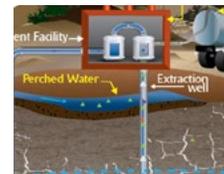




Energy Technology Engineering Center  
Area IV, Santa Susana Field Laboratory

# CleanUpdate

April 2015



Interim Measures considered  
Pages 3,6-7

## Message from the Managers

### Greetings to the SSFL Community:

This year, our major goals at the U.S. Department of Energy (DOE) Energy Technology Engineering Center (ETEC) are to complete investigations and analyses of groundwater and publish the draft Environmental Impact Statement (EIS) which will evaluate clean-up options for the remediation of Santa Susana Field Laboratory (SSFL) Area IV. With that in mind, we are devoting this issue of the *CleanUpdate* to the progress we've made addressing groundwater contamination issues since release of the *2009 Groundwater Remedial Investigation Report*. Scientists have concluded TCE (trichloroethylene) is the primary contaminant of concern in Area IV groundwater, with smaller amounts of perchlorate, strontium-90 (Sr-90), and metals, plus a tritium plume.

To support steps toward groundwater cleanup, we have developed the *Area IV Groundwater Remedial Investigation Work Plan*, which will be available on our website <http://etec.energy.gov> following approval by the California Department of Toxic Substances Control (DTSC). This work plan will guide our study of groundwater data gaps, which are a component of the Groundwater Remedial Investigation in Area IV. Also in this issue you'll find articles on:

- **Interim Measures:** In late 2015, we expect to initiate groundwater investigation actions to address the groundwater contamination at the former Sodium Disposal Facility (see pages 3, 6, and 7).
- **Tritium Plume:** In addition, our monitoring program has established that tritium concentrations in the north-central part of Area IV are decreasing (see page 6).

DOE's EIS will be evaluating and assessing the impact of implementing the groundwater, soil and building decontamination and demolition (D&D) proposed actions. DOE recently completed Soil Treatability Studies, and the Soil Treatability Investigation Group had its final meeting February 12. Using results of these tests and the accumulated data from sampling, DOE, in conjunction with the DTSC, will match appropriate technologies with specific soil contamination issues for analyses in the EIS. To see the latest presentations from the February 12 meeting on the soil treatability test results, see [http://etec.energy.gov/Char\\_Cleanup/Soil\\_Treatability.html](http://etec.energy.gov/Char_Cleanup/Soil_Treatability.html).

We are including in this *CleanUpdate*, our 2014 Community Involvement Annual Report. Once again, we appreciate your continued participation as we look forward to a productive 2015.



John Jones,  
Director, DOE ETEC



Stephie Jennings,  
Deputy Director, DOE ETEC

# Groundwater and bedrock sandstone: how contaminants move

Groundwater is one means to transport contaminants from one location to another at the SSFL. Site operators began monitoring groundwater 29 years ago, with the digging of the first monitoring well in 1986 in Area IV. Site operators have continued installing other monitoring wells – a total of 95 in Area IV.

In 1999, Boeing, on behalf of DOE and the National Aeronautics and Space Administration (NASA), commissioned the SSFL Groundwater Advisory Panel comprised of university professors and researchers with expertise in groundwater flow in fractured sandstone bedrock, which is the bedrock that exists at SSFL. The Panel evaluated groundwater data collected at SSFL, made recommendations for additional data collection, and provided parameters for developing a numerical model of groundwater flow at SSFL. The groundwater model is used to predict the direction and rate contaminants move from introduction into the groundwater to where they may end up.

To use the groundwater flow model, we will apply field data to confirm that the model's predictions are accurate. As part of the groundwater investigation, DOE has contracted groundwater modeling experts to ensure that

data needed for the model are being collected. These experts will then refine the Area IV groundwater model, the results of which will be described in the Area IV Groundwater RI Report, anticipated the spring of 2016.

The model also helps us understand the role of rainfall and bedrock at SSFL. About two inches of annual SSFL rainfall actually percolates through the soil past the plant roots, where it encounters the top of bedrock (typically 5 to 10 feet below the surface). Compared to soil above it, bedrock presents a less permeable barrier, which means the percolated groundwater can form underground "pools" perched upon the bedrock. From there, it slowly seeps into the bedrock.

The sandstone bedrock is not a solid mass. It has cracks and fractures, which can become pathways for contaminant movement. The number and distribution of these cracks and fractures vary greatly, however. For example, at the former Sodium Disposal Facility site, the bedrock has the fewest cracks and fractures in all of SSFL; and contaminant movement of TCE, perchlorate, and metals is slowest at this location (see related articles, pages 3 and 7).

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## State oversees SSFL groundwater program

DOE is meeting its groundwater investigation and clean-up obligations within Area IV in compliance with the 2007 Consent Order (2007 CO) under the regulatory oversight of the DTSC. DOE, Boeing, and NASA jointly signed this Consent Order with DTSC. Under this 2007 CO, responsibilities for Area IV groundwater investigation and cleanup are shared between DOE and Boeing.

DOE is performing the Area IV groundwater studies and analyses under the Resource Conservation and Recovery Act (RCRA). The potential effects of implementing

groundwater clean-up technologies will be presented in the EIS. This will ensure that any conclusions about groundwater clean-up effects presented in the EIS will be aligned with DTSC's RCRA groundwater decisions.

On a parallel track, DOE is meeting its investigation and clean-up obligations for SSFL Area IV soil and structures in compliance with the 2010 Administrative Order on Consent (2010 AOC). The results of these studies will be described in the draft EIS (see article, page 7).

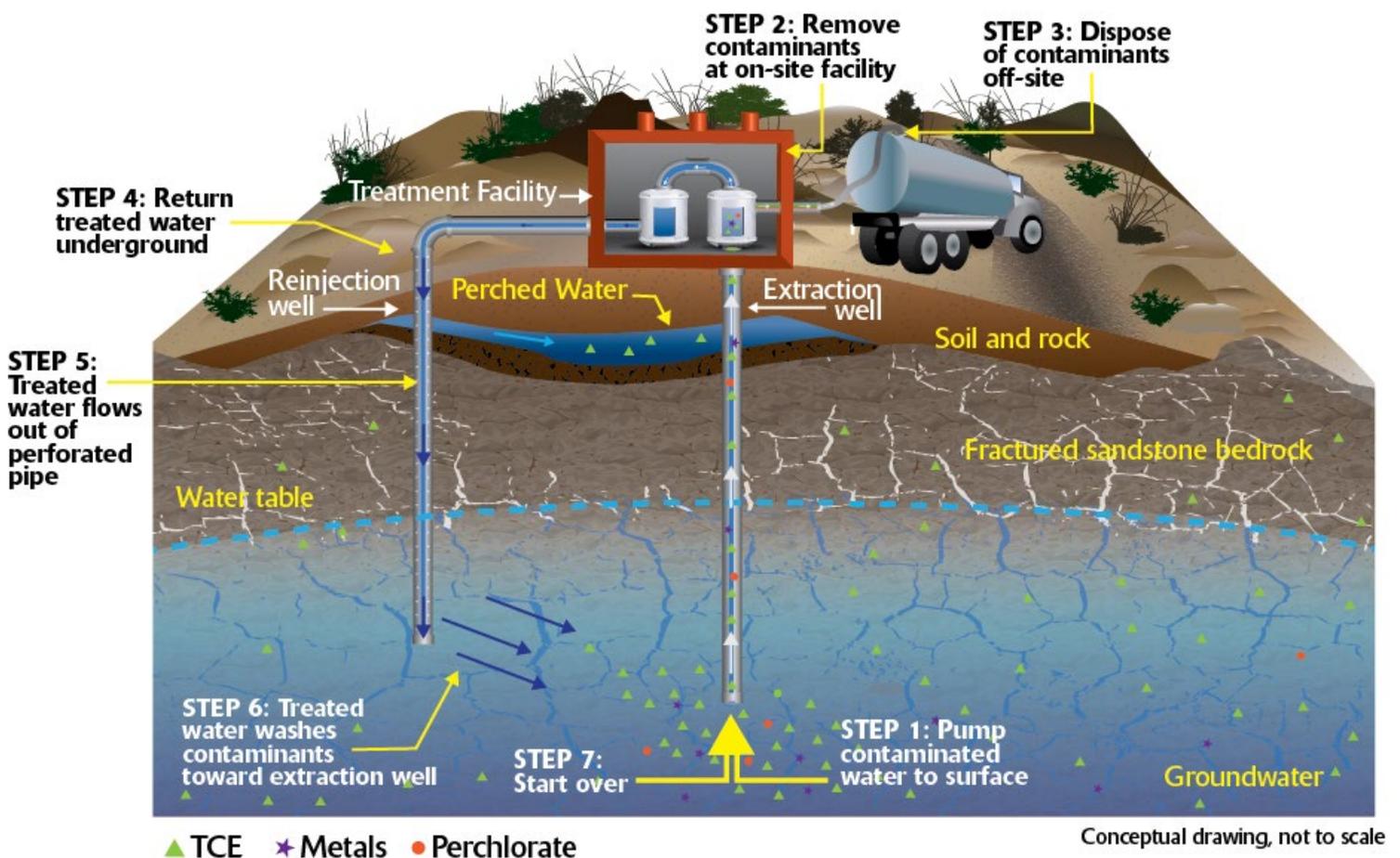
# Interim Measures being evaluated

TCE remains in the bedrock beneath the former Sodium Disposal Facility, known as the FSDF. Groundwater at the FSDF has the highest TCE concentrations for any location within Area IV. As described in the groundwater article on page 2, the FSDF also exhibits the least permeable bedrock within SSFL. Percolating rainwater can sit on the top of that bedrock for a longer period than elsewhere in Area IV. When this water comes into contact with contaminants in the bedrock, it becomes contaminated with TCE.

DOE is planning one, and potentially two, groundwater Interim Measures for the FSDF. These Interim Measures are both concrete steps toward cleanup, plus treatability studies to test ways to remove TCE from groundwater, soil, and bedrock. The target for initiating these studies is late 2015. These studies are:

**Pump and treat: what and how.** Workers will pump contaminated groundwater from the aquifer and affected perched water and treat it on-site to remove TCE, perchlorate, and metals. The treated, cleaned water will be returned underground through perforated pipes. This process will flush additional contaminants toward the wells that extract the groundwater for treatment and the cycle is repeated. The contaminants collected in this process will be hauled to an off-site disposal facility. We expect this iterative process to continue for two to three years. See figure below.

CONTINUED ON PAGE 6



**Pump and treat technology removes groundwater contaminants for off-site disposal**

# COMMUNITY INVOLVEMENT

## Environmental Impact Statement (EIS)

On February 7, 2014, DOE issued an *Amended Notice of Intent for the Remediation of Area IV and the Northern Buffer Zone of the Santa Susana Field Laboratory*, which began a public scoping period to receive input on alternatives and the range of issues to be analyzed in the EIS. DOE advertised scoping twice each in three newspapers and sent 4,200 scoping notification letters to individuals, agencies, and organizations on the SSFL Area IV mailing list, followed by reminders to stakeholders to provide input during the scoping period.

We also distributed letters to potentially interested federal, state, and local government agencies, and representatives of the federally-recognized Santa Ynez Band of Chumash Indians, inviting them to be cooperating agencies in the EIS. Members of other Native American tribes were also actively solicited to participate in the SSFL Area IV EIS process. The US Army Corps of Engineers, NASA, and the Santa Ynez Band of Chumash Indians agreed to participate as cooperating agencies.

During the scoping period, DOE held three scoping meetings. Two of the meetings were for the general public; the third was held for Native Americans. The purpose of the meetings was to gather input on community concerns and issues. The scoping period was originally scheduled to end March 10; however, at public request, it was extended to April 2, 2014.

During scoping, some 309 entities, including individuals, organizations, government agencies, an elected official, a Native American organization, and a Native American Tribe submitted 1,272 comments. These comments are summarized in the *Final Scoping Summary*, issued August 6, 2014, which is available at [http://etec.energy.gov/Char\\_Cleanup/EIS.html](http://etec.energy.gov/Char_Cleanup/EIS.html).

## Technical and Community Meetings

DOE participated with DTSC in twelve stakeholder meetings throughout 2014, including Technical Work Group meetings, general updates, a public health meeting, and four meetings for DTSC's Environmental Impact Report.

DOE continues to partner with the SSFL community of cleaning up Area IV and the Northern Buffer Zone. This summary summarizes the ways in which DOE fostered community involvement through the EIS and soil treatability investigations, and through DOE website, publications, and meetings. DOE encourages public participation. Please send your comments to Ms. Debbie Krueger at [debbie.krueger@etec.energy.gov](mailto:debbie.krueger@etec.energy.gov), 4100 Guardian Street, Suite 160, Simi Valley, CA 91381.

## Soil Treatability Investigation Group (STIG)

On February 6, 2014, the STIG met with scientists conducting the Soil Treatability Study for an update on each study, including soil partitioning, mercury contamination, natural attenuation, bioremediation, and phytoremediation. Background information about STIG activities can be found on the ETEC website: [http://etec.energy.gov/Char\\_Cleanup/Soil\\_Treatability.html](http://etec.energy.gov/Char_Cleanup/Soil_Treatability.html).

## Chemical Data Gap Meeting

DTSC and DOE jointly sponsored a Chemical Data Gap Sampling meeting in April to discuss the proposed sampling locations for round two of the "Go Backs." This was our final meeting for the chemical characterization work.

## PUBLIC INFORMATION

DOE continued to use several means to provide information to the public, as described below.

**DOE website** – The ETEC website provides historical and current information related to Area IV. The website is a primary method for the interested public to search for, review, and download DOE documents. The address is: <http://etec.energy.gov/>.

**Email announcements** – During 2014, DOE issued six email announcements to more than 500 people to provide information about key activities and documents, to

community as we work toward our shared goals in the Northridge Buffer Zone (NBZ). This “2014 Annual Report” on community involvement through efforts such as those provided public information through the ETEC encourages feedback on our ongoing activities. Contact Debbie Kramer at [debbie.kramer@emcbc.doe.gov](mailto:debbie.kramer@emcbc.doe.gov) or at (818) 930-9306 or at (818) 930-9306.

support scoping and data gap meetings, the scoping period extension, the *CleanUpdate*, and availability of the scoping summary.

**CleanUpdate Newsletter** – DOE’s *CleanUpdate* newsletter provides the local community and other interested parties with updates in lay English on Area IV plans, activities, and accomplishments. In 2014, DOE published the *CleanUpdate* in June and sent it by regular mail to approximately 4,200 people, emailed it to the 500-plus individuals on DOE’s email list, and posted it on the ETEC website.

**Annual Community Involvement Report** – In the first *CleanUpdate* of each year, DOE publishes the “Annual Community Involvement Report”. The 2013 Report appeared in the June 2014 issue.

**Site Bus Tours** – DOE sponsored five special interest tours of SSFL in 2014 for the Native American Tataviam Tribe, the State Historic Preservation Office, an *Acorn* newspaper reporter, local realtors, the US Fish and Wildlife Service and the California Department of Fish and Wildlife.

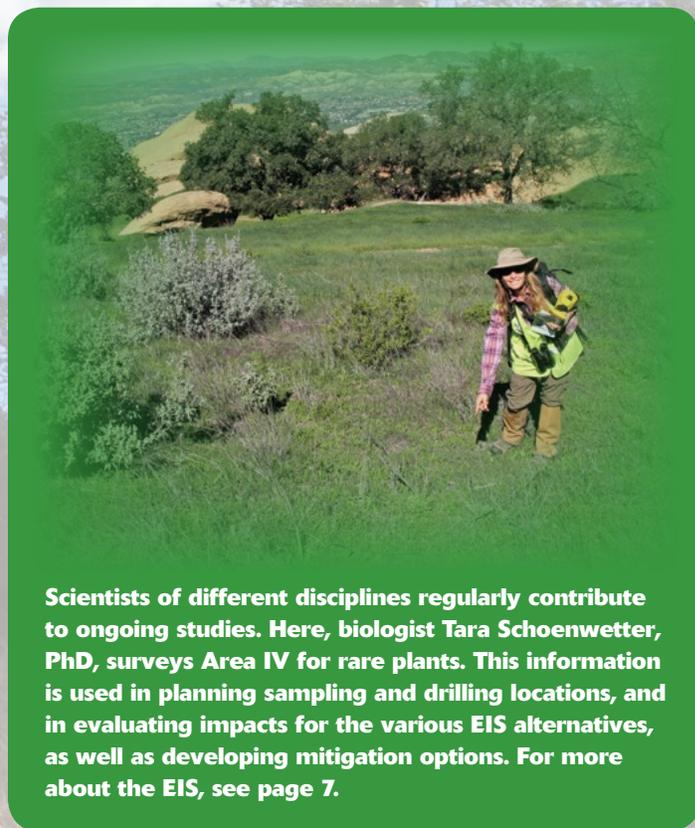
**Interactions with Interested Community Groups**, including the Community Advisory Group, SSFL Workgroup, West Hills Neighborhood Council, Woodland Hills Warner Center/Canoga Park Neighborhood Council, and Bell Canyon Home Owners Association – DOE attended and/or presented at various community meetings throughout the year.

**Information repositories** – DOE-SSFL maintains three information repositories in the area and adds physical copies of documents as they are produced. These repositories are located at:

**California State University, Northridge Oviatt Library**  
1811 Nordhoff Street  
2nd Floor, Room 265  
Northridge, CA 91330  
Phone: (818) 677-2832

**Platt Library**  
23600 Victory Blvd.  
Woodland Hills, CA 91367  
Phone: (818) 340-9386

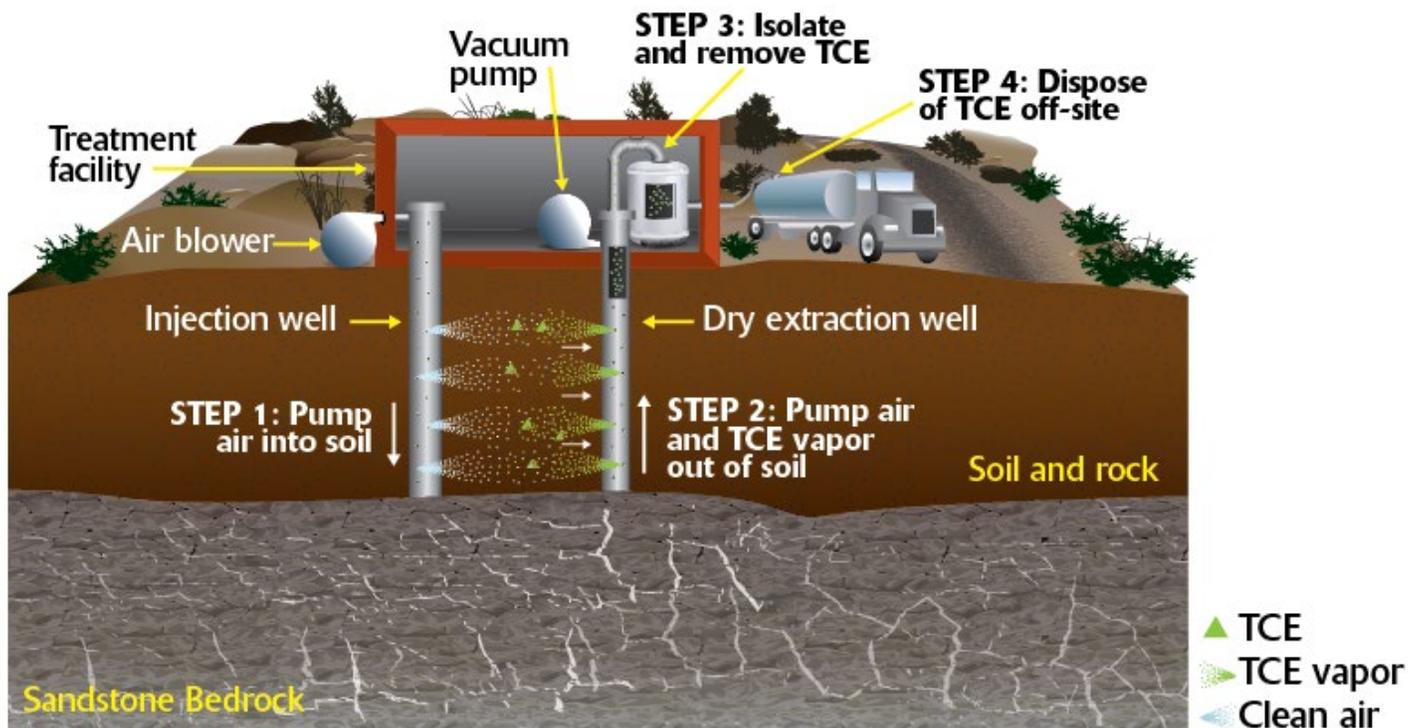
**Simi Valley Library**  
2969 Tapo Canyon Road  
Simi Valley, CA 93063  
Phone: (805) 526-1735



**Scientists of different disciplines regularly contribute to ongoing studies. Here, biologist Tara Schoenwetter, PhD, surveys Area IV for rare plants. This information is used in planning sampling and drilling locations, and in evaluating impacts for the various EIS alternatives, as well as developing mitigation options. For more about the EIS, see page 7.**

## Interim Measures being evaluated

**Soil vapor extraction: what and how.** DOE is also considering soil vapor extraction tests as a method for removing TCE from the soils above bedrock. Workers will pump air into and out of the contaminated soil. TCE easily turns into a vapor, which can then be captured in the airstream and, using dry wells, brought to the surface for treatment in a portable on-site treatment facility (see figure below). The contaminants collected in this process will be hauled to an off-site disposal facility. DOE may implement this technology as a test, and if it is effective, continue it as an interim measure.



**Soil vapor extraction removes TCE-contaminated gas**

## Tritium Concentrations Decline

Tritium is a radioactive form of the element hydrogen that is created naturally in the atmosphere and by humans as a by-product of nuclear testing. The radioactive hydrogen readily reacts with oxygen to create a radioactive form of water, and is thus found in lakes and rivers from rainfall. Tritium has a half-life of 12.3 years, meaning that every 12.3 years the concentration of tritium is reduced 50% by natural decay of the radionuclide. The US Environmental Protection Agency (USEPA) has established a drinking water standard for tritium of 20,000 picocuries per liter.

A groundwater plume of tritium exceeding the drinking water standard is present in the north-central portion of Area IV, where the last testing of reactors occurred during the 1970s. DOE has installed wells within and next to the plume to show where it is and how far it has moved. The monitoring of the plume for the last 10 years has shown more than a 50% reduction in tritium concentration, a result of both the decay of the radionuclide and the dilution of the plume from annual rainfall. DOE anticipates that the entire tritium plume will be below the drinking water standard in the next 10 years. Observations of the behavior of the tritium plume and how far it could move have made a major contribution to DOE's understanding and refinement of the groundwater model.

# Background to FSDF Pump and Treat Interim Measure

The FSDF was originally used from 1956 to 1978 to remove elemental sodium contained in pipes and pumps used in liquid metals studies. The FSDF included two ponds where water reacted with the sodium, removing it from the metal objects. In addition, the area west and south was used to store chemicals in metal drums. Over time, chemicals were released from the drums.

The FSDF area has been subject to several clean-up actions starting in the 1980s, first involving the drums and associated soil. DOE completed removal of the FSDF ponds and contaminated soil in 1993. Solvents in the pond, however, contaminated the underlying groundwater.

DOE performed two extended groundwater pumping tests at that location in the 1990s, which reduced levels of groundwater contamination, but TCE in the groundwater there still exhibits the highest concentrations for any location in Area IV.

The objective of the Groundwater Pump and Treat Interim Measure is to determine the feasibility of continued groundwater extraction by identifying where groundwater should be pumped and how deep to place pumps. Because the conceptual model indicates the TCE is primarily in bedrock fractures, locating those fractures will be one objective of this Interim Measure.

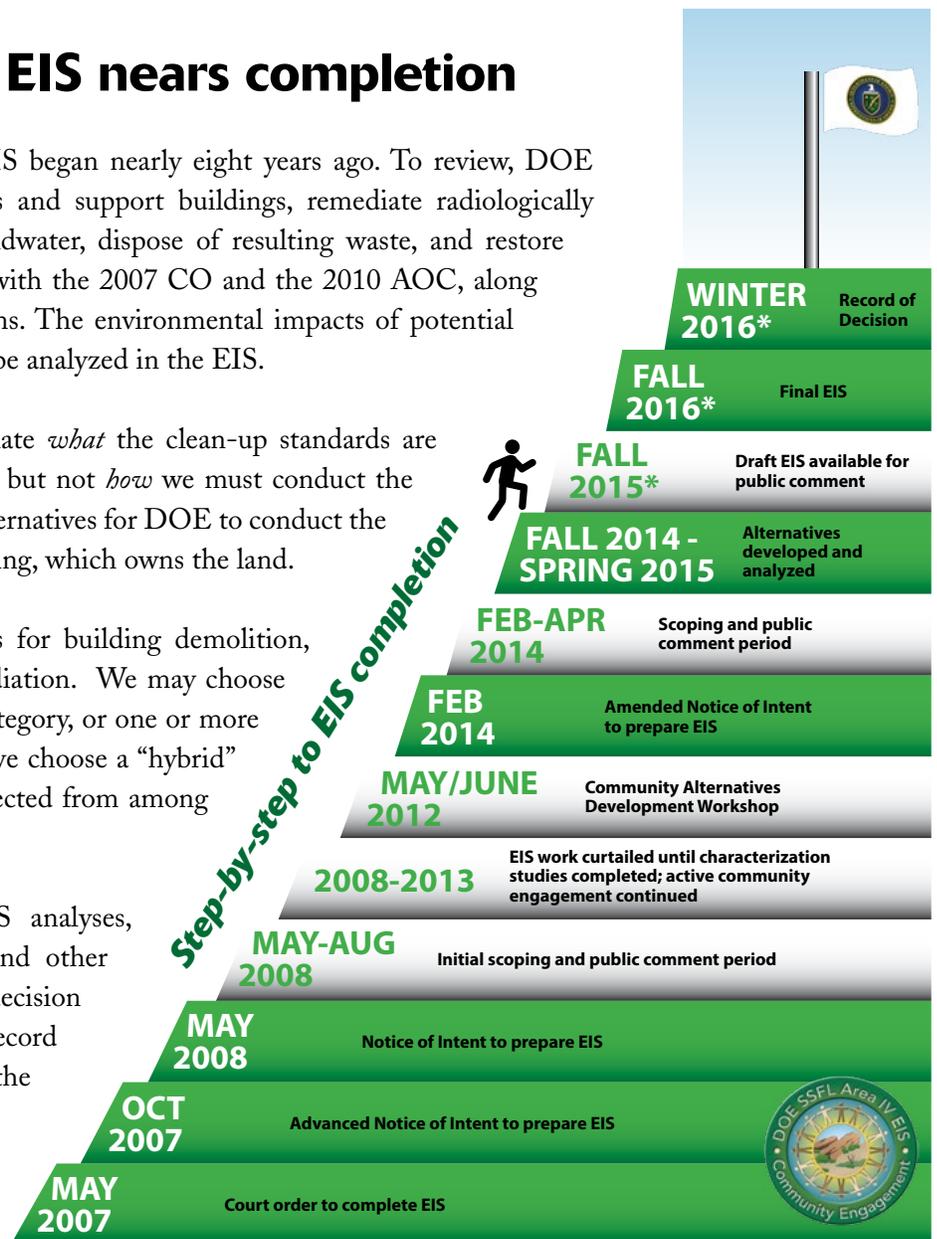
## Preparation of draft EIS nears completion

The process for completing the draft EIS began nearly eight years ago. To review, DOE proposes to dispose of existing facilities and support buildings, remediate radiologically and chemically impacted soil and groundwater, dispose of resulting waste, and restore the affected environment in accordance with the 2007 CO and the 2010 AOC, along with other applicable laws and regulations. The environmental impacts of potential groundwater treatment technologies will be analyzed in the EIS.

The two California DTSC orders stipulate *what* the clean-up standards are for SSFL Area IV soil and groundwater, but not *how* we must conduct the cleanup. Our EIS will examine various alternatives for DOE to conduct the cleanup prior to releasing Area IV to Boeing, which owns the land.

We have developed separate alternatives for building demolition, soil remediation, and groundwater remediation. We may choose one of the alternatives wholly for each category, or one or more alternatives in part for each category. If we choose a “hybrid” alternative, it will consist of activities selected from among the various alternatives.

Decision-makers will consider the EIS analyses, along with public input, cost, policy, and other factors, in selecting alternatives. Our decision on alternatives will be announced in a Record of Decision no sooner than 30 days after the final EIS is published.



\* estimated

# Looking ahead

- Soil Treatability Study Reports due out this spring
- Draft EIS release and hearings – fall 2015
- Groundwater Interim Measures begin late 2015
- RCRA remedy selected with CEQA findings in mid-2016.
- Final EIS and ROD–2016

## For more information

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

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This peony, one of many species that grow wild at SSFL, is named after Paeon, a student of Asclepius. According to Greek mythology, Asclepius, the god of medicine and healing, became jealous of his pupil. Zeus saved Paeon from the wrath of Asclepius by turning him into the peony flower.



New photos in this issue courtesy of Dr. Schoenwetter



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EETEC CleanUpDate | APRIL 2015 | PAGE 8

