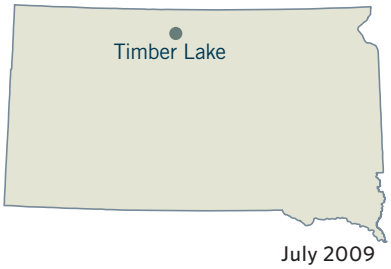
TIMBER LAKE PHYTOREMEDIATION

CHEYENNE RIVER INDIAN RESERVATION
TIMBER LAKE, SOUTH DAKOTA



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ACCOMPLISHMENTS

Phytoremediation or the use of plants to remediate environmental media is a "green" approach to cleaning up contaminated soils and groundwater. Phytoremediation services were implemented at the Timber Lake LUST Site in May 2009. Sixty-nine trees were planted at the site to provide a cost-effective method of remediating soil and groundwater with fewer secondary waters and

less environmental impact than traditional remediation methods. Specifics of the phytoremediation services include:

- Strategically planted 57 tree seedlings (25 *Paulownia tomentosa* and 32 Hybrid Poplar)
- Planted 12 replacement Poplar tree seedlings
- Applied well-graded gravel and mulch/manure compost to the excavations
- Protected seedlings with apparatus consisting of a wire cage and steel t-post
- Watered seedlings

EPA Region 8 performed this work in partnership with the Cheyenne River Sioux Tribe and with contract support from Avanti Corporation.

WHY PHYTOREMEDIATION?

- Supplements chemical oxidation and excavation remediation methods
- Provides an ecologically sound alternative to environmentally destructive physical remediation methods such as excavation
- Relatively affordable
- It is a "Green" solution. External energy sources are not needed.

TREE SELECTION

The Hybrid Poplar and *Paulownia tomentosa* species were selected for the site conditions in South Dakota and both species have the following characteristics.

- Rapid growth rates
- High evapo-transpiration rates
- Long lived
- Extend their roots to the zone of saturation
- Extensive tap root and lateral root systems
- Toleration of wide range of climatic and ecological conditions
- Can be harvested and re-grown from stump

SITE HISTORY

Contamination at the project site was identified in the early 1990's and is believed to be from several former gas stations and bulk fueling facilities. In 2007, a risk-based corrective action (RBCA) assessment was conducted at the site. Petroleum contaminated soil (PCS) was identified in three locations at the site. Three separate source areas were identified for the contaminated groundwater at the site. In 2008, 422 yd3 of PCS was excavated from three target areas and two in-situ chemical oxidation (ISCO) injection events were conducted. In 2009, a microbial analysis was conducted to identify benzene degrading bacteria and 69 tree seedlings were planted at the site. Phytoremediation was used to supplement the excavation and chemical oxidation methods already used at the site.

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