



The True Cost of Remediation

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Introduction

- Remediation costs money – most of us are very familiar with the dollar value of remediation projects. But...
- There are many hidden or external costs and effects.
- The decision to undertake active remediation should take these into account.
- Are our efforts sustainable?



Presentation Outline

- Benefits of Active Remediation
 - Who benefits?
- Impacts of Active Remediation
 - Who pays the costs?
- What are the alternatives?
 - Quantifying costs
 - Sustainable Remediation



Benefits of Active Remediation

- Local improvement in environmental conditions
- Certainty of environmental risk
- Regulatory closure
- Public image of completing active remediation
- General improvement of environment?



Impacts of In Situ Remediation

- Surface disruption during installation





Impacts of In Situ Remediation

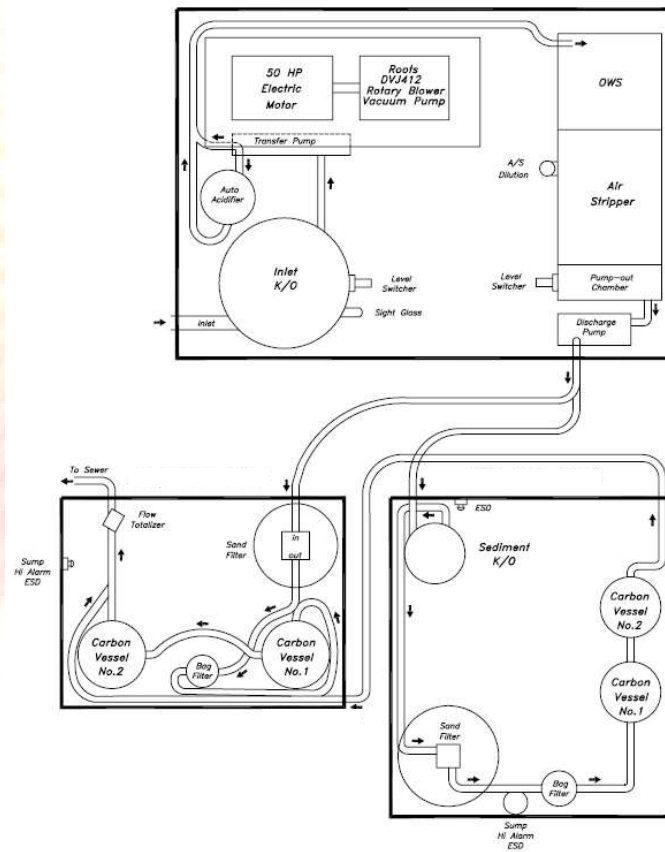
- Disruption of natural soil conditions





Impacts of In Situ Remediation

- Some techniques just result in shifting the contamination to a different medium.





Impacts of In Situ Remediation

- Power consumption – electrical and natural gas, propane, etc.
- Consumption and disposal of other resources: oxidizer chemicals, de-scaler, granular activated carbon, hydrovac wastes from cleaning
 - This is a particular concern for toxic materials.



Impacts of Excavation

- Surface and community disruption





Impacts of Excavation

- Fuel consumption and associated GHG emissions





Impacts of Excavation

- Additional loading of roadways with soil hauling
- Traffic safety due to additional driving hours





Impacts of Excavation

- Loading of landfills





Impacts of Excavation

- Obtaining clean fill





Impacts of Excavation

- New construction over backfill can be challenging





Impacts of Excavation

- And at the end of the day, excavation only moves the problem, it still doesn't eliminate it.
- The waste generator still retains liability (hopefully well-managed by the landfill).



Understanding the Costs

- Quantification of the costs/impacts/risks is important.
- Some tools exist to help with this:
 - Fuel consumption and travel hours from contractors
 - Purchase (and subsequent disposal or use) of materials
 - Scale tickets for soil to landfill



Understanding the Costs

- Greenhouse Gas Emissions:
 - Environment Canada/EPA GHG Equivalencies Calculator
 - International Road Federation GHG calculator
 - Numerous other online tools



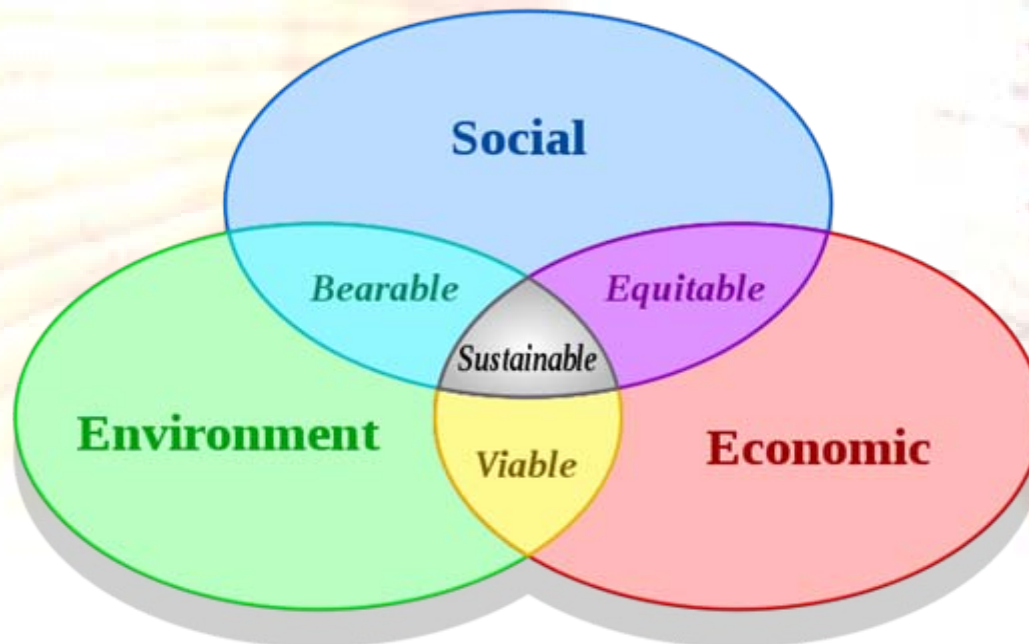
Understanding the Costs

- Even if you quantify a parameter, the units are usually different.
- Value decisions are required
 - What is the cost of disrupting a neighbour, or avoiding 80 hours of highway travel?
- Other conceptual guidance is available:
 - Cumulative Effects Assessment
 - SuRF UK
 - EPA Green Remediation document



Sustainability

- Protects the environment
- Encourages a vibrant economy
- Supports high quality of life





Sustainable Remediation

- Sustainable Remediation Forum (SURF)
<http://www.sustainableremediation.org/>
 - *Sustainable Remediation*: a remedy or combination of remedies whose net benefit on human health and the environment is maximized through the judicious use of limited resources
- EPA Green Remediation: “The practice of considering all environmental effects of remedy implementation and incorporating options to maximize net environmental benefit of cleanup actions.” From “*Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites.*” EPA 2008



Can you improve things?

- Two main concepts:
 - Reduction (or Elimination) & Efficiency
- **Reduction/Elimination** – risk assessment or risk management
 - no remediation = no impact due to remediation
- **Efficiency** – Can you complete the same tasks with less resources?



Reduction

- Site-specific criteria (risk assessment) can reduce the amount of remediation required while still protecting receptors.
- Risk management can reduce the intensity of your work, taking advantage of natural attenuation or less stringent interim receptor sensitivity.
- Some remediation systems reduce effluent (AS/SVE, bioaeration, etc.) or the need for toxic materials.



Reduction



(believe it or not, this is a reduction in volume as compared to the generic criteria!)



Efficiency

- Properly designed systems for your needs
- Maintenance to keep systems operating at peak performance
- Onsite treatment of excavated soils eliminates hauling, disposal & acquiring clean backfill
- Soil recycling facilities turns soil into a resource



Efficiency



Phytoremediation





Decision Time

- Every situation has to be considered on its own.
- More tools are becoming available.
- More companies are providing formal guidance on sustainable development.
- Stakeholders are becoming more aware of risk-based options, and impacts external to the project.



Decision Time

- This combination of events is making it easier (and, in fact, necessary) to assess and communicate the costs and benefits of various options for dealing with contaminated sites.
- **We are at a point where we should be able to show that our actions result in the greatest benefit to the environment.**



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