II. **Chrysotile hazardous**

A. Introduction

1. Not many studies have ability to have folks only exposed to pure chrysotile
   a) Craighead admitted this

B. Dose

1. Duration of exposure

2. Intensity of exposure

3. Size of the fibers
   a) Mines -- larger fibers, not respirable
   b) End users -- smaller fibers, respirable and more dangerous
   c) Interaction with Pleura
      (1) Chrysotile gets into pleura in the right size to cause mesothelioma
         - Preferentally
            - **Le Bouffant-- peer reviewed article**
            - Sebastian

4. Diversity among job sites producing similar products
   a) One may have been very dusty, others less dusty
      (1) **McDonald says crocodolite mines much dustier than chrysotile mines**

C. Genetics

1. Cellular damage
   a) chrysotile affects DNA, chromosomes
      (1) causes mutations -- the necessary prerequisite for cancer to start
   b) chrysotile affects macrophages and other body defense systems
   c) suppresses immune system
   d) causes mesothelioma

2. Animal Studies

Chrysotile hazardous

a) Experiments show it causes mesothelioma in injection and inhalation studies
b) **Dogs whose owners have chrysotile exposure have mesothelioma at autopsy**

D. Blue ribbon unbiased panels considering danger of asbestos fibers

1. **World Health Organization, United Nations subdivision**

2. **International Agency for Research on Cancer**

3. **Environmental Protection Agency**

4. **National Institutes for Occupational Safety and Health** (US governmental agency)

5. **Occupational Safety and Health Administration**

6. **Consumer Products Safety Commission**

E. Studies in Human Populations showing mesothelimoa in chrysotile exposed populations

1. Epidemiology is the scientific tool for drawing cause and effect conclusions from large populations of exposed people

2. Studies where chrysotile mesotheliomas were reported
   a) **Wagoner -- Raymark plant study**
      (1) **Letter from Ike Weaver saying no amphiboles were used at time victim was exposed**
   b) Teta and Lewinsohn
      (1) Raymark plant study-- chrysotile only
   c) Weill and Hughes
   d) Scansetti
      (1) Italian winery worker exposed to chrysotile for only limited period
   e) Langer and McCaughey
      (1) Brake worker
      (2) Lung analysis done -- chrysotile only
   f) Kagen and Jacobson

(1) Two studies -- study #2 was chrysotile only

g) McDonald
   (1) 2 cases of brake worker mesos
h) Viana and Poulen
   (1) wives of employees
i) McDonald "Malignant Mesothelioma in N. America"
   (1) 11 cases from heat protective clothing only
j) Greenberg and Davies
   (1) 4 cases of chrysotile mesothelioma
k) Champion
   (1) 2 cases of malignant meso from chrysotile hoods
l) Cochrane and Webster
   (1) 2 cases of welders using asbestos gloves and cloth
m) Kanetsky (phonetic)
   (1) 23 cases exposed only to fire protective clothing
n) Mancuso
   (1) railroad mechanics
o) Enterline
p) Newhouse and Berry
   (1) 2 people only exposed to chrysotile
q) A.D. McDonald "Malignant Mesothelioma"
   (1) person in Factory A chrysotile only
r) Sebastien
   (1) pathology showed 4 cases with 100% chrysotile in pleura
s) Mayo Clinic
   (1) service station operator
      • brake lining exposure
t) Acheson
   (1) one meso in chrysotile plant
   (2) five mesos in crocidolite plant with more people in the study
u) Dement
   (1) Raymark study
   (2) peritoneal mesothelioma found
   (3) more suspected but couldn't obtain the tissue
v) Wagner
   (1) actual study of lung contents of individuals
      • 3-4 were chrysotile only
w) Wagner Cyprus mine
   (1) 12 mesotheliomas
x) Churg

(1) 6 of 90 consecutive autopsies

y) Japanese study

(1) 6 mesotheliomas with chrysotile only in lung fiber analysis

3. Scientific data is incomplete

a) Not all chrysotile mesotheliomas are reported-- **Craighead's own experience**