

Sustainable Acquisition Success Story

Operations Spotlight on the Pantex Plant

Pantex Reuses Wastewater for Agricultural Irrigation

The Pantex Plant, located northeast of Amarillo, Texas, has generated enormous quantities of treated wastewater from plant operations and groundwater remediation through the years. Approximately 2 billion gallons of wastewater were treated and used for agricultural irrigation between 2005-2017. The beneficial reuse of wastewater at Pantex conserves a major resource in the dry Texas climate and also benefits the environment by preventing recharge of a contaminated aquifer.

Using the wastewater for irrigation has allowed Pantex to avoid discharging this water to a nearby playa lake, which would then refill a perched aquifer that is undergoing environmental remediation. The perched aquifer contains contaminants resulting from legacy operations conducted at Pantex. It is being remediated using a combination of ex situ and in situ remediation techniques. Water pumped from the perched aquifer is remediated and then combined with treated Plant wastewater for use in irrigation.

To use the treated wastewater for irrigation, Pantex obtained a water quality permit from the state of Texas. This permit allows the site to reuse over one million gallons of treated wastewater on average per day by means of subsurface irrigation of 400 acres of agricultural fields. The subsurface irrigation system involves an underground pipeline from the wastewater treatment plant to the fields and several miles of subsurface drip tapes.

Texas Tech University Research Farms manages the agricultural activity conducted on the 400 acres of irrigated cropland, along with hundreds of acres of non-irrigated crop and grazing land owned by the U.S. Department of Energy (DOE), under an agreement initiated in 1955. This agreement, with subsequent updates over the years, provides economic benefits for both parties. The university is provided access to productive agricultural land and receives compensation from selling the agricultural produce grown (sorghum, cotton, oats, and wheat). Pantex avoids certain land management costs (both personnel costs and associated land management equipment costs), and site security is enhanced by the university managing the vegetation.

Irrigation of the 400 acres began in 2005 and continued until 2017 when the system was taken offline for upgrades. It will return to service in 2022.

The water quality permit issued to Pantex by the state of Texas was updated in August 2020 with the goal of adding an additional 300-400 acres of surface irrigation to go along with the subsurface irrigation, which will increase flexibility in the amount of plant wastewater that can be beneficially reused. This irrigation program is critical to the long-term stewardship program at Pantex, and it has resulted in bountiful agricultural growth, economic savings, increased site security, educational opportunities, and conservation of a vital natural resource.



Photo Credit: Pantex - Wastewater treatment facility lagoon



Photo Credit: Pantex - Playa lake with surface water after heavy rains & permitted wastewater discharge



Photo Credit: Pantex - Forage harvest on irrigated tracts

Keys to Success



Challenge

Significant quantity of wastewater to be disposed of, remediation of a perched aquifer, and water scarcity in the dry Texas climate.

Solution

Reuse treated wastewater from plant operations and groundwater remediation for agricultural production.

Results/Benefits

- Supports the Pantex goals of natural resource management,
- Reduces cost of labor for land management (3-6 full-time personnel),
- Supports remediation efforts,
- Increases site security by managing vegetation growth,
- Conserves a critical resource --- water, and
- Supports the decades old relationship between Pantex and Texas Tech University.

Creative Problem Solving

DOE owned and leased land at the Pantex Plant required ongoing maintenance. Teaming up with Texas Tech University helped reduce those maintenance costs. Managing vegetation growth at the site increases site security. Beneficial reuse of the treated wastewater supports environmental stewardship at Pantex and agricultural research at Texas Tech.

Key Stakeholders

Texas Tech University Research Farms, U.S. Department of Energy/National Nuclear Security Administration Production Office, Pantex Plant, Consolidated Nuclear Security, and the state of Texas.

Lessons Learned

- Agriculture can be an important aspect of natural resource management,
- Collaboration with regional universities can provide benefits across multiple aspects of a DOE site's mission, and
- Wastewater is an important asset for a site located in a semi-arid region.

Contact Information: J.D. Booker, jon.booker@cns.doe.gov, (806) 473-8798

