STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF JUNE 20-21, 2024
Prepared on May 20, 2024

ITEM NUMBER: **9**

SUBJECT: **Status Update on Olin Corporation Perchlorate Groundwater Cleanup Case, Morgan Hill, Santa Clara County**

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KEY INFORMATION

Location:	Morgan Hill and San Martin, Santa Clara County
Type of Discharge:	Historic discharge of perchlorate to soil and groundwater
Existing Orders:	Cleanup and Abatement Order (CAO) R3-2004-0101 State Board Order WQ 2005-0007 CAO R3-2007-0077 Waste Discharge Requirements Order R3-2011-0209 Monitoring and Reporting Program Order R3-2008-0028 (revised July 20, 2023)

ACTION: **Information/Discussion**

SUMMARY

This is an informational item to provide an update on the Olin Corporation (Olin) perchlorate groundwater cleanup case, located in Morgan Hill, Santa Clara County. The Central Coast Water Board's Site Cleanup Program (SCP) has directed and overseen the investigation and cleanup of perchlorate from historical discharges of perchlorate at the Olin facility for nearly 25 years. The last update on this case was seven years ago, at the January 2017 board meeting.

The SCP's highest priority is to protect public health, especially to ensure safe drinking water and to mitigate chemical vapor intrusion into residential and commercial buildings. Many SCP sites are focused on addressing groundwater contamination issues that often take years or decades to cleanup. In general, the investigation and cleanup of pollutants in the subsurface, particularly groundwater, is very challenging due to: 1) significant timeframes (year or decades) and costs (hundreds of thousands to millions of dollars) typically required to fully implement assessment and cleanup actions, 2) complexity associated with fate and transport of pollutants once they are below ground,

and 3) site constraints (e.g., contamination under buildings or roads), treatment technology limitations, or geologic/hydrogeologic constraints inhibiting the ability to fully assess or cleanup pollutants to acceptable levels. Despite encountering many of these challenges, the Olin case is an example of how the Water Board can apply the necessary regulatory tools and coordinate effectively with responsible parties and the community to protect drinking water supplies and successfully implement site investigation and remediation.

DISCUSSION

What is Perchlorate?

Perchlorate (ClO_4^-) is both a naturally occurring and man-made chemical that consists of one chlorine atom bonded to four oxygen atoms. A significant portion of perchlorate use in the United States takes place in California, mostly related to the aerospace and defense industries. There are three major man-made sources of perchlorate in the United States:

- Ammonium perchlorate, used as an oxidizer in solid rocket propellants,
- Sodium perchlorate, used in slurry explosives, and
- Potassium perchlorate, used in road flares and air bag inflation systems.

Perchlorate behaves similarly to nitrate in groundwater. It is highly soluble in water, and relatively stable and mobile in surface and subsurface aqueous systems. As a result, like nitrate, perchlorate plumes in groundwater can be extensive.

Site Background

Perchlorate was discharged to the ground at the Olin site in Morgan Hill during flare manufacturing operations conducted from 1956 to 1995. Perchlorate was first discovered in groundwater at the site during a due diligence investigation in 2000. This initiated sampling of over a thousand domestic wells in the Llagas groundwater subbasin for perchlorate, resulting in a discovery that the perchlorate plume spanned approximately 10 miles downgradient of the site in Morgan Hill to east of Gilroy. In December 2007, the Central Coast Water Board issued CAO R3-2007-0077, requiring completion of all necessary characterization and investigation activities and implementation of remedial actions (hydraulic control and groundwater cleanup) associated with the perchlorate release to offsite areas. In July 2011, the Central Coast Water Board adopted Waste Discharge Requirements (WDR) Order R3-2011-0209 to allow the operation of a groundwater extraction and treatment system (GETS) and treated groundwater reinjection. Olin has completed several phases of investigation work with drilling and grab groundwater sampling at several hundred locations plus installation of more than 260 monitoring wells and 9 groundwater extraction wells to a maximum depth of 570 feet below ground surface.

After completing onsite soil remediation to eliminate the source of pollution, more than two decades of ongoing groundwater extraction and treatment, and attenuation through natural physical processes, Olin has effectively reduced the size of the perchlorate plume and significantly reduced the risk to residents who use groundwater for domestic purposes in the area and to public supply wells.

To ensure safe drinking water for the community, in 2004, the Central Coast Water Board issued Cleanup and Abatement Order R3-2004-0101 (CAO R3-2004-0101), revised by the State Water Resources Control Board in its Order WQ 2005-0007, which required Olin to provide replacement water (e.g., bottled water or wellhead treatment) to well owners and tenants whose drinking water wells have perchlorate concentrations greater than the maximum contaminant level (MCL). At the onset of the Central Coast Water Board's Replacement Water Program in 2004, there were 188 domestic wells with perchlorate exceeding the MCL of six micrograms per liter. As of fourth quarter 2023, there are three remaining wells exceeding the MCL. The reduction in the number of wells requiring replacement water is due to successful remediation efforts and ongoing natural attenuation. Olin continues to provide replacement water via bottled water or wellhead filtration where perchlorate exceeds the MCL. The extent of the plume exceeding the MCL in the primary domestic well aquifer has reduced in size to within 5/8 mile of the site since the initial discovery when it was close to 10 miles long.

The current remedial strategy is continued groundwater extraction in three aquifers with long-term groundwater monitoring to confirm additional attenuation is ongoing. In July 2023, the Central Coast Water Board updated MRP Order R3-2008-0028 to optimize the routine monitoring associated with hydraulic control, active cleanup, and monitored attenuation of perchlorate in groundwater. Monitoring trends and chemical transport modeling indicate that perchlorate concentrations are generally stable or declining, and groundwater cleanup to below MCL will take approximately 60 years to achieve.

Representatives from Olin will provide a presentation during the board meeting. The staff report[1] from a January 2017 board meeting provides additional background information about this case. Additionally detailed information regarding the Olin site is also available on GeoTracker at the link below:
https://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL0608756247

Human Right to Water

California Water Code section 106.3, subdivision (a) states that it is the policy of the State of California "that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitation purposes." On January 26, 2017, the Central Coast Water Board adopted Resolution R3-2017-

[1] Staff Report on Olin Corporation perchlorate site, January 26-27, 2017 board meeting Item 18: https://www.waterboards.ca.gov/centralcoast/board_info/agendas/2017/january/item18/item18_stfrpt.pdf

0004, which affirms the realization of the human right to water and the protection of human health as the Central Coast Water Board's top priorities.

Although Olin's replacement water program and initiation of cleanup efforts predate Resolution R3-2017-0004, the combination of these efforts have ensured and continue to ensure that community members have clean drinking water supplies, consistent with Resolution R3-2017-0004. The Olin case is an excellent example of how a community based outreach and replacement water program can be effectively implemented.

Environmental Justice

Environmental Justice principles call for the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income in the development, adoption, implementation, and enforcement of all environmental laws, regulations, and policies that affect every community's natural resources and the places people live, work, play, and learn. The Central Coast Water Board implements regulatory activities and water quality projects in a manner that ensures the fair treatment of all people, including Underrepresented Communities. Underrepresented Communities include but are not limited to Disadvantaged Communities (DACs), Severely Disadvantaged Communities (SDACs), Economically Distressed Areas (EDAs), Tribes, Environmentally Disadvantaged Communities (EnvDACs), and members of Fringe Communities.[2] Furthermore, the Central Coast Water Board is committed to providing all stakeholders the opportunity to participate in the public process and provide meaningful input to decisions that affect their communities.

The Olin site in Morgan Hill is ranked 70-75% for CalEnviroScreen 4.0. The site itself is designated as a disadvantaged community. Other portions of the perchlorate plume that once extended nearly 10 miles are also designated as a disadvantaged community. Central Coast Water Board staff coordinated closely with Olin to conduct significant public outreach to the community over many years to ensure they received information about the status of cleanup efforts and opportunities to receive replacement water.

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[2] Disadvantaged Community: a community with an annual median household income that is less than 80% of the statewide annual median household income (Public Resources Code section 80002(e)); Severely Disadvantaged Community: a community with a median household income of less than 60% of the statewide average. (Public Resources Code section 80002(n)); Economically Distressed Area: a municipality with a population of 20,000 persons or less, a rural county, or a reasonably isolated and divisible segment of a larger municipality where the segment of the population is 20,000 persons or less with an annual median household income that is less than 85% of the statewide median household income and with one or more of the following conditions as determined by the department: (1) financial hardship, (2) unemployment rate at least 2% higher than the statewide average, or (3) low population density. (Water Code section 79702(k)); Tribes: federally recognized Indian Tribes and California State Indian Tribes listed on the Native American Heritage Commission's California Tribal Consultation List; EnvDACs: CalEPA designates the top 25 percent scoring census tracts as DACs. Census tracts that score the highest five percent of pollution burden scores but do not have an overall CalEnviroScreen score because of unreliable socioeconomic or health data are also designated as DACs (refer to the CalEnviroScreen 3.0 Mapping Tool or Results Excel Sheet); Fringe Community: communities that do not meet the established DAC, SDAC, and EDA definitions but can show that they score in the top 25 percent of either the Pollution Burden or Population Characteristics score using the CalEnviroScreen 3.0.

Cleanup successes to date and ongoing groundwater cleanup efforts benefit these communities.

Climate Change

The Central Coast faces the threat and the effects of climate change for the foreseeable and distant future. To proactively prepare and respond, the Central Coast Water Board has launched the Central Coast Water Board's Climate Action Initiative, which identifies how the Central Coast Water Board's work relates to climate change and prioritizes actions that improve water supply resiliency through water conservation and wastewater reuse and recycling; mitigate for and adapt to sea level rise and increased flooding; improve energy efficiency; and reduce greenhouse gas production. The Climate Action Initiative is consistent with the Governor's Executive Order B-30-15 and the State Water Board's Climate Change Resolution 2017-0012.

Central Coast Water Board staff considered carbon emissions when reviewing feasible remedies for addressing perchlorate in the lower deep aquifer. The Central Coast Water Board concurred with Olin's proposed monitored attenuation remedy in part because it saved an estimated 640,000 tons of carbon dioxide equivalent emissions over the remaining life of the project. Climate change effects, such as sea level rise and changes in precipitation, are not expected to affect Olin cleanup efforts.