SHARON STEEL / FARRELL WORKS SUPERFUND SITE
Waste Remediation / Groundwater Control / Native Grassland Creation

Background

The Sharon Steel Corporation Farrell Works Disposal Area site is an area of about 400 acres located in Mercer County in western Pennsylvania, within a few hundred feet of the Ohio/Pennsylvania border. The site is southwest of the former Sharon Steel Corporation Farrell Works, and is bordered on the east by the Shenango River. Beginning about 1900, the Sharon Steel Corporation used the area to dispose of blast furnace slag, electric arc furnace slag, basic oxygen furnace slag, and sludge. From 1949 to 1981, millions of gallons of spent pickle liquor acid were dumped over the slag. It was thought that the acid would partially evaporate and then be neutralized by the carbonates in the slag. In actuality, groundwater contamination resulted. The site is located in the flood plain of the Shenango River, and there are several wetland areas on site.

Contaminants detected in soils, slag, sludge and groundwater on the Site included metals, PAHs, PCBs and pesticides. The groundwater flow under the site transports site-related contamination toward the Shenango River. Sediments in the river and wetlands are contaminated from both groundwater discharge and erosion of soils, slag, and sludge.

The U.S. Environmental Protection Agency (EPA) preferred alternative to remediate the site includes burying the sludge, contouring the slag piles to cap the sludge, mixing biosolids (treated sewage sludge) from a local treatment plant into the slag, and vegetating the cap. The cap and vegetation will reduce the mobility of the metals in the groundwater, minimize runoff into the Shenango River, and reduce dust migration from the slag. The remedy will be performed in phases. Phase 1 addresses contaminated slag and sludge on 100 acres of the site depicted in this photograph. The challenge for EPA and U.S. Fish and Wildlife Service (FWS) biologists is to grow plants on the slag material, which ranges from the size of gravel to large rocks.

Objectives

Reduce heavy metal exposure and transport to the river
Recreate floodplain forest along river
Create native grassland habitat for wildlife
Bind carbon in soil and plants to reduce carbon dioxide emissions

Approach

Test the use of biosolids and compost to reduce metals exposure
Remove waste from river bank and cap it with slag
Mix slag with sewage sludge and compost to create soil
Seed cap area with a mixture of grasses and wildflowers
Plant fast-growing trees between cap and floodplain to control groundwater
Plant trees and shrubs to recreate a wooded floodplain
Monitor to ensure success of vegetation and groundwater control

Methods

Pilot Testing –

Testing began with a greenhouse study that demonstrated that biosolids improved seedling growth in slag and that metals in sludge were toxic to the seedlings. Based on these findings, the EPA agreed to bury all of the sludge below the slag. The second test was conducted at the site to determine if the seedlings could survive the harsh weather. FWS biologists concluded that the severe winds and long dry spells caused the seedlings to die from water stress.

FWS recommended that a third test include both biosolids and compost to increase the soil moisture available to the seedlings. This test was started in 2008 and currently indicates that seeds planted in the compost in the fall sprout and grow large enough in one season to flowers and produce seeds. EPA has agreed that this approach has the best chance of succeeding on the cap.

Cap with Groundwater Control –

With the appropriate mixture of slag, biosolids, and compost determined, the planning of the cap has begun. The cap plan will cover the removal of the sludge from the floodplain, capping of the sludge with slag, adding biosolids to the top two feet of slag, spraying on the compost layer, and seeding/planting. The target date for sludge removal to begin is summer 2011. Once the contouring is complete, EPA and FWS biologists will oversee the mixing of the biosolids into the top layer of slag, the compost layering, and the native grass and wildflower seeding. Between the cap and the river, the biologists will plant fast-growing, native trees such as aspen, cottonwood, and sycamore that use large amounts of groundwater to sustain their growth. They should draw sufficient groundwater during the growing season to prevent any metals in the aquifer from reaching the river.

Monitoring

FWS and EPA biologists will continue to monitor the test plots and will begin collecting the same information on the cap in the spring following seeding. EPA will continue to sample the groundwater to determine how effective the perimeter trees are at keeping the metals under the cap from moving toward the river. Ohio State University will continue to take samples from the test plots to document the amount of carbon that is being deposited and stored in the newly created soil and growth plants.

Conclusions

All of the information generated at the Sharon Steel site will determine whether these novel techniques can be used to restore vegetation on slag and mine sites throughout the United States to provide wildlife habitat and reduce carbon dioxide emissions.

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