

Green Remediation Focus

Minimizing the environmental footprint of site cleanup

A Profile in Using Green Remediation Strategies

Additional profiles available at www.clu-in.org/greenremediation

Crozet Orchard
Crozet, Virginia

Superfund Removal

Cleanup Objectives: Remove metals and pesticides such as lead-arsenates from soil at a former apple orchard.

Green Remediation Strategy: Employ phytoremediation supported by gravity-fed and renewable.

Energy-powered Irrigation Techniques:

- Installed 20,000 Chinese brake ferns for hyperaccumulation of arsenic existing primarily in surface soil (within nine inches)
- Captures and stores hill-top spring water in a 4,000-gallon tank from which water is transferred by gravity to 17 of 24 fern plots when needed
- Uses solar-powered low-flow pumps to transfer water from a hill-bottom spring to a second storage tank, from which water is delivered to other (sloped) plots by way of gravity-fed drip methods

Results:

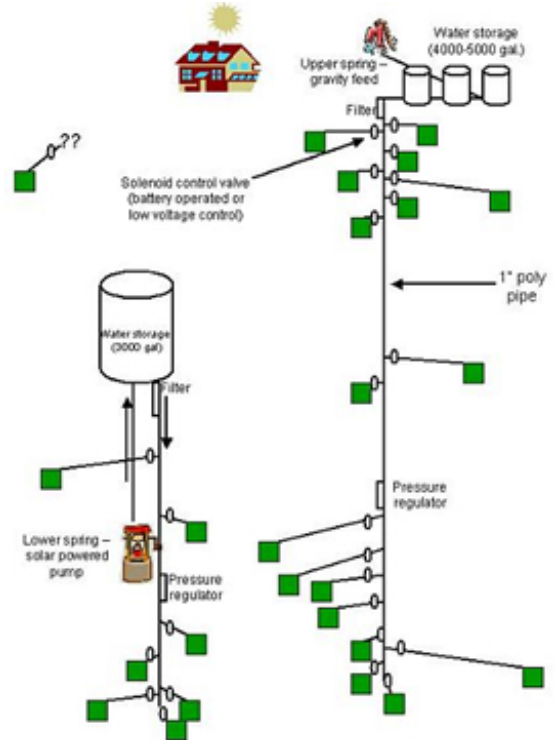
- Reduced arsenic concentrations in nineteen plots to below the 58 mg/kg action level after two growing seasons. Sampling data indicate a minimal reduction in arsenic concentration between 73 and 106 mg/kg at the remaining five plots.
- Stores uncontaminated spring water for onsite use during dry spells
- Avoids costs and greenhouse gas emissions associated with consumption of grid electricity during the treatment process
- Provides unobtrusive methods to remediate residential properties

Property End Use: Residential and open space

Point of Contact: [Myles Bartos](#), U.S. EPA Region 3



Chinese brake ferns (*Pteris vittata*) were planted in 2005 and first harvested in November 2007. Harvested material (including arsenic that hyperaccumulated primarily in fern fronds) was disposed offsite as hazardous waste.



Two spring sources bring a combined capacity of 5,000 gallons of water for irrigation each day during dry conditions.



The hilltop gravity irrigation system uses a small filter and network of 1-inch PVC piping equipped with a pressure gauge.



Solar energy to generate electricity for water pumping is captured by a 390-W photovoltaic array consisting of three 12-volt panels.

Update: July 2024

Upper Arkansas River

<http://clu-in.org/greenremediation/profiles/crozetorchard>



United States Environmental Protection Agency
Office of Solid Waste and Emergency Response (5202P)

For more information:
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