California Regional Water Quality Control Board
Santa Ana Region

September 13, 2002

ITEM: 3

SUBJECT: Hearing on Petitions Filed by Kwikset Corporation and Goodrich Corporation for Review of Cleanup and Abatement Order (CAO) No. R8-2002-0051

STAFF REPORT:

## Introduction

The matter before the Board is to consider petitions regarding Cleanup and Abatement Order (CAO) No. R8-2002-0051, issued to the Kwikset Corporation and the Goodrich Corporation (Goodrich), for past discharges of waste at the160-acre property bounded approximately by Casa Grande Park Avenue on the north, Locust Avenue on the east, the extension of Alder Avenue on the west, and the extension of Summit Avenue on the south, City of Rialto, San Bernardino County.

The purpose of this Staff Report is to provide background on the issues surrounding issuance of CAO No. R8-2002-0051, to summarize the basis for the order, and to briefly discuss issues raised by the petitions and staff's responses to them. A "Notice of Hearing" for this matter (distributed by Mr. Ted Cobb, Assistant Chief Counsel for the State Water Resources Control Board) set a deadline of September 5, 2002, for submittal of written materials to be considered by the Board in this matter. Additional written materials submitted by Board staff and parties to this hearing by the September 5 deadline will be provided to the Board separately.

## Site History

The Northern Rialto area is situated along the foothills of the San Gabriel Mountains in San Bernardino County, to the west of Lytle Creek. During World War II, approximately 2,000 acres in this area were used by the U.S. Government as a military depot for the storage of ammunition. The facility was known as the Rialto Ammunition Storage Point. Bunkers and berms were constructed for use in housing the ammunition at various locations on the property. Following World War II, the Rialto Ammunition Storage Point was vacated by the military. The bunkers and berms were left in place.

From 1950 to 1957, the West Coast Loading Company (WCLC) owned and occupied 160 acres of the former military depot. The 160-acre property is

situated in the southwest quarter of Section 21, Township 1 North, Range 5 West, San Bernardino Baseline and Meridian in the County of San Bernardino, State of California. (See attached figure, "Site Location") During their occupancy of the site, WCLC manufactured pistol flares and parachute flares. In 1957, WCLC merged with Kwikset Locks, Inc.

In 1957, the B.F. Goodrich Company purchased the 160-acre property. B.F. Goodrich Aviation Products, a division of the B.F. Goodrich Company, occupied the site and operated a rocket motor plant until 1964. During their occupancy of the site, B.F. Goodrich performed solid propellant research and development for the United States Air Force. B.F. Goodrich had contracts with the Naval Ordnance Test Station in China Lake, California, which included work on the Sidewinder and Loki Missiles. (The B.F. Goodrich Company is now known as Goodrich Corporation.)

The 160-acre property was later subdivided and sold. The site now consists of numerous separate parcels, with multiple landowners. Since 1964, continuing through the present, various tenants involved in pyrotechnics have occupied portions of the site.

Findings of Perchlorate in Groundwater

Perchlorate, in the form of salts such as ammonium perchlorate and potassium perchlorate, is used as a component of the burn mix and the ignition mix for flares and as an oxidizer in the manufacture of solid rocket propellants. Perchlorate salts are also used in the manufacture of fireworks.

Perchlorate salts are highly soluble and dissociate in water to form perchlorate ions. There are currently no state or federal drinking water standards for perchlorate. However, in 1997, the California Department of Health Services (DHS) established a drinking water Action Level (AL) for perchlorate of 18 parts per billion (ppb). An AL is a temporary safe drinking water level that is based on limited studies.

In 1997 and 1998, the City of Rialto, City of Colton and the West San Bernardino County Water District collected samples of groundwater from their municipal water supply wells in the Rialto Groundwater Subbasin. Laboratory analyses of the groundwater samples indicated that perchlorate was present in seven of the wells that were sampled. Two wells exceeded the perchlorate AL of 18 ppb (at concentrations of 273 ppb and 57 ppb), and five wells were below the AL (all at concentrations less than 6 ppb). The well containing 273 ppb was the well closest to the subject site (approximately one mile away), and was not in use at that time. The well containing 57 ppb of perchlorate was the next closest well downgradient from the subject site. This well remained in use and the water from the well was blended with other wells for a period of time, but the well was eventually shut down. The remaining five wells that contained perchlorate in

concentrations below the AL continued to be used. These five wells are located further downgradient from the site than the other two wells that contained much higher concentrations of perchlorate.

On January 18, 2002, DHS lowered the AL to four ppb. The Cities of Rialto and Colton, West San Bernardino County Water District, and Fontana Water Company have now shut down a total of 14 municipal water supply wells. There are currently 17 municipal wells in the Rialto-Colton-Fontana area that exceed the new AL of 4 ppb for perchlorate.

Relationship between Affected Wells and the WCLC/Goodrich Site

Water supply production wells in the Rialto and Colton Subbasins that are affected by perchlorate are located in a roughly southeasterly alignment, along the direction of regional groundwater flow (from northwest to southeast). The area of known impact covers an approximate distance of seven miles from the former WCLC/Goodrich site, and extends southeast beyond the Interstate 10 Freeway.

The West San Bernardino County Water District (WSBCWD) owns the production well (located in T1N/R5W-28) that is closest to the former site. Sampling of this well (Well # 22) has shown perchlorate concentrations ranging from 273 to 820 µg/l. The furthest affected water supply wells along the path of the perchlorate plume are owned and operated by WSBCWD and the City of Colton, and are located approximately six miles from the site, with perchlorate concentrations of 5.2 and 7.4 ppb. There are also six other perchlorate-contaminated wells located in the southeasterly alignment between the former site and those wells. These additional six wells are owned and operated by the City of Rialto, City of Colton, and WSBCWD. All of the municipal wells that are known to be affected by perchlorate are shown on the attached figure "Affected Wells".

The direction of groundwater flow in the Rialto and Colton Subbasins is known to be towards the southeast, which is from the former WCLC/Goodrich site to the locations of the WSBCWD, Rialto and Colton wells. It is also likely that groundwater moves from the Rialto Subbasin into the Chino Subbasins, where the direction of groundwater flow is to the southwest. This would explain the presence of perchlorate in the Fontana Water Company wells.

Perchlorate was first analyzed for, and found, in the City of Colton's wells in 1997. This was 47 years after WCLC began operations at the site, and 40 years after Goodrich began operations at the site. The estimated groundwater flow velocity in this area of the Rialto Subbasin is between one and three feet per day. At an average flow velocity of two feet per day, it would take approximately 43 years for groundwater to travel downgradient from the site to the City of Colton's wells that contain perchlorate, a distance of six miles. Therefore, the flow

velocity, distance and travel time are consistent with discharges by WCLC and Goodrich serving as the source of perchlorate detected in this well. Taken in conjunction with the fact that the well with the highest concentration of perchlorate is the well closest to the site, and the concentration of perchlorate in the remaining wells decreases with increasing distance of each well from the site, and considering the historical activities that took place at the site, it is evident that the site is a source of the perchlorate that is in the groundwater.

Initial Contacts with Kwikset Corporation and Goodrich

In light of the past activities of WCLC and Goodrich at the 160-acre site, Board staff contacted both Kwikset Corporation and Goodrich in correspondence dated August 24, 2001, and requested that they voluntarily provide historical information about the former facilities. Staff also requested that the companies initiate a soil and groundwater investigation to characterize the perchlorate contamination at the site.

Staff's requests were based largely upon a written report by a former employee of the Goodrich Corporation, Mr. John Kase, who described the Rialto Ammunition Storage Point that existed during World War II, and also described the activities of both WCLC and Goodrich during the period from 1950 to 1964. Mr. Kase's report came from the files of the Rialto Historical Society. Staff also utilized the information in an environmental audit that was prepared by GeoLogic Associates for the West San Bernardino County Water District.

The requests for information from Kwikset Corporation and Goodrich were also based upon staff's collective technical knowledge about the methods for production of flares, and the manufacture and testing of solid rocket propellant. Some relevant technical information about the production of flares and solid rocket propellant are presented below.

In response to staff's letter, Kwikset Corporation initially asked for additional time to review corporate records (letter dated September 12, 2001), and the time extension was granted by the Executive Officer. Kwikset Corporation later declined to initiate any investigation, pending accrual of documents from the Regional Board and San Bernardino County files (letter dated February 27, 2002). Kwikset Corporation stated that they had no knowledge of WCLC or its activities in Rialto.

Goodrich responded with a request for additional time for corporate record review (letter of September 20, 2001), and the time extension was granted by the Executive Officer. Goodrich subsequently indicated they would participate in a limited investigation at the site, if necessary (letters dated October 18 and December 12 2001; January 28 and May 28, 2002). Goodrich also stated that they had no knowledge of former activities at the 160-acre site.

As a result of these responses, Board staff prepared a draft Cleanup and Abatement Order. In May 2002, staff allowed Kwikset Corporation and Goodrich to review the draft Order. On June 6, 2002, the Executive Officer of the Board issued CAO No. R8-2002-0051. The CAO requires Goodrich and Kwikset Corporation to submit a proposal with a one-year implementation schedule to obtain information, define the lateral and vertical extent of the perchlorate contamination in soil and groundwater, and implement an appropriate remedy for the contamination that has occurred as a result of their activities at the 160-acre site.

Both Kwikset Corporation and Goodrich submitted petitions for review of the CAO to the State Water Resources Control Board. The companies also requested that the Regional Board review the Executive Officer's action to issue the CAO.

Basis for CAO No. R8-2002-0051

Water Code Section 13304 provides that "Any person ... who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into waters of the state and creates, or threatens to create, a condition of pollution or nuisance, shall upon order of the regional board, clean up the waste or abate the effects of the waste....". The Board has delegated the authority to issue orders pursuant to this section (generally referred to as Cleanup and Abatement Orders) to its Executive Officer.

CAO No. R8-2002-0051 includes findings that demonstrate that a condition of pollution (i.e., an unreasonable effect on beneficial uses) exists in groundwater in the vicinity of the 160-site in Rialto. This pollution is obvious, based on the number of municipal wells affected by perchlorate and the loss of use of those wells. The CAO also includes findings that Kwikset Corporation and Goodrich have caused or permitted, are causing or permitting, or threaten to cause or permit waste, i.e., perchlorate, to be discharged to waters of the state. The basis for these findings is discussed in more detail below.

WCLC manufactured flares at the site in Rialto from 1950 until 1957. The process of flare production typically includes five main steps:

- Mixing together the materials that make the flare burn;
- Packing the mixture into waxed cardboard tube casings;
- Mixing an ignition material to start the flare;
- Pouring the ignition material into the end of the flare; and
- Assembling the cap, which is used to ignite the flare.

The burn mix commonly consists of a main component such as strontium nitrate, but also contains most or all of the following: potassium perchlorate, sulfur, sawdust, pale oil, polyvinyl chloride, stearic acid, and cornstarch.

The ignition mix for the flares typically contains potassium chlorate, potassium perchlorate, ethyl alcohol, strontium nitrate, charcoal, shellac, umber, and quartz lighting. This ignition mix is heated and dried onto a black "button" on the end of the flare. There is a striking pad (usually consisting of red phosphorus) on the flare's cap. The flare is ignited by using the striking pad (from the flare's cap) to spark the ignition mix (black button) at the end of the flare.

The typical waste products at flare manufacturing sites include ignition material residues (solid residues of perchlorate salts and nitrate) and wash water (a solution of water and ash combined with residual perchlorate salts and other components) from the cleaning of the ignition material mixing bowls.

Board staff has obtained documents describing WCLC's operations at the Rialto site. These documents confirm that perchlorate was used by WCLC in manufacturing of flares. Based on staff's collective knowledge of historic waste disposal practices by industry during this time period and our experience at similar sites, we conclude that wastes containing perchlorate were discharged on site by WCLC.

As noted above, WCLC merged with Kwikset Locks, Inc., in 1957. Kwikset Locks, Inc., assumed the liabilities of WCLC at that time. The relationship between Kwikset Locks, Inc., and Kwikset Corporation will be discussed later in this report.

Goodrich manufactured and tested solid rocket propellant at the Rialto site from 1957 until 1964. Ammonium perchlorate is used as an oxidizer in the manufacture of solid rocket propellant. Board staff has extensive experience involving the investigation and remediation of perchlorate contamination at former manufacturing and testing facilities for solid rocket propellant in the Santa Ana Region.

The typical mixture for solid rocket propellant consists of up to 90% oxidizer (ammonium perchlorate), with the remaining percentage being fuel, plus a component known as "burn rate modifier." Two forms of ammonium perchlorate (ground and unground) have typically been used in creating the oxidizer mixture. The ground material is created by processing large volumes of ammonium perchlorate to a fine particle size, using special grinding equipment. Both the ground and unground ammonium perchlorate are mixed to obtain the desired effect on the burn rate of the solid propellant.

According to the written statement of the former Goodrich employee, Mr. John Kase, the 160-acre site in Rialto was used for research, development and testing of the Sidewinder Missile for the U.S. Navy during the period from 1957 to 1964. Mr. Kase's statement was confirmed by the additional information provided to the Board by the Goodrich Corporation under subpoena. The Goodrich submittal describes the construction and usage of a 150-gallon solid propellant mixer at the Goodrich facility sometime after 1957. The document states that:

> "Mixed batches of solid fuel were expelled at the lower level and transported by truck to production facilities where motors were loaded for rockets and missiles such as the Navy's Loki and Sidewinder. "

A laboratory unit, known as a "sub sieve sizer," is also described in the Goodrich submittal. A photograph of Mr. Kase operating this equipment is shown in the Goodrich submittal. According to the caption for this photograph, the sub sieve sizer unit was operated by Mr. Kase for measuring the particle size of propellant oxidizers.

Mixing machines were used to combine the fuel slurry and the ammonium perchlorate into a homogeneous fluid. Mixing, casting, curing, and assembly were the steps used to create the final solid rocket motor. Throughout these various processes, washing of equipment occurs. Historically, the wash water and waste materials at solid rocket propellant manufacturing facilities have been disposed of in unlined pits or discharged to the ground surface. Solid and liquid wastes were also placed into burn pits and ignited. Information obtained by Board staff indicates that Goodrich's waste disposal practices included on site discharge of wastes containing perchlorate.

In summary, Board staff has concluded that discharges by WCLC and Goodrich at the subject site contributed to perchlorate pollution of groundwater and the effects on downgradient water supply wells. This is based on:

- Known use of perchlorate by WCLC and Goodrich in their manufacturing operations, and generation of wastes containing perchlorate in those operations;
- Knowledge of historic waste disposal practices at similar facilities;
- Documents submitted by Kwikset Corporation and Goodrich;
- Information provided by a former Goodrich employee regarding activities at the site;
- Downgradient locations and pattern of perchlorate concentrations of affected water supply wells; and
- Estimated travel time of perchlorate to affected wells.

Petition of Kwikset Corporation

A copy of the petition submitted by Kwikset Corporation is included with this report. The argument advanced by the petition is that there is no relationship between Kwikset Locks, Inc. (the company that merged with and assumed the liabilities of WCLC) and the current Kwikset Corporation (the company named in CAO No. R8-2002-0051). The petition notes that Kwikset Locks, Inc., was dissolved in 1958, and Kwikset Corporation was not formed until 1985. A third "Kwikset," the Kwikset Locks Corporation, was formed two weeks after the dissolution of Kwikset Locks, Inc., and was itself dissolved in 1986. (Kwikset Corporation assumed the liabilities of Kwikset Locks Corporation upon this dissolution.) The petition claims, however, that the Kwikset Locks Corporation never had any assets and never operated as a company.

Information on the Kwikset Corporation's web site makes clear that the name "Kwikset" has been in consistent use throughout this period and that products using the Kwikset brand name have been consistently manufactured and marketed. Further, there is a common thread among the directors of the various Kwikset entities, with Kwikset Locks, Inc., sharing a director with Kwikset Locks Corporation, and Kwikset Locks Corporation sharing a director with Kwikset Corporation. From this information, Board staff concludes that the three Kwikset entities are linked, and that the current Kwikset Corporation is liable for the activities of WCLC.

Petition of Goodrich Corporation

A copy of the petition submitted by Goodrich is included with this report. Goodrich raises a range of issues in its petition. Among these, Goodrich claims that there is no evidence of discharges at its facility, and that there are other potential sources of perchlorate in the area that are not addressed by CAO No. R8-2002-0051. The basis for Board staff's conclusions regarding discharges at the Goodrich site was discussed earlier in this report.

Board staff agrees that other potential sources of perchlorate exist in the area. Board staff continues its investigations of additional potentially responsible parties (PRPs) that may have discharged, or are continuing to discharge, perchlorate in the vicinity of the site. Additional PRPs include various pyrotechnic companies (dealing in fireworks), the County of San Bernardino's Mid-Valley Landfill, Denova Environmental, Inc. (formerly a hazardous waste disposal facility), and the U.S. Army Corps of Engineers (for activities at the former ammunition storage bunkers that were associated with the U.S. Army's Rialto Ammunition Storage Point during World War II). Based on the results of these investigations, Board staff will recommend additional enforcement actions against parties that are shown to have contributed to the perchlorate pollution in this area. The presence of other potential sources, however, does not diminish Goodrich's responsibility for its own contribution to the problem.

Conclusion

Perchlorate pollution of groundwater in the Rialto-Colton-Fontana area has affected numerous municipal wells and created an extremely serious water quality and water supply problem. Kwikset Corporation and Goodrich Corporation operated manufacturing facilities that used perchlorate in their processes. Based on a variety of information considered by Board staff, we conclude that discharges at these facilities significantly contributed to the perchlorate pollution. It is therefore appropriate to order Kwikset Corporation and Goodrich to investigate and clean up perchlorate.

RECOMMENDATION:

Board staff recommends that the Board affirm Cleanup and Abatement Order No. R8-2002-0051.