airport. Several people were observed walking in Ambler.
5. The population of Ambler was considered extremely stable with most people spending the majority of their lives in Ambler. The effects of immigration and emigration on asbestos risk were not included here.

Risks were calculated using the following equation:

$$Risk_{lung_cancer\&meso} = [asbestos \frac{f}{cc}] * (unit_risk) * (duration_{adjusted})$$

where:

$[asbestos \frac{f}{cc}]$ = The average concentration of PCMe asbestos fibers in air reported as fibers per cubic centimeter. PCMe is defined as particles that have an aspect ratio ≥ 3:1, > 5 μm in length, and > 0.25 μm in width.

(unit_risk) = risk for a continuous lifetime exposure to asbestos as reported in the EPA IRIS file. www.epa.gov/iris Unit risk = 0.23 per f/cc

$$duration_{adjusted} = \frac{hrs}{day} * \frac{day}{24hrs} * \frac{days}{yr} * \frac{yr}{365days} * \frac{yrs_in_ambler}{70yr_life}$$

Appendix C --- General Asbestos Information

Asbestos and asbestos-related health effects

Asbestos is a general name applied to a group of silicate minerals consisting of thin, separable fibers in substantially parallel sides. Asbestos minerals fall into two groups, serpentine and amphibole. Serpentine asbestos has relatively long and flexible crystalline fibers; this class includes chrysotile, the predominant type of asbestos used commercially. Fibrous amphibole minerals are brittle and have a rod- or needle-like shape. Amphibole minerals regulated as asbestos by OSHA include five classes: crocidolite, amosite, and the fibrous forms of tremolite, actinolite, and anthophyllite. Other unregulated amphibole minerals, including winchite, richterite, and others, can also exhibit fibrous asbestiform properties (11).

Asbestos fibers do not have any detectable odor or taste. They do not dissolve in water or evaporate into the air, although individual asbestos fibers can easily be suspended in the air. Asbestos fibers do not move through soil. They are resistant to heat, fire, and chemical and biological degradation. As such, they can remain virtually unchanged in the environment over long periods of time.

The following sections provide an overview of several concepts relevant to the evaluation of asbestos exposure, including analytical techniques, toxicity and health effects, and the current regulations concerning asbestos in the environment.

Methods for Measuring Asbestos Content

A number of different analytical methods are used to evaluate asbestos content in air, soil, and other bulk materials. Each method varies in its ability to measure fiber characteristics such as length, width, and mineral type. For air samples, fiber quantification is traditionally done through phase contrast microscopy (PCM) by counting fibers with lengths greater than 5 micrometers (>5 μm) and with an aspect ratio (length to width) greater than 3:1. This is the standard method by which regulatory limits were developed. Disadvantages of this method include the inability to detect fibers less than 0.25 (<0.25) μm in diameter and the inability to distinguish between asbestos and nonasbestos fibers.

Asbestos content in soil and bulk material samples is commonly determined using polarized light microscopy (PLM), a method which uses polarized light to compare refractive indices of minerals and can distinguish between asbestos and nonasbestos fibers and between different types of asbestos. The PLM method can detect fibers with lengths greater than approximately 1 μm (~1 μm), widths greater than ~0.25 μm, and aspect ratios (length-to-width ratios) greater than 3. Detection limits for PLM methods are typically 0.25%–1% asbestos.

Scanning electron microscopy (SEM) and, more commonly, transmission electron microscopy (TEM) are more sensitive methods that can detect smaller fibers than light microscopic techniques. TEM allows the use of electron diffraction and energy-dispersive x-ray methods, which give information on crystal structure and elemental composition, respectively. This information can be used to determine the elemental composition of the visualized fibers. SEM does not allow measurement of electron

diffraction patterns. One disadvantage of electron microscopic methods is that determining asbestos concentration in soil and other bulk material is difficult (11).

For risk assessment purposes, TEM measurements are sometimes multiplied by conversion factors to give PCM equivalent fiber concentrations. The correlation between PCM fiber counts and TEM mass measurements is very poor. A conversion between TEM mass and PCM fiber count of 30 micrograms per cubic meter per fiber per cubic centimeter (µg/m3)/(f/cc) was adopted as a conversion factor, but this value is highly uncertain because it represents an average of conversions ranging from 5 to 150 (µg/m3)/(f/cc) (12). The correlation between PCM fiber counts and TEM fiber counts is also very uncertain, and no generally applicable conversion factor exists for these two measurements (12). Generally, a combination of PCM and TEM is used to describe the fiber population in a particular air sample.

Asbestos Health Effects and Toxicity

Breathing any type of asbestos increases the risk of the following health effects:

Malignant mesothelioma— cancer of the membrane (pleura) that encases the lungs and lines the chest cavity. This cancer can spread to tissues surrounding the lungs or other organs. The great majority of mesothelioma cases are attributable to asbestos exposure (11).

Lung cancer—cancer of the lung tissue, also known as bronchogenic carcinoma. The exact mechanism relating asbestos exposure with lung cancer is not completely understood. The combination of tobacco smoking and asbestos exposure greatly increases the risk of developing lung cancer (11).

Noncancer effects—these include asbestosis, scarring, and reduced lung function caused by asbestos fibers lodged in the lung; pleural plaques, localized or diffuse areas of thickening of the pleura (lining of the lung); pleural thickening, extensive thickening of the pleura which may restrict breathing; pleural calcification, calcium deposition on pleural areas thickened from chronic inflammation and scarring; and pleural effusions, fluid buildup in the pleural space between the lungs and the chest cavity (11).

Not enough evidence is available to determine whether inhalation of asbestos increases the risk of cancers at sites other than the lungs, pleura, and abdominal cavity (11).

Ingestion of asbestos causes little or no risk of non-cancer effects. However, some evidence indicates that acute oral exposure might induce precursor lesions of colon cancer and that chronic oral exposure might lead to an increased risk of gastrointestinal tumors (11).

ATSDR considers the inhalation route of exposure to be the most significant in the current evaluation. Exposure scenarios that are protective of the inhalation route of exposure should be protective of dermal and oral exposures.

The scientific community generally accepts the correlations of asbestos toxicity with fiber length as well as fiber mineralogy. Fiber length may play an important role in clearance and mineralogy may affect both biopersistence and surface chemistry. ATSDR, responding to concerns about asbestos fiber toxicity from the World Trade Center

disaster, held an expert panel meeting to review fiber size and its role in fiber toxicity in December 2002 (13). The panel concluded that fiber length plays an important role in toxicity. Fibers with lengths <5 μm are essentially non-toxic in terms of association with mesothelioma or lung cancer promotion. However, fibers <5 μm in length may play a role in asbestosis when exposure duration is long and fiber concentrations are high. More information is needed to definitively reach this conclusion.

In accordance with these concepts, it has been suggested that amphibole asbestos is more toxic than chrysotile asbestos, mainly because physical differences allow chrysotile to break down and to be cleared from the lung, whereas amphibole is not removed and builds up to high levels in lung tissue (14). Some researchers believe the resulting increased duration of exposure to amphibole asbestos significantly increases the risk of mesothelioma and, to a lesser extent, asbestosis and lung cancer (14). However, OSHA continues to regulate chrysotile and amphibole asbestos as one substance, as both types increase the risk of disease (15). Currently, EPA's Integrated Risk Information System (IRIS) assessment of asbestos also currently treats mineralogy (and fiber length) as equipotent (12).

Evidence suggesting that the different types of asbestos fibers vary in carcinogenic potency and site specificity is limited by the lack of information on fiber exposure by mineral type. Other data indicate that differences in fiber size distribution and other process differences can contribute at least as much as fiber type to the observed variation in risk (16).

Counting fibers using the regulatory definitions (see below) does not adequately describe risk of health effects. Fiber size, shape, and composition contribute collectively to risks in ways that are still being elucidated. For example, shorter fibers appear to deposit preferentially in the deep lung, but longer fibers may disproportionately increase the risk of mesothelioma (11,16). Some of the unregulated amphibole minerals, such as the winchite (from Libby, MT), can exhibit asbestiform characteristics and contribute to risk. Fiber diameters greater than 2–5 μm are considered above the upper limit of respirability and thus do not contribute significantly to risk. Methods are being developed to assess the risks posed by varying types of asbestos and are currently awaiting peer review (16).

Current Standards, Regulations, and Recommendations for Asbestos

In industrial applications, asbestos-containing materials are defined as any material with >1% bulk concentration of asbestos (11,17,18). It is important to note that 1% is not a health-based level, but instead represents the practical detection limit in the 1970s when OSHA regulations were created. Studies have shown that disturbing soil containing <1% amphibole asbestos, however, can suspend fibers at levels of health concern (19). Friable asbestos (asbestos which is crumbly and can be broken down to suspendible fibers) is listed as a hazardous air pollutant on EPA's Toxic Release Inventory (20). This classification requires companies that release friable asbestos at concentrations >0.1% to report the release under Section 313 of the Emergency Planning and Community Right-to-Know Act.

OSHA's permissible exposure limit (PEL) is 0.1 f/cc for asbestos fibers with lengths >5 μm and with an aspect ratio (length:width) >3:1, as determined by PCM (15). This value represents a time-weighted average (TWA) exposure level based on 8 hours per day for a

40-hour work week. In addition, OSHA has defined an "excursion limit," which stipulates that no worker should be exposed in excess of 1 f/cc as averaged over a sampling period of 30 minutes (15). Historically, the OSHA PEL has steadily decreased from an initial standard of 12 f/cc established in 1971. The PEL levels prior to 1983 were determined on the basis of empirical worker health observations, while the levels set from 1983 forward employed some form of quantitative risk assessment. ATSDR does not, however, support using the PEL for evaluating exposure for community members, because the PEL was developed as an occupational exposure for adult workers.

In response to the World Trade Center disaster in 2001 and an immediate concern about asbestos levels in buildings in the area, the Department of Health and Human Services, EPA, and the Department of Labor formed the Environmental Assessment Working Group. This work group was made up of ATSDR, EPA, CDC's National Center for Environmental Health, the National Institute for Occupational Safety and Health (NIOSH), the New York City Department of Health and Mental Hygiene, the New York State Department of Health, OSHA, and other state, local, and private entities. The work group set a re-occupation level of 0.01 f/cc after cleanup. Continued monitoring was also recommended to limit long-term exposure at this level (21). In 2002, a multiagency task force headed by EPA was formed specifically to evaluate indoor environments for the presence of contaminants that might pose long-term health risks to residents in Lower Manhattan. The task force, which included staff from ATSDR, developed a health-based benchmark of 0.0009 f/cc for indoor air. This benchmark was developed to be protective under long-term exposure scenarios, and it is based on risk-based criteria that include conservative exposure assumptions and the current EPA cancer slope factor. The 0.0009 f/cc benchmark for indoor air was formulated on the basis of chrysotile fibers and is therefore most appropriately applied to airborne chrysotile fibers (22).

NIOSH has set a recommended exposure limit of 0.1 f/cc for asbestos fibers longer than 5 µm. This limit is a TWA for up to a 10-hour workday in a 40-hour work week (23). The American Conference of Government Industrial Hygienists has also adopted a TWA of 0.1 f/cc as its Threshold Limit Value ® (24).

EPA has set a maximum contaminant level (MCL) for asbestos fibers in water of 7,000,000 fibers longer than 10 µm per liter, on the basis of an increased risk of developing benign intestinal polyps (25). Many states use the same value as a human health water quality standard for surface water and groundwater.

Asbestos is a known human carcinogen. Historically, EPA's IRIS model calculated an inhalation unit risk for cancer (cancer slope factor) of 0.23 per f/cc of asbestos (12). This value estimates additive risk of lung cancer and mesothelioma using a relative risk model for lung cancer and an absolute risk model for mesothelioma.

This quantitative risk model has significant limitations. First, the unit risks were based on measurements with phase contrast microscopy and therefore cannot be applied directly to measurements made with other analytical techniques. Second, the unit risk should not be used if the air concentration exceeds 0.04 f/cc because the slope factor above this concentration might differ from that stated (12). Perhaps the most significant limitation is that the model does not consider mineralogy, fiber-size distribution, or other physical aspects of asbestos toxicity. EPA is in the process of updating their asbestos quantitative

risk methodology given the limitations of the IRIS model currently used and the knowledge gained since this model was implemented in 1986.

Appendix D - Example of dust data collected with the DataRAM 4

"Model Number", "DataRAM 4 ", 104
"Serial no. ", "D257 "
"Device no. ", 1
"Tag Number ", 1
"Start Time ", 14:47:30
"Start Date ", 16-Aug-2005
"Log Period ", 00:02:00
"Number ", 61
"CalFactor ", 1.000000
"Unit ", 0
"Unit Name ", "(MASS)ug/m3"
"SIZE_CORRECT", "DISABLED"
"TEMPUNITS ", C
"Max MASS ", 8194.029000
"Max MASS @ ", 36 ,15:59:30 ,16-Aug-2005
"Avg MASS ", 4259.632000
"Max Diam ", 4.127006
"Max Diam @ ", 6 ,14:59:30 ,16-Aug-2005
"Avg Diam ", 3.730545
"ALARM ", "DISABLED"
"ALARM_LEVEL ", 0.0
"AUTO_ZERO ", "DISABLED"
"AZ INTERVAL ", 1
"Errors ", 0000
record,"(MASS)ug/m3", Temp, RHumidity, Diameter
1, 115.7, 27.1, 44, 0.2447 ,14:49:30 ,16-Aug-2005
2, 15.7, 27.1, 42, 0.1438 ,14:51:30 ,16-Aug-2005
3, 260.2, 27.2, 42, 0.4221 ,14:53:30 ,16-Aug-2005
4, 651.3, 27.4, 41, 1.3660 ,14:55:30 ,16-Aug-2005
5, 2748.4, 27.5, 41, 4.0408 ,14:57:30 ,16-Aug-2005
6, 2632.7, 27.5, 41, 4.1270 ,14:59:30 ,16-Aug-2005
7, 1293.2, 27.5, 40, 2.6439 ,15:01:30 ,16-Aug-2005
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15, 4562.6, 27.3, 39, 4.1270 ,15:17:30 ,16-Aug-2005
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17, 5420.2, 27.3, 39, 4.1270 ,15:21:30 ,16-Aug-2005
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22,	4490.2,	27.2,	39,	4.1270	,15:31:30	,16-Aug-2005
23,	5042.9,	27.2,	39,	4.1270	,15:33:30	,16-Aug-2005
24,	5049.5,	27.2,	39,	3.7788	,15:35:30	,16-Aug-2005
25,	5476.8,	27.2,	39,	4.0277	,15:37:30	,16-Aug-2005
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27,	5324.0,	27.2,	39,	4.1270	,15:41:30	,16-Aug-2005
28,	5198.5,	27.3,	39,	4.1270	,15:43:30	,16-Aug-2005
29,	4467.5,	27.3,	39,	4.1270	,15:45:30	,16-Aug-2005
30,	4803.5,	27.3,	39,	4.1270	,15:47:30	,16-Aug-2005
31,	3778.8,	27.3,	39,	4.1270	,15:49:30	,16-Aug-2005
32,	7699.0,	27.4,	39,	4.1270	,15:51:30	,16-Aug-2005
33,	3674.9,	27.4,	39,	4.1270	,15:53:30	,16-Aug-2005
34,	3130.7,	27.4,	39,	3.8016	,15:55:30	,16-Aug-2005
35,	5204.9,	27.5,	39,	3.7659	,15:57:30	,16-Aug-2005
36,	8194.0,	27.5,	39,	4.1270	,15:59:30	,16-Aug-2005
37,	6130.2,	27.5,	39,	4.1270	,16:01:30	,16-Aug-2005
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41,	5034.7,	27.6,	38,	4.1270	,16:09:30	,16-Aug-2005
42,	5905.2,	27.6,	38,	4.1270	,16:11:30	,16-Aug-2005
43,	6376.9,	27.6,	39,	4.1270	,16:13:30	,16-Aug-2005
44,	5327.2,	27.6,	39,	4.1270	,16:15:30	,16-Aug-2005
45,	3162.2,	27.6,	39,	4.1270	,16:17:30	,16-Aug-2005
46,	5025.4,	27.6,	39,	4.1270	,16:19:30	,16-Aug-2005
47,	5882.5,	27.6,	39,	4.1270	,16:21:30	,16-Aug-2005
48,	4083.1,	27.7,	39,	4.1270	,16:23:30	,16-Aug-2005
49,	4227.4,	27.7,	39,	4.0576	,16:25:30	,16-Aug-2005
50,	4240.3,	27.7,	39,	4.1270	,16:27:30	,16-Aug-2005
51,	3363.2,	27.7,	39,	4.1141	,16:29:30	,16-Aug-2005
52,	7063.3,	27.8,	39,	4.1270	,16:31:30	,16-Aug-2005
53,	6478.0,	27.8,	39,	4.1270	,16:33:30	,16-Aug-2005
54,	1311.4,	27.8,	39,	2.7241	,16:35:30	,16-Aug-2005
55,	3512.8,	27.8,	39,	4.0106	,16:37:30	,16-Aug-2005
56,	4353.1,	27.8,	39,	4.1270	,16:39:30	,16-Aug-2005
57,	3931.8,	27.9,	39,	4.1270	,16:41:30	,16-Aug-2005
58,	3709.9,	27.9,	39,	4.1270	,16:43:30	,16-Aug-2005
59,	4905.4,	27.9,	39,	4.1270	,16:45:30	,16-Aug-2005
60,	6699.9,	27.9,	39,	4.1088	,16:47:30	,16-Aug-2005
61,	7417.7,	27.9,	39,	4.1270	,16:49:30	,16-Aug-2005

APPENDIX E – Exposure Investigation Protocol

Exposure Investigation Protocol for
Ambler, AK

July, 2005

A02F

Prepared by

John Wheeler, ATSDR
Richard Robinson, ATSDR

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I. PROJECT OVERVIEW

i. Summary

The Maniilaq Association contacted ATSDR's Region 10 office "concerned as to the level of safety to the health of the population in the service area" from exposure to naturally occurring asbestos. Asbestos (chrysotile) has been identified in a local rock quarry. This quarry has been the source of gravel in Ambler in a number of projects including surfacing of all the roads. We know from the Diamond XX study and the California Air Resources Board's "Slodusty Road" study that asbestos on roads can be a substantial source of airborne asbestos. Three hundred eleven people live in Ambler, AK.

It is unknown what the level of exposure to asbestos is in the community. The primary means of transportation is by 4-wheelers which readily stir up road surface dust/asbestos as they travel over it. Also the gravel has been used for the "pads" that homes sit upon (in a permafrost area homes are not built on foundations but sit on post and gravel pads). We plan on having the sampling performed by EPA's ERT in which they will simulate actual activities to collect both personal samples and stationary samples. This type of sampling, activity-based, provides us a unique opportunity to determine realistic exposure levels. It should be noted that ATSDR and ERT have cooperated in the past for these types of studies (e.g., Quincy Mine, Michigan) and this study will be similar to that sampling. ATSDR will also be collecting data on weather, including snow loads, and road use patterns to better estimate exposure periods.

The impact will be upon the decision making ability of both ATSDR and the Maniilaq Association. Depending upon the outcome of the study ATSDR can make recommendations and provide education to limit exposure (water roads, HEPA vacs, education about dust suppression, etc.). Local government and residents can take action upon those recommendations and explore unique means by which to educate people and eliminate exposures. If an acceptable risk is found residents can be assured as to the safety of their environment.

ii. Investigators and collaborators

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation, Exposure Investigation Section

John Wheeler — Will be providing educational material to community members and officials. Will be investigating the site for health consultation. Will be investigating climate and other factors that may affect exposure.

EICB will fund the ISO-10312 asbestos analysis at Lab Cor in Seattle, WA

Division of Health Assessment and Consultation, Exposure Investigation Section
Richard Robinson Regional lead. Site activity coordination. Obtains local equipment (ATVs).

US Environmental Protection Agency

Emergency Response Team
Brian Brass In charge of all sampling.

Emergency Response Team
To be determined Sampling personnel that will ride ATVs and participate in activity-based sampling.

II. INTRODUCTION

i. Background

The Ambler Naturally Occurring Asbestos Site (site) is located in Ambler Alaska on the north bank of the Kobuk River, near the confluence of the Ambler and Kobuk Rivers. It lies 45 miles north of the Arctic Circle and is 138 miles northeast of Kotzebue, 30 miles northwest of Kobuk and 30 miles downriver from Shungnak. The area encompasses 9.5 square miles of land. Temperatures average –10 to 15 degrees Fahrenheit during the winter and 40 to 65 degrees during the summer. Snowfall averages 80 inches and precipitation is 16 inches total per year. The population is 274 with 89 students enrolled in the village school. The residents are Kowagniut Inupiat Eskimos with a traditional subsistence lifestyle.

August 3, 2003 – Alaska Department of Transportation (ADOT) collected three soil samples at the gravel pit. Results reported on October 3, 2003, indicated 1%, 2% and 10% Chrysotile.

November 3, 2003 – Alaska Occupational Safety and Health collected soil samples and wipe samples at the school as part of a limited health survey for the school construction employees. Asbestos was detected under the school building in gravel laid down from the gravel pit, original soil was non detect for asbestos, trace amounts were found in exterior gravel located in a pile prepared for the school's playground, and from the road. Asbestos fibers were detected inside the building. An air sample collected in a hallway next to the main entry way had 0.01 fibers of asbestos/cc (OSHA standard is 0.1 fibers/cc). It is unknown if this sample was analyzed by TEM or PCM and if it represents only 1 sample. Wipe collected for positive or negative testing from two different windowsills had asbestos fibers.

June 2, 2004 – The Alaska Native Tribal Health Consortium (ANTHC) collected discrete soil samples from the water treatment pad, lift station pad and gravel stockpile. Results were 2-5% chrysotile from fines only from gravel and 1.24-1.99% chrysotile from the gravel.

August 19, 2004 – ANTHC re-sampled the water treatment pad (1.7%), lift station pad (5%), washeteria pad (0.75%) and the gravel stockpile and from the borrow pit (1.46%).

August – September 2004 – Alaska Department of Environmental Conservation (ADEC) collected air samples for 8 weeks every 3 days for 24 hours during these months. The highest dust samples (3 filters) were analyzed for asbestos. None were detected. One sample was collected from the playground, which contained 12 inches of loam. Asbestos was detected, but not quantified. ATSDR is currently unaware of the type of sampling that was performed by ADEC, but we are trying to obtain that information from the data source.

May 20, 2005 – Alaska Division of Public Health (ADPH) conducted a Public Health Evaluation and Assessment and performed a medical records search to determine if any asbestos-related diseases have ever been identified in residents of Ambler, Kobuk, Shungnak, and Kiana. They reviewed all death certificates from 1980 to the present to see if there were any residents of Maniilaq villages who had died from an asbestos-related diagnosis. There were no residents with any asbestos-related diagnoses on the death certificate. A review of the State Cancer Registry and the Alaska Native Tumor Registry to see if there were any asbestos-related cancers that had been diagnosed and reported from any residents of Ambler, Kobuk, Shungnak, and Kiana. There were no residents who had been diagnosed with mesothelioma from any of these villages dating back to 1970. There were no reported cases of lung cancer from Ambler, Kobuk, or Shungnak dating back to 1970. There were five reported cases of lung cancer, all from the village of Kiana. These five cases occurred from 1984 to 2003, and they included four different cell types of lung cancer.

ADPH also reviewed computerized medical records in the RPMS medical record system. There were no residents of the four villages who ever had been diagnosed with any asbestos-related disease. Existing chest x-rays were reviewed from 128 residents from the four villages who were 50 years and older – 28 of these residents were from Ambler. Because of the past epidemics of tuberculosis and other common pulmonary diseases, there were many abnormalities. Of the 28 residents of Ambler whose chest x-rays were reviewed, two had pleural changes that were probably caused by prior exposure to asbestos. Of the 100 residents of Kobuk, Shungnak, and Kiana whose chest x-rays were reviewed, seven had pleural changes that might have been caused by prior exposure to asbestos. The asbestos-related changes were in the form of pleural plaques, and their appearance suggests that they were due to asbestos exposure many years ago, possibly due to occupational exposure. After receiving the information from reading the chest x-rays, a medical epidemiologist from the Section of Epidemiology visited Maniilaq, reviewed all available medical records, and with the help of a local interpreter, interviewed the patients who were still living and who agreed to be interviewed. Several of the residents described past employment working in mines. Many of the residents worked in mining many years ago, and they were unable to provide detailed information that would enable specific characterization of exposure to asbestos. Of the 9 people with pleural plaques suspicious for asbestos exposure, 1 recalled working in asbestos mine, 1 worked with asbestos as a construction worker, 1 was repeatedly exposed to high levels of mine dust while washing her husband's clothing, 1 refused interview, 2 had other medical conditions not-related to asbestos that definitively explained the x-ray findings, and the results for the remaining 3 were inconclusive because they had non-asbestos related lung diseases but these diseases did not definitively account for the x-ray changes. There are no medical tests to determine the amount of asbestos a person has been exposed to during their lifetime. There are no medical tests that are uniquely specific to identifying asbestos-related

disease, but general clinical tests of lung function and chest x-rays are used to diagnose the disease and its impact. It is particularly difficult to identify mild cases.

In response to these results, ATSDR and U.S. EPA are undertaking this project to determine the potential risk to road user.

ii. Justification for the exposure investigation

Two major studies; 1) Slodusty Road by the California Air Resources Board and 2) The Diamond XX study in California have concluded that serpentine materials used for road gravel, when contaminated with asbestos, can lead to significant risk levels for people exposed beside the road and occupants in vehicles on the road. The gravel used for Ambler roads has been shown to contain up to 10% asbestos. The EI is needed to collect basic information concerning road conditions in Ambler and to determine if exposures can be occurring.

iii. Objectives

1) Meet with residents and community leaders to discuss asbestos issues.
2) Obtain activity based samples of road dust to determine if exposure is occurring and at what level.
3) Learn about activity patterns, life style, and weather patterns to help assess exposure.

III. METHODS

i. Exposure investigation design

Perimeter Air Sampling

Air sampling will be conducted at fixed locations proximal to where the activities are being conducted. For the purpose of this Sampling and Analytical Plan, these fixed locations will be referred to as perimeter samples because they are being collected on the perimeter of the activities.

Site background/reference and perimeter samples will be collected concurrently with the ATV sampling. Up to five perimeter samples will be collected during ATV activities based on meteorological data.

Background Air Sampling

Background or reference samples will be collected to develop a reference point from which to evaluate the activity-based sampling. For Asbestos, a high volume (1-20L/m) air sampler will be used to collect in excess of 4,000 liters and achieve a detection limit below that of the personal air

samplers. Three background samples will be collected for each activity-based sampling event. Background sampling locations will be selected once the team arrives at the site.

Activity-Based Air Sampling

For all activity-based sampling events, asbestos samples will be collected from the breathing zones of the event participants at two distinct flow rates, a high flow of approximately 9 liters per minute (L/min) for approximately two hours for a target volume of 1080 liters (L) and a low volume sample of approximately 3.5 L/min for a volume of 420 L. Using these sample collection parameters will provide a sensitivity limit of less than or equal to 0.0033 f/cc.

Real-time dust measurements will be collected with a dust monitor (DataRam or similar unit) carried by an ATV. Results from dust monitoring will be retained for possible use in dust emissions modeling.

The National Oceanic and Atmospheric Administration (NOAA) meteorological weather station located in Ambler, Alaska will be employed to measure wind speed, wind direction, relative humidity, temperature, and barometric pressure, proximal to the activities.

- The ATV scenario is described below:
  - 2.2.3.1 Two ATVs
  -

    Two event participants will ride ATVs back and forth along a portion of the road at the same time until a sufficient volume of air has been collected to achieve the required detection limit. The riders, one lead rider and one following rider, will vary the vehicle speed between 5 and 30 miles per hour (mph). Riders will strive for an average speed of 15 mph. The average speed is a target speed only; vehicle speeds will be adjusted to meet road conditions. Vehicles will be equipped with a speedometer and odometer to record speeds and distance traveled. Global positioning units will be used to estimate average speed.

    Each ATV will be fitted with two personal sampling pumps for asbestos set at two distinct flow rates (3.5 and 9 liters per minute), sampling cassettes will be inspected for dust loading after 1 hour and the filters changed if needed. The sampling pumps will be carried in a backpack while the dust monitor will be mounted to the ATV. The cassettes for the personal sampling pumps will be attached to the shoulder straps of the backpack proximal to the riders' lapels in the breathing zone.

    If it is necessary to relieve a rider from the activity, a backup rider will be suited up and ready prior to the exchange. The active rider will stop the vehicle, dismount the vehicle, remove the backpack and transfer it to the replacement rider. The relief rider will don the backpack and mount the ATV from the opposite side. The original rider will assist the relief rider with donning and adjusting the backpack. The exchange is anticipated to take less than 60 seconds, so the sampling pumps and event time clock will not be halted

during the exchange. If the exchange requires more than 60 seconds, the pump and event clock will be stopped until activity is re-initiated.

Soil Sampling

Three soil samples will be collected from the road to determine moisture content, particle size, and the presence of asbestos-containing material (ACM) on the road surface. One sample will be collected from each end of the test section of the road and one in the center. Samples will be collected from an area measuring approximately 12 square inches and to a depth of two inches below the ground surface. Sufficient soil will be collected to fill one eight-ounce jar. The samples will be homogenized before analysis of moisture content. An off-site laboratory will quantify the percent moisture, particle size and percent ACM by weight.

ii. Exposure investigation population

The study will not be collecting samples on exposed populations. Only EPA personnel from the emergency response team will be utilized to collect activity-based samples. This team has conducted these tests before and knows how to use personal protective equipment and the regulations required to protect personnel.

Sampling locations will be located on the outskirts of the town. This will help prevent any exposure to local community members. There is only one road into and out of town so it will be impossible to shut the road down. However, the activities that are planned are not out of the ordinary activities that take place on the road everyday. In addition, bystanders will be discouraged and anyone walking on the road will be encouraged to wait until sampling is completed.

iii. Data collection/sampling procedures

SAMPLING METHODOLOGY

- The selection of air sampling locations on the road is biased. That is, they will not randomly selected using a statistically valid methodology. Sampling locations will be selected to collect air based on types of activities associated with road use and in locations where these activities are likely to occur. This approach is necessary to meet the data quality objective of determining concentrations of asbestos during typical activities along the road.
- U.S. EPA ERT sample collection Standard Operating Procedures (SOPs) will be followed for all sampling events. Specific SOPs for the following topics referenced for site work are, Soil Sampling #2012, General Air Sampling Guidelines #2008, and #2015 Asbestos Sampling.
- On-site air sampling for asbestos fibers in air will be conducted using International Standards Organization (ISO) Method 10312. The method includes the following

field procedures for collecting a sample:

- Each sampling pump shall be calibrated with a representative 0.8 micron pore size mixed cellulose ester filter cassette in line; (Note: this is a modification to the ISO 10312 method. The method specifies a maximum 0.45-micron pore size.) For personal sampling, sampling cassettes shall be fastened near the worker's lapel proximal to the worker's mouth. The top cover from the cowl extension on the sampling cassette shall be removed ("open-face") and the cassette oriented face down. The joint between the extender and the monitor body shall be wrapped with tape to help hold the cassette together and provide a marking surface to identify the cassette. At least 2 field blanks (or 10% of the total samples, whichever is greater) shall be submitted for each set of investigative samples. Top covers shall be removed from the field blank cassettes and stored in a clean area (e.g., closed bag or box) during sampling. Top covers shall be replaced onto field blank cassettes when sampling is completed. Sampling pumps shall be set at flow rates that range from 1.5 to 10 L/min (depending on sampling event). Sampling rates shall be adjusted to achieve the required detection limit without overloading the cassette with dust. The purpose of adjusting sampling rates is to obtain optimum fiber loading on the filter. For asbestos samples, dusty atmospheres require smaller sample volumes to obtain countable samples. This is the likely case with the activity-based sampling. Top covers and small end caps shall be replaced onto sampling cassettes at the end of the sampling event. Samples shall be shipped upright, with the conductive cowl attached, and in a rigid container with packing material to prevent jostling or damage. Untreated polystyrene foam shall not be used in the shipping container as electrostatic forces may cause fiber loss from sample filter.

Soil samples will be collected using disposable stainless steel trowels and filling the appropriate container.

Quality Control Samples

A field quality control (QC) program shall be implemented to assure conformance with data quality protocols established by the U.S. EPA. The field QC program is normally comprised of additional collected field QC samples, including those samples described in the following sections.

Duplicate Samples

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. At least two duplicates will be collected.

Performance Samples

A performance sample may be submitted for analysis. The performance sample employs a known concentration of chrysotile asbestos on a filter that is submitted to measure the analytical accuracy.

Lot Blanks

Lot Blanks are samples of the collection media, from the same manufacturer's lot as those being used for sample collection, submitted to the laboratory for analysis to detect potential contamination or issues with the sampling media. Lot blanks will be submitted for the asbestos filter cassettes.

Field Blanks

Field blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures.

iv. Data analysis

Asbestos by TEM

Transmission Electron Microscopy (TEM) methods provide much greater resolution than the Phase Contrast Microscopy method, and can be used to confirm the presence of asbestos fibers. These methods use the same criteria of greater than 5 micrometers (um) and an aspect ratio of greater than 3 to 1 for identifying fibers. In combination with other techniques, TEM methods can specifically identify asbestos fibers versus other kinds of fibers (fiberglass, rock wool, etc.) and have a much greater ability to detect shorter and thinner asbestos fibers.

Laboratory analysis using TEM will identify and determine asbestos fiber concentrations using established TEM methodology (ISO 10312).

All asbestos structures/fibers observed will be counted, described and recorded per the Libby Protocols Spreadsheet (NADES).
The analytical sensitivity limits required for this method are:

- 0.0033 structures or fibers/cc for activity based sampling; and
- 0.0005 structures or fibers/cc for ambient air sampling.

Soil Moisture and Particle Size

Soil samples will be analyzed by an off-site lab for moisture content via American Society for Testing and Materials (ASTM) Standard D6565-00 Test Method for Determination of Water (Moisture). Particle size analysis will be determined using ASTM Standard D422-63 Test Method for Particle-Size Analysis of Soils.

Data interpretation

Soil samples collected will be used to indicate the presence or absence of asbestos in the samples. The percent asbestos (by visual area) will represent a qualitative interpretation of the extent of contamination but will not be used for health based risk decisions other than to determine areas of concern.

Because of the limitations of soil data, this protocol highly emphasizes the collection of appropriate air data through activity-based sampling. Air results will be examined with a number of risk-models to determine the cancer health risk associated with the asbestos air level. These include the EPA IRIS model, the OSHA regulatory model, the Berman-Crump protocol model, and the new ATSDR calculator for making less than lifetime exposure estimates. This will require a laboratory analysis for B-C protocol structures; the details of which will be worked out following the preliminary analysis. Note: The majority of fibers found in Ambler to-date are from the serpentine rock found in the quarry and only include chrysotile. This makes using the IRIS unit risk (that does not consider mineralogy) appropriate. If a substantial number of protocol structures (> 10 μm) are found the IRIS unit risk may not be appropriate.

v. Records management

Provide information on any foreseeable data entry, editing, and management responsibilities. Describe how information will be kept confidential, who will have access to it, and assurances that all summary reports and papers produced from he investigation will *not* include any individual identifying information.

vi. Fieldwork coordination

Describe who will do the sampling, when the sampling will take place, how samples will be shipped to specific labs.

vii. Quality assurance

Data Quality Objectives (DQOs) are statements that define the type, quality, quantity, purpose, and use of data to be collected. The design of a study is closely tied to the data quality objectives, which serve as the basis for important decisions regarding key design features such as the number and location of samples to be collected, and the analyses to be performed.

Presenting appropriate DQOs helps ensure that the project plan is carefully thought out and that the data collected will provide sufficient information to support the key decisions, which must be made following the investigation. DQOs identified for this sampling event at the Ambler Naturally Occurring Asbestos Site are:

- To determine the concentrations of asbestos fibers in air on the road during typical, ambient conditions;
- To determine the asbestos exposures by inhalation that individuals may experience through typical All Terrain Vehicle use of the road;
- To determine the contribution of potential background sources of asbestos to air quality on the road; and
- To determine if respirable asbestos in roadbed materials are a source for airborne contaminants on the road.

IV. COMMUNITY INVOLVEMENT

During the testing, ATSDR personnel will be meeting with community leaders and members to inform them about asbestos and the steps they can take to help eliminate exposure. We will be describing the process by which we are collecting samples, how those samples will be processed and how we will share our findings with them. We will be describing the ATSDR Health Consultation process and the possibility for future public meetings.

The materials to be used are fact sheets, presentations, and the Toxicological Profile for Asbestos. All these materials have previously been reviewed (Oak Ridge HS Health Consultation) through ATSDR clearance and peer review processes. Materials cover what asbestos is, the toxicity of asbestos, and what a person (or community) can do to limit exposure to asbestos.

V. RISK/BENEFIT INFORMATION

Only EPA federal employees will be involved in sample collection. The EPA Emergency Response Team will be involved. They have extensive experience in this type of collection and have performed these identical studies in different venues. Risk/benefit analysis is N/A here.

VI. INFORMED CONSENT PROCEDURES

Informed consent procedures are for subjects that will participate in the study and need to know of any risks associated with the study. This investigation will not employ any individuals other than government workers that have previously performed similar investigations. The investigators have all had proper training and will be equipped with

PPE to eliminate any exposure. The investigators will be performing routine activities that are carried out by the residents of Ambler on a daily, if not greater, basis.

VII. PROCEDURES FOR NOTIFYING PARTICIPANTS OF INDIVIDUAL AND OVERALL RESULTS

The community will be notified through ATSDR regional office, conference call, and release of a Public Health Consultation.

VIII. ASSURANCES OF CONFIDENTIALITY

No personal identifier data will be collected because samples are strictly environmental.

VIII. ESTIMATED TIME FRAME

August 15 - 19, 2005 Collect samples
August 20 - November 1 Analyze samples
November 1 - December 31 Prepare reports.

IX. PROJECTED BUDGET AND SOURCE OF FUNDING

ATSDR's cost is only for laboratory sample analysis. Estimated cost is for 40 samples at $500/sample or $20,000. The funds will be allocated from the EI section, EICB, ATSDR

APPENDIX F

Site Specific Sampling Plan
For the
AMBLER NATURALLY OCCURING ASBESTOS SITE

Ambler, Alaska

Prepared by:

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SECTION 1
INTRODUCTION

1.1 GENERAL SITE INFORMATION

The Ambler Naturally Occurring Asbestos Site (site) is located in Ambler Alaska on the north bank of the Kobuk River, near the confluence of the Ambler and Kobuk Rivers. It lies 45 miles north of the Arctic Circle and is 138 miles northeast of Kotzebue, 30 miles northwest of Kobuk and 30 miles downriver from Shungnak. The area encompasses 9.5 square miles of land. Temperatures average –10 to 15 degrees Fahrenheit during the winter and 40 to 65 degrees during the summer. Snowfall averages 80 inches and precipitation is 16 inches total per year. The population is 274 with 89 students enrolled in the village school. The residents are Kowagniut Inupiat Eskimos with a traditional subsistence lifestyle.

1.2 ENVIRONMENTAL ASSESSMENT

August 3, 2003 – Alaska Department of Transportation (ADOT) collected three soil samples at the gravel pit. Results reported on October 3, 2003, indicated 1%, 2% and 10% Chrysotile.

November 3, 2003 – Alaska Occupational Safety and Health collected soil samples and wipe samples at the school as part of a limited health survey for the school construction employees. Asbestos was detected under the school building in gravel laid down from the gravel pit, original soil was non detect for asbestos, trace amounts were found in exterior gravel located in a pile prepared for the school's playground, and from the road. Asbestos fibers were detected inside the building. An air sample collected in a hallway next to the main entry way had 0.01 fibers of asbestos/cc (OSHA standard is 0.1 fibers/cc). Wipe collected for positive or negative testing from two different windowsills had asbestos fibers.

June 2, 2004 – The Alaska Native Tribal Health Consortium (ANTHC) collected discrete soil samples from the water treatment pad, lift station pad and gravel stockpile. Results were 2-5% chrysotile from fines only from gravel and 1.24-1.99% chrysotile from the gravel.

August 19, 2004 – ANTHC re-sampled the water treatment pad (1.7%), lift station pad (5%), washeteria pad (0.75%) and the gravel stockpile and from the borrow pit (1.46%).

August – September 2004 – Alaska Department of Environmental Conservation (ADEC) collected air samples for 8 weeks every 3 days for 24 hours during these months. The highest dust samples (3 filters) were analyzed for asbestos. None were detected. One sample was collected from the playground, which contained 12 inches of loam. Asbestos was detected, but not quantified.

May 20, 2005 – Alaska Division of Public Health (ADPH) conducted a Public Health Evaluation and Assessment and performed a medical records search to determine if any asbestos-related diseases have ever been identified in residents of Ambler, Kobuk, Shungnak, and Kiana. They reviewed all death certificates from 1980 to the present to see if there were any residents of Maniilaq villages who had died

from an asbestos-related diagnosis. There were no residents with any asbestos-related diagnoses on the death certificate. A review of the State Cancer Registry and the Alaska Native Tumor Registry to see if there were any asbestos-related cancers that had been diagnosed and reported from any residents of Ambler, Kobuk, Shungnak, and Kiana. There were no residents who had been diagnosed with mesothelioma from any of these villages dating back to 1970. There were no reported cases of lung cancer from Ambler, Kobuk, or Shungnak dating back to 1970. There were five reported cases of lung cancer, all from the village of Kiana. These five cases occurred from 1984 to 2003, and they included four different cell types of lung cancer.

ADPH also reviewed computerized medical records in the RPMS medical record system. There were no residents of the four villages who ever had been diagnosed with any asbestos-related disease. Existing chest x-rays were reviewed from 128 residents from the four villages who were 50 years and older – 28 of these residents were from Ambler. Because of the past epidemics of tuberculosis and other common pulmonary diseases, there were many abnormalities. Of the 28 residents of Ambler whose chest x-rays were reviewed, two had pleural changes that were probably caused by prior exposure to asbestos. Of the 100 residents of Kobuk, Shungnak, and Kiana whose chest x-rays were reviewed, seven had pleural changes that might have been caused by prior exposure to asbestos. The asbestos-related changes were in the form of pleural plaques, and their appearance suggests that they were due to asbestos exposure many years ago, possibly due to occupational exposure. After receiving the information from reading the chest x-rays, a medical epidemiologist from the Section of Epidemiology visited Maniilaq, reviewed all available medical records, and with the help of a local interpreter, interviewed the patients who were still living and who agreed to be interviewed. Several of the residents described past employment working in mines. Many of the residents worked in mining many years ago, and they were unable to provide detailed information that would enable specific characterization of exposure to asbestos. Of the 9 people with pleural plaques suspicious for asbestos exposure, 1 recalled working in asbestos mine, 1 worked with asbestos as a construction worker, 1 was repeatedly exposed to high levels of mine dust while washing her husband's clothing, 1 refused interview, 2 had other medical conditions not-related to asbestos that definitively explained the x-ray findings, and the results for the remaining 3 were inconclusive because they had non-asbestos related lung diseases but these diseases did not definitively account for the x-ray changes. There are no medical tests to determine the amount of asbestos a person has been exposed to during their lifetime. There are no medical tests that are uniquely specific to identifying asbestos-related disease, but general clinical tests of lung function and chest x-rays are used to diagnose the disease and its impact. It is particularly difficult to identify mild cases.

In response to these results, ATSDR and U.S. EPA are undertaking this project to determine the potential risk to road users.

1.3 PROBLEM STATEMENT

Since the 1960's the Ambler gravel pit, located 2 miles outside of the village, has been used to provide gravel for the airport, village roads and foundation pads for houses, the school and clinic. The village is located in an area of high concentration of naturally occurring asbestos. In August 2003, the Alaska Department of Transportation and Public Facilities (ADOT) visited Ambler to check on the quantity of gravel available for an airport expansion project. As part of their assessment, they collected soil samples to identify whether asbestos was present in the source material. Test results showed the presence of a

potentially harmful form of asbestos in the gravel pit, chrysotile at concentrations up to 10%. These results raised concerns in the community over exposure to airborne asbestos from the road dust in particular; there is a concern that individuals using the gravel roads could be exposed to airborne asbestos fibers. Therefore, it is necessary to examine the potential health risk to road users due to inhalation of airborne asbestos fibers on and near the road.

1.4 PROJECT PURPOSE

The primary purpose of this project is to collect data that accurately represents the exposure of typical road users to respirable asbestos fibers in air. Breathing zone air samples for asbestos fibers will be collected during typical road user activities, primarily, ATV use. Results from sampling will be submitted to State and federal health officials to screen the human health risk associated with use of the road.

Ambient air concentrations of asbestos in the village of Ambler will also be quantified by collecting air samples from up to five locations within town.

1.5 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are statements that define the type, quality, quantity, purpose, and use of data to be collected. The design of a study is closely tied to the data quality objectives, which serve as the basis for important decisions regarding key design features such as the number and location of samples to be collected, and the analyses to be performed.

Presenting appropriate DQOs helps ensure that the project plan is carefully thought out and that the data collected will provide sufficient information to support the key decisions, which must be made following the investigation. DQOs identified for this sampling event at the Ambler Naturally Occurring Asbestos Site are:

- To determine the concentrations of asbestos fibers in air on the road during typical, ambient conditions. (The Ambler area is typical of a continental interior region of Alaska. Temperatures during the long summer days are mild, with maximums mostly in the high 60s and low 70s, with occasional climbs into the 80s. The sun does not set during the period from early June early July. The freeze-free period averages 89 days annually, extending from May to late August. Annual precipitation amounts are 16 inches (80 inches of snow), which is typical for continental climate. Ambler also follows the pattern of nearly all Alaskan stations, with precipitation amounts building up to a maximum during late summer and the fall months. Snow has been recorded during all months except July. Surface winds are seldom strong during any season of the year, nor do they show much seasonal variation. Prevailing winds are from north at 10 miles per hour for the majority of the year.)
- To determine the asbestos exposures by inhalation that individuals may experience through typical All Terrain Vehicle use of the road;
- To determine the contribution of potential background sources of asbestos to air quality on the road; and
- To determine if respirable asbestos in roadbed materials are a source for airborne contaminants on the road (Is asbestos, present in the roadbed aggregate, release to the atmosphere in measurable amounts).

SECTION 2
SAMPLING PROCEDURES

2.1 OVERVIEW OF ASBESTOS SAMPLING PLAN

2.1.1 Health and Safety Plan

A Health and Safety Plan (HASP) specific to the air sampling activities has been developed by the U.S. Environmental Response Team (ERT). Health and safety considerations are paramount to the success of the sampling activity and the HASP will be strictly adhered to during site activity.

2.1.2 Site Access

The site is public property controlled by the local tribal council and community. The U.S EPA will be responsible for obtaining site access to the property before sampling begins.

2.2 SAMPLING PROCEDURES

2.2.1 Perimeter Air Sampling

Air sampling will be conducted at fixed locations proximal to where the activities are being conducted. For the purpose of this Sampling and Analytical Plan, these fixed locations will be referred to as perimeter samples because they are being collected on the perimeter of the activities.

Site background/reference and perimeter samples will be collected concurrently with the ATV sampling. Up to five perimeter samples will be collected during ATV activities based on meteorological data.

2.2.2 Background and In-Village Air Sampling

Background or reference samples will be collected to develop a reference point from which to evaluate the activity-based sampling. For Asbestos, a high volume (1-20L/m) air sampler will be used to collect in excess of 4,000 liters and achieve a detection limit below that of the personal air samplers. Three background samples will be collected from upwind locations for each activity-based sampling event. Samples will be collected at a flow rate of approximately 10 L/m.

Background or reference air samples will be collected to determine the ambient air concentration of asbestos occurring from undisturbed geologic sources or contaminants which are occurring solely from a source other than the activity based sampling.

Sampling locations shall be selected based on wind direction, similarity of the air shed and environmental conditions to those found on-site.

Background samples for ambient air will be collected upwind of the site at a great enough distance to minimize the likelihood of interference from the site. Since site-related and background air concentrations are expected to fluctuate, background and on site samples will be collected simultaneously.

Air samples will also be collected in the Village of Ambler to aid in evaluating potential asbestos exposure to residents of the village. Approximately 5 sampling locations will be selected based on

recommendation by the local community. The Village samples will be collected using a high volume (1-20L/m) air sampler to collect in excess of 4,000 liters and achieve a detection limit below that of the personal air samplers. Samples will be collected over approximately an eight hour period.

2.2.3 Activity-Based Air Sampling

For all activity-based sampling events, asbestos samples will be collected from the breathing zones of the event participants at two distinct flow rates, a high flow of approximately 9 liters per minute (L/min) for approximately two hours for a target volume of 1080 liters (L) and a low volume sample of approximately 3.5 L/min for a volume of 420 L. Using these sample collection parameters will provide a sensitivity limit of less than or equal to 0.0033 f/cc.

Real-time dust measurements will be collected with a dust monitor (DataRam or similar unit) carried by an ATV. Results from dust monitoring will be retained for possible use in dust emissions modeling.

The National Oceanic and Atmospheric Administration (NOAA) meteorological weather station located in Ambler, Alaska will be employed to measure wind speed, wind direction, relative humidity, temperature, and barometric pressure, proximal to the activities. Portable meteorological instruments and flagging tape will also be used to determine on-site conditions.

- The ATV scenario is described below:

2.2.3.1 Two ATVs

Two event participants, wearing appropriate Personal Protective Equipment, will ride ATVs back and forth along a 1000 foot long portion of the road (currently anticipated to be between the Ambler Airport and the Village of Ambler) at the same time until a sufficient volume of air has been collected to achieve the required detection limit. The riders, one lead rider and one following rider, will vary the vehicle speed between 5 and 30 miles per hour (mph). Riders will strive for an average speed of 15 mph. The average speed is a target speed only; vehicle speeds will be adjusted to meet road conditions. Vehicles will be equipped with a speedometer and odometer to record speeds and distance traveled. Global positioning units will be used to estimate average speed.
Each ATV will be fitted with two personal sampling pumps for asbestos set at two distinct flow rates (3.5 and 9 liters per minute), sampling cassettes will be inspected for dust loading after 1 hour and the filters changed if needed. The sampling pumps will be carried in a backpack while the dust monitor will be mounted to the ATV. The cassettes for the personal sampling pumps will be attached to the shoulder straps of the backpack proximal to the riders' lapels in the breathing zone.

If it is necessary to relieve a rider from the activity, a backup rider will be suited up and ready prior to the exchange. The active rider will stop the vehicle, dismount the vehicle, remove the backpack and transfer it to the replacement rider. The relief rider will don the backpack and mount the ATV from the opposite side. The original rider will assist the relief rider with donning and adjusting the backpack. The exchange is anticipated to take less than 60 seconds, so the sampling pumps and event time clock will not be halted during the exchange. If the exchange

requires more than 60 seconds, the pump and event clock will be stopped until activity is re-initiated.

2.2.4 Soil Sampling

Three composite soil samples will be collected from the road to determine moisture content, particle size, and the presence of asbestos-containing material (ACM) on the road surface. One sample will be collected from each end of the test section of the road and one in the center. Samples will be collected from an area measuring approximately 12 square inches and to a depth of two inches below the ground surface. Sufficient soil will be collected to fill one eight-ounce jar. The samples will be homogenized before analysis of moisture content. An off-site laboratory will quantify the percent moisture, particle size and percent ACM by weight.

Soil Sampling. Soil sampling will be conducted using modified ERT/REAC SOP #2012, *Soil Sampling*. The collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. The surface material will be removed to the required depth (0-2 inches) and soil samples will be collected using dedicated equipment (i.e., trowels, bowls, spoons, etc.). The following procedure will be used to collect surface soil samples:

Using GPS or other appropriate means to navigate to the predetermined sampling location.

1. Remove sticks, rocks, and vegetation from the sampling area.
2. Mark a one-square-foot area to be sampled with the edge of a trowel.
3. Remove soil to a depth of approximately 3 inches using a stainless steel trowel.
4. Accumulate an adequate volume of soil in a stainless mixing bowl.
5. Repeat steps 1 through 7 for the remaining three sampling locations.
6. Thoroughly mix the soil to obtain a sample that is representative of the entire sampling location using a stainless steel spoon.
7. When compositing is complete, transfer aliquots of the mixed sample into appropriate, labeled containers and secure the caps tightly.
8. Follow appropriate packing and shipping procedures.

Alternatively, a section of the grassy area may be cut and the top layer of grass and/or sod pulled back prior to soil sampling or a plug of grass will be removed to a depth of 3 inches. Use of these alternate techniques may minimize the disturbance to the property. The above method will be modified accordingly either beginning with step 4 or step 6, depending on the technique chosen.

Sampling locations will be determined randomly using the Visual Sampling Plan program. Seven samples, comprised of four sub-samples each will be collected. See Visual Sampling Plan output for details.

2.3 SAMPLING METHODOLOGY

- The selection of air sampling locations on the road is biased. That is, they will not randomly selected using a statistically valid methodology. Sampling locations will be selected to collect air based on types of activities associated with road use and in locations where these activities are likely to occur. This approach is necessary to meet the data quality objective of determining concentrations of asbestos during typical activities along the road.

U.S. EPA ERT sample collection Standard Operating Procedures (SOPs) will be followed for all sampling events. Specific SOPs for the following topics referenced for site work are, Soil Sampling #2012, General Air Sampling Guidelines #2008, and #2015 Asbestos Sampling.

On-site air sampling for asbestos fibers in air will be conducted using International Standards Organization (ISO) Method 10312. The method includes the following field procedures for collecting a sample:

- Each sampling pump shall be calibrated using a primary or secondary calibration standard with a representative 0.8 micron pore size mixed cellulose ester filter cassette in line; (Note: this is a modification to the ISO 10312 method. The method specifies a maximum 0.45-micron pore size.) Another project specific modification is that all pumps will be Pre- and Post calibrated using the actual filter employed to collect the sample.

- For personal sampling, sampling cassettes shall be fastened near the worker's lapel proximal to the worker's mouth. The top cover from the cowl extension on the sampling cassette shall be removed ("open-face") and the cassette oriented face down. The joint between the extender and the monitor body shall be wrapped with tape to help hold the cassette together and provide a marking surface to identify the cassette. At least 2 field blanks (or 10% of the total samples, whichever is greater) shall be submitted for each set of investigative samples. Top covers shall be removed from the field blank cassettes and stored in a clean area (e.g., closed bag or box) during sampling. Top covers shall be replaced onto field blank cassettes when sampling is completed. Sampling pumps shall be set at flow rates that range from 1.5 to 10 L/min (depending on sampling event). Sampling rates shall be adjusted to achieve the required detection limit without overloading the cassette with dust. The purpose of adjusting sampling rates is to obtain optimum fiber loading on the filter. For asbestos samples, dusty atmospheres require smaller sample volumes to obtain countable samples. This is the likely case with the activity-based sampling. Top covers and small end caps shall be replaced onto sampling cassettes at the end of the sampling event. Samples shall be shipped upright, with the conductive cowl attached, and in a rigid container with packing material to prevent jostling or damage. Untreated polystyrene foam shall not be used in the shipping container as electrostatic forces may cause fiber loss from sample filter.

Soil samples will be collected using disposable stainless steel trowels and filling the appropriate container.

2.3.2 Quality Control Samples

A field quality control (QC) program shall be implemented to assure conformance with data quality protocols established by the U.S. EPA. The field QC program is normally comprised of additional collected field QC samples, including those samples described in the following sections.

2.3.2.1 Duplicate Samples

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. At least two duplicates will be collected.

2.3.2.2 Performance Samples

A performance sample may be submitted for analysis. The performance sample employs a known concentration of chrysotile asbestos on a filter that is submitted to measure the analytical accuracy.

2.3.2.3 Lots Blanks

Lot Blanks are samples of the collection media, from the same manufacturer's lot as those being used for sample collection, submitted to the laboratory for analysis to detect potential contamination or issues with the sampling media. Lot blanks will be submitted for the asbestos filter cassettes.

2.3.2.4 Field Blanks

Field blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures.

2.4 ANALYTICAL METHODOLOGY

2.4.1 Asbestos by TEM

Transmission Electron Microscopy (TEM) methods provide much greater resolution than the Phase Contrast Microscopy method, and can be used to confirm the presence of asbestos fibers. These methods use the same criteria of greater than 5 micrometers (um) and an aspect ratio of greater than 3 to 1 for identifying fibers. In combination with other techniques, TEM methods can specifically identify asbestos fibers versus other kinds of fibers (fiberglass, rock wool, etc.) and have a much greater ability to detect shorter and thinner asbestos fibers.

Laboratory analysis using TEM will identify and determine asbestos fiber concentrations using established TEM methodology (ISO 10312). ISO 10312 is the method selected by the EPA's Asbestos Technical Review Workgroup for activity based sampling. The method is in the process of being modified into a Superfund Method. Use of this method will permit comparison to other sites. Should both the high and the low volume samples be overloaded, the high volume sample will be analyzed by the indirect method ISO 13794-Ambient air - Determination of asbestos fibres - Indirect-transfer transmission electron microscopy method

All asbestos structures/fibers observed will be counted, described and recorded per the Libby Protocols Spreadsheet (NADES).
The analytical sensitivity limits required for this method are:

- 0.0033 structures or fibers/cc for activity based sampling; and
- 0.0005 structures or fibers/cc for ambient air sampling.

2.4.3 Asbestos, Soil Moisture and Particle Size

Asbestos content of soil samples will be determined using PLM-Visual Estimation (PLM-VE) technique 1000 point count (Analysis of Asbestos Fibers In Soil by Polarized Light Microscopy). Prior to analysis, soil samples will be prepared using ISSI Libby-01 Soil Sample Preparation.

Soil samples will be analyzed by an off-site lab for moisture content via American Society for Testing and Materials (ASTM) Standard 4643-00 Test Method for Determination of Water (Moisture). Particle size analysis will be determined using ASTM Standard D422-63 Test Method for Particle-Size Analysis of Soils. Soil moisture will be measured on site using a soil moisture probe.

2.5 SAMPLING SCHEDULE

Asbestos sampling activities are to be conducted during the third week in August 2005. The schedule is based on historical weather patterns and may be adjusted should actual or forecast weather conditions differ. Ideally, road soils would be less than 50% available moisture [per United States Department of Agriculture, Natural Resource Conservation Service, Estimating Soil Moisture by Feel and Appearance (Program Aid 1619)] and there would be at least 3 days of dry weather (no measurable precipitation) prior to sampling. However, soil moisture in the 30 to 70th percentile based on estimates derived from a one-layer hydrological model (Huang et al., 1996, van den Dool et al., 2003) will be acceptable as they are representative of average summer conditions. This model uses daily precipitation totals from observation stations that are input to the model. However, since Ambler is such a remote location, barring torrential down pours or snow cover, sampling will likely occur regardless of weather conditions, with the acknowledgement that additional data may need to be collected in the future. It is assumed that sampling activities will occur over a one-week period. It is anticipated that laboratory analysis will be completed within 45 days of sample collection and final data validation will be completed within five days of delivery of the completed electronic data packages.

2.5.2 Numbers of Samples to Be Collected

2.5.2.1 Activity Based Sampling

It is anticipated that 12 activity-based, 15 perimeter and nine background/reference air samples will be collected and submitted for TEM analysis. The ATV riding activity will be repeated three times. Three ambient air background samples will be collected for each activity-based sampling event. The background samples will be collected upwind of the locations of the activity-based sampling.

Table 1: Number of Samples to Be Collect

Activity Description	Number of Personnel Required	Number of Events	Number of Samples	Number of Background Samples	Number of Perimeter Samples	Total Number of Samples*	Comments
Two ATVs	3	3	12	9	15	36*	
Duplicates/co-located			1	1	1	3	
Samples in Town	2	2	5	2	NA	14	
Soil Samples	2	1	7	0	NA	7**	
Field Blanks			2			2	
					Total #	55	

* A high (1080l) and low (420l) volume sample will be collected on the ATV riders. Only the higher volume sample will be analyzed, if it is readable. ** Soil samples not included in totals.

2.6 SAMPLE IDENTIFICATION AND DOCUMENTATION

2.6.1 Data Sheets and Log Books

Electronic SCRIBE software will be used to record and manage sampling information. Information in the datasheets will include, at a minimum, the following:

- Location at the site and activity being conducted during sample collection;
- Date and time of sample collection;
- Sample description
- Description of temperature and general weather conditions at the time of sample collection; and
- The unique sample identification number for each sample.

SCRIBE forms will be completed, signed, and dated by the recorder.
A logbook will be kept with details of sampling activities. All notes written in paper logs will be written with waterproof ink. All corrections to data entered will be made by crossing out the error with a single horizontal line, initialing the correction, and entering the correct information. Crossed-out information shall be readable.

2.6.2 Photographs

Photographs will be taken during each air-sampling event. The photographs will be used to provide backup documentation of compliance with this SAP. The camera will be equipped with a device to record the date and time on the photograph, if possible.

Videos clips of the activities will also be taken to further document the effort.

2.6.3 Sample Labeling

Each sample will be identified with an adhesive label bearing a unique sample identification number as designated by the SCRIBE sample management program.

2.7 DECONTAMINATION

Decontamination of personnel and equipment used during the sampling activities will be carried out in compliance with the site-specific Health and Safety Plan.

SECTION 3
QUALITY ASSURANCE

3.1 DATA QUALITY OBJECTIVES

The DQOs to be followed for air and soil sampling are outlined in Section 1.5 of this Site Specific Sampling Plan.

3.2 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

All field staff conducting sampling will have proper OSHA training and participate in a medical monitoring program. Field staff will attend a briefing from the field team leader during each sampling session to address any site-specific training requirements or hazards. All sampling activities are conducted in compliance with the site-specific Health and Safety Plan.

3.3 SAMPLE HANDLING AND CUSTODY PROCUDURES

Chain of custody procedures will be used to maintain and document sample collection and possession. During the sampling process, the SCRIBE-based Chain of Custody Record (COCR) form will be completed. The completed COCR will be signed, as required, as each sample package recipient receives and relinquishes possession of the sample package, and the COCR will accompany samples during shipment.

3.3.1 Sample Packaging and Shipment

The air sample filter cassettes will be packaged and shipped to the analytical laboratory using standard methodology. In addition to sample handling and shipment instructions included in Section 2.3 of this plan, the following procedures will also be incorporated into field procedures.

3.3.1.1 Cooler Preparation

In preparation for sample shipment:

- Plastic coolers, or similar, will be used for each sample shipment;
- Coolers shall be inspected prior to shipment for cleanliness;
- All cooler drain plugs will be sealed with tape;
- All previous shipping labels will be removed.

3.3.1.2 Packing Samples in Coolers

Each sample will be placed in an individual plastic bag. See section 2.3 for additional details on sample packing.

3.3.1.3 Closing and Shipping of Coolers

Sample documentation will be enclosed in sealed plastic bags taped to the underside of the cooler lid. Coolers will be secured with packing tape and custody seals as described below:

- Cooler lids will be taped shut with strapping tape, encircling the cooler several times;
- Chain of custody seals will be placed on two sides of the lid after closing the lid (one in front and one on the side);
- "This Side Up" arrows will be placed on the sides of the cooler; and
- Coolers will then be shipped to the laboratory by overnight courier as soon as possible. Daily shipments are not required since the samples are not temperature sensitive and the site is in a remote location with limited overnight shipment capabilities.

3.4 SELECTION OF ANALYTICAL LABORATORIES

Samples for asbestos will be analyzed by analytical laboratories selected and qualified by EPA. This effort will be coordinated between the OSC, the EPA-ERT Work Assignment Manager, and the Region 10 Laboratory Contracts Coordinator.

3.5 DATA VALIDATION

Table 2

QA/QC ANALYTICAL SUMMARY and FIXED LABORATORY ANALYTICAL METHODS
Ambler Asbestos Gravel Pit Site
Ambler, AK

Laboratory	Matrix	Parameters/Method	Method Description/ Sensitivity	Total Field Samples[a]	QA/QC Sample Summary Analyses				Total Field and QA/QC Analyses/ Containers	Precision and Accuracy
					Method Blank	Duplicates	Lot Blanks	Field Blanks		
Commercial Laboratory	Air	TEM Asbestos/ ISO 10312	TEM/ 0.0033 fibers/cc TEM/ 0.0005 fibers/cc	55	NA	3	>2 or as required by lab	2	62	Per ISO Method
Commercial Laboratory	Soil	Particle Size Soil Moisture Asbestos by PLM	NA Per Method 0.2%	7	NA	NA		NA	7	Per ISO Method

[a] Total number of field samples is estimated.
[b] Total analyses and containers includes both field and QA/QC aliquots to be submitted for fixed laboratory analysis.
Key:
cc = Cubic centimeter.
ISO = International Organization for Standardization.
NA = not applicable.
QA = Quality assurance.
QC = Quality control.
TEM = Transmission Electron Microscopy.

SECTION 4
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