2014 YEAR in REVIEW
NASA SANTA SUSANA FIELD LABORATORY

NASA continues with investigation and cleanup activities in two areas used historically for research, development and testing of rocket engines at Santa Susana Field Laboratory (SSFL). This document provides highlights of some of NASA's accomplishments in the past year and NASA's ongoing commitment to communicating with neighbors and community members about progress we make.

SOIL INVESTIGATION

NASA made significant progress with soil investigations including sampling, laboratory analyses, and treatability studies involving both laboratory and field testing in preparation for conducting a comprehensive soil cleanup effort.

Field Sampling Plan

NASA reached a milestone this year by completing soil characterization. This process was defined by the terms of the 2010 Administrative Order on Consent (AOC). The AOC requires NASA to clean up soil to Look-Up Table (LUT) values. Beginning in 2011, NASA divided the site into five areas and developed five Field Sampling Plans (FSPs). NASA collected and analyzed soil and soil vapor from these areas. The field work performed for the sixth and final FSP closed the gaps that remained from the five previous soil sampling activities. Data from all six sampling events will be summarized in a Data Sampling Report (expected in 2015) and with approval of the report, the soil investigation phase will be finished in areas that NASA administers.

Bench Scale and Field Study

Bench Scale: Soil Washing and Thermal Desorption

NASA is considering a range of soil remediation technologies and has been evaluating how effective they would be on site-specific contaminants under environmental conditions present at SSFL. These analyses also consider whether or not the technologies would be able to meet the AOC requirements of cleaning up to Look-Up Table values and meeting the 2017 cleanup deadline. Bench scale tests, conducted in a laboratory, had mixed results. Soil washing involves physically separating fine-grained from coarse-grained materials followed by a chemical process that "washes" the soil. NASA tested three wash solutions: water only, Citrikleen, and BioSolve. Results showed that the chemicals of concern were reduced to meet LUTs, with the exception of total petroleum hydrocarbons (TPH). Soil washing requires excavating soils for treatment. Washed soil that meets LUTs may be returned to the excavated site. It is a very water intensive technology and the water required per day to operate would result in a significant volume of wastewater (and multiple waste streams). NASA performed another bench scale test using thermal desorption. This technology can be performed in situ (in place treatment) or ex situ (removed for treatment) and involves heating soil to very high temperatures. NASA conducted four ex situ tests to evaluate TPH removal: two at 250 degrees Celsius (ºC) and two at 550ºC for 15 and 30 minutes each. Results showed that hydrocarbon removal improved at increasing temperature and met LUT values. This technology has high electricity needs and it results in soil being stripped of organics and nutrients that would make it challenging for re-vegetation and soil restoration in a treated area.

Field Study: Bioventing

NASA conducted a bioventing field study in July. The purpose of bioventing is to inject oxygen into the subsurface to restore favorable conditions to the bacteria that naturally degrade hydrocarbons. NASA selected the Bravo Test Stand area for the field study and installed three wells and four monitoring points to measure whether injecting air into the ground released contaminants to the surface. Air was injected and then trapped at the surface using a special cover. The study results show that mechanically, air travels through the subsurface with little to no leakage occurring. Increased oxygen levels enhance the biological breakdown of hydrocarbons in the shallow bedrock and NASA was able to raise the oxygen to over 20% at every spot measured. NASA is considering a second phase of bioventing field work in 2015 to test the success of bioventing near the Bravo Skim Pond where traces of fuel were found in the soil. NASA expects this fuel to be treatable when exposed to oxygen, followed by in-situ chemical oxidation.

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GROUNDWATER INVESTIGATION

NASA, Boeing and the Department of Energy continue joint groundwater investigation efforts site wide. NASA is at the same time conducting its own pilot testing and groundwater investigation field work.

Bedrock Vapor Extraction

A bedrock vapor extraction (BVE) pilot test was conducted in Area II to see whether or not this technology could be implemented in the bedrock that exists at SSFL and if so, to evaluate its effectiveness in removing volatile organic compounds (VOCs). Field work began in July with the installation of seven vapor monitoring wells in the Bravo Skim Pond area. In August and September, NASA began testing if air, extracted from an existing core hole in the rock, could be moved through bedrock. A fifty-horsepower vacuum blower was used at a target depth between 30 feet and 175 feet below ground. The air that was pumped was cleaned above ground using two 1000-lb. vessels of activated carbon. No contaminants were detected after treatment. Approximately 30 lbs. of VOCs were removed in the first 13 days of the pilot test. This was promising, but more importantly, vacuum and concentration changes in monitoring wells were observed all around and as far away as 370 feet from the extraction well. Fractures deep in the rock seem to indicate that this technology could work if it connects to a wider network of fractures throughout the bedrock. Follow up tests were conducted in October and NASA is optimistic about this first round's results. Final data are being compiled to assess the potential for larger-scale use of this technology at SSFL.

Areas of Impacted Groundwater

NASA began field work in September to investigate Areas of Impacted Groundwater (AIGs) which consist of five groundwater plumes in Area II and the portion of Area I that NASA administers. Field characterization work being done as part of this investigation consists of evaluating faults and fractures, seeps, spring (where applicable), and contaminant migration within the vadose (extending from the ground surface to the water table) and unsaturated zones. NASA has installed new wells and deep bedrock boreholes, and continues to sample, survey and test to identify potential contaminant source areas, characterize geologic structures, and understand the distribution of groundwater contamination. The Department of Toxic Substances Control (DTSC), the agency providing regulatory oversight of SSFL cleanup, approved work plans for NASA to conduct field work in three areas this year. The last of the AIG field work will be conducted at Alfa/Bravo in early spring 2015. NASA believes these investigations will advance understanding of the groundwater profile so that the groundwater investigation phase can be completed.

PROPERLY MANAGING WASTE

NASA Being Proactive

Investigations and cleanup efforts generate waste of some type and the proper on-site management, and off-site transport and disposal is needed to protect public health and the environment. A June DTSC audit found that NASA was in complete compliance regarding the proper storage, labeling, supporting permits and documentation, and tracking of hazardous waste. DTSC also noted that NASA was proactive in managing erosion by hydroseeding and placing curbing at the four on-site storage impoundments. In October, site and document inspections of hazardous materials and waste were conducted by the Ventura County Certified Unified Program Agency (CUPA). CUPA provides regulatory oversight for six State environmental programs and distributes this information to emergency response agencies in the event of an emergency at the site. NASA was in complete compliance with CUPA requirements for 90-day waste accumulation and hazardous materials storage areas, and supporting permits and documentation. In addition, NASA was in complete compliance with both DTSC and CUPA requirements for proper training of staff managing hazardous waste. NASA remains committed to meeting or exceeding all regulatory requirements.

COMMUNITY OUTREACH

In Contact Through the Year

NASA maintains frequent contact during the year with community groups and interested stakeholders by participating in presentations and meetings, and by email and phone. In 2014, for example, NASA presented at the Woodlands Hills-Warner Center and Canoga Park neighborhoods councils meeting, and at College of the Canyons, as well as at a Workgroup meeting and at DTSC's Community Advisory Group (CAG) meetings. NASA hosted the Santa Susana Sacred Site Council and the Section 106 Consulting Parties. NASA also hosted a number of graduate students, providing them access to study site structures and features. This was the third year NASA, Boeing and Department of Energy co-hosted bus tours of the site for members of the public. In November, NASA gave over 50 interested community members the chance to tour and photograph areas and historic test stands at SSFL before demolition of structures began. NASA participated in a technical roundtable in March and two DTSC-sponsored Open Houses where the public was hosted by all parties involved with SSFL cleanup. Throughout the year, NASA posted several project updates to the SSFL cleanup website (http://ssfl.msfc.nasa.gov). FieldNOTE, the online newsletter, was published in August and November. The August edition featured the Bedrock Vapor Extraction treatability study and the November edition described the plan for demolition of structures in advance of soil cleanup. Also in November, NASA welcomed Lori Manes as the SSFL community outreach coordinator. Lori joins the SSFL team after several years in community involvement work with NASA at the Jet Propulsion Laboratory.

The 2014 Year in Review is intended to present highlights from the work accomplished at SSFL over the past year.

More information is available at http://ssfl.msfc.nasa.gov or contact:

Lori Manes
NASA SSFL Community Outreach Coordinator
Phone (818) 806-8834 **Email** lori.manes@nasa.gov