Second nature

Boeing cleans up old site pollution with help from the environment

By Patrick Summers

Michael Spain can look out over a grove of cottonwood trees and acres of clover and alfalfa to a small windmill that sits inside the sustainable remediation area at the Emery Landfill in Wichita, Kan.

"A lot of the technology we use for cleaning up the landfill comes from nature," said Spain, a Boeing remediation project manager. "Some of our ideas, especially for generating power, have been around for more than 100 years."

Wind, sunshine and native vegetation all play an important role in powering and sustaining the cleanup of the 69-acre (28-hectare) site along the Arkansas River. The clean, renewable energy generated by the windmill and a small solar-powered water pump also significantly reduce the site's operating and maintenance costs.

The Emery Landfill is part of Engineering, Operations & Technology's remediation program, which cleans up locations affected by past business operations.

"Sustainable means minimizing the environmental footprint of cleanup activity, with an emphasis on employing renewable energy, protecting water supplies and restoring natural ecosystems," said Wayne Schlappi, a Boeing remediation project manager.

Boeing began using the landfill for industrial waste from the Wichita site in the mid-1950s. Boeing Wichita produced nearly 15,000 aircraft, including B-52s and B-29s, as well as fuselages, tail sections and components for commercial airplanes.

The company purchased the Emery Landfill site in 1983. When low levels of contamination including volatile organic compounds were detected in the groundwater in 1987, the company developed a remediation plan and began site cleanup in 1991. Although the landfill closed in 2007, remediation activity continues.

The first remediation plan used a "pump and treat" system to pump out and treat contaminated groundwater with air strippers, an energy-intensive technology that blows air through the water to separate out the volatile organic compounds. It required 27 water pumps.

"With the pump-and-treat system, you basically will be pumping water forever," Spain noted, since the system does not stop ground- or rainwater from infiltrating the landfill, becoming contaminated and flowing off-site.

In 2009, the remediation team designed a "closed cell" sustainable system for the landfill that stops groundwater and most rainwater from entering the site and contamination from leaching off-site. The system pumps out the small amount of rainwater that still seeps into the landfill.

The sustainable remediation technology includes:

- A 30-inch-thick (76-centimeter) clay barrier that extends from ground level to bedrock 30 feet (9 meters) below the surface and encapsulates the site
- A 30-inch-thick clay cap that covers the top of the landfill
- A layer of native grasses and alfalfa atop the clay cap, with roots that can extend down 30 feet and help absorb water
- One windmill-powered and one solar-powered water well; each pumps three to four gallons (11 to 15 liters) per minute
- Twenty-one mature cottonwood trees that each can absorb an estimated 500 gallons (1,900 liters) of water per day, naturally assisting the mechanical pumps in removing contaminated water

An added advantage of the closed cell, Spain said, is a lack of oxygen that creates perfect conditions for the growth of natural bacteria that eat volatile organic compounds. Water pumped from the site meets health standards that allow it to be discharged untreated into the local sewer system.

The two renewable energy-powered water pumps and one remaining electric pump replaced the 27 water wells needed for the previous cleanup system. The sustainable remediation strategy's operational efficiencies have the benefit of reducing energy use, carbon footprint and costs, Spain noted. The site's monthly electric bill for remediation has been cut from $900 to about $30, and the annual cost of water sampling has dropped from $80,000 to $5,000.

The project is an excellent example, Spain said, of how the Sustainable Remediation Program is achieving a"triple bottom line"—environmental, economic, and social goals and objectives. ■

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PHOTO: Remediation project manager Michael Spain inspects the Emery Landfill area in Wichita, Kan., surrounded by fields of alfalfa and clover. BEVERLY NOWAK/BOEING