SOIL SAMPLING RESULTS AND PRELIMINARY RISK ASSESSMENT FOR THE NORTH RIDGE ESTATES SITE, KLAMATH FALLS, OREGON

D. Wayne Berman, Ph.D.

Aeolus, Inc.

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WHAT IS ASBESTOS

- Asbestos: the term used to describe the fibrous forms of a selected set of naturally occurring minerals
- Two general families:
  - Most common asbestos form: one member from serpentine family (chrysotile)
  - Amphibole family (five members currently included in definition of asbestos)
- Asbestos fibers have been incorporated into more than 3,000 commercial products

WHERE IS ASBESTOS FOUND?

- Natural deposits of asbestos occur in a variety of rock formations that are common in certain areas
- For example, the “State Rock” of California is Serpentine, which is the parent mineral of chrysotile and chrysotile is found throughout the state
- Asbestos is also common in human-created environments where asbestos-containing products have been used
- Asbestos is also commonly found at low concentrations in ambient air

WHY DO WE WORRY ABOUT ASBESTOS EXPOSURE?

- Breathing asbestos fibers has been linked to several diseases including primarily:
  - Asbestosis
  - Lung cancer
  - Mesothelioma
- Importantly, asbestos fibers must get into the air before they pose a hazard
- Also, as important, the level of risk is a direct function of the level of exposure
- Therefore, the key to evaluating risk is understanding the level of exposure

WHAT WE HAVE DONE TO EVALUATE EXPOSURES AT THE NORTH RIDGE ESTATES SITE

- We have completed a study of ambient conditions, which is documented in our air report.
- We have also completed a preliminary study of asbestos in soil.

FINDINGS FROM THE STUDY OF AMBIENT AIR

- Risks from breathing ambient air at the North Ridge Estates Site are no greater than four in one million
- Results also indicate that ambient conditions at this site are not distinguishable from general background

FINDINGS FROM THE PRELIMINARY STUDY OF ASBESTOS IN SOIL

- Steam-pipe insulation should be removed or encapsulated whenever it is encountered at the site
- Otherwise, results indicate that estimated risks do not require further immediate action, as they appear generally within the range that is potentially acceptable by EPA even on a permanent basis

ARE MY KIDS SAFE?

- My analysis indicates that your kids will not experience exposures during the near term (while the final investigation and remediation of this site is completed) that pose risks greater than what are potentially considered acceptable by EPA even for the long-term.

IS IT OK TO LIVE HERE?

- My analysis indicates that you will not experience exposures during the near term (while the final investigation and remediation of this site is completed) that pose risks greater than what are potentially considered acceptable by EPA even for the long-term.

WOULD I MOVE HERE?

- When the remaining phases of this project are completed, I do not see any reason why I wouldn’t consider moving here.

HAS LIVING HERE ADVERSELY AFFECTED MY HEALTH?

- My analysis suggests that it is unlikely living here has adversely affected anyone’s health in any measurable way. We will be able to better address this question, once the data gaps for evaluating long-term risks at the site are filled.

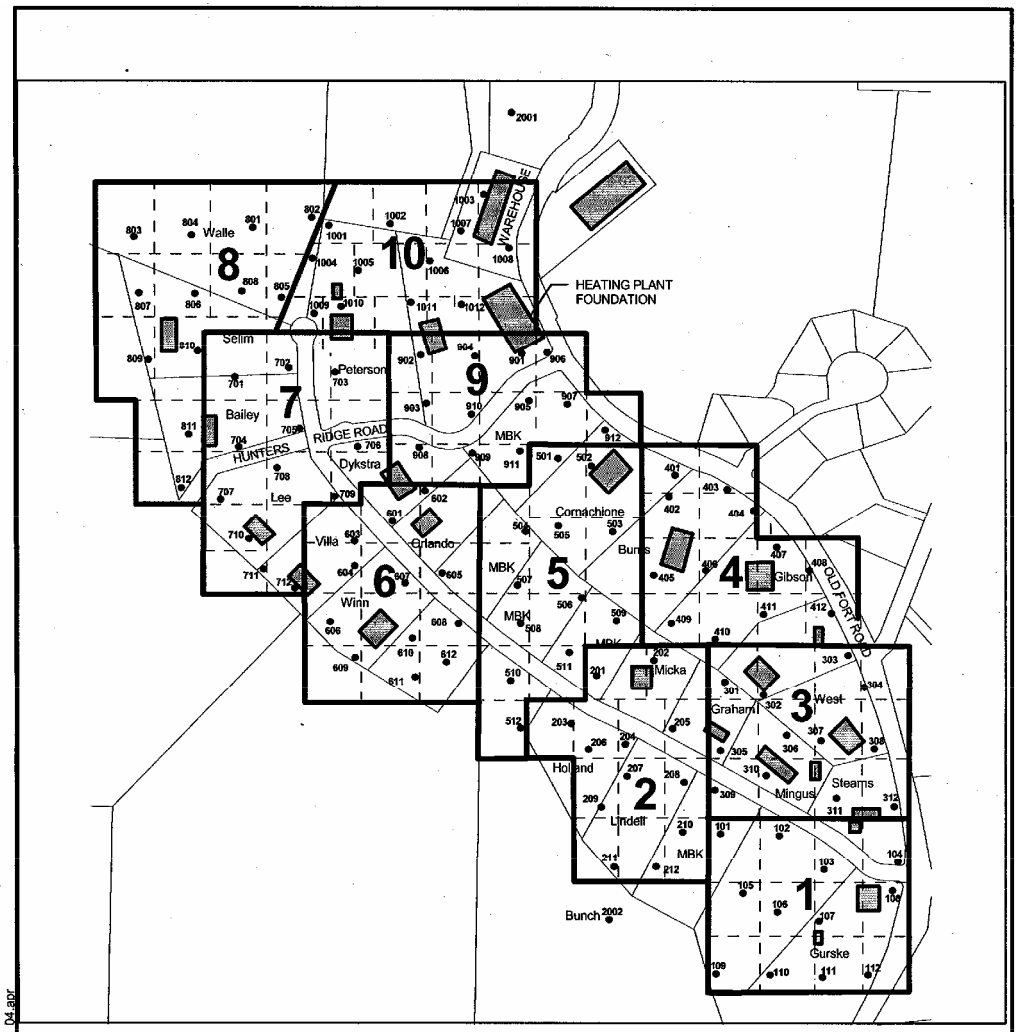
THE PRELIMINARY SOIL REPORT…. DETAILS

OBJECTIVES

- Assess the need for immediate (vs. long-term) action to protect public health
- Identify and focus issues of most relevance to assessing site risks
- Identify data gaps and corresponding data needs required to support final decisions and design of a permanent remedy

APPROACH

- Collect data to characterize general site conditions, to bound conditions on occupied parcels, and to characterize and bound conditions at known hot spots
- Define source concentrations based on the data collected
- Model release and transport of asbestos from sources to estimate potential exposure and risk



N

0 300 600 Feet

LEGEND

- SOIL SAMPLE LOCATION AND NUMBER
- BUILDINGS
- 16 LEE — LOT NUMBER AND OWNER
- TAX PARCELS
- COMPOSITE NUMBER AND BOUNDARY

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PBS

PROJECT	SOIL SAMPLE LOCATION MAP	FIGURE
19148.200	AOC TASK 9A NORTH RIDGE ESTATES KLAMATH FALLS, OREGON	3
Date: JUNE 2004		

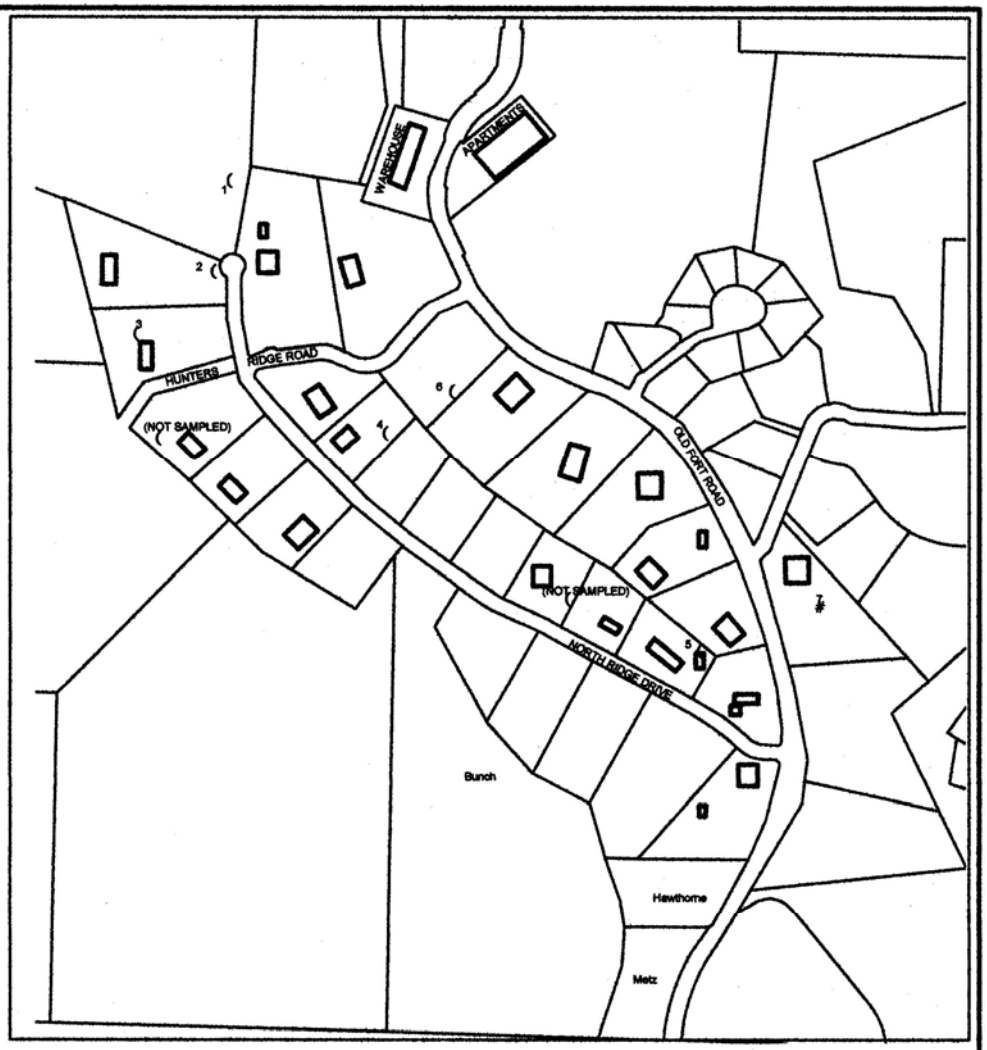


FIGURE A-2:
LOCATIONS OF HOT SPOT SAMPLES

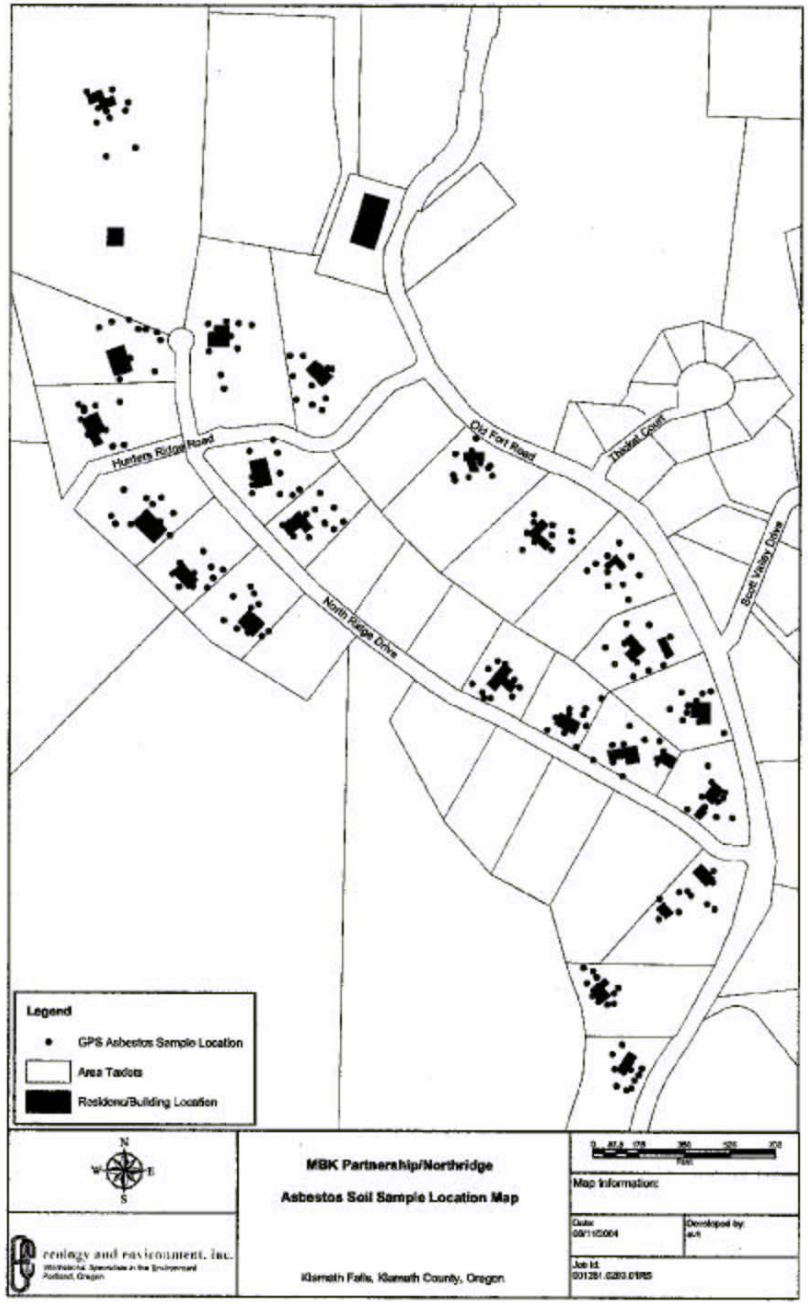
N

0 300 600 Feet

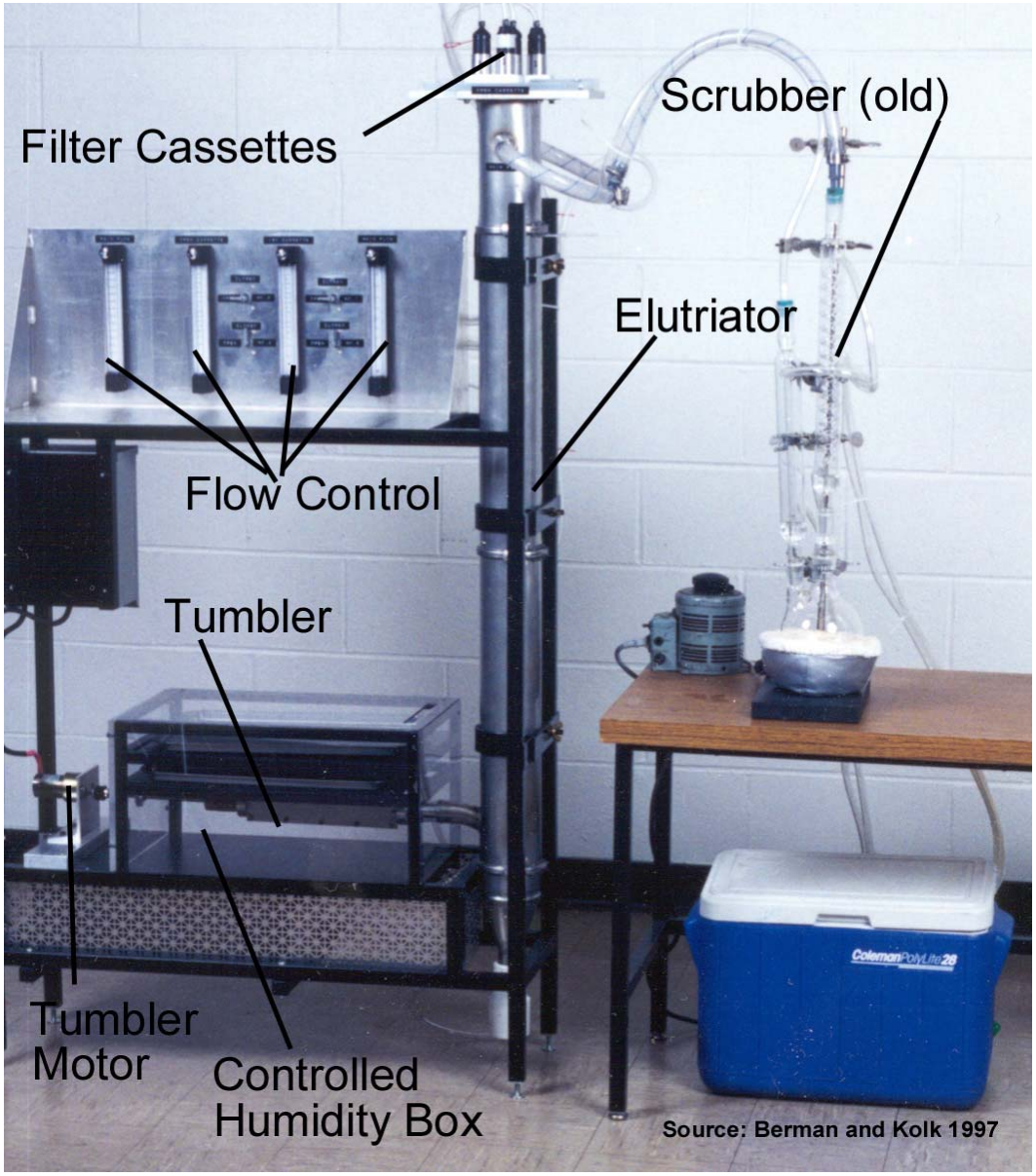
LEGEND

- HOT SPOT LOCATION AND REFERENCE NUMBER
- BUILDINGS
- LEE TAX LOT OWNER
- AREA TAXLOTS

PBS	PROJECT 19148.002	HOT SPOT LOCATION MAP	FIGURE
	Date: JAN. 2004	AOC TASK 3A NORTH RIDGE ESTATES KLAMATH FALLS, OREGON	3


Hunters Ridge Road
Old Fort Road
Thelma Court
Scott Valley Drive
North Ridge Drive
Legend
GPS Asbestos Sample Location
Area Taxlots
Residence/Building Location
N
W
E
S
ecology and environment, inc.
MBK Partnership/Northridge
Asbestos Soil Sample Location Map
Klamath Falls, Klamath County, Oregon
Map Information:
Date:
Developed by:
Job Id:

ELUTRTIATOR METHOD



UNIQUE ATTRIBUTE OF MEASUREMENTS FROM MODIFIED ELUTRIATOR METHOD

$$\frac{\text{Structures}}{g_{PM10}} \times \frac{g_{PM10}}{cm^3} = \frac{\text{Structures}}{cm^3}$$

EXPOSURE PATHWAYS EVALUATED

- Residential:
  - Walking
  - Running
  - Bicycling
  - ATV riding
  - Gardening
  - Child’s play in dirt
  - Rototilling
  - Intentional abrading of ACM
- Construction Related:
  - Bulldozer excavation
  - Loading and dumping
  - Grading
  - Off-road transport
- Evaluated both with no dust control and assuming required dust control

HOW EXPOSURE PATHWAYS ARE EVALUATED

- Model *dust* emissions and dispersion for each pathway using standard EPA models with conservative input assumptions
- For a few pathways, models were adapted from standard models in demonstrably conservative ways
- Multiply modeled dust exposure concentrations by measured asbestos concentrations in source materials to estimate asbestos exposure concentrations
- Multiply estimated exposure concentrations by appropriate unit risk factors to assess risk

ESTIMATED ASBESTOS CONCENTRATIONS IN SOIL
AT THE NORTH RIDGE ESTATES SITE, KLAMATH FALLS, OREGON

	Bulk Concentrations		
	protocol	%long	7402
Type of Estimate	**(s/ugPM$_{10}$)**	**(s/ugPM$_{10}$)**	**(s/ugPM$_{10}$)**
CHRYSOTILE			
Mean of Composite Concentrations (w/o ACM)[a]	0.18	100%	0.18
95% UCL for mean of Composite Concentrations (w/o ACM)[b]	0.9	100%	0.9
Maximum of Composite Concentrations (w/o ACM)	2.0	100%	2.0
Maximum of Composite Concentrations (w ACM)	19	50%	7.2
Maximum of Hot Spot Concentrations (w ACM)	300	50%	130
Maximum Detected Concentration in ACM	6300	50%	2200
Mean of Detected Concentrations in ACM	770	50%	250
Concentration of Chrysotile Detected in Steampipe Insulation[c]	2400	35%	1100
AMOSITE			
Maximum of Hot Spot Amosite Concentrations (w ACM)	7.8	50%	16
Concentration of Amosite Detected in Steampipe Insulation[c]	24000	36%	14000

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CONCLUSIONS AND RECOMMENDATIONS: THE NEED FOR IMMEDIATE ACTION

- Steam-pipe insulation should be removed or encapsulated whenever it is encountered at the site
- Otherwise, results indicate that estimated risks do not require immediate action, as they appear generally within the range that is potentially acceptable by EPA even on a permanent basis

CONCLUSIONS AND RECOMMENDATIONS: IDENTIFYING AND FOCUSING ISSUES FOR THE LONG TERM

- Additional work is required to better characterize the site both to reduce uncertainties and to support evaluation, selection, and design of remedial alternatives to further mitigate long-term risks
- The vast majority of the asbestos observed at the site is chrysotile. Nevertheless, the site needs to be characterized and controlled sufficiently to assure that any amphibole asbestos remains adequately sequestered
- To assure soils containing limited free-chrysotile remain acceptable for unrestricted use, the mass fraction of any embedded ACM needs to be below 0.3% by weight

CONCLUSIONS AND RECOMMENDATIONS: DATA GAPS AND FURTHER STUDY

- Conduct a bench-scale study to better define certain input parameters used to evaluate the intentional abrading of ACM
- Collect data needed to better characterize the areal and vertical extent of asbestos and ACM contamination in local soils to:
  - Support improved risk estimation to focus concerns and reduce uncertainty
  - Select and design remedial options for a permanent remedy for the entire site