

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

STAFF REPORT

TO: Bruce H. Wolfe
Executive Officer

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FROM:

Keith E. Roberson, Ph.D., RG
Engineering Geologist

CONCUR:

Stephen A. Hill, Chief
Toxics Cleanup Division

John D. Wolfenden
Section Leader

SUBJECT: **Revision of Site Cleanup Requirements for United Technologies Corporation Site**, 600 Metcalf Road, Santa Clara County

Water Board staff is issuing for public review a tentative order that will revise the final Site Cleanup Requirements (SCR) for the United Technologies Corporation (UTC) site at 600 Metcalf Road, San Jose. The new SCR will rescind and supercede the SCR for Operable Unit 1 (Order 94-064), as amended, and the SCR for Operable Unit 2 (Order 98-070). The order is being revised to accomplish the following objectives:

1. Combine the two existing site cleanup orders into one that covers the entire site;
2. Rescind a Water Reclamation Requirements order issued in 1991 that allowed offsite use of treated groundwater;
3. Establish cleanup standards for perchlorate and 1,4-dioxane, and revise cleanup standards for chemicals for which drinking water standards have changed;
4. Require submittal of a remedial action plan supplement for cleanup of perchlorate from groundwater and soil;
5. Require improved stormwater runoff monitoring in creeks and drainages on-site, and require the development of remedial measures to eliminate discharge of perchlorate into streams;
6. Require enhanced monitoring of groundwater and surface water quality along Las Animas Creek between the site boundary and Anderson Reservoir;
7. Facilitate coordination between our order and the Department of Toxic Substances Control (DTSC)'s Post-Closure Permits for the Open Burn Facility and three other surface impoundments.

Technical Background and Physical Setting

UTC owns and occupies a large (5,113 acre) property in the hills southeast of San Jose, where it has operated a solid rocket motor research and development facility since 1959. About 3,000 acres of the property are developed and used for various research and industrial processes. Three seasonal creeks (Shingle Creek, Mixer Creek, and Las Animas Creek) flow through the most heavily developed portions of the facility, and a fourth (San Felipe Creek) passes along the easternmost portion of the property. These streams merge near the southeastern boundary of the site, and the combined flow (Las Animas Creek) flows southeastward into Anderson Reservoir. Anderson Reservoir is the largest drinking water reservoir in Santa Clara County, and is less than one-half mile from the UTC property. Groundwater and surface water are closely linked at the site, as groundwater underlying the hills drains into alluvial aquifers in the stream valleys. In several places, particularly during times of high precipitation and recharge, groundwater containing perchlorate discharges to the creeks, producing a measurable impact on surface water quality. To date, chemicals released at the UTC facility have not been detected in Anderson Reservoir.

Site Contamination and Remediation History

Volatile Organic Compounds

Site investigations initiated in the 1980s revealed that large amounts of volatile organic compounds (VOCs) and other chemicals used and stored on site had been released to the environment and had impacted soil and groundwater beneath the site. Groundwater contamination on the UTC property is most pronounced in the alluvial aquifers in Shingle and Mixer Valleys, and in the bedrock aquifer beneath a portion of the site known as the Open Burning Facility (OBF). UTC has performed extensive soil and groundwater remediation at the site. These remedial efforts generally have been focused on maintaining hydraulic control and preventing off-site migration of VOC plumes in alluvial groundwater. These objectives have largely been achieved, as chemicals are only rarely detected at offsite monitoring locations at concentrations below drinking water standards. However, VOC concentrations throughout much of the site remain highly elevated above cleanup goals, and continued implementation of remedial measures is necessary to maintain plume control and prevent VOC migration.

Perchlorate

Since the late 1990s, concern has grown regarding the human health effects of perchlorate ingestion. Ammonium perchlorate is used extensively at the UTC facility as the oxidizing agent in solid rocket fuel, and the presence of perchlorate in soil and groundwater at the site has long been known. Perchlorate is now a greater environmental concern than VOCs at the UTC site. Investigations begun in 1998 have largely established the extent of perchlorate contamination at the facility. Several perchlorate source areas and groundwater plumes have been identified, and some areas have very high concentrations. Because perchlorate is completely soluble in water and does not bind to soils, perchlorate is considerably more mobile than VOCs and thus more likely to

migrate across property boundaries. Offsite migration of perchlorate in groundwater plumes has been limited by extensive groundwater extraction at the downgradient UTC property boundary. However, because perchlorate generally passes through groundwater treatment systems designed for VOC removal, and because the treated effluent from groundwater treatment systems was used extensively for landscape irrigation within the UTC facility, perchlorate was spread widely at low concentrations throughout the site. This situation has been addressed by recent modifications to the treatment systems to remove perchlorate from the waste streams.

Perhaps the greatest concern with perchlorate at UTC is that perchlorate enters the creeks through groundwater discharge and stormwater runoff, particularly during the wet winter months. While perchlorate is routinely detected in surface water at on-site creek sampling locations, perchlorate is detected infrequently at off-site locations, and perchlorate has never been detected in Anderson Reservoir. Nonetheless, given the large amount of perchlorate present in soil and groundwater at UTC and perchlorate's mobility, the threat of perchlorate entering Anderson Reservoir exists and must be addressed by more aggressive remedial action.

Changes Proposed in the Tentative Order

The tentative order includes several significant changes to the existing orders to accomplish the objectives listed on page one. The reasons for these changes are discussed below.

Changes to the Groundwater Cleanup Standards

The tentative order adds cleanup standards for perchlorate and 1,4-dioxane. Cleanup standards for some other chemicals have been revised to reflect changes in the state drinking water standards.

UTC recently completed a risk assessment for perchlorate and 1,4-dioxane, and proposed risk-based soil and groundwater cleanup levels for these chemicals. Water Board staff has approved the results of UTC's risk assessment, and we have used these numbers as cleanup standards in the tentative order. On the basis of the risk assessment, UTC proposed a cleanup standard of 6 micrograms per liter (ug/L) for perchlorate in groundwater. Subsequently, the State of California issued a Public Health Goal (PHG) for perchlorate, which is also 6 ug/L. California/EPA is in the process of developing a Maximum Contaminant Level (MCL) for perchlorate in drinking water. In the absence of an MCL, we have set the cleanup goal equal to the PHG. Should the MCL differ from the PHG, we will consider revising the cleanup goal to the MCL.

An MCL for 1,4-dioxane does not exist and one is not anticipated in the near future, so the tentative order sets the groundwater cleanup level for 1,4-dioxane at the current State provisional action level of 3 ug/L.

Revision of the Self-Monitoring Program

UTC will continue to submit an annual Environmental Monitoring Program Plan (EMPP), which details the environmental sampling and analysis program for the following calendar year. UTC will also continue to submit quarterly monitoring reports, with the fourth quarter's report serving as an annual monitoring report that summarizes monitoring results from the four quarters.

The environmental monitoring program has been revised to enhance the surface water monitoring program. The tentative order places greater emphasis on storm water monitoring. New sampling requirements specified in the tentative order include creek sampling during or immediately after storm events. The monthly creek sampling that UTC has conducted will continue, but the tentative order requires additional samples be collected during times of peak mass discharge associated with storm events.

Storm events often flush soluble contaminants, particularly perchlorate, from soil and groundwater sources into the creeks. While creeks are monitored monthly at specified locations for perchlorate content, little attempt has been made to fully quantify the amount of perchlorate that discharges into creeks and moves through the facility during and immediately after significant storms. The new order will direct UTC to devise a stormwater monitoring program that will allow for a more quantitative evaluation of the amount of perchlorate that is carried across the site boundary in Las Animas Creek in the direction of Anderson Reservoir. This stormwater monitoring program should include real-time stream gauging to log peak flows after storm events, and real-time sampling for perchlorate content in storm runoff. This will facilitate calculation of perchlorate mass delivered through the hydrologic system to the downgradient property boundary.

Also, the order requires re-evaluation of the groundwater monitoring well network at the downgradient property boundary. Additional sentry wells may be required along Las Animas Creek between the site boundary and Anderson Reservoir. The groundwater monitoring frequency has been reduced for some on-site areas where VOC and perchlorate concentrations in groundwater are generally stable.

Coordination with DTSC for RCRA Permit Monitoring

DTSC and UTC have negotiated a schedule for monitoring specified point-of-compliance wells to satisfy Resource Conservation and Recovery Act (RCRA) requirements for post-closure monitoring at the Open Burn Facility and three closed surface impoundments. RCRA protocols specify certain requirements for post-closure monitoring which are, in many cases, more detailed and rigorous than what the Water Board would require for its regional groundwater monitoring program. The order incorporates the RCRA monitoring requirements. While the Water Board can modify UTC's monitoring program through annual changes to the EMPP, the monitoring requirements for the RCRA post-closure units will not be open to annual modification, and can only be changed through the permit modification process.

New Tasks

The tentative order requires UTC to perform several new tasks, including:

1. *Develop and implement an enhanced surface water monitoring program for the site. Surface water monitoring henceforth will include collection of samples during, or following, storm events in addition to the monthly creek samples currently collected at the site.*
2. *Develop and implement a plan to eliminate discharge of perchlorate-contaminated water to creeks.*
3. *Develop and implement a plan for enhanced offsite groundwater monitoring. UTC will be required to demonstrate that an adequate number of sentry wells are provided along Las Animas Creek between the property boundary and Anderson Reservoir.*
4. *Complete characterization of perchlorate contamination in soil and groundwater and present a Final Remedial Action Plan for perchlorate.*
5. *Evaluate alternate remedial technologies for use at VOC source areas where groundwater pump and treat was not successful.*