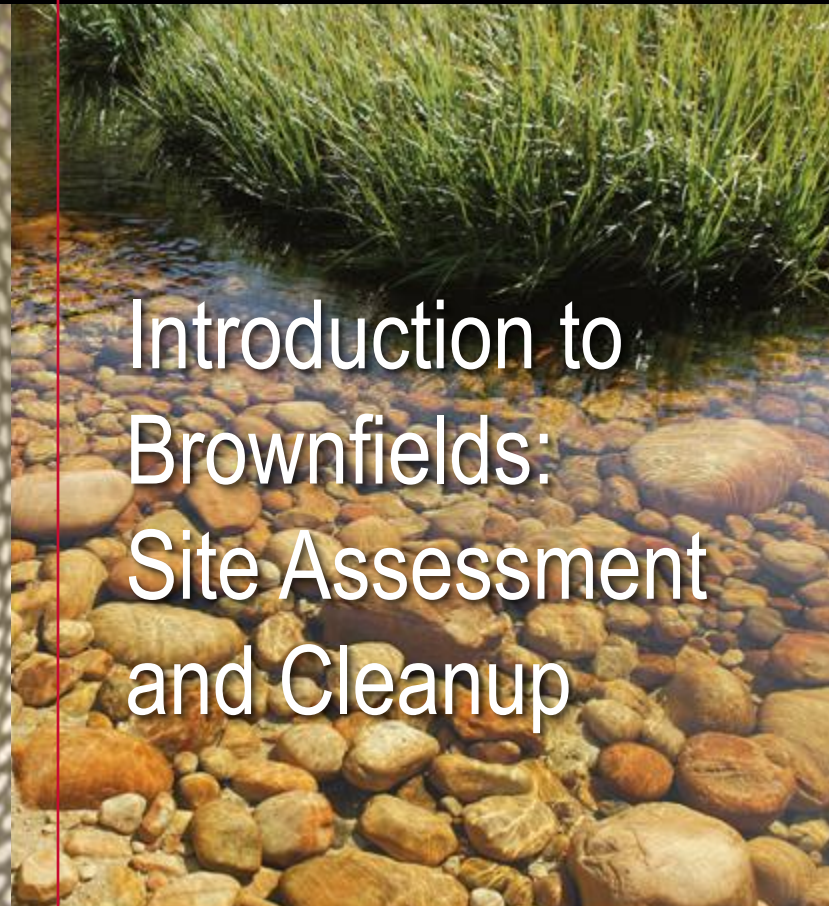
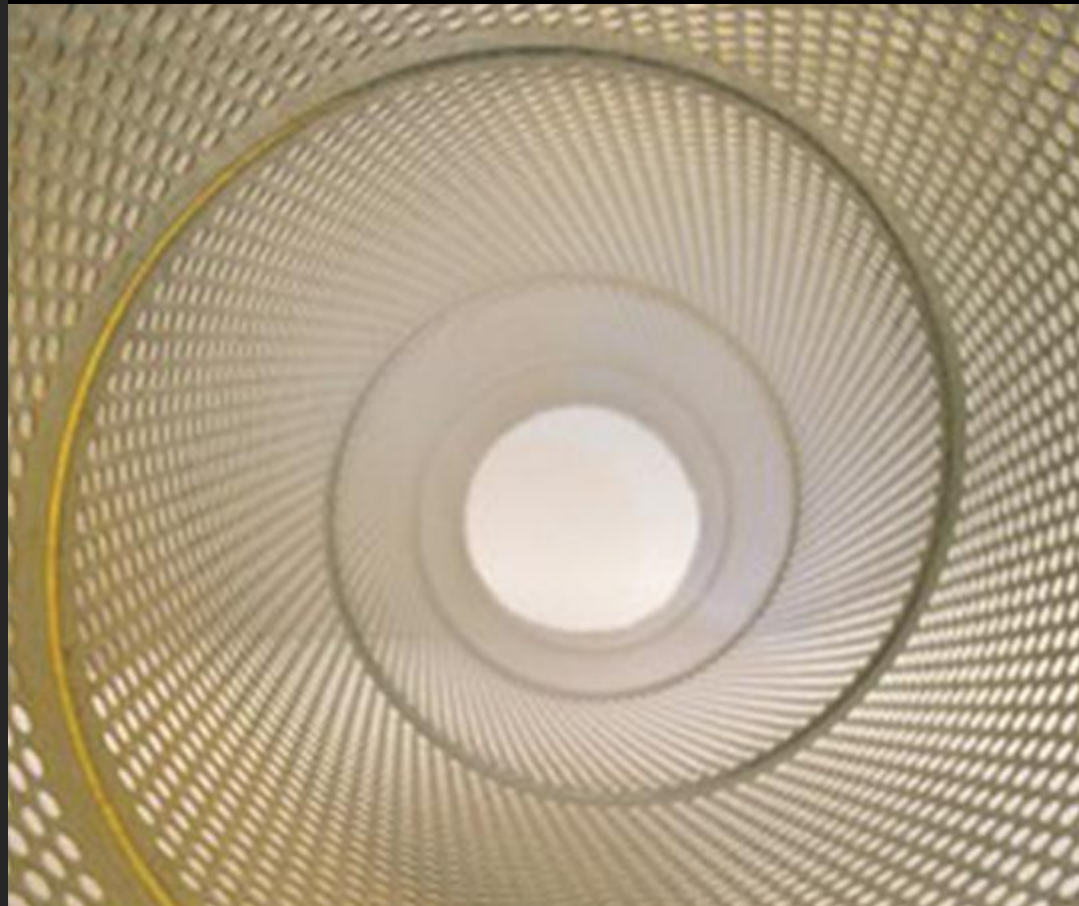


# consulting engineers and scientists

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## Introduction to Brownfields: Site Assessment and Cleanup

Presented by: Barry Giroux, P.E., LEP,  
Senior Project Manager





# What is a Brownfield?

- Under-used industrial or commercial properties
- Often abandoned because of perceived environmental contamination
- Commercial properties
- Mills
- Warehouses
- Factories





# Benefits of Brownfields Redevelopment

- Protects human health and the environment.
- Increases the tax base in the local area.
- Restores or replaces dilapidated buildings and facilities.
- Strengthens central economic centers.
- Creates jobs.
- Utilizes existing infrastructure.
- Encourages inner city investment.
- Reduces suburban sprawl.
- Prevents the spread of the contaminants.







# Key Challenges

- Environmental liability
  - Manage liabilities associated with contamination
- Financial barriers
  - Additional cost to development
  - Cleanup costs greater than property value
  - Lenders hesitant to finance
- Cleanup may add to development timeline
- Reuse planning





# Key Players

- State Environmental Agencies
- State Economic Development and Planning Agencies
- Commercial Lenders
- Technical and Environmental Consultants
- Legal Counsel
- Citizens and Community Groups
- Local Government Agencies

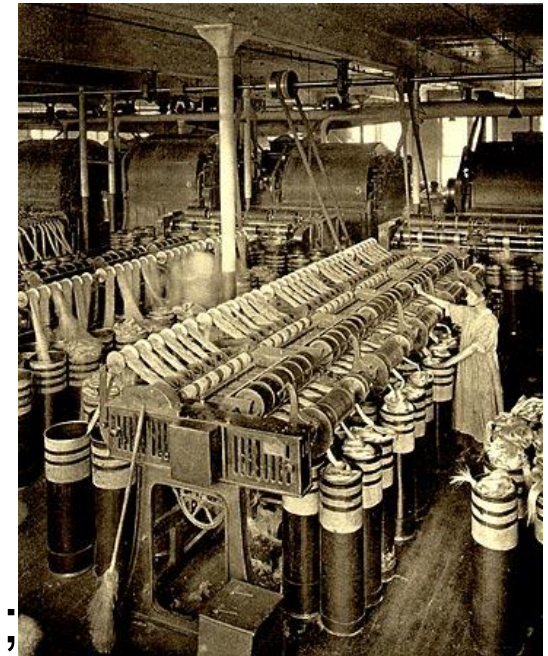


- United States Environmental Protection Agency (EPA)
- Developers
- Local Community Development Corporations (CDCs)
- Federal Government Agencies
  - HUD
  - ACOE



# Mills

- Operations that uses raw material to manufacture products:
  - textiles;
  - pulp, paper, and paperboard;
  - wood products for construction;
  - iron and steel for construction.
- Process:
  - cotton, wool, and other raw fibers;
  - wood and wood fiber, both virgin and recycled; and
  - iron, ore, coal, and metal scrap.





# Characteristics of Mills

- Centerpiece of town
- Historic structures
- Readily accessible to transportation
- Existing utilities and infrastructure
- Large
- Multiple tracts of land
- Water bodies and rivers
- Opportunity for waterfront development
- Long development time periods

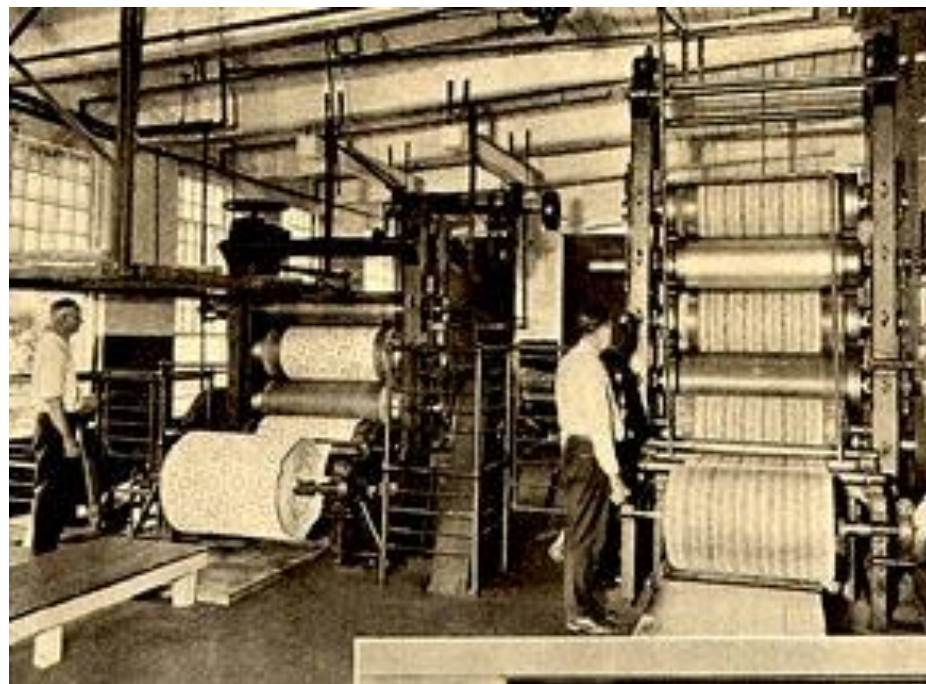






# Types of Contamination at Mills

- Textile
  - Mercury
  - Polychlorinated biphenyls (PCBs)
  - Lead and other metals,
  - Volatile organic compounds (VOCs)
  - Asbestos
  - Petroleum

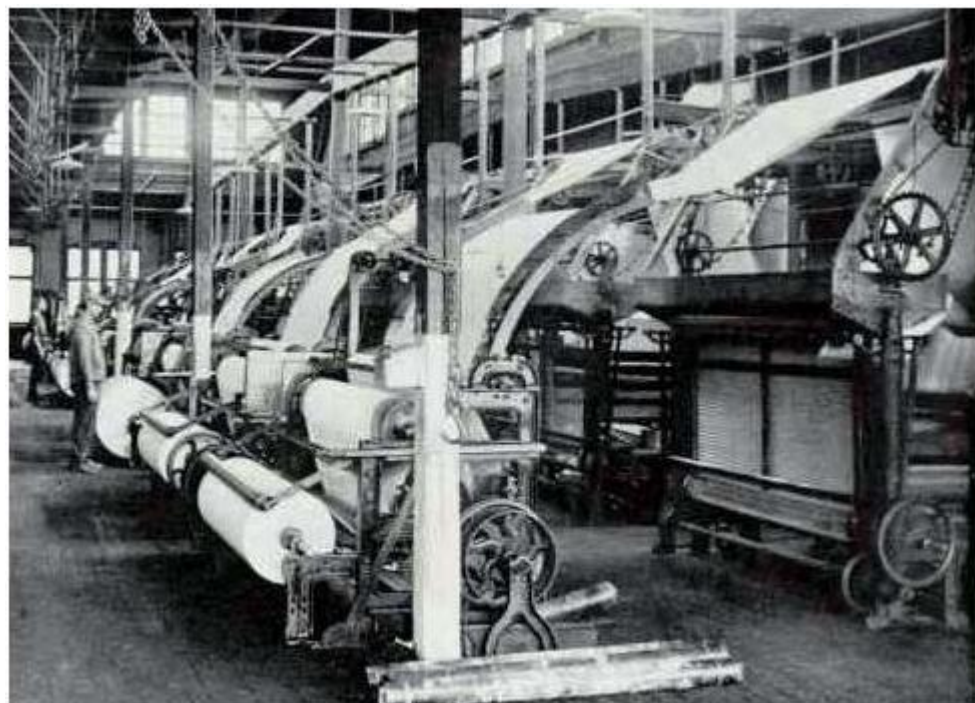






# Types of Contamination at Mills

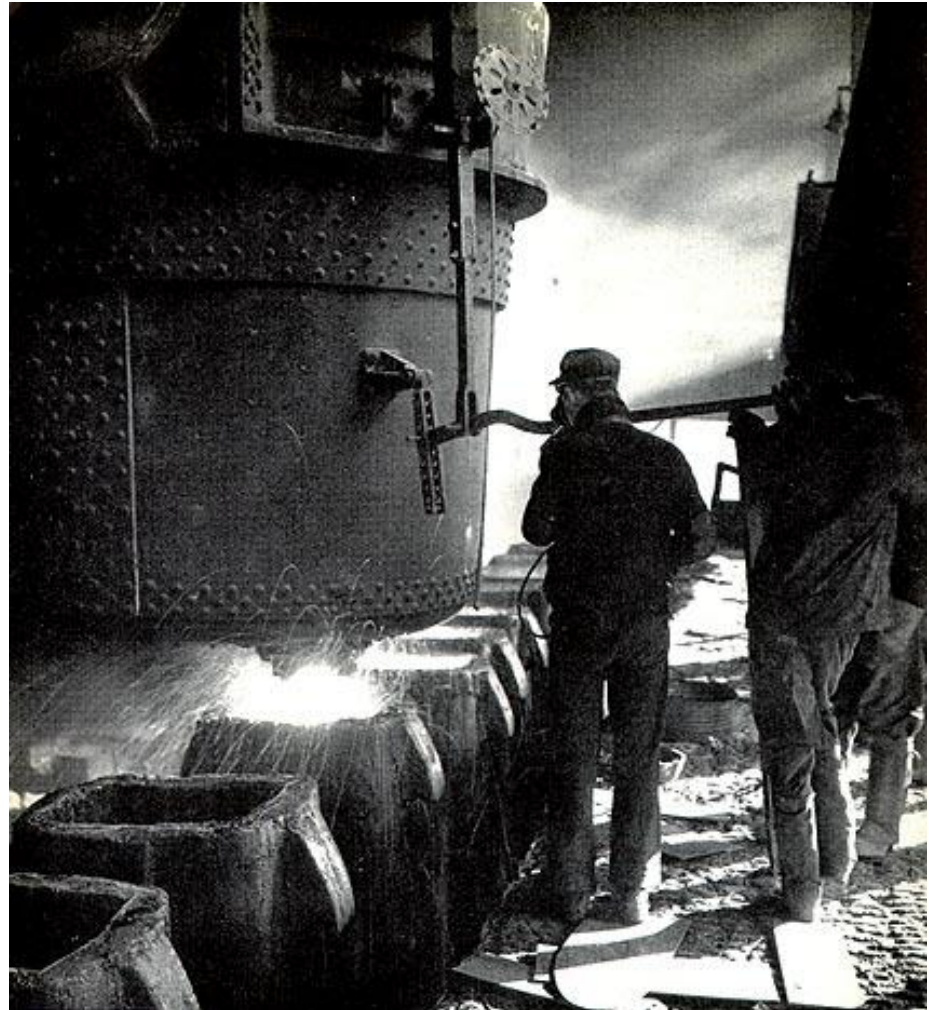
- Paper mills and wood products
  - Wood treating chemicals
  - Creosote
  - VOCs
  - Dioxins
  - Lead
  - PCBs
  - Petroleum





# Types of Contamination at Mills

- Iron and steel
  - Lead
  - PCBs
  - Petroleum
  - Slag
  - Asbestos





# Types of Contamination at Mills

- Railroad lines and spurs
  - Polyaromatic hydrocarbons (PAHs)
  - Lead
  - Pesticides
  - PCBs
- Underground storage tanks (USTs)
  - Fuel oil
  - Gasoline

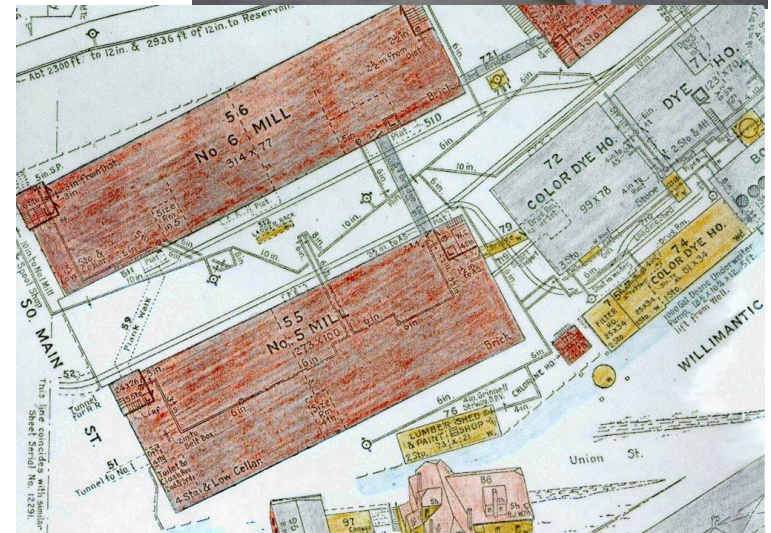






# Phase I Due Diligence

- Goal: Identify “areas of recognized environmental concerns”
- Paper Search
- Historic Information
- Interview
- Site Visit
- Areas of Environmental Concern (AOEC)
  - Historic use, USTs, metal finishing, dry cleaners, types of manufacturing



# Sources

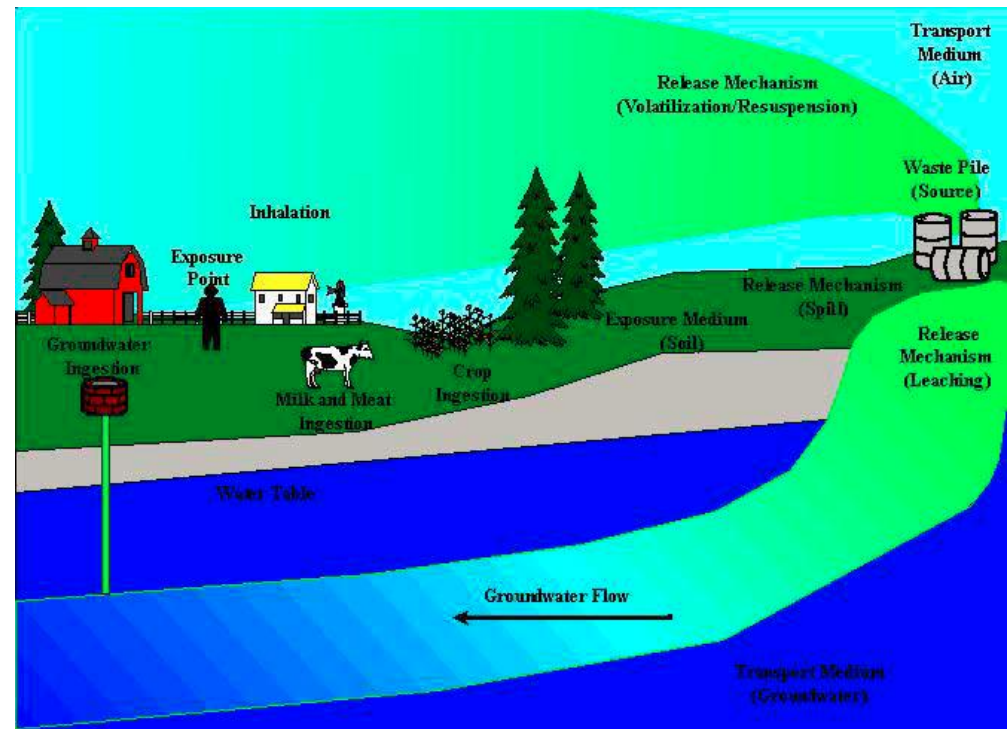
- Leaking USTs
  - Fuel
  - Gasoline
  - Chemicals
- Contaminated fill
- Contamination from historic process
- Dry wells, drums, dumping
- Building contaminants
  - Asbestos
  - Lead paint
  - Mold
  - PCBs





# Media

- Soil
- Groundwater
- Sediment
- Surface Water
- Soil Gas
- Indoor Air
- Building Materials



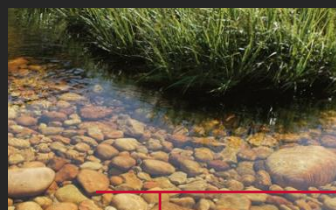




# Field Investigation

- Subsurface Investigation
  - Soil borings/test pits/monitoring wells
  - Soil and groundwater testing
  - Soil gas testing
- Sediment and surface water sampling
- Indoor air testing
- Building materials





# Test Pit Excavation







# GeoProbes

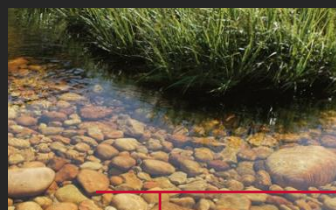






# Monitoring Well Installation





# Water Supply Well Sampling







# Soil Vapor Sampling

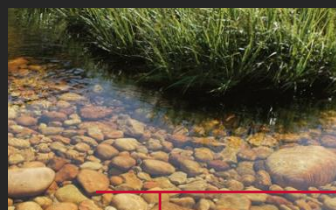






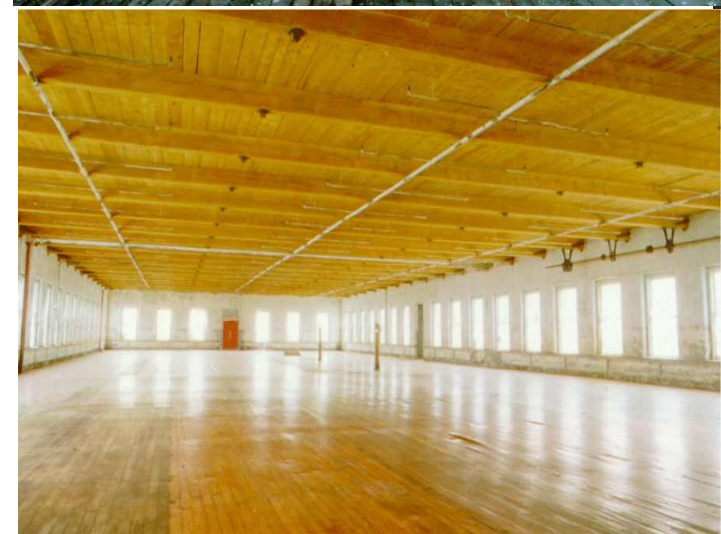
# Indoor Air Sampling





# Building Materials

- Asbestos
  - Pipe and boiler installation
  - Suspended ceiling tiles
  - Wallboard and joint compound
  - Caulking and glazing
  - Mastic
  - Floor covering and tiles
- Lead-based paint
- Mold
- Mercury





# Where PCBs are in Building Materials

- Construction between 1950s and late 1970s
- Caulking and grout in floor and wall joints
- Oil-based paint coating floors and walls
- Mastic and adhesives used under flooring (tiles and carpets)
- Sealants and finishing used on flooring
- Gaskets around windows and doors and in heating, ventilation, and air conditioning systems and ducting
- Window glazing
- Roofing and siding

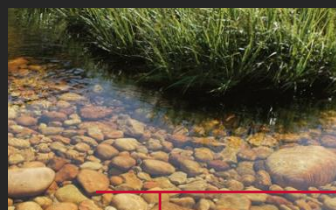




# What Materials are Likely Affected

- Ceilings
- Electrical equipment/fixtures
- Elevator shafts
- Expansion joints
- HVAC Equipment
- Masonry joints
- Painted surfaces
- Porous surfaces
- Roofs
- Underlying soils
- Window and door frames





# Cleanup and Development

- Remedial Action Plan
  - Establish Cleanup Goals
  - Determine if institutional control are required
  - Estimate Cleanup Costs
- Soil Cleanup
- Indoor Air
- Building Materials
  - Demolition
  - Restoration

# How to Cleanup a Mill

- Soil
  - Excavation and off-site disposal of soil
  - Encapsulation
  - On-site treatment

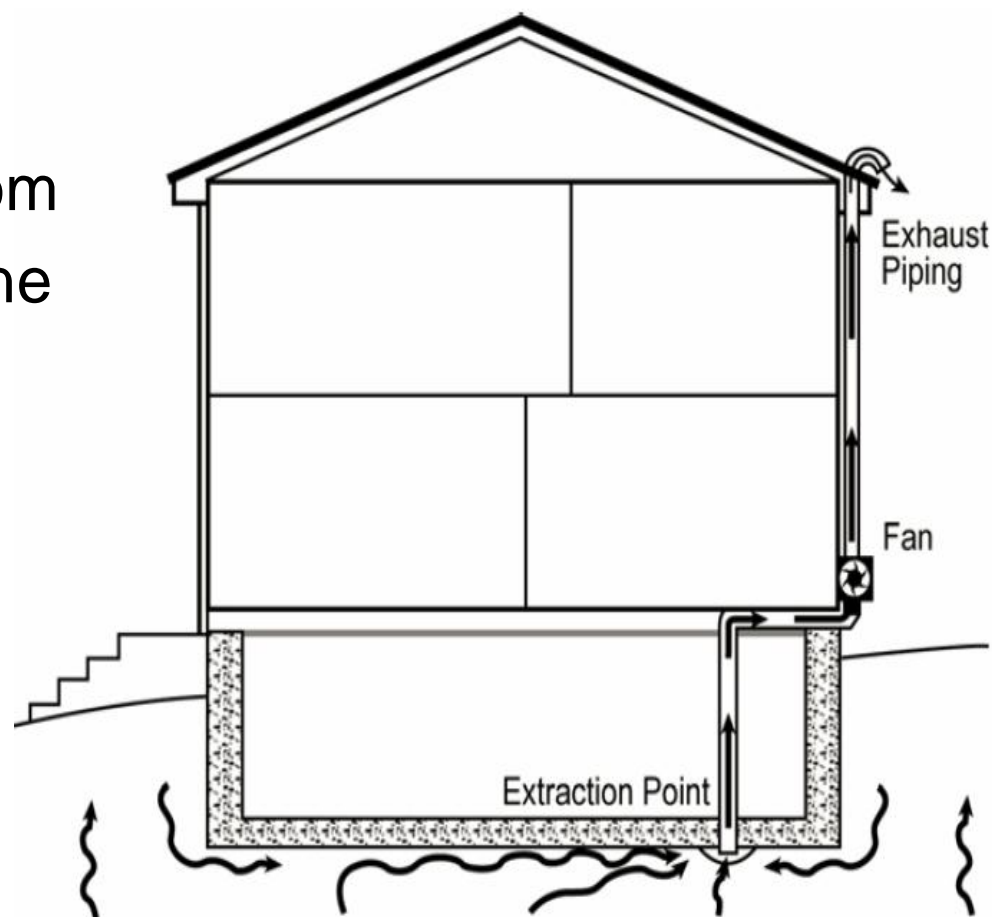






# How to Cleanup a Mill

- Indoor air
  - Vapor intrusion from solvents or gasoline
  - Sub-slab depressurization systems





# Building Cleanups

- Abate asbestos, lead paint and PCBs
  - Significant costs
  - Asbestos abatements are state regulated
  - PCB abatements are federally regulated and approved
  - Remove
  - Encapsulate





# Building Cleanups

- Demolition Debris Management
  - Abate asbestos, lead paint and PCBs prior to demo
  - Asphalt, brick, and concrete
    - Crush and reuse onsite for backfill, grading and roadway bedding





# Cohannet Mill, Taunton, MA



- Textile Mill
- 6.5 acres
- 140,000 square feet (sq ft)
- Railroad easement
  - Lead and PAHs
- Asbestos in building
- USTs and petroleum
- Transformer
- 64 Affordable residential units
- 18,000 sq ft commercial
- Riverfront greenspace



# Forest City, Cumberland, RI



- Phase I and Phase II Due Diligence
- Part of Peterson-Puritan Superfund Site
- Arsenic, lead, PAHs, oil in soil. Encapsulated to prevent exposure
- Deed restriction
- PCB-contaminated building debris



# MASS MoCA, North Adams, MA



- Textile Mill
- National Historic Register
- 13 Acres
- Electronics Manufacturer
- PCBs, trichloroethylene (TCE) and heavy metals
- Soils excavated and capped
- Largest center for contemporary arts
- 19 galleries, 100,000 sq ft exhibit space
- 60,000 sq ft office and retail





# North Dam Mill, Bidderford, ME



- Textile Mill
- Heart of city's downtown
- Lead-contaminated soil, asbestos, lead paint
- Asbestos and lead paint abatement
- Soil capping
- Residential / commercial

