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Small Party Issues in Large Sediment Site Allocation:

A Technical Framework for Decision-Making

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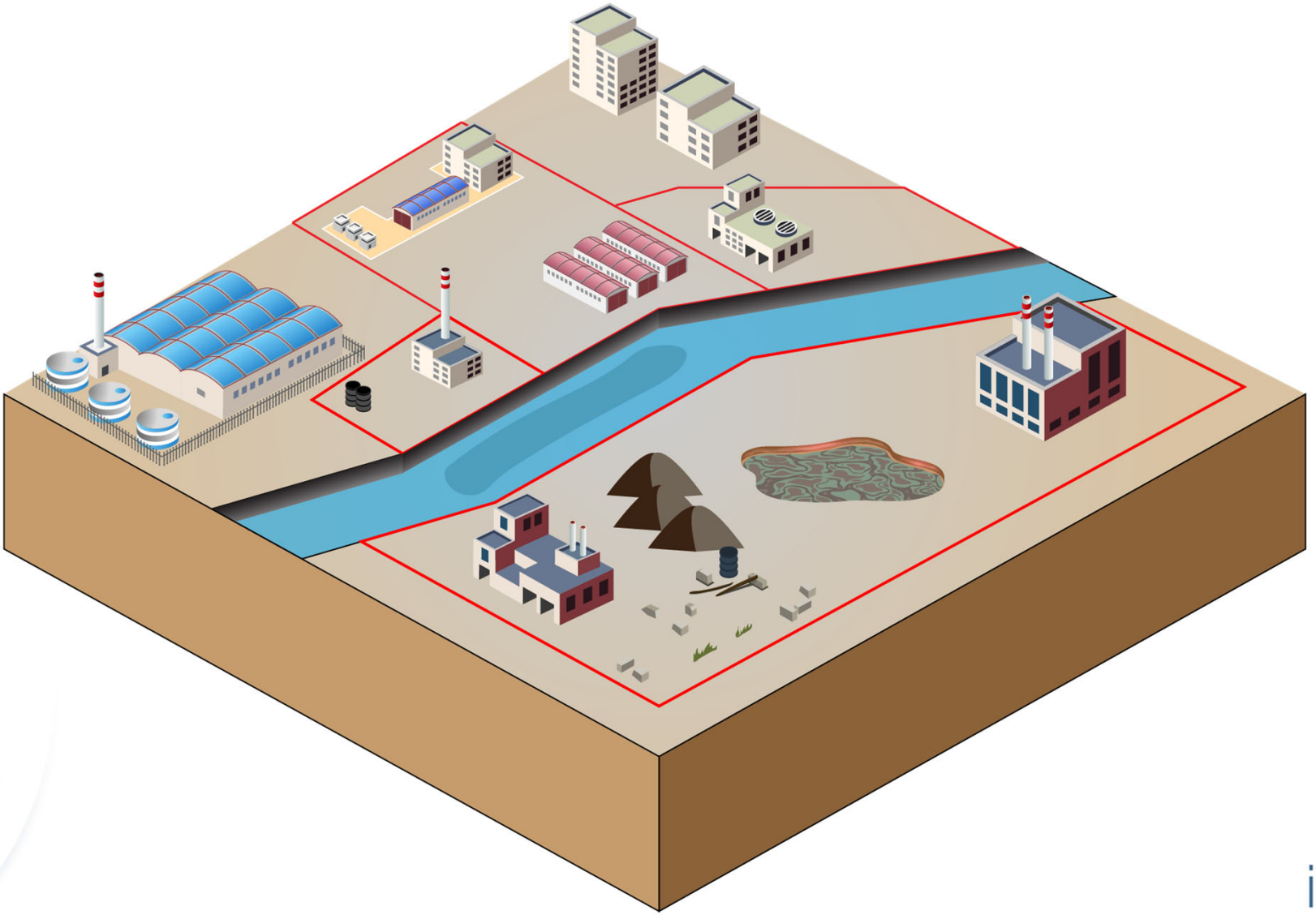
Sediment Site

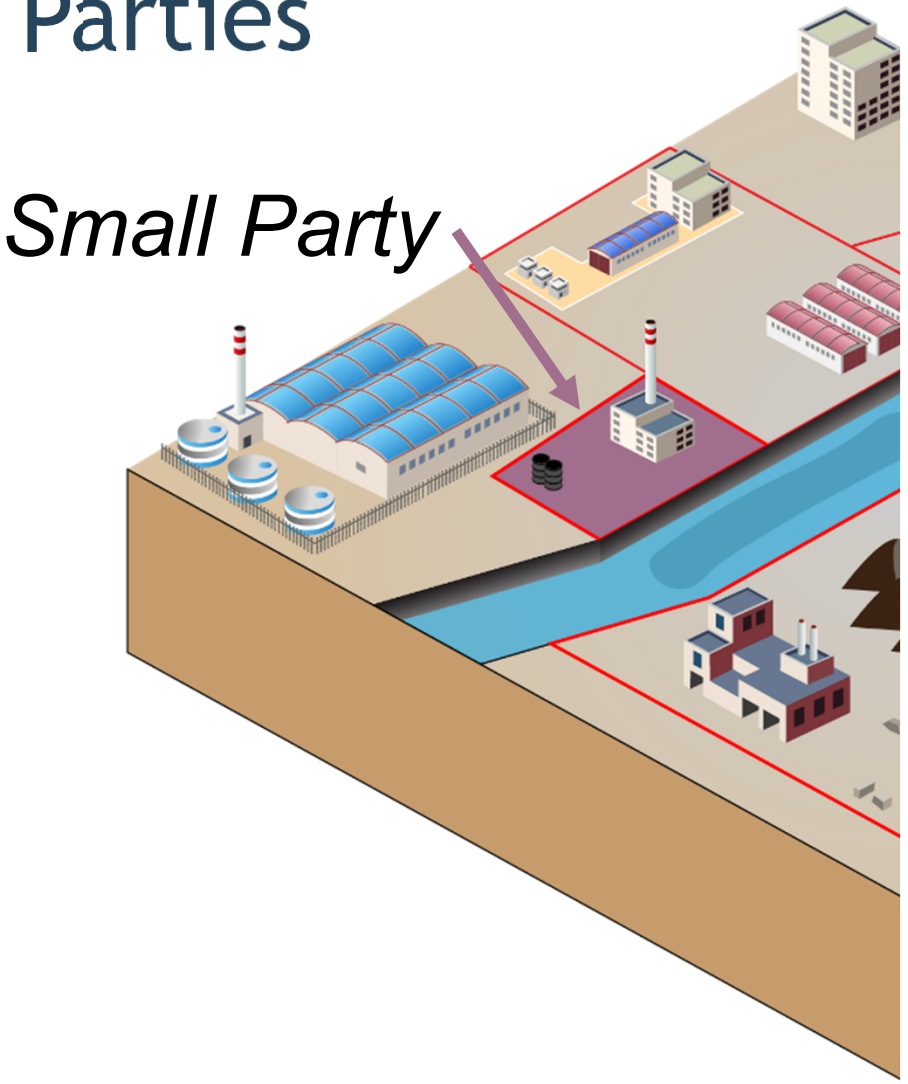


Small Parties

- Result from CERCLA Section 104(e) information gathering process
- Implied regulatory potential discharge or releases
- May have few documented releases

Typical Characteristics of Small Parties

- Small releases
- Minimal upland contamination
- Secondary remedial drivers
- Short operating periods
- Smaller footprint



Small Party Challenges

- Minimal records
- Are amid many other activities that did release materials
- Often data poor
- Small numbers are hard to quantify
- Allows for inference and attribution

Party Cost Model

Cost to individual party

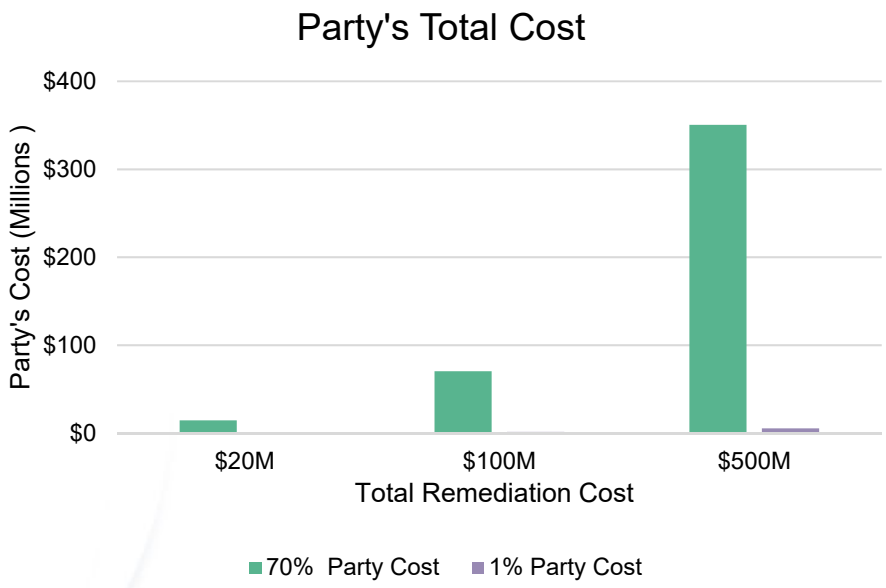
Total site liability (Remedial costs+other liabilities)

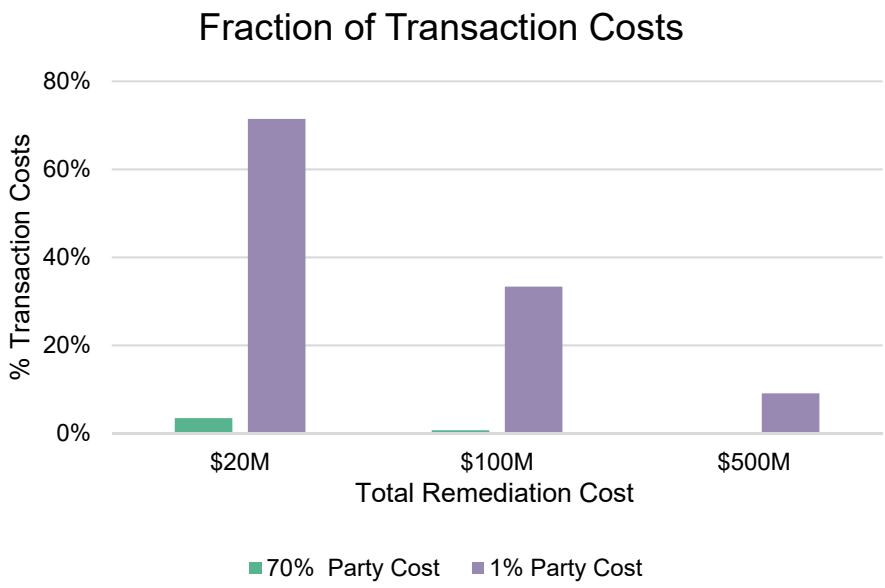
f_i = Allocation fraction (Loading, toxicity, other factors)

Transaction costs for party (Lawyers, consultants, insurance issues, etc.)

Party's Cost = Total Liability × Allocation Percentage + Transaction Costs

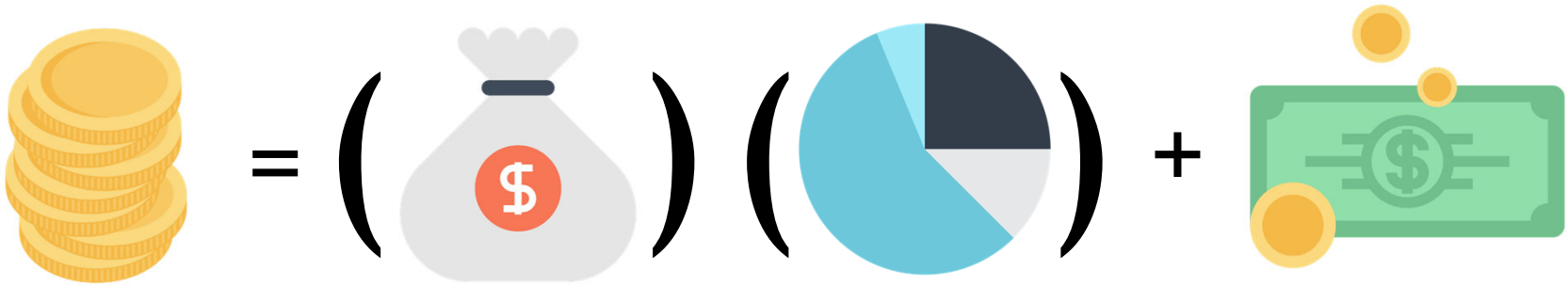
Small Parties Pay More Transaction Costs Relative to Their Liability[1]

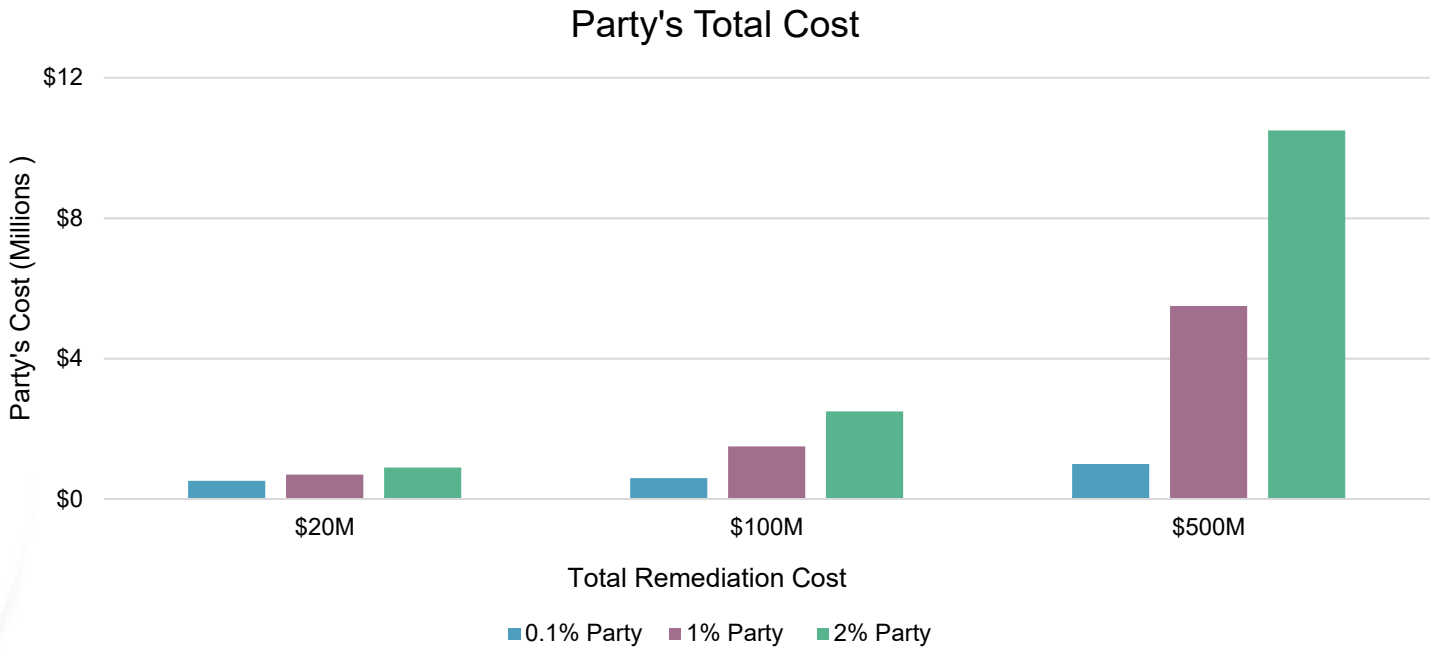




[1]Assumption: both parties have $500,000 transaction costs

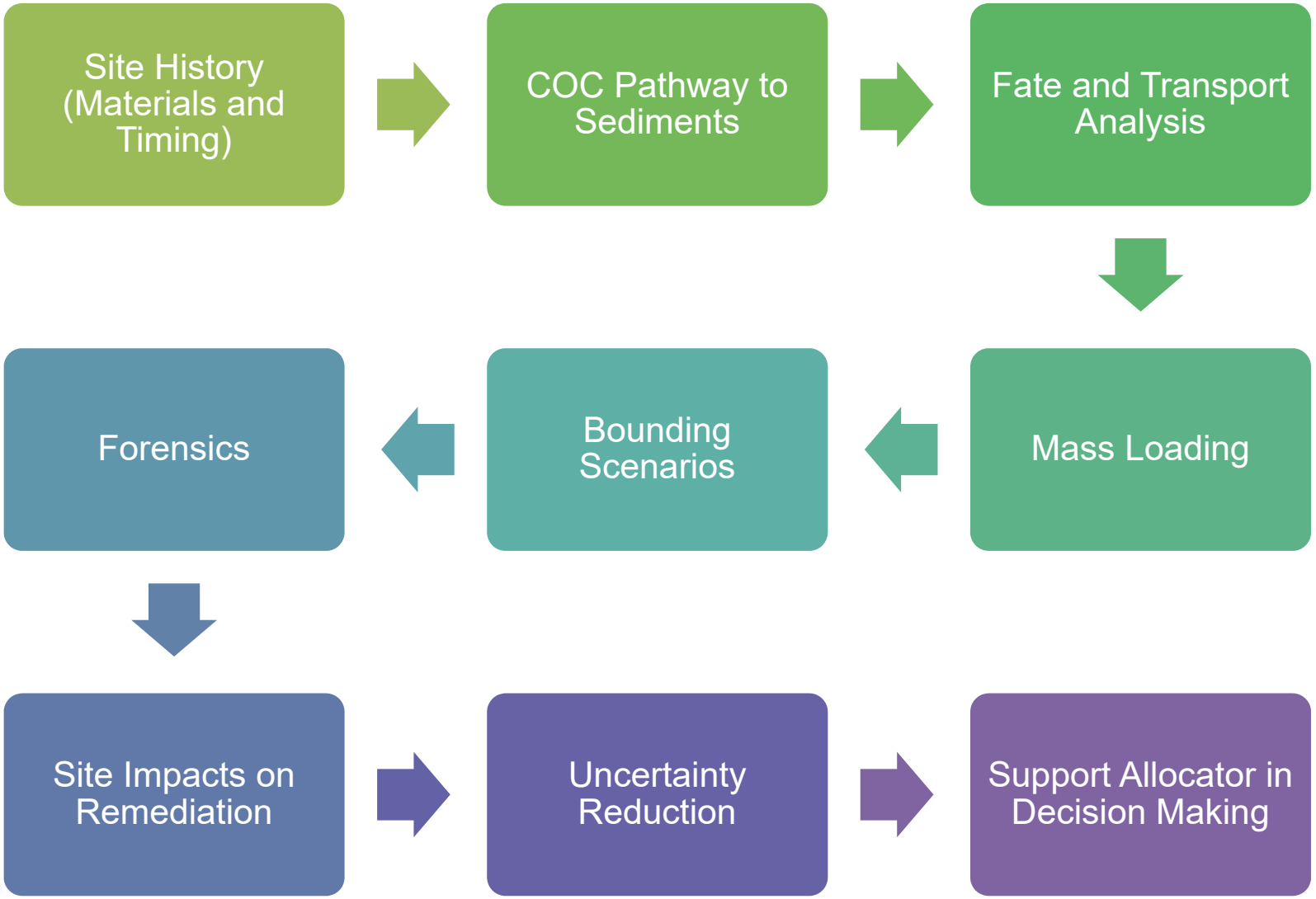
Small Parties Are Very Sensitive to Allocation Fraction[1]





[1]Assumption: all parties have $500,000 transaction costs

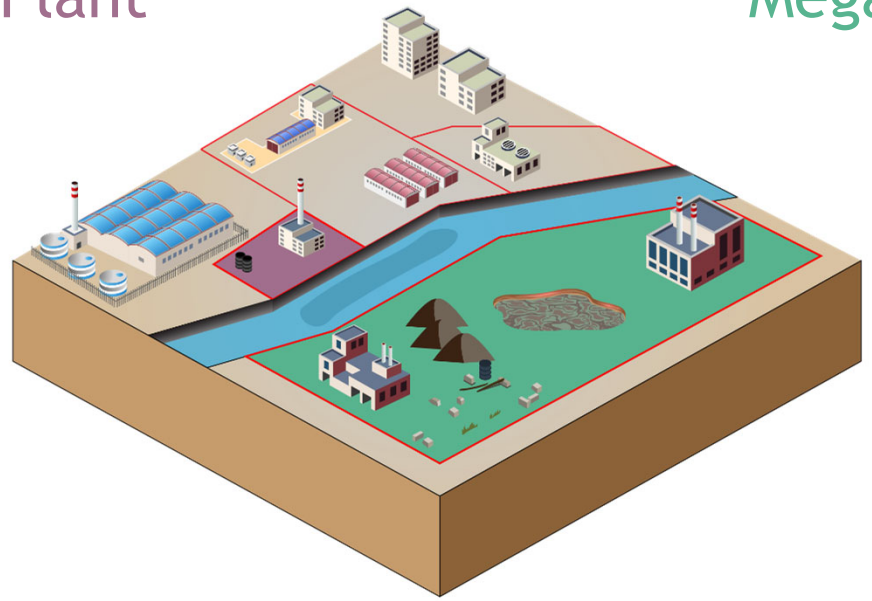
Small Party Framework



Site History Analysis Shows Small Contributions Are Realistic

Smalley's Power Plant

- Operated 8 years
- 2 Acres
- Handled coal with ~22 mg/kg Pb in it
- Waste went to off-site ash landfill



Mega Metal Processing

- Operated 80 years
- 50 Acres
- Had ore piles with ~440 mg/kg Pb
- Some wastes discharged to waterway

$$Allocation\ Fraction \approx Time\ Factor \times Area\ Factor \times Concentration\ Factor$$

$$Allocation\ Fraction \approx {}^{8}/_{80} \times {}^{2}/_{50} \times {}^{22}/_{440}$$

$$Allocation\ Fraction \approx 0.04\%$$

Fate and Transport Analysis Can Limit Connections to Sediments

- Establish connection or lack thereof
- Know your site history
  - Sewers
  - Permitted discharges
  - Other pathways
- Insist that assumptions applied to small parties are applied to big parties

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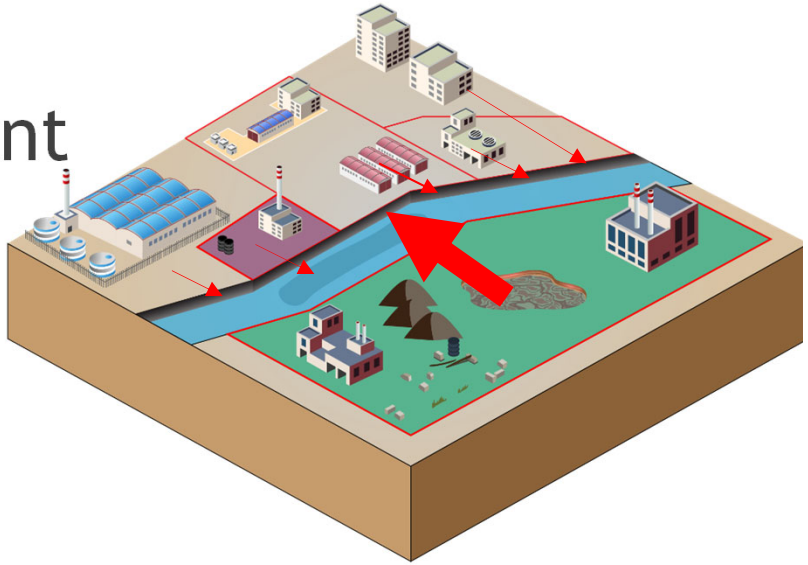
Mass Loading Analysis Provides Context

- Release rates can be estimated from process information, water treatment records
- Some releases are ongoing and estimated in RI/FS process
- Even with uncertainty can create order of magnitude differences



Mass Loading Example: PAHs

Coal

- **Materials**
  Coal
- **PAH Content**
  20–100 mg/kg
- **Pathways**
  –Pile Runoff
  –Overwater
- **Recalcitrant**
- **Management**
  –Storage
  –Distribution

Petroleum

- **Materials**
  Petroleum
- **PAH Content**
  1,000–5,000 mg/kg
- **Pathways**
  –Runoff
  –Groundwater
  –Overwater
- **Degrades**
- **Management**
  –Storage
  –Distribution

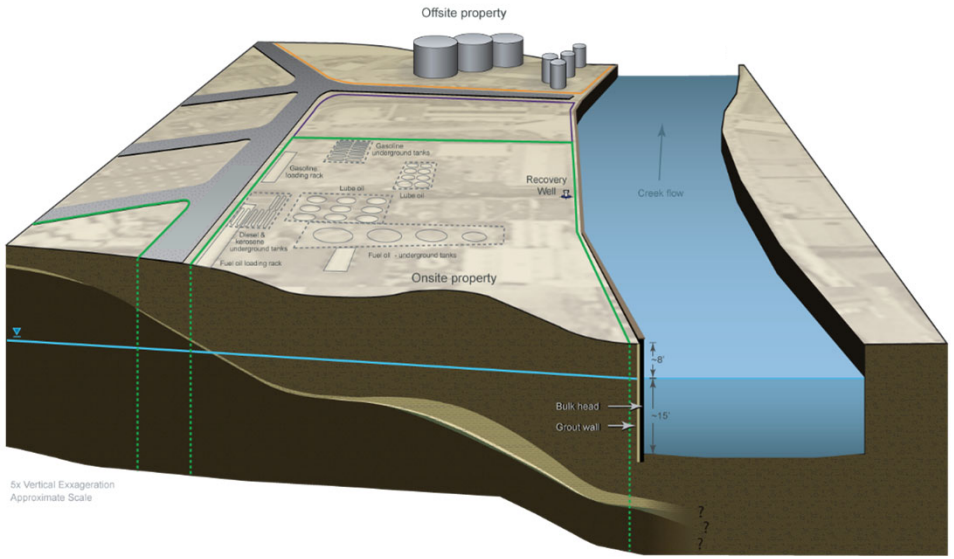
MGP

- **Materials**
  Coal
  Petroleum
  Coal Tar
- **PAH Content**
  8–50 percent
- **Pathways**
  –Runoff
  –Overwater
  –Groundwater
  –Waste Discharge
- **Stable/Degrade**
- **Management**
  –Storage
  –Distribution
  –Waste Disposal

Bounding Analysis

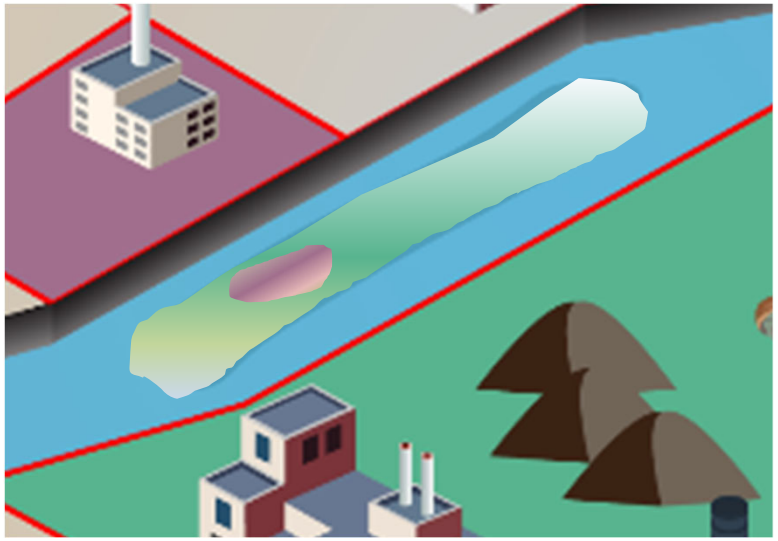
Example: hypothetical overwater diesel release

- 10,000 gallons released 30 years ago over 10-year period (~2 bbl per month loss)
- PAH content ~2,000 mg/kg
- PAH degraded
- 71 kg of total PAH released
- Degrades to ~31 grams of PAHs



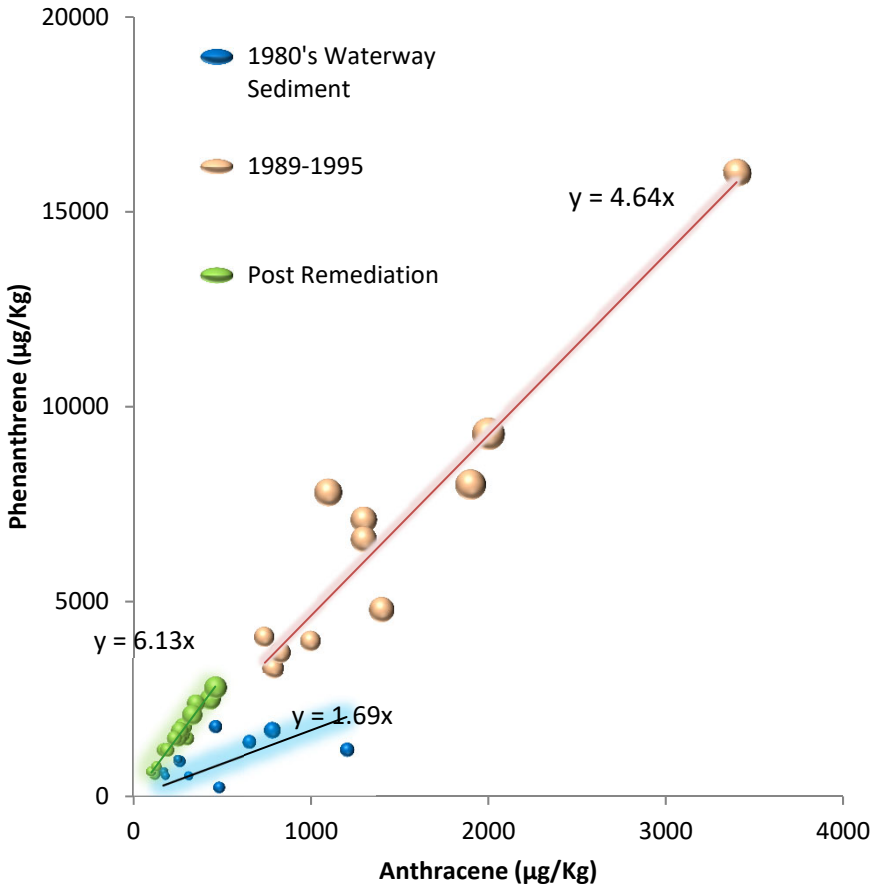
Site Role in Remediation

- Often, one or a handful of primary contaminants drive the extent and nature of remediation
- Small parties have secondary contaminants
  - Area above standard is limited
  - Sediment standard is less refined



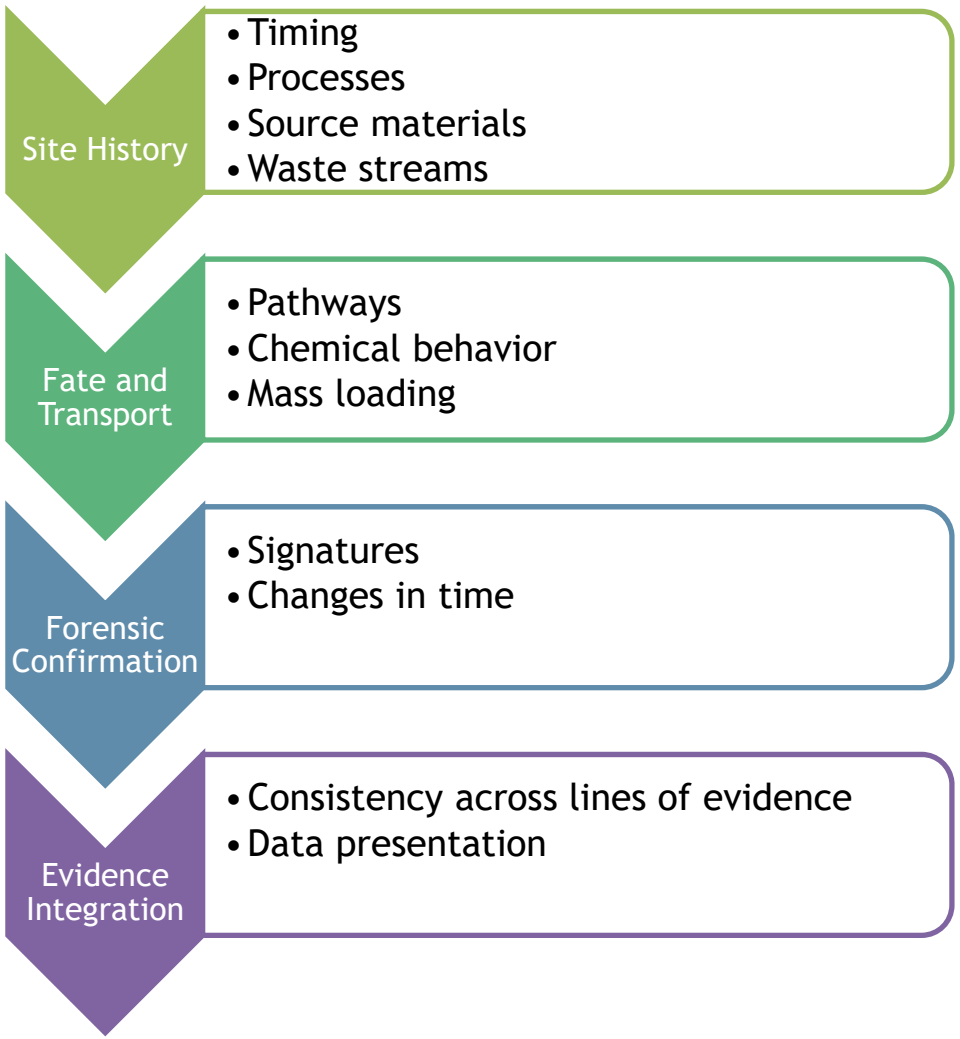
Forensic Applications

- Forensics are useful in identifying sources
  - Time
  - Space
  - Quantitative
- Must be in the context of other data
- For small parties, the value of forensics may be in the lack of observed inputs
- PAH forensics can indicate petrogenic vs. pyrogenic sources



Reducing Uncertainty

- Show order-of-magnitude differences
- Communicate the site story
- Transparency and documentation
- Sensitivity analysis



Small Party Solutions: Allocator Interaction

- Provide for allocation fractions <1%, incl. zero
- Specify allocation factors upfront
  - Require Technical Gore factors
- Constrain the technical assessment means and methods:
  - Appropriate CSM/fate and transport principles
  - Source characterization/matrices accountability
  - Chemical forensics/numerical methods
  - Uncertainty/probabilistic analysis protocols

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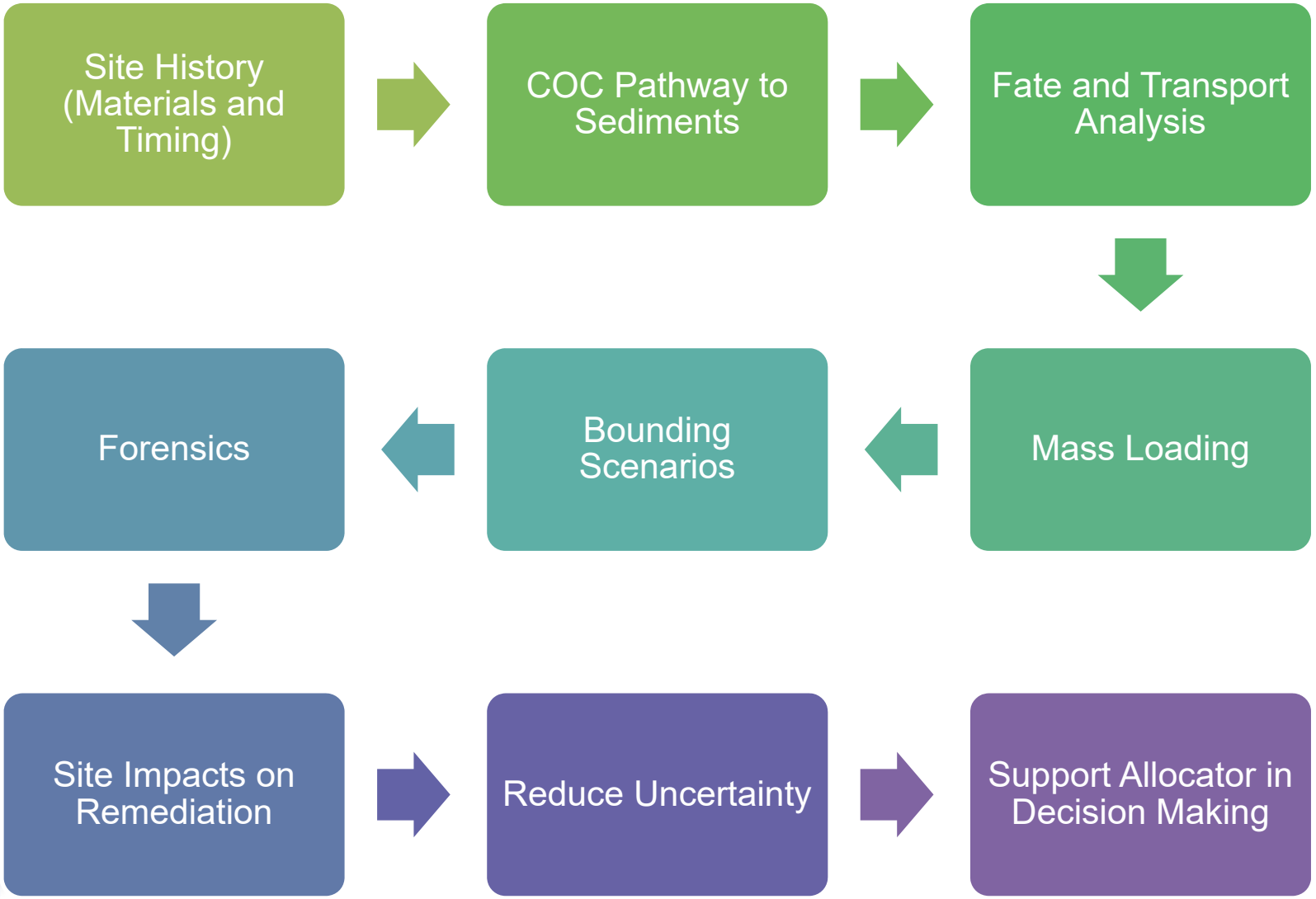
Small Party Framework



Conclusions

- Recognize the differences in the needs of individual parties in negotiating solutions
- Use framework to quantitatively show limits to contribution
- Combine technical and legal defenses
- Provide the decision maker/allocator the coherent story to make a decision

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