

9.0 CONCLUSIONS AND RECOMMENDATIONS

Table of Contents

9. CONCLUSIONS AND RECOMMENDATIONS	121
9.1 Conclusions	121
9.1.1 Data Limitations:	121
9.1.2 Contaminant Migration Pathways.....	121
9.1.3 Past and Present Exposures.....	121
9.2 Recommendations.....	123
9.2.1 Data Needs.....	123
9.2.2 Future Monitoring.....	124

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

9.1.1 Data Limitations:

- 1) Data limitations include, but are not limited to:
 - a) Inadequate assessment of vertical and horizontal hydraulic gradients.
 - b) Insufficient delineation of the extent of groundwater contamination in areas east of SSFL.
 - c) Insufficient identification and monitoring of ephemeral springs.
 - d) Lack of current well use surveys in areas east, northeast, and south of the facility.
 - e) Lack of long-term (>4 years) historical onsite meteorological data.
 - f) Lack of air monitoring data (historical and current) for chemicals and radionuclides.
 - g) Potential for non-detection of significant concentrations in past monitoring programs due to the detection limits of monitoring devices (1948–1980s).
 - h) Inadequate monitoring data for offsite areas with particular deficiencies east and northeast of SSFL.
- 2) It was not possible to conduct a quantitative dose reconstruction and health risk assessment due to:
 - a) Lack of historical chemical/radionuclide activity reports and release data.
 - b) Unreliable radionuclide monitors during accidental leaks.
 - c) Lack of air quality monitoring data
 - d) Unreliable sediment analytical monitoring procedures.
 - e) Insufficient monitoring to accurately delineate the extent of offsite contamination.

9.1.2 Contaminant Migration Pathways

- 3) Migration pathways from SSFL to offsite areas include (but cannot be limited to):
 - a) Surface water runoff (controlled and natural) to the north, south and east.
 - b) Groundwater migration to the northeast and northwest.
 - c) Air dispersion and deposition.
 - d) In general, the contribution of soil to offsite exposure was found to be low compared to that of other pathways.

9.1.3 Past and Present Exposures

- 4) Past community exposures of concern include (but cannot be limited to):
 - a) Potential chronic exposures to TCE and hydrazine resulting from emissions associated with rocket engine testing and open-pit burning between 1953 and early 1980s. Potential residential receptor locations of inhalation exposure include West Hills, Bell Canyon, Dayton Canyon, Simi Valley, Canoga Park, Chatsworth, Woodland Hills, and Hidden Hills.
 - b) Chronic exposure to TCE and associated degradation products in groundwater from 1953 to the late 1970s via use of private wells east and north of SSFL. Potential receptors include residents using private wells and residents who habitually ingested area-grown crops or livestock.

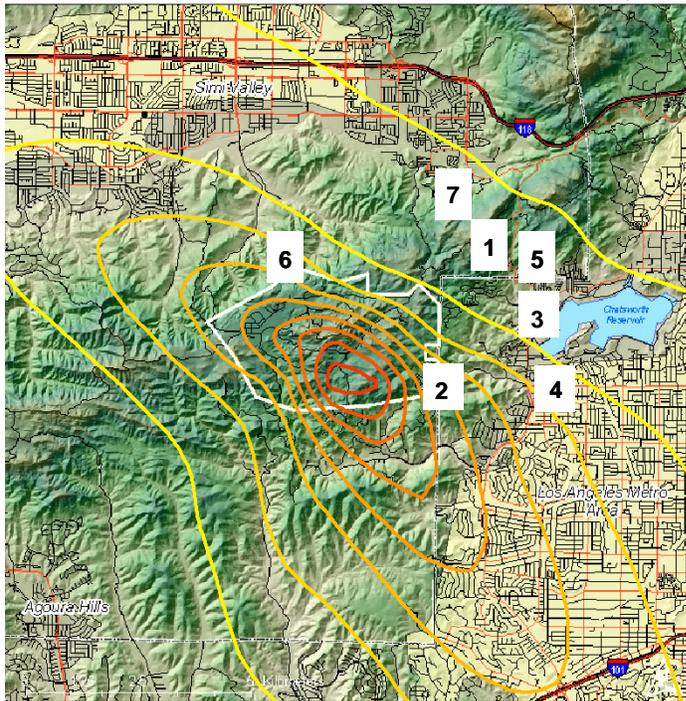
- 5) There is potential for chronic exposures, in areas within ~1-2 miles of SSFL, which include, but are not limited to :
 - a) TCE, vinyl chloride, and 1,1-DCE in the northeast quadrant off site of SSFL through use of private groundwater wells or from habitual home-grown crop ingestion.
 - b) Arsenic (source unknown) via habitual home-grown crop ingestion in Bell Canyon, Brandeis-Bardin, and potentially all areas north and east of SSFL, including Simi Valley, Dayton Canyon, and West Hills.
 - c) Lead (source unknown) via incidental soil ingestion/inhalation or from habitual home-grown crop ingestion in Bell Canyon and potentially areas east of the facility; as well as extended use of private water wells or habitual home-grown crop ingestion.

- 6) Removal of the large amount of TCE that is estimated to reside in the soil subsurface and groundwater at SSFL is beyond the capabilities of current remediation technologies. Therefore, there is potential for long-term exposure to TCE if contaminated groundwater if it comes in contact with human and ecological receptors and also due to volatilization from the soil subsurface.
 - a) The above concern is consistent with the conclusions of the 1990 U.S. Army Corps of Engineers–sponsored baseline public health risk assessment for the SSFL property. That assessment concluded that there may be a public health risk associated with onsite personnel and residential use of the property: “Exposure of site residents to TCE via multiple pathways could lead to cancer risks exceeding the 1×10^{-6} level” (Techlaw, 1990).
 - b) It has also been stated by the U.S. EPA(EPA, 2003b) that:
 - i) “Future Land Use” DOE cleanup levels for the ETEC site in Area IV could “result in cancer risks exceeding the CERCLA risk range of 10^{-6} to 3×10^{-4} ”; risk from this dose limit “may vary by an order of magnitude or more depending upon the radionuclide present and the selected land use.”
 - ii) DOE-selected cleanup levels do not satisfy standards for unrestricted land use.

- 7) Areas of exposure concern (AEC) where: (i) contaminant levels exceed health-based standards; (ii) there is potential for exposure; (iii) exposure could result an adverse health effects at the levels detected, include (Figure 9-1):
 - a) The upper northeast (offsite) quadrant and Bell Canyon. These are areas of exposure concern due to:
 - i) the potential for the use of domestic wells in the northeast quadrant area, and existence of mobile home communities that have used wells in the past, and
 - ii) lead and arsenic levels in Bell Canyon soils and the potential for exposure of children in this area.

- 8) Potential areas of exposure concern where: (i) monitoring is inadequate; (ii) onsite to offsite transport pathways exist; and (iii) exposure is possible include (Figure 9-1): West Hills, and Dayton, Woolsey, Meier, Runckle, and Black Canyons.

Figure 9-1. Areas of Potential Exposure Concern



Areas of Exposure Concern (AEC)

Area where:

- i. contaminant levels exceed health-based standards;
- ii. exposure is possible;
- iii. exposure could result in an adverse health effect at the levels detected.

Identified AEC

- 1. Northeast Quadrant
- 2. Bell Canyon

Potential AEC

- 3. Dayton Canyon
- 4. West Hills
- 5. Woolsey Canyon
- 6. Meier and Runckle Canyons
- 7. Black Canyon

9.2 Recommendations

9.2.1 Data Needs

- 1) Extent of groundwater contamination and conductivity:
 - a) There is need for accurate determination of the DNAPL volume remaining in the subsurface fractures.
 - b) Accurate estimation of subsurface TCE distribution.
 - c) Mapping of soil gas emissions throughout the site.
 - d) Continued monitoring of subsurface TCE and its degradation products
- 2) Extent of private well use and potential contamination within three miles of SSFL:
 - a) There is a need for a comprehensive canvas of private wells north and east of SSFL (including Santa Susana Knolls).
 - b) Quantitative exposure analysis will require information on population distribution and activity patterns.
 - c) Mapping of the location and extent of contamination of ephemeral springs arising from the hills and canyons during heavy rainfall.

- 3) If onsite land is to be used for residential or recreational activities, the following activities/analyses are suggested:
 - a) Continuous monitoring of onsite groundwater, soil, and subsurface for contaminants that are of primary concern.
 - b) Assessment of aggregate exposure to single chemicals from multiple sources and pathways, as well as cumulative exposures to multiple chemicals. Areas where mixtures of hazardous wastes were disposed of—Areas I, III, and IV—are of particular concern.
- 4) Considering the ongoing extensive development at and in the vicinity of SSFL, there should be an enforcement of sampling/monitoring of soil/sediment, groundwater, and resuspended dust for all construction sites.
- 5) Due to extensive onsite contamination, information on potential security gaps is needed for (1) SSFL⁹⁻¹ and (2) Chatsworth Reservoir⁹⁻². Precautionary defensive measures around these areas should be taken to prevent access to children.

9.2.2 Future Monitoring

- 6) The following chemicals should be considered for continuing offsite monitoring (see Appendix L for full list of COCs): PCBs, PCDDs/PCDFs, perchlorate, beryllium, asbestos, arsenic, chromium, mercury, lead, N-nitroso-dimethylamine, TCE and DCE.
- 7) Areas that warrant continuing future monitoring include: *Meier and Runckle Canyons, Bell Canyon campground, playground and Bell Creek, Dayton Canyon and Creek, Orcutt Ranch, Woolsey Canyon and Creek, Santa Monica Mountains Conservancy / Sage Ranch (ephemeral streams), Black Canyon, West Hills, Brandeis-Bardin Institute campground and garden.*
- 8) A comprehensive offsite monitoring of radionuclides is warranted given the recent detection of tritium at levels as high as 83,000 pCi/L in new groundwater wells (Area IV, DOE Community Meeting, Simi Valley, 6/3/2004). Some radionuclides to monitor include: tritium, cesium-137, strontium-90, radium-226/228, plutonium-238, thorium-230, and uranium-235 (see Appendix L for full list of COCs).
- 9) Offsite monitoring plans should consider and/or include:
 - a) Adequate survey instrument calibration procedures.

⁹⁻¹ Access to SSFL was reported during informal interviews (Appendix G), and gaps in SSFL boundary fences were observed within one block of Bell Canyon neighborhoods during site visits (Chapter 6, Figure 6-2).

⁹⁻² Review of Chatsworth Reservoir was not directly within the purview of this report as contamination of this area (see Appendix R, Table R-7 and Appendix H, Table H-5) resulted from activities at the former Hughes Aircraft Company site (8433 Fallbrook Ave., Canoga Park, south of Chatsworth Reservoir; the “Canoga Facility”). However, from 1966 to 1976, Rocketdyne occupied the site with Hughes and Bunker Ramo. There are three areas of concern at Hughes: the northwest, the southwest and the southeast corners. The northwest and southwest portions of the site (now DeVries Institute) is contaminated (soil and groundwater) with VOCs (including halogenated compounds) and the southeast portion of the site is contaminated (soil and groundwater) with Freon-11 and radioactivity (Ecology and Environment, 1991). Areas of contamination are confined within fences, however informal community interviews revealed that children access the area via subterranean canals, thus it was deemed appropriate and significant for mention.

- b) Use of spacing grids.
 - c) Filtered and unfiltered water samples.
 - d) Monitoring of local edible vegetation in agricultural and residential areas.
 - e) Soil samples from various depths and soil types.
 - f) Unfiltered samples from groundwater wells in shallow alluvial deposits for radionuclides.
 - g) Precautions for sample preparation and preservation.
 - h) Assessment of reliability, accuracy, and precision.
 - i) Blind-processed controls to multiple labs.
- 10) Municipal water supply companies using groundwater wells in Ventura and Los Angeles counties (within 3 miles of SSFL) should regularly monitor for perchlorate, NDMA, 1,4-dioxane, and chromium and assess the ability of their water treatment systems to remove these chemicals.