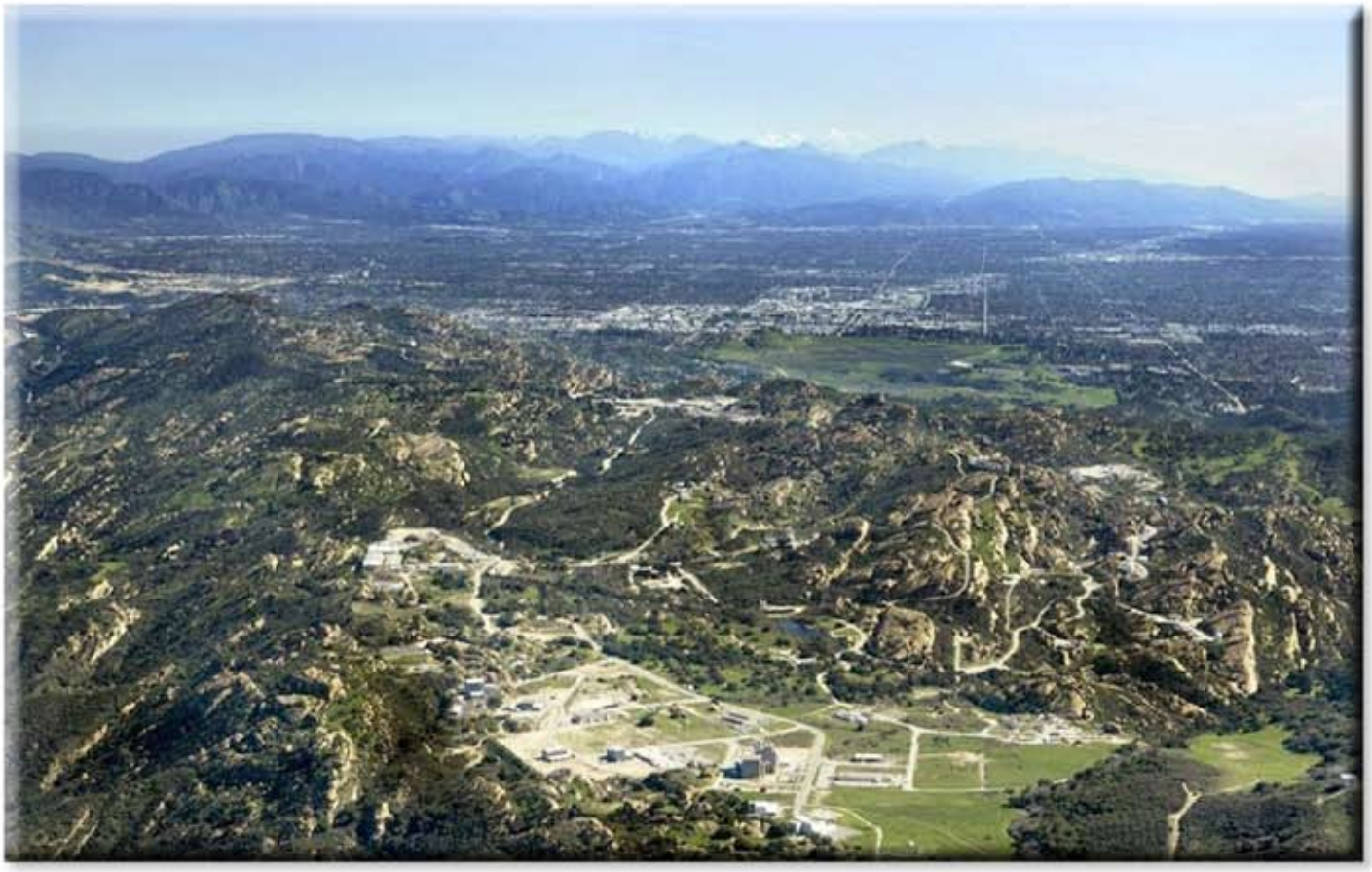
Toward Cleanup at Santa Susana



A Guide to the *Draft Gap Analysis Report*

Environmental Impact Statement for Remediation of Area IV
The Santa Susana Field Laboratory

U.S. Department of Energy (DOE)
June 2008

Message from the Managers

Commitment to Cleanup

As we move forward with the Environmental Impact Statement for cleaning up Area IV of the Santa Susana Field Laboratory, we, at the DOE's Energy Technology Engineering Center (ETEC), thought that it was critical to start with an independent review and analysis of all previously collected data. This step is unusual for an Environmental Impact Statement, but we heard and intend to respond to community concerns about the need for a better understanding of the type and extent of contamination that remains in Area IV. The *Draft Gap Analysis Report* and this brief *Guide* describe this analysis.

DOE is committed to actively involving all interested parties throughout the Environmental Impact Statement process. To that end, DOE has now permanently assigned two experienced people to live and work in the community. We were selected for this assignment because we have extensive experience with environmental cleanups under the National Environmental Policy Act and the Comprehensive Environmental Response, Compensation, and Liability Act. Each of us also understands and appreciates the value and importance of community involvement.

Our contractor team, led by CDM, independently reviewed and analyzed all the existing information to determine what additional sampling will be needed. CDM first established "data quality objectives" defining requirements our data must meet. They then screened the existing data, identified how much of it could be used, and determined what additional information will be needed to perform human health and ecological risk assessments. These risk assessments will help us evaluate a full range of cleanup alternatives for the Environmental Impact Statement. The result is the *Draft Gap Analysis Report,* which will guide sampling decisions for additional data collection. After input from regulators and stakeholders on this report, CDM will develop a Field Sampling and Analysis Plan for Area IV.

A key element of the cleanup will be to inform, involve, and interact with regulators, state and local officials, Native Americans, neighbors, citizen groups, local communities, and the public each step of the way. We encourage you to read this *Guide* and the full report, ask questions, and let us know what else we should consider as we develop the sampling plan.

Stephie Jennings
NEPA Document Manager

Thomas Johnson, Jr.
Federal Project Director

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Why Do a Data Gap Study?

How Stakeholder Input Pointed the Way

To clean up Area IV, DOE must conduct a *risk assessment*[1] and prepare an *Environmental Impact Statement* (EIS). Both tasks require extensive data about the types and extent of contaminants in Area IV and knowledge of how that contamination compares to environmental protection standards. For a diagram of how the risk assessment fits into the EIS, see the figure below.

The main purpose of the data gap study was to identify existing radiological and chemical data – a great deal of it has been collected in the past – that can be used for both tasks and determine what additional data are required. In addition, DOE wanted to make sure the EIS responds to stakeholder concerns.

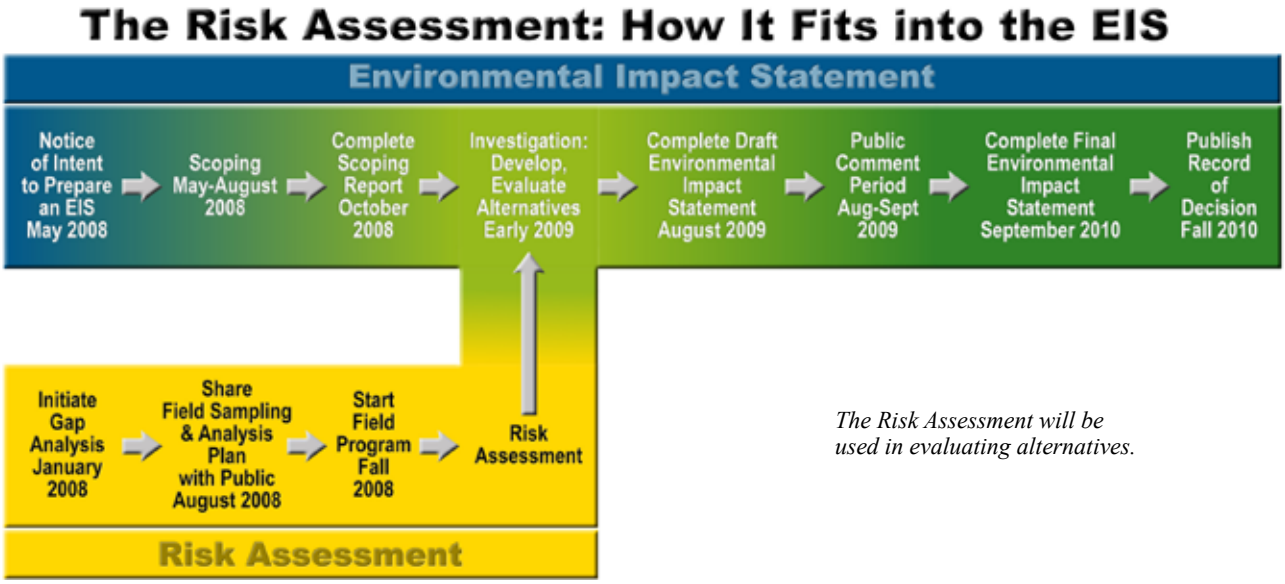
The data gap study began by considering stakeholder comments on the 2003 *Energy Technology Engineering Center Environmental Assessment.* They focused on the following issues:

- **Risk Assessment:** The U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control (DTSC) said DOE should evaluate potential human health impacts of the cleanup alternatives – in other words, conduct a risk assessment, using guidelines under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

  Consistent with CERCLA, DOE will conduct two risk assessments, one for human health impacts and the other for impacts to plants and animals. The data gap study evaluated existing data for soils, water, air, and plants and animals to identify which data will be adequate for these risk assessments and what additional information will be needed.

- **Chemical and Radioactive Contamination:** EPA, the DTSC, and stakeholders said DOE should evaluate the risks of combined exposures to contamination through multiple pathways.

  DOE will assess all chemical and radioactive contaminants of concern through all pathways, such as skin contact with soil, incidental soil consumption, inhalation of soil particles, consumption and use of groundwater, exposure to radionuclides, and consumption of food that may be grown at the site in the future. The data gap study screened existing data and identified additional data needed to evaluate combined exposures.



The Risk Assessment will be used in evaluating alternatives.

[1] *Words defined in the glossary are shown in italics on first mention.*

- **Ecological Risk Concerns:** Commenters said that DOE did not evaluate the impacts that decommissioning and decontamination activities might have on endangered species and other plants and animals.

  DOE will collect data to assess how demolition of facilities and cleanup of Area IV contamination would impact the ecology (the system of plants, animals, and the environment). These data do not exist for Area IV and are thus a data gap to be filled.

- **Groundwater:** Other commenters said they believe that groundwater was not sufficiently described and understood for the evaluation of cleanup alternatives.

  DOE will expand its understanding of chemical and radioactive contaminants in groundwater. The data gap study reviewed existing groundwater information and identified additional data that will be necessary to develop a more thorough characterization of the groundwater.

- **Materials from Building Demolition:** Commenters said the risk of exposure during the demolishing and transporting of building debris containing radionuclides was not adequately considered.

  DOE will evaluate this issue further. The data gap study reviewed existing data on radiation levels to identify additional information needed to assess the risks of demolishing and transporting the building debris off site.

> *"...DOE has committed to an independent data collection process in which its contractor, CDM will be expected to arrive at its own conclusions."*

In addition, the California legislature has required, in essence, that the Santa Susana Field Laboratory (SSFL) be cleaned up to a level suitable for suburban or rural residential land reuse (Senate Bill 990). The Governor signed the bill into law in October 2007. DOE will collect soil and plant uptake data to evaluate an alternative that would be compatible with that potential land use.

The bottom line is that DOE has committed to an independent data collection process in which its contractor, CDM will be expected to arrive at its own conclusions. This commitment includes a thorough evaluation of existing information to determine its applicability to the EIS risk assessments, and produce an EIS that responds to stakeholder concerns. To that end, DOE has contracted with CDM, an independent technical contractor, to conduct the investigation and prepare the EIS. CDM began by deploying a team of "data gap scientists," comprised of health physicists, geologists, hydrogeologists, chemists, toxicologists, human health professionals, ecologists, and environmental scientists, to complete this first task.

CDM is a consulting, engineering, construction, and operations firm. CDM's staff have supported federal facility closures in California, consistent with CERCLA guidelines, for more than 20 years. CDM's major subcontractor is Science Applications International Corporation (SAIC), a scientific, engineering, and technology applications company, which provided technical support to CDM in the preparation of the *Draft Gap Analysis Report.* Both firms are experienced in investigations of hazardous and radioactive materials under CERCLA, the National Environmental Policy Act (NEPA), and the Resource Conservation and Recovery Act (RCRA).

High Level Summary:

What Was the Draft Gap Study About?

Before the cleanup can begin, DOE must know what the contaminants are, where they are, how much is there, and what risks they present. A data gap study is a review of existing information about a topic that compares it with the data needed to conduct a thorough investigation of that topic. If information needed for that investigation – in this case, the EIS risk assessment – is incomplete, it is identified as a data gap.

Key Questions

In planning the study in January 2008, data gap scientists asked these two questions:

- Are existing data related to Area IV adequate for evaluating different cleanup alternatives for possible future land uses?
- If the existing data are incomplete, what else is needed?

Plan for Answering the Questions

To answer these questions, the data gap scientists first established requirements for data they would need. These requirements, referred to as *data quality objectives*, are based on U.S. EPA guidance for conducting investigations of contaminated sites. Data quality objectives are a yardstick against which data are measured and either accepted or rejected for a particular purpose. The process for developing data quality objectives is a key component in the CERCLA risk assessment guidance. See the figure on the next page, for a bird's eye view of the process; for more detail see Section 3.2 of the *Draft Gap Analysis Report.*

The Data Review

The data for the SSFL Area IV is contained in the Boeing Geographic Information System (GIS) database, which includes data that The Boeing Company, its predecessors, and their contractors collected over the years. The data gap scientists

Data Gap Analysis Philosophy

The data gap scientists used an approach based on these premises:

- Total independence.
- No pre-determined decisions regarding the validity of existing data and supporting studies.

The data gap scientists worked independently of DOE, Boeing, and its consultants in reviewing and analyzing data and reports. Once the scientists had obtained the necessary data and reports, they worked separately to develop their findings. The data gap investigators made no presumptions regarding the thoroughness of the existing data or supporting studies, questioning all aspects of the prior investigations as to completeness. They started the data review using basic investigative techniques to ensure that nothing had been missed by the prior investigators.

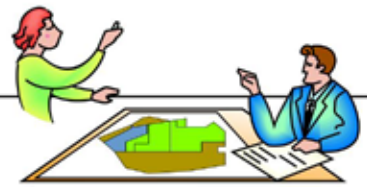
Finally, the data gap scientists are comprised of a group of individuals with more than 10 years environmental cleanup investigation experience each. Their professional reputations are paramount and their findings reflect their judgments and opinions.

Data Quality Objectives:

A Multi-step Process for Obtaining Needed Data

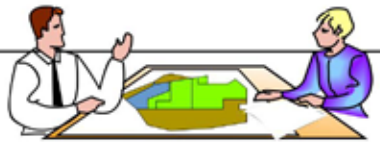
1. State the Problem

Are existing data adequate for preparing an EIS?



2. Identify the Goal

If not, identify and collect the needed data



3. Identify Information Inputs

Information Needed

- Existing Data
- Historical knowledge
- Screening levels for...
- Background Concentrations...
- Conceptual site model for...

4. Define Study Boundaries

Study Boundaries

- How broad: Area IV, plus drainages and...
- How deep: to bedrock or water table...
- What time period...

5. Develop Approach

Screening Rules

Chemicals

- Dioxins...

Radionuclides

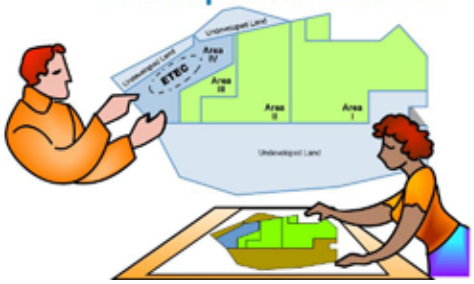
- Cesium...

6. Evaluate Data

Ensure Only Quality Data Used

- Evaluate usability of existing data
- Specify detection limits for new data

7. Develop Plan for More Data



reviewed these data to see how much of it can be used to determine the nature and extent of contamination and to support decision-making about cleanup. The *Draft Gap Analysis Report* lists the data reviewed (more than 30,000 analytical data records and 200 reports), and describes the site, the approach, the process, and the results. Sources for radionuclide data are listed in Table 2-1 and Appendix B, and sources for chemical data are identified in Appendix A, of the *Draft Gap Analysis Report.*

The data gap scientists compared the data against the yardsticks they had developed in the data quality objectives process – the standards for all the contaminants, *preliminary remediation goals* for human health, ecological screening levels for plants and animals, and *background concentrations* for metals, dioxins, and radioactive materials. Some existing data were collected for different purposes that do not match the current need and therefore could not be used. Where needed, additional data will be collected.

The Results

The data gap scientists identified several areas where additional data are needed. The *Report* lists the data that met the standards (Section 4) and the gap between the available data and those needed to complete the EIS risk assessments (Section 5). In brief, the data gap scientists found:

- Additional data are needed to evaluate potential chemical and radioactive contamination in soil, groundwater, groundwater seeps, surface water, sediment, the plant and animal system, the buildings, and the bedrock, and to assess potential impacts of cleanup.
- While additional data are not required for *soil vapor* (small amounts of gas trapped in the soil), some additional data may be collected to help identify the best places for groundwater monitoring wells and to complete the risk assessments.
- Guidance for radionuclide investigations indicates that less than 100 acres of Area IV would require a *gamma walkover survey* for the presence of radioactive material. Due to the uncertainties surrounding Area IV, DOE has elected to do a 100 percent survey of all accessible areas in Area IV, impacted areas of undeveloped buffer zones contiguous with Area IV where information indicates the survey should extend, and drainages. In this survey, data gap scientists will walk or use all-terrain vehicles to traverse back and forth across the proposed areas, using instruments that detect and record radioactivity. All areas where the scientists can safely reach with their instruments will be surveyed. The goal is 100 percent. This survey will help guide additional sampling.

Due to the uncertainties surrounding Area IV, DOE has elected to do a 100 percent survey of all accessible areas of Area IV, impacted areas of the undeveloped buffer zones contiguous with Area IV, and drainages.

- No gaps in the existing data for air quality were identified. Because building demolition and removal may create different air quality issues from those identified during operations. Soil and building data will be used to model the risk of airborne contamination during decontamination and decommissioning and during transportation activities.

The rest of this *Guide* describes the process in more detail, including a table on page 13 summarizing these results. See Sections 4 and 5 of the *Draft Gap Analysis Report* for a full discussion of findings.

The Approach

Key Steps in the Screening Process

Early on, the data gap scientists identified *contaminants of interest* (see box at right) and various *media* of interest, including soils and bedrock, surface water and sediment, groundwater and seeps, plants and animals, air, and materials from buildings that will be demolished. Then they reviewed all the existing data and reports for each medium, as described below.

Soils

The screening process for soils included, among other things, the following:

- **Development of *screening criteria* –** Two types of limits were developed for each contaminant of interest: background concentrations and human health and ecological risk-based criteria.

  Background concentrations are levels of chemicals or radionuclides in the soil that are naturally occurring or the result of fallout from weapons testing. Knowledge of background can help scientists determine whether a chemical or radionuclide may be the result of Area IV activities.

  Risk-based criteria helped data gap scientists evaluate whether the concentration of a contaminant could pose health risks.

- **Screening of data and identifying contaminants of interest –** This review identified elevated concentrations of some chemicals and radionuclides that exceeded either background or the risk-based screening criteria levels.

- **Subdividing Area IV into Exposure Units –** Using an approach specified by the *Multi-Agency Radiation Survey and Site Investigation Manual* (*MARSSIM*), the data gap scientists divided Area IV into 16 *exposure units* whose size varies between 17 and 20 acres so the data gap scientists could evaluate the distribution of radiological contaminants of interest.

What are the Contaminants of Interest?

The SSFL database includes both radionuclides and chemicals. The data gap scientists reviewed all the data, examined the history, and compiled a comprehensive list of contaminants of interest.

A contaminant of interest is any chemical or radioactive substance that could contribute to contamination, regardless of whether it was actually detected. At this preliminary stage, the data gap scientists will sample for anything they think is needed to accomplish the project objectives.

Chemical contaminants of interest – The data gap scientists screened for a comprehensive list of chemicals, such as:

- Solvents, such as TCE and TCA
- Dioxins and furans
- Industrial chemicals, such as polychlorinated biphenyls (PCBs)
- Volatile and semi-volatile organic compounds
- Metals, such as mercury and cadmium

Soil chemicals of interest are listed in Table 3-9 of the *Draft Gap Analysis Report,* groundwater chemicals of interest are shown in Table 3-12, and soil vapor chemicals of interest are in Table 3-13.

Radionuclide contaminants of interest – The data gap scientists also screened for a comprehensive list of radionuclides (see Table 3-10 of the *Draft Gap Analysis Report),* such as:

- Activation products, e.g., Tritium, Cobalt-60
- Fission products, e.g., Cesium-137, Strontium-90
- Reactor fuel materials, e.g., uranium, plutonium

The EIS will draw upon existing contaminants of interest data and any data collected during field sampling to identify *contaminants of concern*. A contaminant of concern is a chemical or radionuclide that is present where it does not belong or is present at levels that might cause harmful health effects.

What is MARSSIM?

MARSSIM defines a methodical approach to radionuclide sampling. It provides detailed guidance for planning, implementing, and evaluating environmental and facility radiological surveys conducted to demonstrate compliance that remedial objectives have been met. The MARSSIM is intended to apply to final status surveys, but the principles may be adapted and used as guidance for application to scoping surveys. MARSSIM principles were adapted and used in this gap analysis for evaluating soil, water, and building radiological data requirements necessary for the evaluation of risk-based alternatives in the SSFL Area IV EIS.

The MARSSIM was developed by four federal agencies responsible for the management of radioactive materials – DOE, EPA, the Nuclear Regulatory Commission, and the Department of Defense.

In most cases, the exposure units were divided into smaller areas termed *survey units*, based on geographic features, operatonal history, and prior land use. The survey units helped in identifying areas where expected contaminants should be found and areas with little or no data. Depending on the likelihood that contamination was present, the data gap scientists categorized areas within the units as Class 1, 2, or 3, for high, low, and little or no potential for unacceptable levels of contamination, based on existing data or known history of the processes in those locations.

- **Evaluating the Distribution of Contaminants of Interest –** The data about contaminant concentrations were then plotted across the 16 exposure units to help data gap scientists identify patterns in the locations of radioactive contaminants where additional sampling would be warranted.
- **Determination of Data Needs –** The data requirements for each contaminant of interest that exceeded limits were tallied to identify the approximate number of samples needed for the evaluation of alternatives.
- **Gamma Walkover Survey –** The purpose of a gamma walkover is to identify locations with elevated concentrations of gamma-emitting radiation that should be sampled. A number of gamma walkover surveys were conducted for Area IV prior to current guidelines. The data gap scientists reviewed reports on them to determine whether the way they were performed would be consistent with current guidelines. If not, the data could not be used.
- **Evaluating Distribution of Chemical Contaminants of Interest in soils –** The evaluation of the data gap for chemical contaminants in soil was based on CERCLA principles and followed a thought process similar to the one for radionuclides. The data gap scientists divided Area IV into exposure units and used statistical methods to identify the number of samples needed to perform a risk assessment. They also plotted the results for existing data to illustrate their distribution and to determine where results were below or exceeded the screening criteria. This allowed the scientists to identify locations for additional samples that would help determine the nature and extent of contamination.

Groundwater

The process for screening groundwater data was similar to the one for soils, supplemented with an evaluation of the existing network of groundwater monitoring wells. The scientists developed a conceptual site model to describe

groundwater flow at the site (see Figure 4-1 in the *Draft Gap Analysis Report).* They also considered soil and soil vapor data as possible indicators of groundwater contamination and reviewed the Boeing hydrogeologic model and pump test data to determine groundwater remediation needs for the EIS. Some of the new well locations DTSC has proposed for Boeing under the RCRA facility investigation coincide with data gap findings. CDM proposes to collect additional groundwater data to be used in evaluating cleanup alternatives.

Air

Data gap scientists looked at air quality data to understand historical processes during operations and research. Due to the nature of the database and requirements for the risk assessment, however, risks during building demolition and debris removal may create different potential contamination issues from those identified in air quality data during operations. With this in mind, data gap scientists concluded they need to know how much and what types of chemicals and radionuclides are in the building components and soil so they can project how much contamination might become airborne as a result of cleanup activities.

Plants and Animals (Biota)

No prior studies of plants and animals were performed within Area IV; therefore, data gap scientists developed a conceptual site model to identify pathways and receptor species (plants and animals that might be affected). See Figure 3-2 in the *Draft Gap Analysis Report* for the conceptual site model for biota.

Buildings

The data gap scientists reviewed data from all existing buildings. These buildings will be considered in the human health risk assessment, both as they exist today (baseline risk assessment) and the risks resulting from their demolition and debris removal.

Tar Plant

Overview of Results

The Findings

Data Evaluated	Data Gap
Soil	Additional chemical and radionuclide data are required for determining risks to human health and ecological receptors. Data are also required for characterization and delineation of the extent of contamination for analysis of risk-based alternatives.
Gamma Walkover Survey	Due to uncertainties surrounding Area IV, DOE proposes to conduct a 100% gamma walkover survey of all accessible portions of Area IV, adjacent areas identified as potentially impacted, drainages down gradient of Area IV, and groundwater seeps.
Groundwater	Data are needed to define horizontal and vertical extent of contamination, both for areas where extent is not adequately defined and in areas with no groundwater sampling data. Data on the hydrologic properties of the aquifers are also needed for evaluation of alternatives in the EIS.
Groundwater Seeps	Radionuclide and chemical data are needed to understand the *fate and transport* of groundwater contaminants and assess human and ecological receptor *exposure pathways*. Seeps will be sampled if water is available during field sampling. Regardless of the presence of water during the field effort, a gamma walkover survey will be performed.
Soil Vapor	While additional data are not required for the EIS per se, additional soil vapor data may be considered in the Field Sampling Program to optimize the location of groundwater monitoring wells and to support the human health and ecological risk assessments.
Surface Water	Surface water quality for Area IV is currently being assessed under the SSFL's National Pollutant Discharge Elimination System (NPDES) permit. For the most part, these data are adequate for EIS purposes. Surface water chemical and radionuclide data from ponds and drainages internal to Area IV are required for assessment of risk to ecological receptors. Surface water will be sampled as precipitation occurs.
Sediment	Sediment chemical and radionuclide data from ponds and drainages internal to Area IV are required for assessment of *surface soil* risk to human health and risk to ecological receptors.
Ecological Receptors	Existing data include biota samples only for Area I, which do not apply to Area IV. The data gap study identified requirements for chemical and radionuclide data for soil, water, and biological tissue to assess risk to ecological receptors.
Air	No data gaps for air were identified. Data gap scientists concluded, however, they need to know how much and what type of contamination is in the building components and soil so they can project how much contamination might become airborne during cleanup activities.
Buildings	Radionuclide data for building surfaces are incomplete. Additional data from buildings are required for human health risk assessment.
Bedrock	Chemical and radionuclide analytical data, including aquifer physical and natural chemistry data are required.
Background	Accepted background data for radionuclides in surface, near-surface soil, and subsurface soil; metals and dioxin in subsurface soil; and radionuclides, metals and dioxin in sediment, surface water, groundwater and bedrock are needed. These data should be collected from media in both geologic formations found at the site.

Ongoing Studies

How Resource Conservation & Recovery Act (RCRA) Studies Fit

The data gap scientists performed all initial evaluations of data adequacy independent of the RCRA facility investigations. Reconciliation of the data gap and the ongoing RCRA work has been identified as an opportunity to help fill the gap and will be ongoing during the field sampling process. The RCRA facility investigations are being conducted under orders issued by the California Department of Toxic Substances Control (DTSC). DTSC has been actively engaged in the review and approval of all of the investigation steps and has conducted oversight of the field sampling efforts. As part of the evaluations of usability of the RCRA data, the data gap scientists reviewed sampling locations, procedures, contaminants of interest, and analytical protocols to assess applicability of the effort to addressing data gap needs.

Performing a gamma walkover survey.

Sources of Existing Data

The Database, Surveys, Reports

Boeing provided the primary sources of existing chemical and radionuclide data used in the data gap analysis in its GIS database. The data gap scientists reviewed data and reports made available prior to January 30, 2008, recognizing that investigations of portions of Area IV are ongoing under the RCRA Facility Investigations. The data gap scientists and other CDM-SAIC personnel will draw on those efforts in development of the field sampling investigation.

The data gap scientists reviewed all Area IV radiological surveys conducted at the SSFL (listed in Table 2-1 of the *Draft Gap Analysis Report),* for facility status and process history. Table 2-1 of the *Draft Gap Analysis Report* also summarizes documents reviewed for the chemical evaluation.

The radiological soil and groundwater data used in the analysis are from the Boeing GIS database. The data gap scientists used the Historical Site Assessment (summarized in Appendix B of the *Draft Gap Analysis Report)* as the source for understanding Area IV process history, that is, what chemicals and radionuclides were used in various research activities and facility operations. They also used the Historical Site Assessment and the buildings remaining in Area IV to assess requirements for conducting additional radiological surveys of buildings.

Air sampling data for radionuclides, provided in the annual *Site Environmental Reports,* formed the basis for the air quality data review.

To assess the requirements for gamma walkover surveys, the data gap scientists reviewed seven Final Status Reports or Surveys.

Milk Vetch

Understanding the Area IV Environment

Why It Is Important

The site characteristics potentially influence the distribution and transport of contaminants through the environment. These characteristics, including topography, drainage, geology, soils, hydrogeology, climate, and biological setting, are described in Section 2.3 of the *Draft Gap Analysis Report,* and are summarized below.

Topography and drainage: The SSFL is located on a ridge about 850 feet above the valleys to the north and south. While the laboratories and other facilities are generally located on relatively flat ground, local elevations can vary up to 600 feet.

In Area IV, the highest elevation is 2,150 feet above sea level, along the southern boundary. Along the northwest boundary, the land slopes steeply away to undeveloped land. The relatively flat area in the southern part of Area IV is called "Burro Flats."

Drainage in the northern portion of Area IV flows north into Meier Canyon, Arroyo Simi, and then west to the Pacific Ocean. Drainage in the southern portion of Area IV flows to the southeast into Area III and then the Bell Creek drainage system. Bell Creek is a tributary of the Los Angeles River. Drainage within Area IV is through manmade and natural ditches and swales which lead to natural streambeds. The drainage from some operational areas is directed through various settling and process ponds.

Geology and hydrogeology: The most dominant geologic feature is fractured sedimentary rocks, such as sandstone that dip to the northwest, with beds exposed at the land surface in many areas. Widespread fractures and joints in the bedrock are important conduits for groundwater and contaminant movement.

Shallow groundwater occurs sporadically across the site, as *perched groundwater* (that is, near-surface isolated pockets underground) in some areas. In other areas shallow groundwater is connected to groundwater in the underlying Chatsworth Formation**.** Groundwater is slowly replenished from rain. Generally, on the western half of Area IV, groundwater moves downward and to the west-northwest, and on the eastern half of Area IV, groundwater moves downward and to the east-southeast. Section 2.3.2 in the *Draft Gap Analysis Report* describes the geology and hydrogeology of Area IV in detail.

Soils: Soil is the major pathway for exposure. Two geologic formations are the parent material for Area IV soil. In some cases, they contain naturally occurring metals and radionuclides. The data gap scientists will look for contaminants that may have been introduced through site-related activities.

The Coast Horned Lizard is a protected species at SSFL.

Biological setting: Ecologists have identified 16 different habitat types within SFFL, dominated by oak woodland with undergrowth of grass or sage species. Canyon vegetation is dominated by shrub willow, California bay, and broom, due to fire suppression. These habitats support numerous and diverse plant and animal species, including mammals such as the mule deer, gray fox, bobcat, western gray squirrel, and brush rabbit; birds such as the California and mountain quail, acorn woodpecker, scrub jay, Costa's hummingbird, cactus wren, Lazuli bunting, wrentit, and plain titmouse; and reptiles such as the western fence lizard, southern alligator lizard, coast horned lizard, western rattlesnake, and red rattlesnake.

Some species in the area are protected. Others are valued for ceremonial reasons, and some are prized by game hunters.

Mule Deer

Conceptual Site Models

How Contaminants Move through the Environment

The data gap scientists developed conceptual site models, which are representations of how things work in the SSFL environment – how humans, plants, and animals might be exposed to contaminants. Understanding how contaminants move through the environment can help in identifying which media to sample, contaminant sources, the extent of contamination, and possible ways to reduce or eliminate the hazards of each contaminant. They can help focus on what type data are needed for the risk assessment.

Data gap scientists developed separate models for human health risk and ecological risk. The figure, Conceptual Site Model for Human Health Exposure Pathways, on page 19 in this Guide, shows an illustrated human health model for Area IV. See Section 3.2.1 of the Draft Gap Analysis Report for more detail about the conceptual site models.

Human Health Risk Assessment

Potential Receptors

On-site Human Receptors: Because most Area IV buildings are now vacant, current potential onsite human receptors include maintenance workers and trespassers. Future potential receptors include residents, industrial workers, construction workers, and recreational visitors.

Offsite Receptors: Some contaminants of interest may move offsite and cause human exposure through surface water runoff, groundwater, or fugitive dust. During cleanup actions, contaminants may be hauled offsite on public roadways en route to approved disposal facilities. Offsite receptors would be community members between SSFL and the disposal facility.

Potential Exposure Pathways

The conceptual site model for human health identifies four basic pathways through which contamination might reach receptors:

- Inhalation of contaminated dust or gases
- ingestion, whether incidental or by consuming contaminated soil, vegetables or water
- dermal contact, by skin contact with contaminated soil or water
- external gamma (penetrating) radiation primarily by walking across soil.

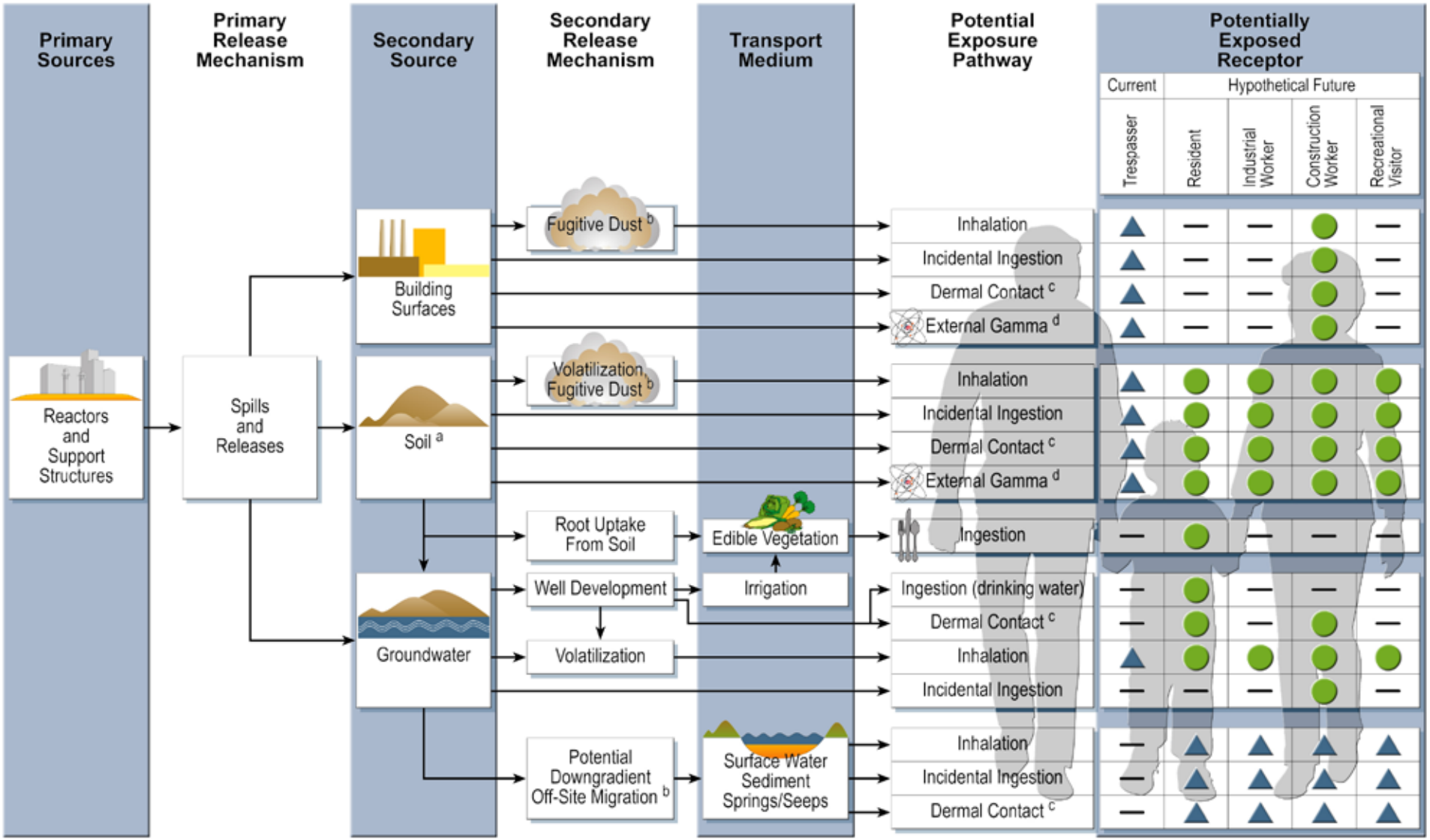
Not all pathways are complete for every receptor. For example, a pathway from vegetable gardening to a future industrial worker would be incomplete because that receptor would not likely be on site long enough to grow vegetables.

The data gap scientists will evaluate complete pathways in two ways. All pathways will be evaluated quantitatively, using values based on existing or new data. For incomplete pathways where such data do not exist, the potential for offsite migration of site-related contaminants will be evaluated qualitatively, recognizing no quantifiable values exist. For example, in the case of a future industrial worker, actual data do not exist for the pathways that are complete, such as their exposure to chemicals in the dust, so the potential for exposure can be noted, but not quantified. The data gap scientists identified some pathways that will be evaluated for chemical exposure only, for example, through skin contact; and others for exposure to radionuclides only, for example, through gamma radiation.

Ecological Risk Assessment

The ecological conceptual site model shows the pathways potentially resulting in exposure of ecological receptors, including terrestrial (land based) and aquatic (water based) plants and animals. The model will enable evaluation of exposure pathways for common species that can be extrapolated to uncommon or rare species that warrant special consideration. CDM will evaluate each of these in the ecological risk assessment. (See Figure 3-2 and Section 3.2.2 for further discussion, both in the *Draft Gap Analysis Report*.)

Conceptual Site Model for Human Health Exposure Pathways



[a] Soil media include ash, bedrock, and sediment. Soil will be evaluated by depth

[b] The potential for offsite migration of site-related contaminants will be qualitatively evaluated

[c] Dermal Contact is evaluated for chemicals only

[d] External Gamma is evaluated for radionuclides only

- Quantitatively Evaluated Exposure Pathway
- Qualitatively Evaluated Exposure Pathway
- — Incomplete Pathway

Next Steps

Initial Definition of Field Sampling and Analysis Program

The overall objective of the data gap study was to identify data needed for the risk assessments and develop approximate locations for a field sampling investigation. The next step is to develop a *Work Plan*, which will include a field sampling and analysis plan, drawing on the findings in the *Draft Gap Analysis Report* and on comments from stakeholders.

DOE is seeking stakeholder comments on the historical reports and data sources, the methodology, and the findings in the *Draft Gap Analysis Report*, along with personal historical knowledge about Area IV contaminants. Please see the next section for information about meetings devoted to the *Draft Gap Analysis Report*.

The field investigation will evaluate chemicals and radionuclides in all media. DOE expects the *Work Plan* to be completed in Fall 2008 and will also seek stakeholder input on it.

The *Draft Gap Analysis Report* is based on data obtained prior to January 30, 2008. The data gap scientists will evaluate the new data obtained by the RCRA Facility Investigation between January 2008 and September 2008 to determine how much of those data meet the needs identified in the *Draft Gap Analysis Report*. Data needs not met by the RCRA Facility Investigation will be obtained during the EIS field sampling and analysis effort.

DOE is engaged in discussions with EPA in developing the scope of a background radiation study and the gamma walkover survey.

Formal comment is invited during the Summer of 2008 on the scope of the EIS, the issues to be studied, and the alternatives to be evaluated. See the next section for details on how stakeholders can comment.

Public input encouraged

How Stakeholders Can Be Involved

DOE invites stakeholders to two workshops focused on the *Draft Gap Analysis Report* in June 2008. DOE is particularly looking for feedback that can help in the development of the Field Sampling and Analysis Program. This *Guide* has been prepared to inform stakeholders about the data gap study and to facilitate public comments.

Both meetings will be at the Grand Vista Hotel, located at 999 Enchanted Way, Simi Valley:

- On Tuesday, June 10, from 6:30 to 9:30 p.m., interested stakeholders are invited to learn about the *Draft Gap Analysis Report* and ask questions about the approach, results, and conclusions. Copies will be available at the workshop, posted on the website (http://www.etec.energy.gov), and available in the libraries below.
- On Thursday, June 26, from 6:30 to 9:30 p.m., interested stakeholders will have another opportunity to ask questions and to offer input and suggestions that can be used in development of the field sampling and analysis plan.

DOE is committed to informing and involving stakeholders in the EIS and cleanup process. Interested stakeholders can get more information in several ways:

- Mailing list – Sign up to be on the mailing list by contacting Ms. Stephanie Jennings, NEPA Document Manager, by mail at U.S. Department of Energy, P.O. Box 10300, Canoga Park, CA 91309, or by telephone at (818) 466-8162, or email at: stephanie.jennings@emcbc.doe.gov.
- Website – Visit the ETEC website for information about the EIS, cleanup efforts, site history, and health and safety, at: http://www.etec.energy.gov.
- Reading rooms – More information is available at the following public libraries:
  - Simi Valley, California: Simi Valley Library, 2969 Tapo Canyon Road, (805) 526-1735

- *Woodland Hills, California*: Platt Branch Library, 23600 Victory Blvd., (818) 340-9386
- *Northridge, California*: California State University Northridge Oviatt Library, 2nd Floor, Room 265, (818) 677-2285

In addition, DOE expects to hold periodic meetings and workshops with stakeholders to discuss and solicit input on the ongoing progress of the EIS.

Formal comment is invited during the Summer of 2008 on the scope of the EIS, the issues to be studied, and the alternatives to be evaluated, and again in 2009 on the Draft EIS. The public scoping meetings will be held at the following locations on the following days and times:

- *Simi Valley, California*: Grand Vista Hotel, 999 Enchanted Way, July 22, 2008, 2:00 p.m. to 4:00 p.m. and 6:30 p.m. to 9:30 p.m.;
- *Northridge, California* World Vision Church, 19514 Rinaldi Street, July 23, 2008, 2:00 p.m. to 4:00 p.m. and 6:30 p.m. to 9:30 p.m.; and
- *Sacramento, California*: Sacramento Central Library, 828 I Street, July 24, 2008, 2:00 p.m. to 4:00 p.m. and 6:30 p.m. to 9:30 p.m.

Further information about these meetings is available on the ETEC Website, or by calling Ms. Stephanie Jennings, NEPA Document Manager, at (818) 466-8162. In addition, DOE will notify persons on the mailing list of these involvement opportunities and advertise them in local newspapers.

Using an ATV for a gamma driveover survey.

Some Questions and Answers

Why does the EIS focus only on Area IV?

From the mid-1950s until 1988, DOE and its predecessors did research on radioactive materials solely at Area IV. DOE has no authority over any other part of the site, nor does it own any of the land. The court case that led to the EIS dealt only with DOE's responsibility in Area IV, and the judge ruled only on that case.

Discussions among DOE, Boeing, NASA, and the state about performing a radiological evaluation in remaining areas of SSFL are ongoing.

What is the schedule for completing the EIS and Area IV cleanup?

DOE plans to complete the EIS Record of Decision in the Fall of 2010 and proceed with cleanup as quickly and effectively as possible for both radiological and chemical contamination. The requirement in the RCRA Consent Order to complete cleanup of chemical contamination at SSFL by 2017 is a target DOE will work to complete sooner if possible. DOE will also work collaboratively with NASA, Boeing, and the State to investigate, evaluate, and implement both interim and final cleanup actions. DOE also plans to begin any required radiological cleanup immediately following completion of the EIS.

When will the rest of the site be cleaned up and who is responsible?

In August 2007, the California DTSC issued a Consent Order requiring DOE, Boeing, and NASA to clean up all chemically-contaminated soils and groundwater at the Santa Susana Field Laboratory by 2017. DOE is working toward this goal, cooperating with Boeing, NASA, and the state as responsibilities overlap. The state has final approval authority over the cleanup of chemical contamination.

How do the different cleanup efforts fit together, and who is coordinating them?

A Core Team with one representative each from DOE, Boeing, and NASA serves as the focal point for coordination. DOE has asked CDM, the EIS contractor, to collect samples and perform the work necessary to complete the EIS so that relevant portions of this work can be available for others.

How many buildings remain in Area IV?

There are 24 structures remaining in Area IV. DOE owns 15 (each associated with one of four facilities), and Boeing owns nine, plus three slabs. Of the 24 existing structures, 17 have a radiological history, including ten that belong to DOE.

What else is going on with the EIS?

A separate analysis of other data needed to analyze the proposed alternatives of the EIS is also underway as part of the EIS development process. This separate analysis is evaluating data available for other resource areas such as cultural resources, socioeconomics, transportation, etc., to determine what additional data would be needed to complete a thorough analysis of alternatives.

Performing a gamma walkover survey.

Related Reading

CDM-SAIC, 2008, *Draft Gap Analysis Report, Santa Susana Field Laboratory Area IV*, Denver, CO

Council on Environmental Quality, Executive Office of the President, 2007, *A Citizen's Guide to the NEPA: Having Your Voice Heard,* Washington, D.C.

Related Links

CERCLA overview:
http://www.epa.gov/superfund/policy/cercla.htm

DTSC website on SSFL cleanup:
http://www.dtsc-ssfl.com/

EPA, A Community Guide to Superfund Risk Assessment:
http://www.epa.gov/oswer/riskassessment/commeng.htm

EPA Region 9 NEPA website:
http://www.epa.gov/region09/nepa/

EPA's Guidance for the Data Quality Objectives process: http://www.epa.gov/OUST/cat/epaqag4.pdf

ETEC website: http://www.etec.energy.gov/

Interstate Technology and Regulatory Council website: http://www.itrcweb.org/ibt.asp. Source for web-based training information for different environmental programs, such as CERCLA and RCRA

MARSSIM for Beginners, Intermediate MARSSIM, Advanced MARSSIM:
http://www.marssim.com/index.htm

Natural Resource Defense Council v Department of Energy: Order Granting Plaintiff's Motion for Summary Judgment:
http://www.websupp.org/data/NDCA/3:04-cv-04448-66-NDCA.pdf

Acronyms & Glossary

alpha radiation – see radiation.

Atomic Energy Commission (AEC) – a predecessor agency to the Department of Energy.

background concentrations – the levels of naturally occurring chemicals or radioactive materials or fallout from world-wide nuclear weapons testing in a location against which scientists can compare samples taken from the same or similar locations nearby to determine the presence of potential contaminants.

beta radiation – see radiation.

biota – plants and animals in an environment.

CERCLA process - the protocols and procedures established under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that provide a comprehensive framework to evaluate, clean up, and pay for the harm or damage caused by past or abandoned hazardous chemical and radioactive materials, and to assign responsibility for the damage. The CERCLA process uses risk-based evaluations for cleaning up sites contaminated with hazardous materials.

contaminant of concern – a chemical or radionuclide that is present in an environment where it does not belong or is present at levels that might cause harmful health effects.

contaminant of interest – for purposes of this study, all chemicals and radionuclides in the SSFL database, plus others that the data gap scientists thought could be present, based on knowledge of the past operations The data gap scientists researched data and reports for contaminant of interest information to make sure that nothing had been missed during prior studies.

data quality objectives (DQOs) – qualitative and quantitative requirements to ensure that data to be used in risk assessments and determining areas of contamination are of known, documented, and appropriate quality, and are collected and analyzed in a manner that will support a decision. Developing DQOs is the first step in planning a site investigation for a risk assessment before any data are collected.

DOE – U.S. Department of Energy

DTSC – California Department of Toxic Substances Control

EPA – U.S. Environmental Protection Agency

Energy Technology Engineering Center (ETEC) – a Department of Energy research laboratory that operated from the 1950s to the late 1980s. ETEC is now closed and awaiting environmental restoration. It is located at the Santa Susana Field Laboratory near Simi Valley, CA

Environmental Assessment (EA) – a concise public document prepared by or for a federal agency, required by NEPA, briefly providing sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact (FONSI).

Environmental Impact Statement (EIS) – a detailed public document prepared by or for a federal agency, required by NEPA. When compared to an environmental assessment, an environmental impact statement is a more in-depth and thorough evaluation of environmental impacts that might result from a proposed action and alternatives, including the no-action alternative, which provides a basis for comparison with other alternatives. An EIS provides full and fair discussion of significant environmental impacts and is used to inform decision makers and the public of whether and how the reasonable alternatives would avoid or minimize adverse impacts or enhance the quality of the human environment. NEPA requires public participation during the preparation of an EIS.

exposure pathway – the route a substance takes from its source (where it began) to its end point (where it ends), and how people and/or organisms can come into contact with it (or get exposed to it). An exposure pathway has five parts: a source of contamination, an environmental medium and transport mechanism, a point of exposure, a route of exposure, and a receptor. When all five parts are present, the exposure pathway is termed a completed exposure pathway. An incomplete exposure pathway is missing one or more parts of the pathway and therefore cannot be a route for exposure to a contaminant.

exposure routes – ways in which human or environmental receptors may be exposed to contaminants, including inhalation, ingestion, direct contact, or gamma exposure. Examples for each route might include inhalation – breathing contaminated dust; ingestion – drinking contaminated well water; direct contact – gardening in contaminated soil; and gamma – walking across radiologically contaminated soil.

exposure units – for purposes of the data gaps study, divisions of Area IV into smaller, more manageable pieces for investigation and sampling purposes.

fate & transport – the means by which contaminants move through the environment, where they go, and how long they stay there.

Finding of No Significant Impact (FONSI) – a document prepared by a federal agency briefly presenting the reasons why an action analyzed in an environmental assessment would not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared. It includes the environmental assessment or a summary of the environmental assessment.

fugitive dust – dust released when soil or other materials are disturbed. Fugitive dust is commonly released during construction or cleanup operations or any operations where soil or materials such as building debris are being moved.

gamma radiation – see radiation.

gamma walkover survey – an evaluation of whether a source of gamma radiation is in the soil, performed by scientists physically carrying radiation-sensing equipment back and forth across the ground surface.

Geographic Information System (GIS) – A mapping system that uses computers to collect, store, manipulate, analyze, and display data. For example, GIS can show the concentration of a contaminant within a community in relation to points of reference such as streets and homes.

groundwater – water beneath the Earth's surface located between soil particles and between rock surfaces.

Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) – A detailed guidance for planning, implementing, and evaluating environmental and facility radiological surveys conducted to demonstrate compliance that remedial objectives have been met. The MARSSIM is intended to apply to final status surveys, but the principles may be adapted and used as guidance for application to scoping surveys. Provides guidance for sampling radionuclides; developed by four federal agencies most concerned with the management of radioactive materials, DOE, EPA, the Nuclear Regulatory Commission, and the Department of Defense.

media – parts of the environment that might become contaminated, such as soil, water, and air.

National Environmental Policy Act (NEPA) – federal law that requires federal agencies to evaluate proposed projects to determine impacts to the human and natural environments from the proposed action and alternative actions. The evaluation may result in a categorical exclusion, or an environmental assessment or an environmental impact statement.

perched groundwater – small, near-surface pockets of groundwater typically not connected to aquifers or larger bodies of groundwater.

polychlorinated biphenyls (PCBs) -- A group of toxic, persistent chemicals used in electrical transformers and capacitors, and in gas pipeline systems as flame-retardants, as coolants in industrial processes, and for insulating purposes

preliminary remediation goal (PRGs) – planning guidelines for initial evaluation of a site. They are primarily used at the planning stage until site specific goals are developed.

qualitative evaluation – an evaluation or study based on descriptive, rather than numeric knowledge and facts. For example, a description of the locations of previous spills or processes that could result in environmental contamination is part of a qualitative study or evaluation. A qualitative study or evaluation guides where quantitative data should be obtained.

quantitative evaluation – an evaluation or study based on numerical results such as concentrations of contaminants.

Radiation – Some atoms, known as radionuclides, are unstable; they undergo a spontaneous "decay" process whereby they emit particles or rays, changing into different radionuclides until they become stable. There are four basic types of ionizing radiation: alpha, beta, gamma, and neutrons. They differ in penetrating power, in the manner in which they affect human tissue, and in how long they last in the environment.

> **Alpha** particles are the least penetrating type of radiation; they can be stopped by a sheet of paper or the outer layer of skin. Plutonium, uranium, thorium, and radium emit alpha radiation.

Beta particles have short range in their ability to travel through air and low ability to penetrate other materials, though they may be stopped by aluminum foil or glass; tritium and strontium-90 are examples of beta emitters.

Gamma rays, like X-rays, are waves of pure energy and can travel several hundred feet through air. Gamma radiation is very penetrating requires a thick wall of concrete, lead, or steel to stop it. Cesium-137 and Cobalt-60 are examples of gamma emitters.

Neutron particles have about one-quarter the weight of an alpha particle. Like gamma radiation, they can easily travel several hundred feet in air. Neutron radiation is most effectively stopped by materials with high hydrogen content, such as water or plastic.

radioactive materials – materials that emit radiation.

radionuclide – any radioactive isotope (form) of any element.

receptor – people or organisms that could come into contact with hazardous substances.

risk – the expected frequency or probability of undesirable effects resulting from exposure to known or expected stressors, in the case of the data gaps study, contaminants.

risk assessment – a process that estimates the likelihood that humans or organisms exposed to hazardous chemicals or radioactive materials may have undesirable health effects.

risk-based evaluation – an assessment, based on the goal of protecting human health and environmental quality, of the likelihood that undesirable effects will result from exposure to chemical or radiological contaminants.

screening criteria – as used in this document, rules that guide the evaluation of data.

soil vapor – gaseous elements and compounds (including volatile organic compounds) in the small spaces between particles of soil.

SSFL – Santa Susana Field Laboratory

surface soil – for purpose of the data gap study and risk assessment, soil that is located vertically from 0 to 6 inches below the ground surface.

survey units – for purposes of the data gap study, subdivisions of the exposure units designed to facilitate development of a sampling program.

transport medium – methods by which contaminants may be moved through the environment, typically by wind, surface water, groundwater, and uptake by plants through the soil.

Performing a radiological building survey.