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Oversight News

Newsletter of the Commonwealth's Environmental Oversight Section for the Dept. of Energy's Paducah Site



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*Kentucky Department for Environmental Protection
Division of Waste Management
Hazardous Waste Branch
Paducah Site Section*

C-400 Remedial Investigation Underway

The C-400 building at the Paducah Gaseous Diffusion Plant in Paducah is the main source of two four-mile long TCE groundwater contamination plumes, commonly identified as the Northeast and Northwest Plumes. The groundwater plumes are the largest known sources of contamination leaving the site and are therefore the main risk to human health and the environment. In order to clean up contamination at the C-400 complex, a comprehensive investigation will define the extent of contamination. This is needed to set the parameters necessary to evaluate and choose the most effective treatment options.

Scoping meetings for the investigation work plan phase began in 2018 and continued into 2019. The purpose of the meetings were to support a meaningful ex-

change of information and expectations; to develop a general consensus on the scope, to facilitate development of the Remedial Investigation/Feasibility Study (RI/FS) Work Plan, thereby accelerating the document review, comment and approval process. During the scoping process, sample locations were identified; concepts and data needs were determined; exchanges of investigation methods were discussed; and concerns relating to RI/FS Work Plan development were resolved.

Through meetings, discussions, and correspondence during the scoping process the DOE, EPA, and KDEP were able to agree to the scope of the RI/FS Work Plan which received final approval from EPA and KDEP on October 7, 2019. The DOE announced implementation of the RI/FS Work Plan fieldwork on November 11, 2019. Initial field activities in the C-400 operable unit included gamma walkover surveys, maintenance/redevelopment of existing monitoring wells, obstacle removal at designated sampling locations, and ground survey marking of drill locations and underground utilities. Installation of new monitoring wells began on March 3, 2020. Four monitoring wells were installed at three locations prior to the suspension of C-400 RI field activities on March 24, 2020 due to the COVID-19 pandemic. Cleanup progress at the site is made possible, in part, by active participation by site stakeholders, regulators, workers, elected officials, and other members of the public.



SWMU 211-A Enhanced *In Situ* Bioremediation

Trichloroethene (TCE) was used as a solvent to clean equipment in and outside of the C-720 building. In addition to C-720 cleaning operations, at least one former plant worker reported that drums of TCE were dumped in a ditch north of the C-720 building. Through a series of investigations, beginning in the mid-1990s, it was determined that TCE contaminated the soil and groundwater around the C-720 building. A remedial action is getting ready to start at one of the impacted areas located northeast of C-720 building, identified as SWMU 211-A.

A Remedial Design Report determined that SWMU 211-A is a suitable site for a type of treatment known as Enhanced In Situ Bioremediation (EISB). This type of remediation begins by injecting a slurry containing sand and microscale zero-valent iron (mZVI) as proppants using Direct Push Technology (DPT) jet injection to create lenses with higher permeability within the UCRS. Then microorganisms and amendments (and nutrients) are added to stimulate and enhance biological activity. The microorganisms consume, digest and transform the TCE through a process called reductive dechlorination, resulting in the non-toxic end product, ethene.

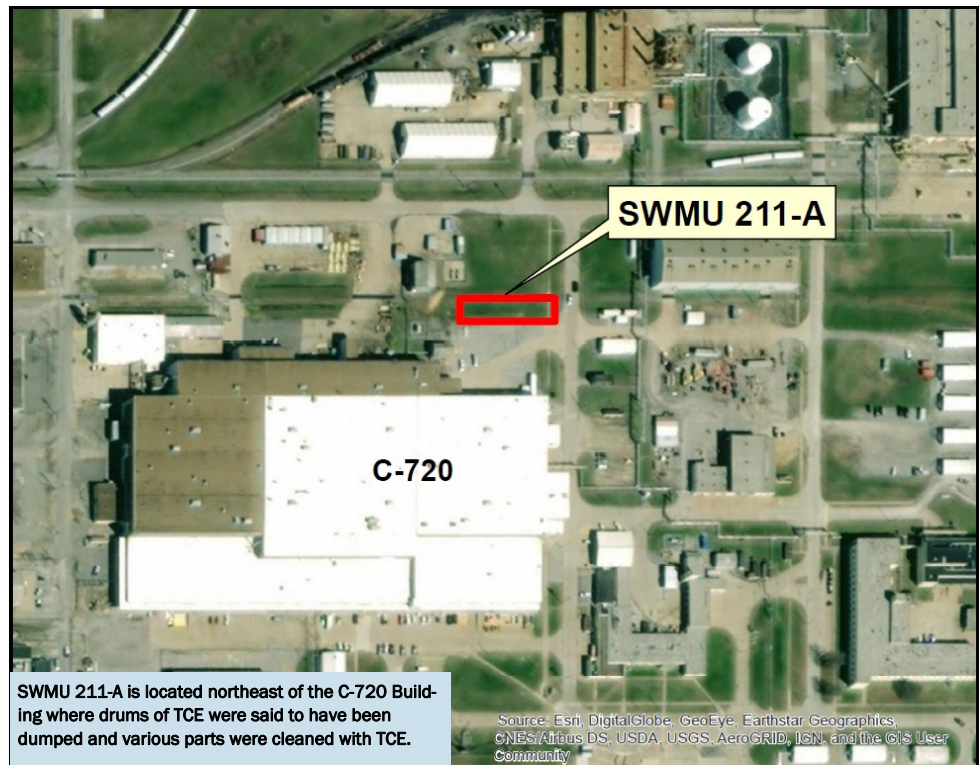
The bioremediation treatment footprint will be approximately 13,200 ft² and cover two distinct areas. Injection locations were selected to provide coverage of the treatment area with a 15-ft design radius of influence and accounts for injection overlapping of ~30%. The treatment depth generally extends from 17ft to 65 ft below ground surface. The vertical spacing between injection depths will range from 3 ft to 4 ft at each location, with closer spacing occurring in higher known TCE concentration areas.

In the field, hydraulic fracturing, using DPT jet injection will create horizontal fractures so sand and iron can be delivered under pressure to fill the void space. Emulsified vegetable oil will be mixed with anaerobic water and injected into each well, followed by the microbes and nutrients, which will occupy voids and start reducing TCE concentrations.

This EISB remedy includes both a performance monitoring program and a long-term monitoring program. Performance monitoring will provide data on the bioremediation action and subsurface conditions, while the long-term monitoring will provide data on the VOC concentrations. Baseline monitoring will be performed prior to EISB implementation so comparisons can be made before and after treatment begins.

Several parameters will be measured during performance monitoring. Among them, ethene and ethane concentrations will be monitored because they are the end products of TCE reduction. Methane also will be tracked and used as an indicator of groundwater geochemistry since methane-producing bacteria typically are active under the same geochemical conditions as dechlorinating bacteria. Several other parameters will also be monitored during this time.

The implementation of field activities for the 211-A bioremediation project are expected to last approximately 9-12 months.



Personnel Changes

Chris Travis joined the Paducah Gaseous Diffusion Plant Section on December 16, 2018 after serving as an asbestos and source inspector for the Division of Air Quality. Prior to joining the Kentucky Department of Protection in 2017, Chris worked at the Paducah Gaseous Diffusion Plant for 28 years as an environmental regulatory specialist. Chris retired as a Commander from the United States Naval Reserve following 28 years of service as a Naval Intelligence Officer. He obtained a bachelor's degree in chemical engineering from the University of Louisville. His interests outside of work are hiking, golf, and theatre.

Tabitha Owens joined the Paducah Gaseous Diffusion Plant Section on March 1, 2019. Tabitha earned a bachelor's degree in biology with minors in chemistry and physics from Eastern Kentucky University and a master's degree with an emphasis in chemistry from Union College. She most recently earned a Master of Public Health in Environmental Health Science from Eastern Kentucky University. Before joining the Paducah section, she worked in the Stormwater Section of the Division of Water, issuing industrial wastewater discharge permits throughout the Commonwealth. She enjoys watching movies, trying new restaurants and spending time with her husband.



Chris Jung, formerly of the Paducah Gaseous Diffusion Plant Section, has left to take a promotion as Section Supervisor of the State Section in the Superfund Branch effective December 3, 2019.

Kentucky Environmental Oversight News is published quarterly by the Kentucky Department for Environmental Protection's Division of Waste Management. It features information regarding environmental cleanup activities at the DOE Paducah Site and related topics. Additional information is available from:

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