

**Review of Possible Perchlorate Contamination in Simi Valley
Relative to Santa Susana Field Lab**

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Michael Kuhn, Ph.D., Principal Author

Contributions from the SSFL Community Advisory Group

**Reviewed and Approved by the SSFL Community Advisory
Group**

Situation:

Some claims have been circulating to the effect that perchlorate has flowed from the Santa Susana Field Laboratory (SSFL) into the Simi Valley groundwater system and water supply.¹

Perchlorate is primarily a man-made chemical but can also be found in organic nitrate fertilizers from Chile. Adverse health effects have been reported primarily related to prenatal development.²

Perchlorate compounds do contaminate a discrete portion of the Happy Valley portion of Area I of the field lab site as a result of storage of perchlorate, the development and testing of solid fuel propellants for rockets, the testing of gun propellants, in support of flare research for the military, and in a building where turbine spinners and igniters were assembled.³ (All such activities are no longer performed at SSFL.)

- *Has perchlorate from SSFL contaminated Simi Valley's groundwater?*

Findings:

In order to discuss the issue of perchlorate contamination it is necessary to briefly explain the characteristics of the two groundwater basins in Simi Valley. The two groundwater basins are made up of the water-saturated alluvial fill under the valley.

The eastern groundwater basin extends roughly easterly from a line running through the Metro-link station and just west of the northern end of Stearns Street. The alluvial fill is relatively shallow - approximately 100 feet at its deepest. The eastern basin exhibits a relatively high groundwater table - which is sometimes high enough along the Arroyo Simi to drain directly into the flood control channel through weep holes and to have produced sand boils at the surface during the 1994 Northridge Earthquake. The shallowness of the basin is the major reason that the irrigation of cropland was limited primarily to lower lying areas during the 20th Century. The eastern basin simply does not contain enough groundwater to support wide-scale irrigation. Water from the eastern basin cascades to the west over several subsurface rock barriers into the much larger and deeper groundwater basin under the western two-thirds of the valley.

¹ Tabidian (2006).

² Dr. M. Ali Tabidian, "Land-use Conversion and Its Potential Impact on Stream/Aquifer Hydraulics and Perchlorate Distribution in Simi Valley, California," prepared under contract to the Santa Susana Field Laboratory Advisory Panel, a project of the Tides Center. The work of the panel was conducted under contract to the California Environmental Agency pursuant to funds provided by the California State Legislature (October 2006), p. 37, referencing United States Government Accountability Office, 2005. Perchlorate: A System to Track Sampling and Cleanup Results Is Needed. Report to the Chairman, Subcommittee on Environment and Hazardous Materials, Committee on Energy and Commerce, House of Representatives, GAO-05-462, 74 p.

³ "Happy Valley Interim Measures Work Plan Addendum and Amendment, Happy Valley and Building 359 Areas of Concern, Santa Susana Field Laboratory, Ventura County, California," prepared for The Boeing Company, Rocketdyne Propulsion and Power, prepared by MWH, 300 N. Lake Ave., Ste. 1200, Pasadena, CA 91101. (This report is stamped "DRAFT - Under Review by DTSC.")

West of the Metrolink Station the depth of alluvial fill varies, but is approximately 600 or more feet under the intersection of Los Angeles Avenue and Tapo Canyon Road. West of Sequoia Avenue the depth of the alluvial fill is 400-500 feet. Approximately a few hundred feet west of Madera Road the Simi-Santa Rosa fault crosses the Arroyo Simi trending roughly east-west at the base of the hills on the northern side of the valley. Bedrock on the north-northwest side of the fault has been steadily uplifted, accounting for the presence of the Santa Susana Mountains. That bedrock presents a barrier to the movement of groundwater out of the valley and results in high water table conditions west of Erringer Road. Essentially, the deep alluvial basin must fill in order for groundwater to spill over the bedrock barrier. The high clay content of the alluvial fill in the upper 200 feet or so functions as an aquiclude to the upward or downward movement of groundwater. Water in the lower aquifer is confined under hydraulic pressure west of approximately Erringer Road. During the latter part of the 19th Century wells exhibited artesian flow above the surface of the ground. Pumping was not required for irrigation. While artesian head is still present at the west end, some groundwater moves from the confined aquifer to the perched – shallow – aquifer abetted by numerous improperly closed-in well casings and water movement along strings and lenses of sand and gravel. Today the city of Simi Valley operates six dewatering wells at the west end to reduce the artesian head in the confined aquifer and to abet downward drainage of water in the perched aquifer. East of Erringer Road and south of Royal Avenue the aquiclude effect is much reduced, with more sand and gravel lenses, which allow greater upward migration of groundwater to supercharge the perched water table. Groundwater does naturally enter the Arroyo Simi through the lower banks of the watercourse downstream from Erringer Road.

Groundwater testing for perchlorate in Simi Valley has mostly used shallow wells that have been installed on and around existing and former service station sites. Those wells were installed to detect and monitor leaks in underground fuel storage tanks. The well sampling sites, then, were not randomly selected and were sporadic. Perchlorate was detected in a few of the wells. Some of the samples contain perchlorate in excess of the Maximum Contaminant Level. Others exceeded the Notification Level.

The California Department of Toxic Substances Control (DTSC) has thoroughly examined the question of possible perchlorate contamination in Simi Valley. Their conclusion is that, with the exception of one sample from the service station on the northwest corner of Stearns Street and Barnard Street, none has been detected in the eastern two thirds of Simi Valley.

Both the Llajas and the Santa Susana formations exhibit low overall permeability - greatly reducing the movement of groundwater from the SSFL site into the eastern groundwater basin in Simi Valley. So, the Stearns Street positive reading must be a result of a source other than the SSFL.

Some perchlorate is present in the perched, i.e., shallow, aquifer at the western end of the valley.

The California Department of Toxic Substances Control (DTSC) has concluded that the evaluation of the surface and groundwater pathways of perchlorate offsite, i.e., the western end of Simi Valley, does not indicate a connection between the perchlorate detected in Simi Valley and perchlorate present in the soil and groundwater at the SSFL.⁴

⁴ California Department of Toxic Substances Control, "Santa Susana Field Laboratory, Questions Regarding Potential Off-site Issues" (April 9, 2014), p. 20.

One sample from an artesian well (OS-10) located in the bottom of the eastern branch of Meier Canyon on the Brandeis-Bardin Campus of the American Jewish University did test positive for perchlorate. However, subsequent tests did not detect any perchlorate in that well. The latest sampling was on February 18, 2014.⁵

Quoting DTSC, “The DTSC concludes that the subsequent sampling data confirms that perchlorate is not present in the well. DTSC has seen no evidence of perchlorate being transported from the SSFL site into Simi Valley. *Despite a great deal of testing, no continuous perchlorate plume originating from SSFL site into Simi Valley has been found.*”⁶ A soil sample in the western branch of Meier Canyon tested positive for perchlorate. No perchlorate was detected in seven subsequent samples.⁷

The DTSC states “We would not state what the source of the perchlorate is but would rather indicate *that the nature of the perchlorate detections are not consist (sic) with a release from a point source such as SSFL. Rather the perchlorate distribution is more characteristic of a ‘non-point source’ fireworks, road flares, or agricultural fertilizer.*”⁸

In a 2006 paper, Dr. M. Ali Tabidian (See footnote No. 1), argues that perchlorate released at the SSFL is likely the source of the west end perched aquifer pollution. While there is no direct evidence to support his conclusion, he urges further study of the problem. In the report prepared for the U.S. Army Corps of Engineers, Los Angeles District, CH2MHILL also calls for further investigation (See footnote No. 7).

Conclusion:

Returning to the question posed at the outset of this review:

- *Has perchlorate from SSFL contaminated Simi Valley’s groundwater?*

There is cogent evidence that there is no connection between perchlorate detected in Simi Valley and perchlorate at the SSFL.

There is no cogent evidence to claim that the SSFL is the source of any perchlorate in Simi Valley.

⁵ Ibid., p. 23.

⁶ Email, dated May 9, 2014, from Tom Seckington, DTSC, in comment on earlier draft of this paper.

⁷ “Reconnaissance Study Report, Simi Valley Perchlorate Study, Ventura County, California,” Prepared for United States Army Corps of Engineers, Los Angeles District by CH2MHILL (August 2007), Figure 3-1.

⁸ See footnote No. 6.