



# ERP Fact Sheet

September 2005

## Air Force Tests Whey to Destroy Solvent at Site 19

This Fact Sheet describes how Edwards AFB is testing an innovative material to remediate Site 19.

**T**he Air Force is performing a treatability study for in situ bioremediation using an organic material, whey powder, which will be injected into the subsurface to promote the destruction of trichloroethene (TCE) in groundwater at Site 19. TCE is a chlorinated hydrocarbon commonly used as a solvent to clean grease from metal parts.

Site 19 is the former testing facility for the X-15 and other aircraft. The site is located to the northeast of the Main Base Flightline.

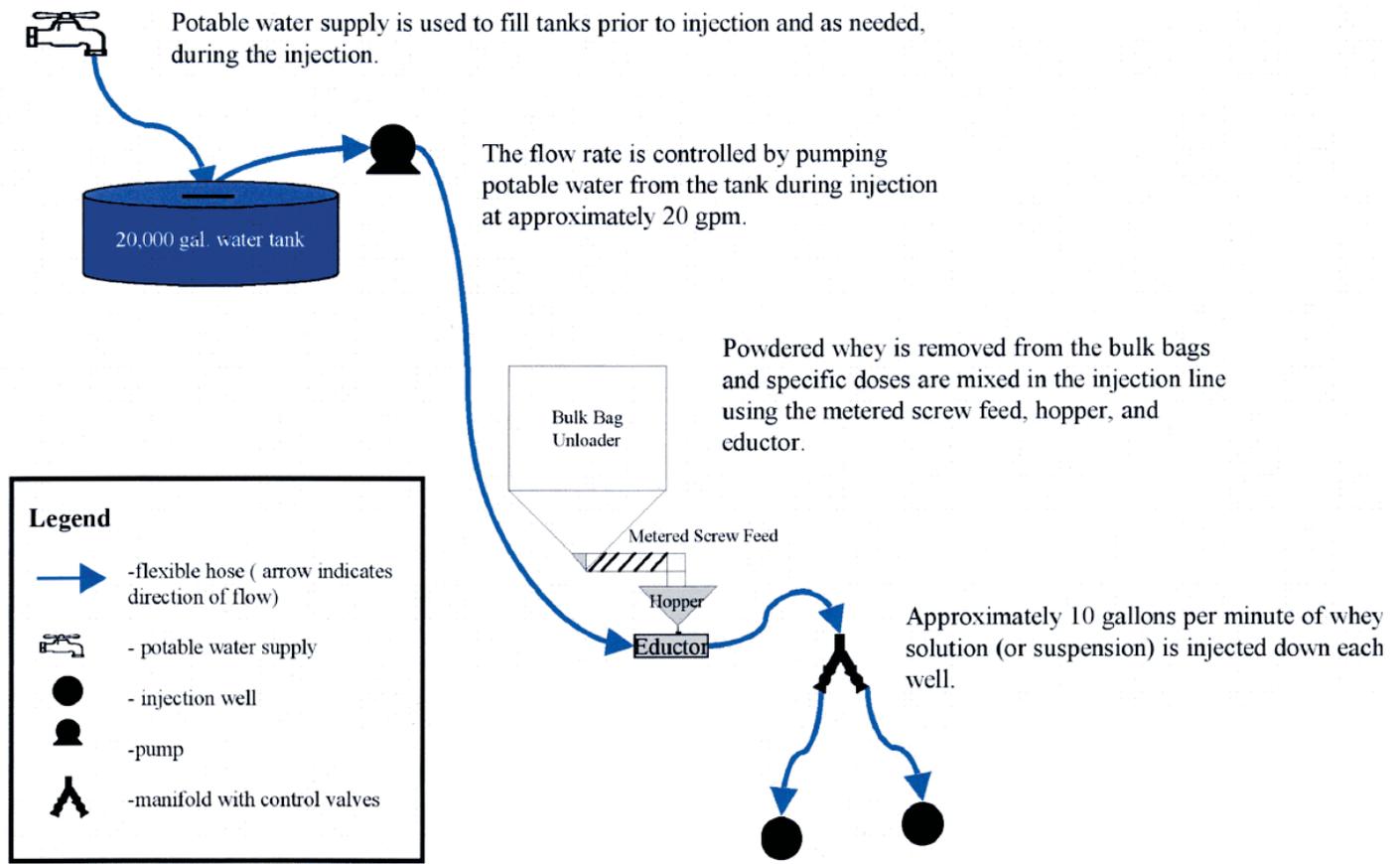
During aircraft testing in the 1960's and 1970's, wastewater containing solvents was discharged to a soil catchment basin and this is the suspected source of a large TCE plume in groundwater beneath the site.

The maximum TCE concentrations in the study area at the site are about 7,000 parts per billion (ppb). The regulatory limit for TCE is 5 ppb.

Whey powder, a dairy product which is a mixture of lactose (a type of sugar)



Gary Mecham, Engineering Department Manager for contractor North Wind, opens the hopper hatch to allow dry whey powder to enter the system.



### Explanation

gpm = gallons per minute

This diagram shows the process for injecting the whey powder liquid.

and protein, has been shown to stimulate bioremediation of TCE in laboratory studies and in field demonstrations.

During the study, whey powder is mixed with potable water and then the solution is injected into the groundwater aquifer through two injection wells. Approximately 9,600 gallons of whey powder solution will be injected at a time into each well. Ten monitoring wells surrounding the injection wells are periodically sampled and the samples analyzed by a laboratory in order to track the progress of TCE bioremediation.

The whey powder stimulates the destruction of TCE by microorganisms already present in the subsurface through a process called anaerobic reductive

dechlorination (ARD). This process occurs in subsurface environments in which there is no oxygen, known as anaerobic conditions. The ARD process requires that a sufficient quantity of a suitable nutrient, such as whey powder, is available to the microorganisms.

As the microorganisms metabolize the nutrient, they produce hydrogen atoms. If oxygen is present, two hydrogen atoms combine with an oxygen atom to form a water molecule. If no oxygen is initially present or all of the available oxygen has been converted to water molecules, the hydrogen atoms will replace the chlorine atoms of the TCE molecules, “dechlorinating” and ultimately converting the TCE into harmless chemicals.