

# Recipe for cleanup

Boeing scientists cook up a better way to perform environmental cleanup—using a touch of sugar and vinegar

By Blythe Jameson

**W**alking across the tarmac at the north end of Boeing Field in Seattle, Carl Bach prepares for a delivery of sugar. The mechanical engineer is not assisting with a catering order. Bach, project manager for Boeing's Environment, Health and Safety Remediation team, is one of more than 30 "remediators" working on environmental cleanup programs at sites affected by former operations.

Sugar and sugar syrups that can't be used at a bakery or soda company are being used to treat volatile organic compounds in groundwater, according to Bach.

"We couldn't believe how effective this is," Bach said. "Natural degradation is already occurring. We are basically providing an additional food source, feeding the bacteria and promoting the biodegradation process that already exists."

The sugar, which otherwise might have been sent to a waste treatment plant, provides an ideal food source for the bacteria. Identifying strategic injection points is key, as the sugar is used only where it will completely degrade and provide the greatest benefit.

Bach and the Remediation team work with regulatory agencies, leading scientists and experts, and community members to clean up former manufacturing facilities, as well as sites where Boeing or companies it has acquired shipped chemicals and other waste for treatment, storage or disposal.

The team also looks for opportunities to build sustainable, or what the U.S. Environmental Protection Agency calls "green remediation," practices into their projects. An EPA initiative, these unique applications are geared toward minimizing the environmental footprint of a cleanup.

Reducing air emissions, minimizing impacts to water quality, conserving natural resources and increasing operational efficiencies are some of the ways the team works to further enhance a

remediation project. "Bioremediation," or using naturally occurring microorganisms to degrade hazardous substances into less toxic or nontoxic substances, is one way the team is seeing success at several remediation sites.

At Santa Susana, a former federal rocket engine testing site in Southern California, the Remediation team treated perchlorate-impacted soils on site. Perchlorate, a salt, is used as a component of solid rocket fuel and road flares. By using food products and other biodegradable materials to help naturally occurring microorganisms clean up the salt, the team eliminated the need to haul soil to a hazardous waste facility.

"Rather than shipping approximately 650 truckloads of contaminated soil to a landfill, we stockpiled the soil on site, added water and a food source, and left the bugs to break down the perchlorate," said Art Lenox, Remediation project manager for the Santa Susana site. "We saw concentrations reduced by orders of magnitude, meeting our cleanup goal, and we didn't have to send it off-site for disposal."

And in Rancho Cordova, Calif., a Remediation team used highly concentrated, pure vinegar to treat contaminated groundwater.

"We saw significant results," said Brian Anderson, Remediation project manager for Rancho Cordova. "By injecting concentrated food-grade vinegar into the groundwater zone, we eliminated 500 pounds (230 kilograms) of perchlorate in 18 months. This started as a pilot test, but it proved to be very effective and we intend to continue operating this system." ■

*blythe.e.jameson@boeing.com*

**PHOTO:** Carl Bach, Remediation project manager, examines a sample of sugar solution that will be injected into the groundwater at Boeing Field in Seattle. MARIAN LOCKHART/BOEING