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Universities to complete soil treatability studies

The U.S. Department of Energy (DOE) at the Santa Susana Field Laboratory (SSFL) is funding California Polytechnic State University (Cal Poly), San Luis Obispo and University of California, Riverside (UC Riverside) researchers to complete five of the six Area IV soil treatability studies that Sandia National Laboratories recommended in September 2012. The five studies, which started in May, and were presented to the public at a meeting held May 29, are described below. Each study has an overarching goal of potentially treating the soil to reduce soil volumes that would need to be taken off-site in compliance with the 2010 Administrative Order on Consent (AOC).

To conduct these studies, both institutions will use university-based researchers, including graduate students, research associates, and professors. Cal Poly will conduct the Phytoremediation, Bioremediation, and Natural Attenuation studies. UC Riverside will conduct the Soil Partitioning and Mercury Chemical State studies.



Dr. Yarrow Nelson and Mackenzie Billings, both of Cal Poly, at May 29 public meeting.

Phytoremediation Study

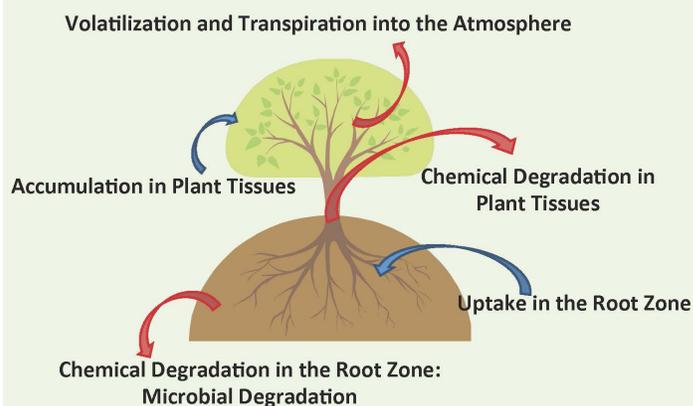
What and why? In this study, researchers will study soil and plants to find out whether existing plants accumulate contaminants internally. If so, this might be one way to reduce metal concentrations in soil.

What's involved? First, researchers will sample existing soil and plant tissues at an uncontaminated control location and at several contaminated locations after the growing season. Plant stem, leaf materials, and root systems will be analyzed separately to see whether and where the chemicals are being deposited in the plant's systems.

If the study demonstrates that some plants effectively remove chemicals from soil, a controlled greenhouse study of those

plants would look at ways to “encourage” the plants to take up chemicals by changing the soil chemistry or adding specific nutrients. This phase will evaluate different plant growth media that could facilitate plant uptake of contaminants in place.

How Does Phytoremediation Work?



Soil Partitioning Study

What and why? Researchers will separate, or partition, contaminated soils according to the size of the soil particles and figure out whether site contaminants are mainly found with the soil's smallest particle sizes, referred to as “fines”. If so, possibly the fines and their associated contaminants can be removed from the site, “washed”, or thermally treated separately from the larger particle sizes. In addition, researchers in the other studies will draw on the results of this soil partitioning study to help them understand whether contaminants on site can be taken up by plants and microbes.

What's involved? The researchers will collect soil samples from areas known to be contaminated then sift them through sieves of smaller and smaller mesh sizes. Known as “partitioning”, this process will create subsets of the soil based on particle size. The researchers will then analyze these soil subsets to determine, among other things, whether the contaminants are found in the fines, or are distributed throughout the various sizes of soil particles.

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Community members attend “office warming”

DOE hosted a “Meet and Greet” in April to give community members the opportunity to see the new location of the DOE-SSFL office for cleanup of the Energy Technology Engineering Center (ETEC). Lots of people stopped by the office to welcome DOE to Simi Valley, including Simi Valley Mayor Bob Huber and City Council Member Mike Judge. The DOE moved its office from the Santa Susana Field Laboratory to Simi Valley, CA in December 2012.



Pictured are Simi Valley Mayor Bob Huber (left) and DOE ETEC Director John Jones

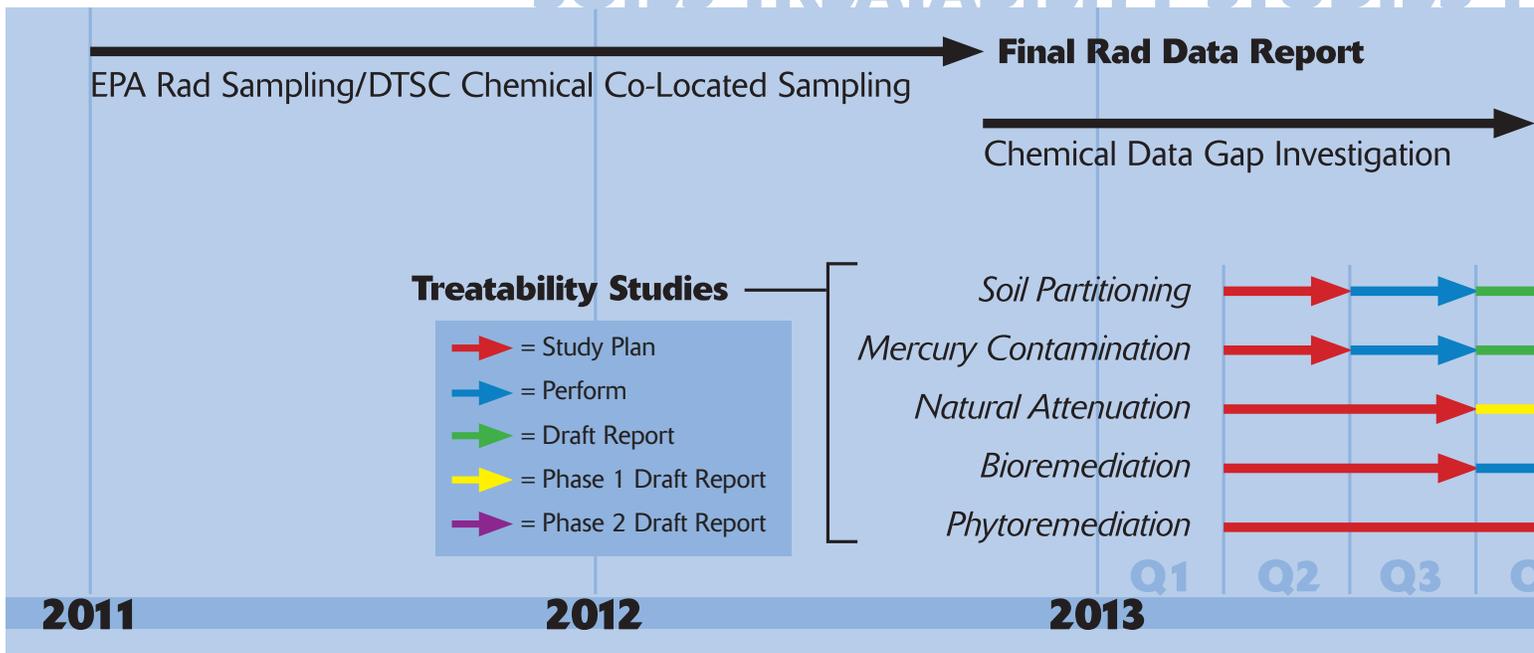
Chemical characterization nears completion

DOE ETEC has nearly completed its study of chemical contaminants at SSFL Area IV. Beginning in 2010, ETEC has worked closely with California Department of Toxic Substance Control (DTSC) and the community in developing and implementing a soil characterization strategy that has resulted in determining what contaminants are present, where they are present, and what areas require remediation. Over the last 2.5 years, DOE technicians have taken more than 4,000 samples, and performed thousands of laboratory analyses. Scientists have compiled the results of these analyses into a database of more than one million records, providing the foundation for understanding the chemical contamination at the SSFL Area IV.

One requirement for determining final characterization needs is to compare sampling results with the “Chemical Look-Up Table” of soil cleanup values – essentially, the cleanup standard for contamination in SSFL soils that DOE and the DTSC agreed to develop under the 2010 AOC. The values were determined by DTSC and were presented at a community meeting in May. DOE is now using the Look-Up Table values to evaluate final data collection needs.

John Jones, DOE’s ETEC Federal Project Director, said recently, “Based on our data evaluation, DOE has concluded that the soil data produced during our remedial investigations and AOC sampling program provide the data we need to begin soil clean-up planning for most of the area we are responsible for. This process begins with chemical and radiological contaminant summary reports that compile all data, for approval by DTSC. A few remaining locations will require limited additional sampling in the near term, which we can sample in parallel with initial planning. DOE will discuss those locations with DTSC and the community during upcoming meetings. In addition, DOE expects clean-up planning may identify other small sampling efforts that may be necessary later on. And of course, we will collect many more samples at the end, during clean-up confirmation work. What the data evaluation does mean is that DOE can focus its efforts on soil clean-up planning, treatability studies, and the EIS,” Jones concluded.

SOILS TREATABILITY STUDIES T



Mercury Chemical State Study

What and why? In this study into the forms of mercury in Area IV soils, researchers will find out whether it is metallic mercury – the silvery liquid that was commonly used in thermometers. Some forms of mercury are easier to clean up using in-situ (in place) methods than others. If the mercury is in its metallic form, it's possible that heat could be used to vaporize and drive it out of the soil, and the vapor could be captured for treatment or disposal. Other forms generally do not lend themselves to in situ processes, although some plants and microorganisms can convert mercury compounds to metallic mercury. The phytoremediation and bioremediation researchers will use the results of the mercury tests to determine whether this would be possible in Area IV.

What's involved? Researchers will collect soil samples with mercury contamination and use specialized testing to learn specifics about the mercury and mercury compounds found in Area IV soil. If they find a wide variability in the results, they may need to sample each location contaminated by mercury.

Bioremediation Study

What and why? Researchers will evaluate whether soil organisms, particularly fungi and bacteria, can use and/or convert Area IV contaminants to basic components to an energy source, such as carbon and salts. If so, can they live solely on that contaminant? Next, can this process be enhanced through stimulation of naturally existing species or introduction of non-natural species?

What's involved? First, researchers will determine the types of fungi and bacteria that live in the Area IV soil by

collecting soil samples and nurturing the growth of existing organisms in a laboratory. Once the species are known, they will be transferred to a fresh growth medium infused with chemicals similar to those in Area IV. The researchers will track any growth in this new medium to determine which species are capable of using site chemicals for carbon energy and growth.

Natural Attenuation Study

What and why? A number of processes in the natural environment lead to the breakdown of all chemicals into simpler elements and compounds, such as carbon dioxide, water, and mineral salts. Researchers would study the rate at which these processes are working so a determination can be made whether the rate would be sufficient to achieve timely remediation.

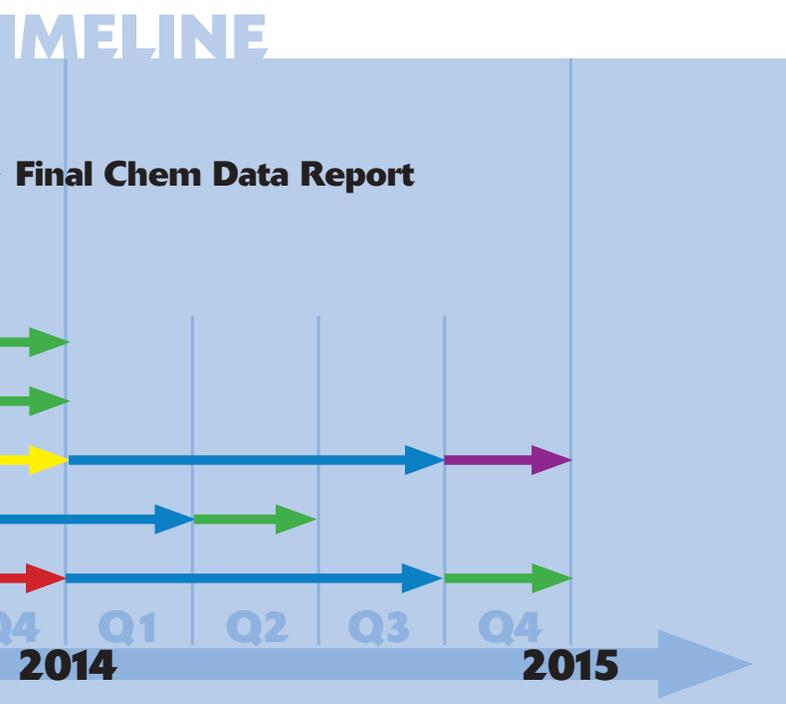
What's involved? First, researchers will review relevant scientific literature to identify contaminant concentrations, soil types, rates of chemical breakdown, and measures other researchers took to enhance the breakdown of chemicals in the environment. The results of this literature review will be provided to the researchers conducting the phytoremediation and bioremediation studies for insight into how to enhance the degradation of chemicals in soils. Then the researchers will develop a database that includes results from the researchers' phytoremediation and bioremediation studies in Area IV and information collected during the literature review.

For more information about these studies:

Briefings presented at the May meeting and Sandia's full memorandum and recommendations provide greater detail about all these studies, including a list of contaminant groups and suggested on-site plant alternatives for phytoremediation. See treatability study information at: http://www.etec.energy.gov/char_cleanup/soil_treatability.html.

Next steps

DOE projects these studies will be completed by late summer 2014. Meanwhile, more active work on the EIS resumes later this year. DOE will use results of the soil treatability studies to inform the analyses of alternatives in the EIS and Soil Remedial Action Implementation Plan. This plan will describe the remedial actions proposed for Area IV. Promising soil cleanup techniques identified in treatability studies and the EIS will be included in cleanup plans. In addition, soil treatability results will inform DTSC's CEQA analysis.



Greetings SSFL Community:

We are thrilled that we are continuing to move closer to the cleanup of Area IV. We are continuing the characterization of Area IV, which should be completed at the end of this calendar year.

We have also kicked off Phase II of the Soil Treatability Study. For Phase II we have asked two universities with specialized expertise to conduct actual tests to determine whether one or more treatment technologies could help us comply with the 2010 Administrative Order on Consent (AOC). We are hopeful that we can reduce the levels of contamination sufficiently so that we can minimize the quantity of soil that will have to be excavated and transported to an off-site disposal site(s).

In this issue of the *CleanUpdate*, you will learn about what each of the treatability studies entails, the local universities conducting the recommended studies, and how the STIG will be involved in Phase II (all beginning on page 1).

We hope you will find this issue of the *CleanUpdate* informative. We look forward to your continued participation as we continue to work towards cleanup at Area IV of SSFL.



John Jones,
Federal Project Director



Stephie Jennings,
Deputy Federal Project Director

For more information

<http://www.etec.energy.gov>

Ms. Jazmin Bell, Stakeholder Liaison

U.S. Department of Energy

4100 Guardian Street, Suite 160

Simi Valley, CA 93063

Telephone: 805-416-0990 Fax: 855-658-8695

email: jazmin.bell@emcbc.doe.gov

