Hello, this is Kevin O'Donovan, and I'd like to welcome you to the National Institute of Environmental Health Sciences Superfund Research Program monthly Research Brief podcast.

This month, we're discussing a new solar-powered approach for groundwater contamination.

The Research Brief, Number 211, was released on July 3, 2012, and was written by SRP contractor Rebecca Wilson in conjunction with SRP-supported researcher Akram Alshawabkeh.

Trichloroethylene (TCE), a chlorinated hydrocarbon that is used as an industrial solvent and degreaser, is one of the most common soil and groundwater contaminants in the United States. A research team led by Akram Alshawabkeh, Ph.D., from the Northeastern University Superfund Research Program has developed a new, low-cost strategy for remediating this contaminant.

In a study published in the February 2012 edition of *Environmental Science & Technology*, the researchers outline a novel method that uses iron ions (Fe(II)) along with a palladium (Pd) catalyst to enhance oxidative degradation of TCE, which typically occurs as a side reaction during traditional TCE hydrodechlorination. Their method is particularly suited for sustained treatment of aquifers since a solar-powered system can be engineered for *in situ* implementation.

To develop the method, Songhu Yuan, Ph.D., a visiting professor from the China University of Geosciences in Wuhan, China, together with Xuhui Mao, Ph.D., a postdoctoral research associate at Northeastern University, applied mixed metal oxide electrodes to simulated TCE-contaminated groundwater to generate H_2 in a lab-controlled environment. They added palladium powder to catalyze the reaction, which degraded TCE into ethane and other byproducts. Without the addition of Fe(II), 40% of the TCE was degraded within 80 minutes. However, when Yuan added Fe(II), 95% of the TCE was degraded within the same amount of time. He found that adding Fe(II) shifts the process of TCE decontamination from hydrodechlorination (a reduction process) to a more rapid oxidative reaction. This shift was most effective when high concentrations of iron (about 10 mg/L) were present and the pH of the water was low. This is the first time a research group has reported on palladium's ability to indirectly catalyze an oxidation process for groundwater remediation.

The researchers believe that this may be a low-cost and highly efficient method to remediate contaminated groundwater. They used the results to devise a three-electrode palladium -catalytic remediation system with automatic pH-regulation, which they are currently evaluating. They are also developing an in-well solar-powered system for field testing.

If you'd like to learn more about this research, visit the Superfund Research Program website at www.niehs.nih.gov/srp. From there, click on "Who We Fund" and follow the links to the Northeastern University research summary. If you have any questions or comments about this month's podcast or if you have ideas for future podcasts, contact Maureen Avakian at avakian@niehs.nih.gov.

Join us next month as we discuss more exciting research and technology developments from the Superfund Research Program.