GREEN BUSINESS QUARTERLY

FALL 2009

CONSUMER PERCEPTION STUDY
Sustainability remains priority to purchasers; businesses have opportunity to increase brand value

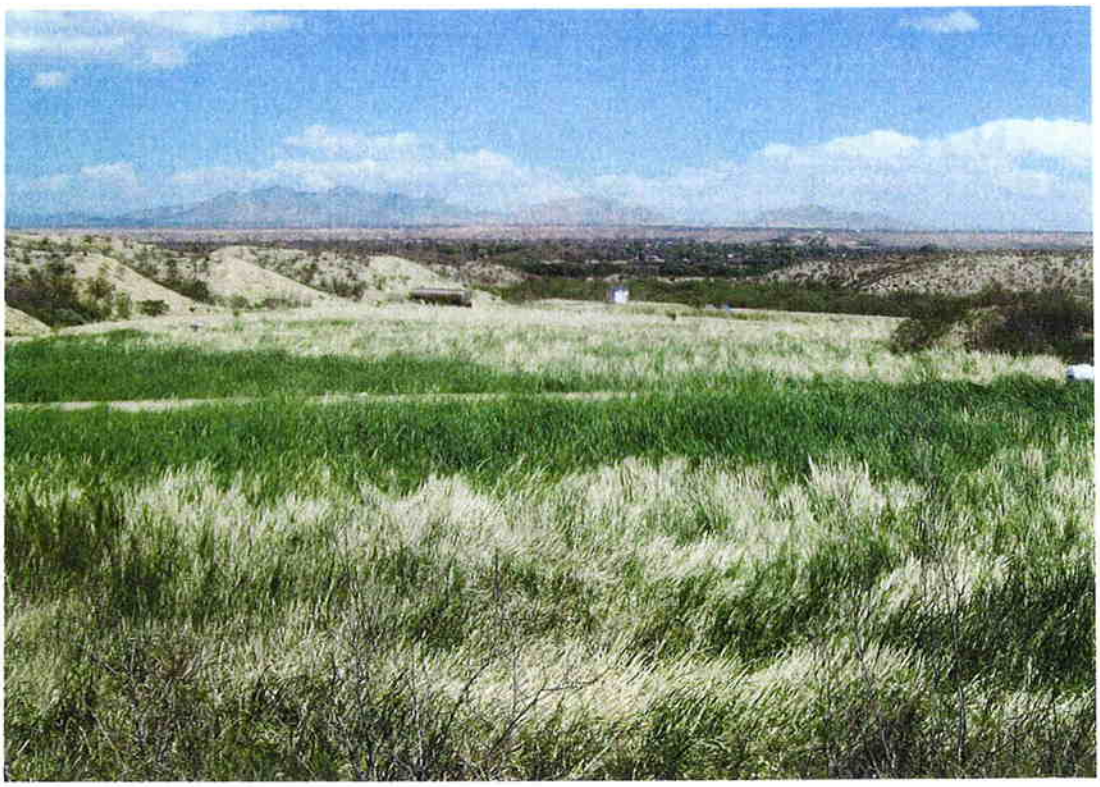
GREEN FRANCHISING
Redefining the traditional general store

Greening Your Office

Creating a healthy, productive, and efficient workspace for employees

PLUS

CITY TO WATCH: BRADDOCK, PA, TRANSFORMING A CITY HIT HARD BY ECONOMIC CONDITIONS



▸ By constructing a five-acre wetland in the southern Arizona desert, the Apache Nitrogen, Inc. has used an all-natural treatment method to remove nitrates from aquifer water. By 2008, Apache Nitrogen estimates that its wetlands had treated 400 million gallons of water and removed half a million pounds of nitrates.

APACHE NITROGEN, INC.

Ammonium-nitrate-production company improves environment with water-cleansing techniques

BY ERICA ARCHER

APACHE NITROGEN PRODUCT, INC. HAS taken a Superfund site and turned it into a sustainability powerhouse, amping up their plant's efficiency in the process.

Established in 1920 as Apache Powder, Apache Nitrogen originally made dynamite for mining companies, but shifted to ammonium nitrate as the industry changed. Seventy percent of the company's customers are mining-related, and Apache Nitrogen's owners are affiliated with mining companies Freeport McMoRan and Southwest Energy. Apache Nitrogen's non-mining products, including liquid ammonium nitrate fertilizer, are for agricultural use. They also manufacture aqua ammonia, a product used by power plants to reduce stack emissions.

By constructing a five-acre wetland in the southern Arizona desert, the company has used an all-natural treatment method to remove nitrates from aquifer water. "It's a sustainable treatment technology as opposed to having a big waste water treatment plant that uses a bunch of chemicals," explains Pamela Beilke, director of compliance and quality at Apache Nitrogen.

Through routine water quality monitoring, the Arizona Department of Environmental Quality noticed elevated levels of nitrates in the San Pedro River, running on the eastern side of the Apache plant, and in local shallow wells. In 1990, Apache Nitrogen was placed on the Superfund National Priority List by the EPA. The nearby San Pedro River and local shallow wells contained levels of nitrates higher than the levels designated acceptable for drinking water by the EPA. The numbers were not higher than the state of Arizona's limits for surface water, Beilke notes.

Although nitrates are beneficial as fertilizer, high doses in drinking water can be risky for human consumption. "The nitrates can interfere with the blood's ability to absorb oxygen. In infants it can cause what's known as methemoglobinemia [or Blue Baby Syndrome], because the baby can't get enough oxygen. It's not a health concern that affects the general population; it's a very specific population," explains Beilke.

The treatment process is simple. "It's just cattails, bacteria and molasses," says Beilke.

Molasses feeds the bacteria, she explains, although excessive molasses breaks

AT A GLANCE

LOCATION:
BENSON, AZ

AREA OF SPECIALTY:
PRODUCTION OF AMMONIUM NITRATE FOR MINING AND AGRICULTURE

EMPLOYEES:
100

down into hydrogen sulfide, creating a rotten egg smell. "The bacteria need a source of carbon as their food. Theoretically anything with carbon would work, but we tried [acetate and sugar] and the bacteria weren't doing anything. So we gave them molasses and they were happy again." Beilke jokes, "They're addicted to molasses."

The wetlands process between six million and six-and-a-half million gallons of water each month. The company reached a milestone at the end of 2008. At that time, Apache Nitrogen estimated that its wetlands had treated 400 million gallons of water and removed half-a-million pounds of nitrates.

The company has also taken steps to eliminate waste water and emissions, and has maximized production by reducing waste. The plant has achieved zero water discharge status by collecting all of its rinse waters and waste waters. "That water naturally has ammonium nitrate in it, because we're washing down areas where we produce it," says Beilke. "That water is then used to make liquid ammonium nitrate, which is sold as a fertilizer."

Another part of the zero-discharge plan is the brine concentrator, which operates like a still. The distilled water it creates is used to make aqua ammonia.

Formerly, the plant's nitric-acid stack produced a brief plume of orange nitrogen gas (NOx) startup, harmless but alarming to the layperson. The company tried adding hydrogen peroxide to the top of the tower, and the process was found to improve production and reduce NOx emissions to a negligible amount. This pollution prevention practice was recognized in 2002 by the Arizona Governor's Pride Award. Adding hydrogen peroxide is now the standard operating procedure for starting these plants.

Although Apache Nitrogen experienced a record year during 2008 due to increased copper mining, with the drop in the copper market and the worldwide economic downturn the company projects that 2009 sales will fall below the 2007 level. But the nearly 90-year-old company is not worrying. "We've been through that kind of thing many, many times before," says Beilke. GBQ

HOW THE WETLANDS REMOVE NITRATES:

- First, water from the nearby aquifer is pumped into man-made ponds.
- A cattail mat on the first three ponds makes them anerobic—there are five ponds altogether. The bacteria in the first three ponds metabolize the nitrates in the water and release natural gas, a natural component of the Earth's atmosphere. Meanwhile, the bacteria consume molasses, which is added by hand, for energy.
- The fourth open aerobic pond is designed to release ammonia, a residual by-product of denitrification, into the air. "We have never seen significant concentrations of ammonia in our process," says Beilke.
- The water enters the fifth anerobic pond for final "polishing" and residual nitrate removal.
- The treated water is discharged into a wash and recharges the groundwater supply. A solar-powered flow monitor measures the water volume of water leaving the wetlands.