Soil Treatability Study

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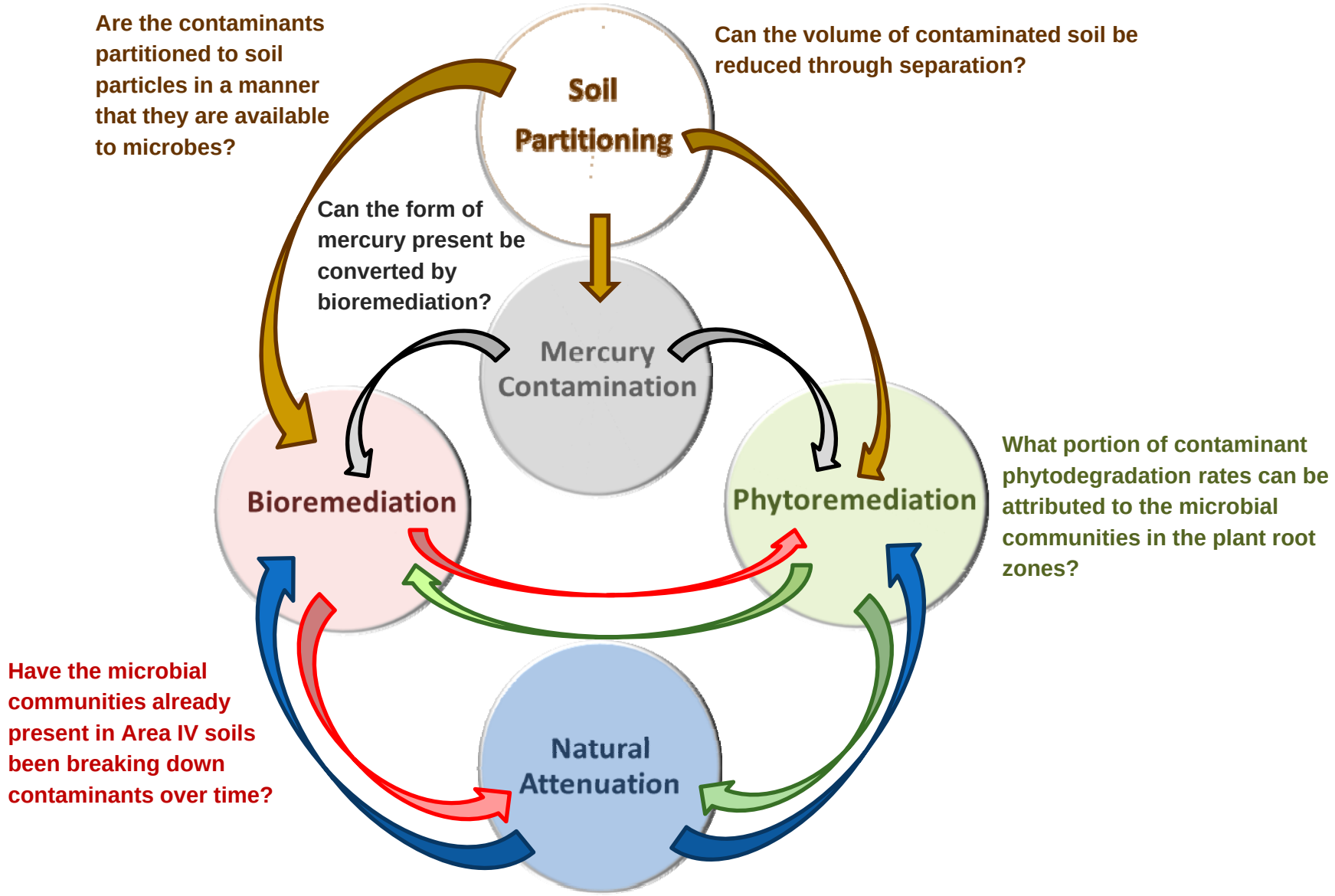
# Treatability Study Background

- Sandia National Laboratories was contracted by DOE to identify potential soil treatability technologies for further exploration
- DOE contracted with California Polytechnic State University and University of California Riverside for five treatability studies:
  - Cal Poly: Natural Attenuation, Bioremediation, Phytoremediation
  - UC Riverside: Soil Partitioning, and Mercury State Determination
- DOE, CDM Smith and the Universities worked closely with DTSC in developing Study Plans


Are the contaminants partitioned to soil particles in a manner that they are available to microbes?
Soil Partitioning
Can the volume of contaminated soil be reduced through separation?
Can the form of mercury present be converted by bioremediation?
Mercury Contamination
Bioremediation
Phytoremediation
What portion of contaminant phytodegradation rates can be attributed to the microbial communities in the plant root zones?
Have the microbial communities already present in Area IV soils been breaking down contaminants over time?
Natural Attenuation
How can microbiological, biological, and weathering degradation processes be optimized?

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# Study Overviews

- Soil Partitioning
  - Collection of field samples, laboratory analyses
    - "What soil sizes do we find at the site?"
    - "In what soil sizes do we find the contaminants?"
    - "How tightly do the soils hold the contaminants?"
- Mercury
  - Collection of field samples, laboratory analyses
    - "What types of mercury are in the soils?"
    - "How effective can phytoremediation or other treatments be in cleaning up the mercury types that we have?"

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# Study Overviews

- Bioremediation
  - Part 1: Collection of field samples, DNA analyses
    - "Are the microbes that are already in SSFL soils capable of cleaning up the contaminants?"
  - Part 2: Laboratory microcosms, biostimulation/bioaugmentation
    - "How fast are the microbes in the soils degrading the contaminants?"
    - "Can we do anything to speed up how fast the microbes degrade the contaminants?"

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# Study Overviews

- Phytoremediation
  - Phase 1: Collection of field samples, laboratory analyses
    - "What plants already growing at SSFL are already taking up contaminants?"
  - Phase 2: Laboratory microcosms, augmentations
    - "How fast are the plants degrading or picking up the contaminants?"
    - "What can we add to the soil to help the plants degrade or pick up the contaminants faster?"

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# Study Overviews

- Natural Attenuation
  - Phase 1: Literature review
    - "How fast have other studies shown the contaminants to degrade at other sites?"
  - Phase 2: Analysis of phytoremediation and bioremediation study results
    - "How long might we expect bioremediation and/or phytoremediation to take to reach remediation goals?"