



# Draft Risk Evaluation for Asbestos Part 2: Evaluation Including Legacy Uses and Associated Disposals of Asbestos

**Public Webinar**  
**May 13, 2024**

Office of Pollution Prevention and Toxics  
Office of Chemical Safety and Pollution Prevention  
U.S. Environmental Protection Agency

# Briefing Purpose and Key Findings



## Purpose:

- Highlight scope and outline of the Draft Asbestos Part 2 Risk Evaluation
- Provide overview of risks identified

## Key Takeaway: Cancer and Non-Cancer Risks Identified

- **Occupational exposures** to asbestos through construction/demolition
- **Take-home exposures** from handling asbestos contaminated clothing worn during occupational activities
- **General population exposures** near asbestos releasing facilities/activities
- **Consumer (do-it-yourself) exposures** from inhalation of asbestos fibers released during activities modifying asbestos containing materials (ACMs)
- **Bystanders** in take-home and consumer exposure scenarios

# Introduction to Asbestos



- Generic commercial designation for a **group of naturally occurring mineral silicate fibers** of the serpentine and amphibole series.
- EPA definition (TSCA Title II, 1986) is asbestiform varieties of six fiber types:
  - Chrysotile (serpentine)
  - Crocidolite (riebeckite)
  - Amosite (cummingtonite-grunerite)
  - Anthophyllite
  - Tremolite
  - Actinolite
- Primarily used as fire retardant in construction and manufacture of cement pipes, utility vehicles, and brakes
- Current regulations and reporting
  - Occupational Safety and Health Administration (OSHA)
  - EPA Office of Air and Radiation (OAR)
  - State and local
  - EPA Asbestos Part 1 Final Rule under TSCA

# Asbestos History and Timelines

- 9<sup>th</sup> Circuit Court required TSCA Asbestos Risk Evaluation to expand scope beyond chrysotile, the only fiber with ongoing use, to consider legacy uses and associated disposals
- **Chrysotile Asbestos Risk Evaluation (Part 1)** continued forward
- **Asbestos Part 2 Risk Evaluation** developed to address:
  - Additional fiber types: crocidolite (riebeckite), amosite (cummingtonite-grunerite), anthophyllite, tremolite, actinolite, Libby Amphibole Asbestos, asbestos-containing talc
  - Legacy uses: uses without ongoing or prospective manufacturing, processing, or distribution
  - Disposals: future disposal of legacy uses and past disposal
  - Cancer and non-cancer human health effects
  - Take-home exposures from occupational activities and general population exposures from environmental releases
  - Dermal and oral exposures

July 2017  
Risk Evaluation Rule



November 14, 2019  
Safer Chemicals, Healthy Families v. EPA

December 2020  
Asbestos Part 1 Risk Evaluation

June 2022  
Asbestos Part 2 Scope Released

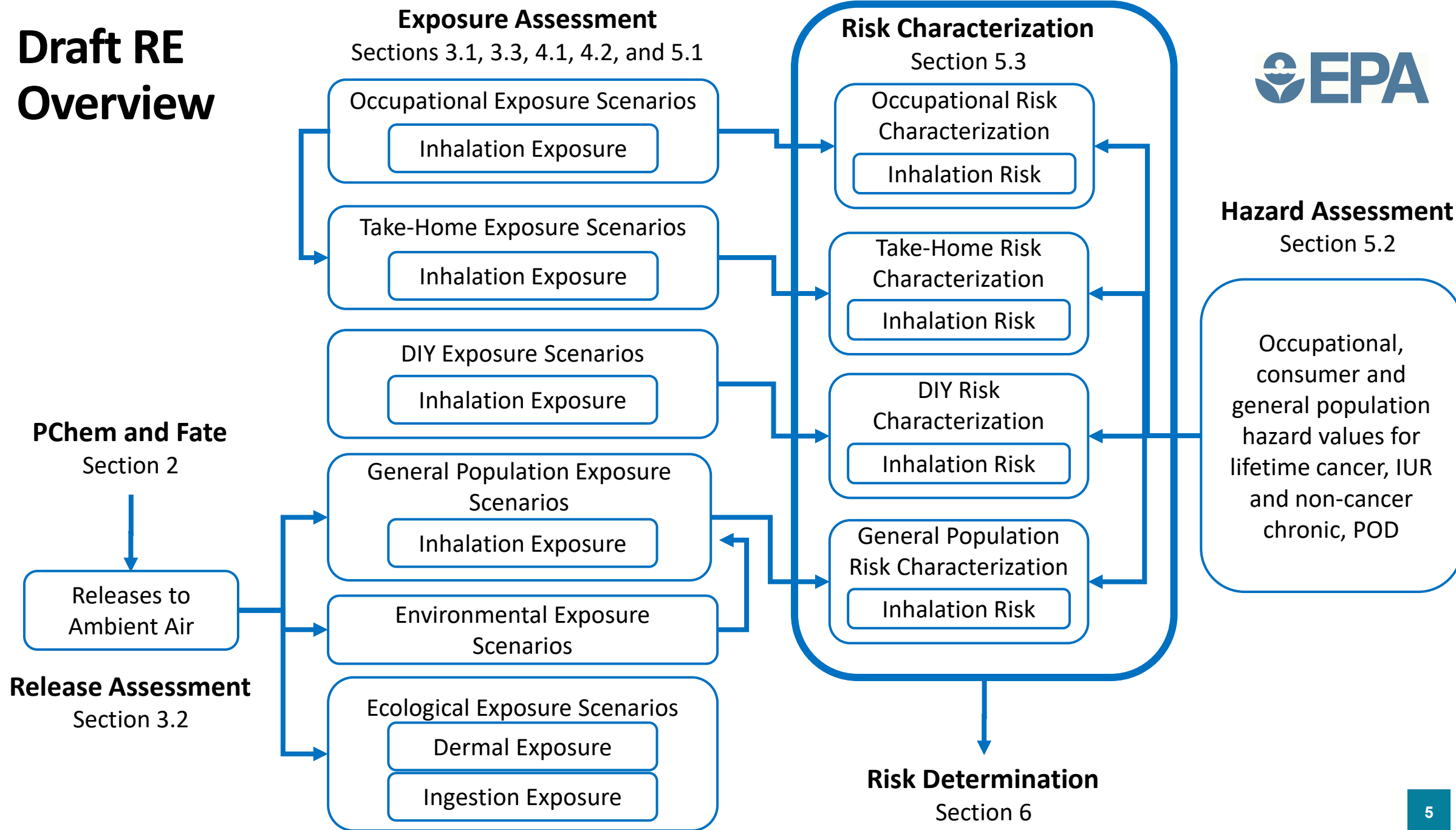
August 2023  
TSCA 8(a) Rule Effective (Data Call In)  
Asbestos Part 2 White Paper Letter Peer Review

February - May 2024  
Data Submission Period

April 2024  
Draft Asbestos Part 2 Risk Evaluation Release

December 2024  
Court Mandated Asbestos Part 2 Risk Evaluation Final Release

# Draft RE Overview



# Summary of PChem and Fate



- The strong Si-O-Si covalent bonds in the silicate tetrahedra of asbestos fibers result in environmental stability, negligible water solubility, high tensile strength, hardness, and inertness.
- Small asbestos fibers (<1 μm) can remain suspended in air and water. Deposition expected to be higher closer to the asbestos source and eventually settle to soils, water bodies, and sediments.
- Asbestos fibers in water settle into sediments and biosolids from wastewater treatment processes, so aquatic and terrestrial organisms are not expected to uptake asbestos fibers from water.
- Incineration of asbestos fibers results in morphological changes during recrystallization yielding non-asbestos fibers and negligible releases to air.

Property	Chrysotile	Crocidolite	Amosite	Anthophyllite	Tremolite	Actinolite	Libby Amphibole
<b>Essential Composition</b>	Silica sheet (Si <sub>2</sub> O <sub>5</sub> ), with a layer of brucite (Mg(OH) <sub>2</sub> )	Na, Fe silicate with some water	Fe, Mg silicate	Magnesium and iron silicates	Ca, Mg silicate with some water	Ca, Mg, Fe silicate with some water	Winchite (84%), richterite (11%), and tremolite (6%)
<b>Hardness (Mohs)</b>	2.5–4.0	4.0	5.5–6.0	5.5–6.0	5 to 6	6.0	–
<b>Flexibility</b>	High	Fair to Good	Good	Poor: very brittle, non-flexible	Poor: generally brittle	Poor: brittle, non-flexible	–
<b>Tensile Strength (MPa)</b>	1,100–4,400	1400-4600	1500-2600	≤30	<500	≤7	–
<b>Decomposition Temperature (°C)</b>	600–850	400–900	600–900	1,150–1,340	950–1,040	1,140–1,296	–

Excerpt from Table 2-1 in Draft RE document

# Environmental Risk



- EPA did not calculate risk to aquatic organisms due to a lack of useable aquatic environmental exposure data
  - Limited aquatic exposure data did not yield numbers outside of Superfund sites; therefore, no representative numbers were available to calculate risk
  - Concentrations of concern (COCs) were calculated for:
    - Acute COC: Asiatic clams (*Corbicula sp.*) - 20 fibers/L chrysotile asbestos
    - Chronic COC: Asiatic clams (*Corbicula sp.*) - 10 fibers/L chrysotile asbestos
    - Chronic COC: Japanese medaka (*Oryzias latipes*) – 10,000 fibers/L chrysotile asbestos
- EPA did not calculate risk to terrestrial organisms due to a lack of relevant ecological (apical) endpoints such as mortality and reproductive effects
- In accordance with the Asbestos Part 1 Risk Evaluation, EPA concludes that there is very limited potential for asbestos exposures to aquatic or sediment-dwelling organisms and risk is not observed from exposure to asbestos fibers

# Summary of Asbestos Conditions of Use

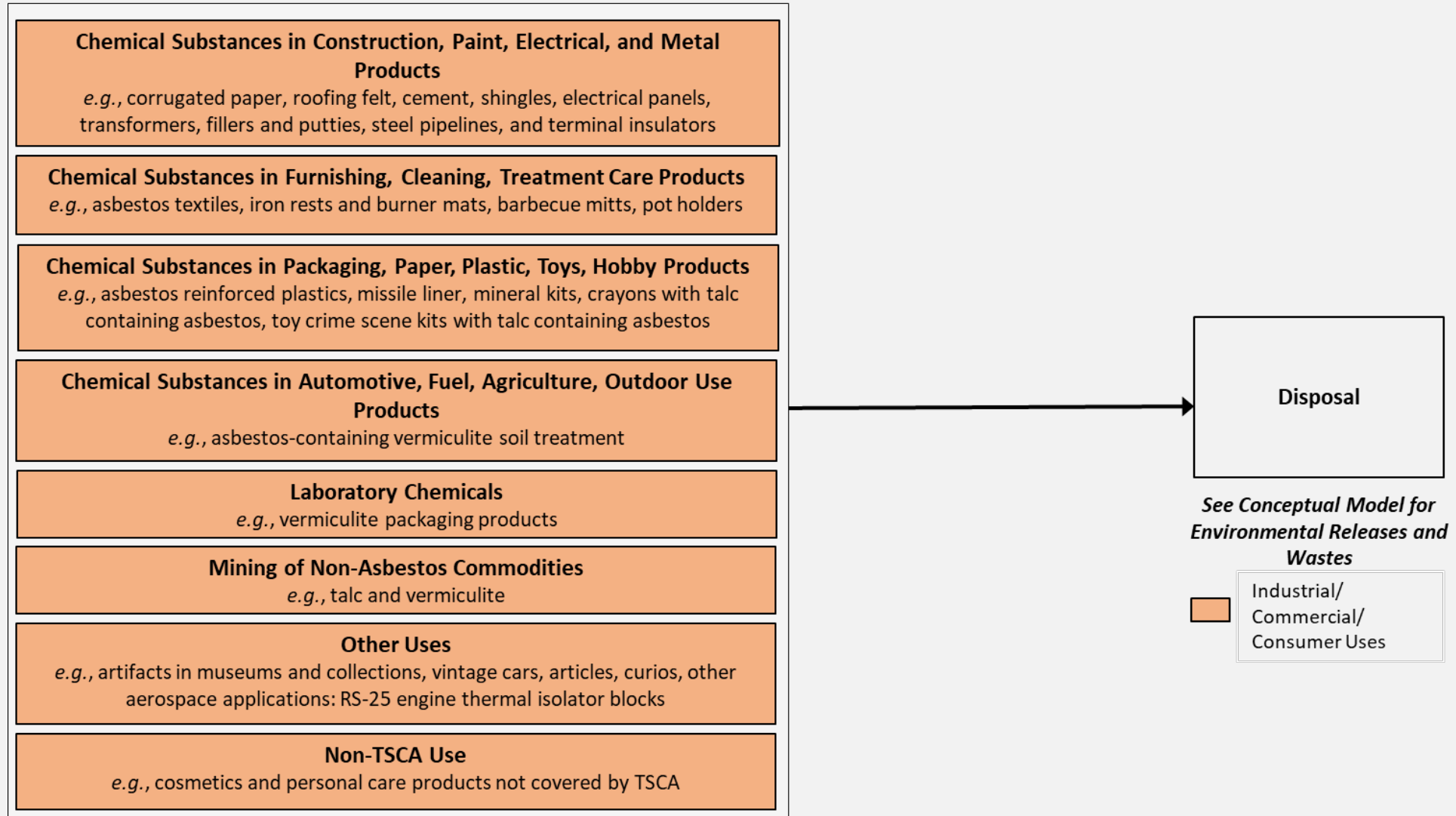


Figure 1-2 in Draft RE document



# Exposure - Occupational



- Inhalation exposure estimates based on monitoring data.
- Targeted Populations:
  - Male and female workers >16 years of age
  - Female workers of reproductive age (16 to <50)
- Short-Term workers – 30 min.
- 8-hr time weighted average workers – 8-hrs TWA
  - Higher exposure-potential worker: directly generate friable asbestos through actions such as grinding, sanding, cutting, or abrading.
  - Lower exposure-potential worker: may come into direct contact with friable asbestos while performing their required work activities.
  - Occupational non-users (ONUs): workers who may be in the vicinity of asbestos but are unlikely to have direct contact with ACM.

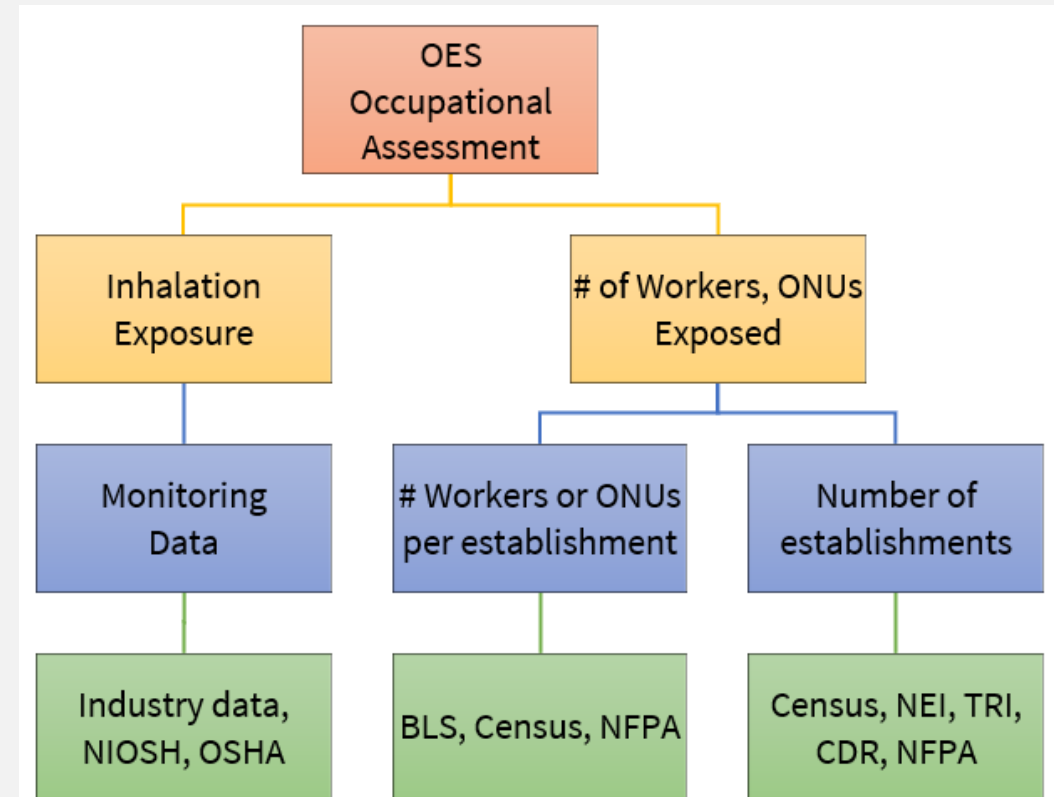
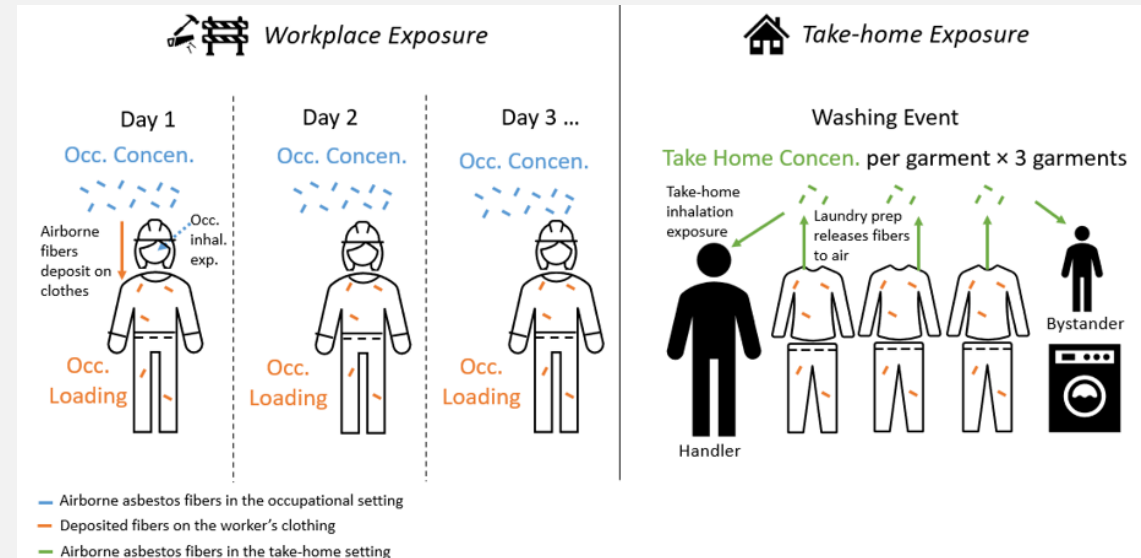


Figure 5-1 in Draft RE document

# Exposure – Take Home



Figure 3-2 in Draft RE document



## Take home exposures

- Inhalation only
- Asbestos fiber concentrations based on occupational monitoring data
- Exposure scenario: fibers loaded onto clothing/garment during some occupational activity subsequently inhaled during garment handling at home

## Bystander exposure in the take-home assessment

- Person in proximity to the garment handling activity
- Multiple age groups considered for bystander
  - Children bystanders in main RE
  - Adults and lifetime in appendix

### Key Assumption: Unit Exposure for Take-Home Scenarios

one *occupational* exposure day where a *single garment* is loaded based on an *8-hr TWA conc.*

corresponds to

one *take-home* exposure day where a *single garment* is washed leading to a *proportional 24-hr TWA conc.*

#### For one day of workplace exposure:

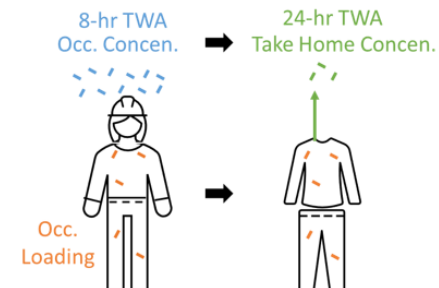


Figure 3-3 in Draft RE document

# Exposure – Consumer Do-It-Yourself



- Inhalation exposure estimates based on monitoring data.
- Activity-based scenarios for DIY users.
  - ≥ 16 years all genders
  - 62 year duration
- Activity-based scenarios for DIY bystanders.
  - All ages, all genders
  - 78 years duration
- EPA built DIY scenarios for repair and removal activities in which asbestos containing materials (ACM) are modified and asbestos fibers are released.
  - Repair – Assumed one task per year. The length of time spent on the task varies for low-end, high-end, and central tendency exposure estimates. Exposure Factor Handbook and professional judgement used.
  - Removal – EPA reviewed the frequency of replacement for various home materials. Only the first replacement job is likely to involve removing ACM.

# Exposure – General Population

- Asbestos fibers released into the environment from occupational activities and people that reside at certain distances from the release inhale the fibers.
- Distances considered in this assessment: 10, 30, 60, 100, 1,000, 2,500, 5,000, and 10,000 m.
- Exposures 0-1 and 0-20 years in RE (additional exposure durations in Appendix L).

Figure 5-2 in Draft RE document

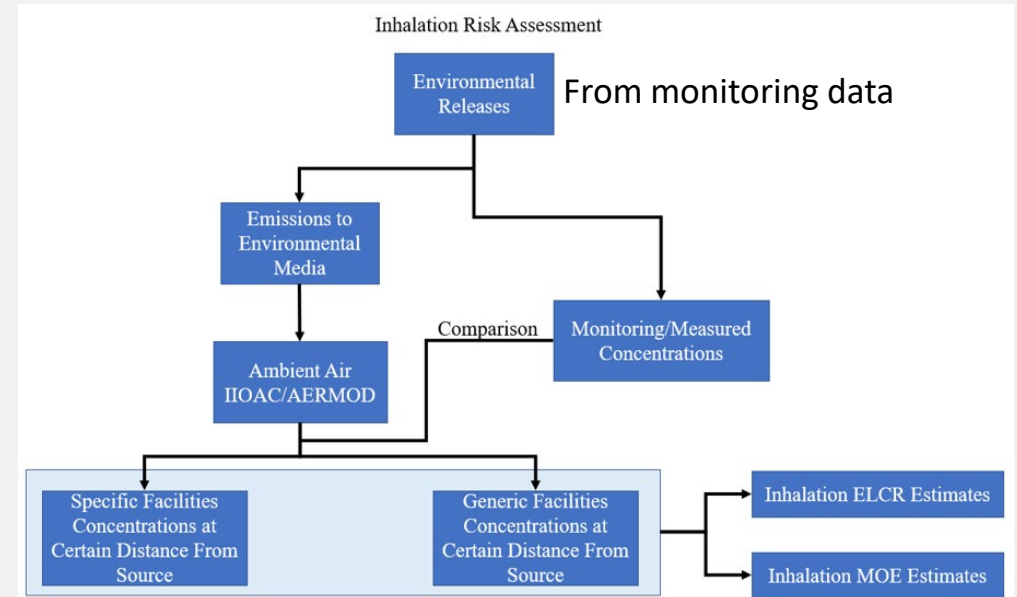


Figure 5-3 in Draft RE document

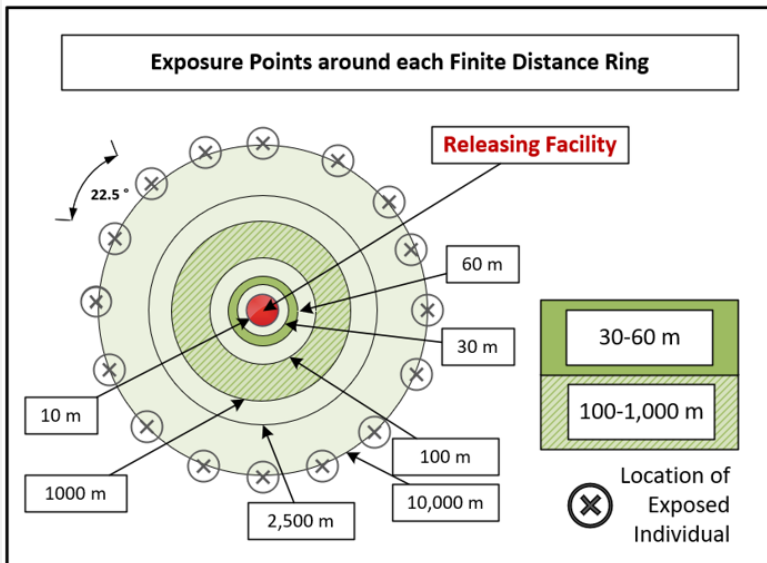


Table 5-17. General Population Exposure Duration Parameters

Parameter	Description	Values and Notation
Exposure duration (ED) for stationary OES	Exposures starting at birth and lasting 20 years of residing at same household. Assumption of number of years children reside in a single residential location. Most protective assumption as the exposure will be carried out through the exposed population's lifetime.	ED = 20 years Less-than-lifetime (LTL) IUR = IUR(0,20) = 0.13
Exposure duration for non-stationary short duration OES	Exposures starting at birth and lasting 1 year of residing at same household. Assumption is that the activity sporadically occurs for 1 year. Most protective assumption as the exposure will take place through the exposed population's lifetime.	ED = 1 LTL IUR = IUR(1,0) = 0.01

# Human Health Hazard

- Cancer inhalation unit risk (IUR): 0.2 per fiber/cc
  - Based on mesothelioma and lung cancer with quantitative adjustment for laryngeal and ovarian cancers
  - Account for the EPA existing IURs
    - 1988 RE 0.23 per fiber/cc
    - 2014 IRIS 0.17 per fiber/cc
    - 2020 RE 0.16 per fiber/cc
  - Sensitivity analysis conducted and no change in risk across IURs
- Non-cancer point of departure (POD): 0.026 fiber/cc
  - Based on localized pleural thickening (LPT)
  - Cohort from O.M. Scott plant in Marysville, Ohio
    - Most robust and relevant information for dose-response analysis
    - Over 50 years of follow-up
  - POD selected in 2014 IRIS Libby Asbestos Assessment

# Risk characterization



- The development of all exposure scenarios for this risk evaluation is based on the understanding that friable asbestos are modified (*e.g.*, removed, sanded, cut, disturbed) to release fibers. ACMs that stay in place without any modification done to it, are not expected to result in releases, and hence no human exposures and risks are expected.
- EPA used measured or estimated air concentrations to calculate exposure concentrations required for risk assessment, such as average daily concentration (ADC), margin of exposure (MOE), and excess lifetime cancer risk (ELCR).
- Estimated risks for all populations for non-cancer chronic and lifetime cancer.

Population	Benchmark	Value
Occupational	ELCR	$1 \times 10^{-4}$
General Population	ELCR	$1 \times 10^{-4}$ to $1 \times 10^{-6}$
DIYers and Take Home	ELCR	$1 \times 10^{-6}$
Occupational and Non-Occupational	MOE	300

# Risk Characterization Approach



Population of Interest	Exposure Scenario	Sources of Uncertainty
Workers and ONUs	<ul style="list-style-type: none"> <li>▪ Adolescent (<math>\geq 16</math> years old) and adult workers exposed to asbestos for the entire 8-hr workday for up to 250 days per year for 30 and 40 working years (CT and HE respectively)</li> <li>▪ Few OESs where more detailed information about identified job types and categories was available were split between higher and lower exposure-potential workers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Number of workers per COU</li> <li>▪ Which industries and occupations are associated with the uses assessed</li> <li>▪ Split between higher and lower exposure-potential workers</li> <li>▪ Larger data variability for nonusers</li> <li>▪ Representativeness of the data and variability due to work practices</li> </ul>
Take Home Garment Handler	<ul style="list-style-type: none"> <li>▪ Adolescent (<math>\geq 16</math> years old) and adults exposed to asbestos during handling of clothing contaminated with asbestos from occupational activities, for 40 working years</li> <li>▪ CT and HE driven by worker exposure concentrations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Concentration data used may include non-asbestos and smaller particle sizes and overestimate risk</li> <li>▪ Variability due to products and asbestos concentrations differences across activities and asbestos containing products</li> </ul>

# Risk Characterization Approach



Population of Interest	Exposure Scenario	Sources of Uncertainty
DIYers (Consumers)	<ul style="list-style-type: none"> <li>▪ Adolescent (<math>\geq 16</math> years old) and adult DIYers exposed to asbestos fibers during an activity that modifies asbestos containing materials</li> <li>▪ LE, CT and HE driven by monitoring concentration data, frequency and duration of activity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Determination of products and potential to release asbestos fibers</li> <li>▪ Concentration data used may include non-asbestos and smaller particles sizes and overestimate risk</li> </ul>
General Population	<ul style="list-style-type: none"> <li>▪ All genders and age groups indoor environments exposed to asbestos fibers infiltrating from outside from occupational exposure activities and disposal releases</li> <li>▪ LE, CT and HE driven by release concentration data</li> </ul>	<ul style="list-style-type: none"> <li>▪ Meteorological data from specific locations versus generalized approaches</li> <li>▪ Number of emissions per year</li> </ul>
Bystanders	<ul style="list-style-type: none"> <li>▪ Individuals of all ages exposed to asbestos fibers through DIYers and take-home activities</li> </ul>	



# COUs Found to Contribute to Unreasonable Risk (UR)



## Industrial/commercial use (5):

- Chemical substances in construction, paint, electrical, and metal products
  - Construction and building materials covering large surface areas – paper articles; metal articles; stone plaster, cement, glass, and ceramic articles
  - Machinery, mechanical appliances, electrical/electronic articles
  - Other machinery, mechanical appliances, electronic/electronic articles
- Chemical substances in furnishing, cleaning, treatment care products
  - Construction and building materials covering large surface areas – fabrics, textiles, and apparel
  - Furniture and furnishings – stone, plaster, cement, glass, ceramic articles, metal articles, and rubber articles

## Consumer use (3)

- Chemical substances in construction, paint, electrical, and metal products
  - Construction and building materials covering large surface areas – paper articles; metal articles; stone, plaster, cement, glass, and ceramic articles
    - Fillers and putties
- Chemical substances in furnishing, cleaning, treatment care products
  - Furniture and furnishings – stone, plaster, cement, glass, and ceramic articles; metal articles; or rubber articles

## Disposal (1)

- Distribution for disposal

# Soliciting Comments



- EPA seeks feedback on the assessment of risk for asbestos as presented in the Asbestos Part 2 Draft Risk Evaluation and welcomes specific input on each section of the Asbestos Part 2 Draft Risk Evaluation.
  - Take-home exposure scenarios.
  - Non-cancer endpoints used to characterize risk.
  - Single risk determination for asbestos where the Agency intends to determine that asbestos, as a chemical substance, presents an unreasonable risk of injury to health when evaluated under its conditions of use.
- EPA is **not** requesting public comment on the hazard, exposure, or risk characterization sections of part 1, as those sections remain unchanged.
- EPA encourages all potentially interested parties to comment on the Asbestos Part 2 Draft Risk Evaluation.
- To the extent possible, cite any public data related to or that supports responses.
- To the extent possible, describe any supporting data that is not publicly available.
- Do not include CBI in comments. See Federal Register Notice for details on CBI submission.
  
- **Comments must be submitted by June 17, 2024**
- **Comment Link:** <https://www.regulations.gov/commenton/EPA-HQ-OPPT-2021-0254-0048>

# Links and Contacts



## Relevant Links:

- Federal Register: <https://www.federalregister.gov/documents/2024/04/16/2024-08024/asbestos-part-2-supplemental-evaluation-including-legacy-uses-and-associated-disposals-draft-risk>
- Draft Risk Evaluation for Asbestos Part 2: <https://www.regulations.gov/document/EPA-HQ-OPPT-2021-0254-0049>
- Comments should be submitted to docket: [EPA-HQ-OPPT-2021-0254-0048](https://www.regulations.gov/document/EPA-HQ-OPPT-2021-0254-0048)
- Risk evaluations for Asbestos under TSCA: <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluation-asbestos-0>
- General information on TSCA: <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/frank-r-lautenberg-chemical-safety-21st-century-act>

## Contact for Technical Information:

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