# FIRST FIVE-YEAR REVIEW REPORT FOR ROCKETS, FIREWORKS, AND FLARES SUPERFUND SITE SAN BERNARDINO COUNTY, CALIFORNIA

PREPARED BY

U.S. Army Corps of Engineers Seattle District

FOR

**U.S. Environmental Protection Agency**

**Region 9**

Approved by:

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# Executive Summary

This is the first Five-Year Review of the Rockets, Fireworks, and Flares Superfund Site (Site) located in San Bernardino County, California. The purpose of this Five-Year Review is to review information to determine if the remedy is and will continue to be protective of human health and the environment.

Most of the Site is located in the Rialto-Colton Groundwater Basin, which is an important source of drinking water to residents and businesses in the cities of Rialto, Colton, and Fontana. Located east of the city of Los Angeles, the Site consists of three operable units[1] (OUs). The Source Area Operable Unit addresses groundwater contaminated with volatile organic compounds and perchlorate at and near the source area. EPA is evaluating the need for cleanup at the Mid-Basin Operable Unit, which addresses contaminated groundwater downgradient of the Source Area Operable Unit, and the Soils Operable Unit, which addresses contaminated soil at a 160-acre source area. EPA added the Site to the National Priorities List in September 2009.

On September 30, 2010, EPA signed an Interim Record of Decision (ROD) that selected the following remedy for the Source Area Operable Unit groundwater to protect long-term human health and the environment:

- Groundwater extraction wells located downgradient of the 160-acre source area.
- Water treatment systems to reduce the concentrations of trichloroethylene (TCE) and other volatile contaminants from the extracted groundwater below levels allowed by federal and state drinking water standards.
- Water treatment systems to reduce the concentrations of perchlorate from the extracted groundwater below the level allowed by the state drinking water standard.
- Pipelines and pumps to convey the contaminated groundwater from the extraction wells to the treatment plant.
- Pipelines and pumps to convey the treated water from the treatment plant to one or more local water utilities for distribution as municipal water supply (or for aquifer replenishment); and.
- A groundwater monitoring program.

The remedy has been implemented by expanding an existing water treatment system at an adjacent state-led cleanup site. A new groundwater extraction well, new liquid-phase granular activated carbon and ion exchange water treatment systems, and new pipelines were constructed. The expanded system is referred to as the Combined Treatment Plant. Emhart Industries, Inc., a company responsible for conducting the cleanup in accordance with a 2013 Consent Decree, conducted two pilot-scale tests to demonstrate that the new ion exchange systems would adequately treat extracted Site groundwater.

[1] The term "operable unit" (OU) defines a discrete action that is an incremental step toward a comprehensive remedy for a site.

Upon regulatory and local agency approval, treated Site groundwater from the Combined Treatment Plant will be chlorinated and pumped to the city of Rialto municipal water system.

Exposure assumptions, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid. No new human health or ecological routes of exposure or receptors have been identified. In addition, no new contaminants or contamination sources have been identified. No additional ecological risks have been identified. No impacts from natural disasters have affected the protectiveness or activities of the Site. Some Applicable or Relevant and Appropriate Regulations (ARARs) have changed since finalization of the 2010 Interim ROD. However, none of these changes call into question the protectiveness of the remedy.

Based on review of project-related documents and data, as well as the site inspection, the remedy is expected to function as intended by the Interim ROD. It is expected that the remedy will achieve the remedial action objectives of protecting water supply wells and groundwater resources by limiting the spread of contaminated groundwater from the 160-acre area and by removing contaminants from groundwater.

The remedy at the Rockets, Fireworks and Flares Superfund Site is expected to be protective of human health and the environment upon completion. In the interim, the remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

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| | |
|---|---|
| ARARs | Applicable or Relevant and Appropriate Regulations |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| EPA | Environmental Protection Agency |
| EW | Extraction Well |
| gpm | gallons per minute |
| ROD | Record of Decision |
| NCP | National Contingency Plan |
| ng/L | nanograms per liter |
| NPL | National Priorities List |
| TCE | trichloroethylene |
| PFAS | polyfluoroalkyl substances |

# 1. Introduction

The purpose of a Five-Year Review is to evaluate the implementation and performance of a remedy to determine if the remedy will continue to be protective of human health and the environment. The methods, findings, and conclusions of a review are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this Five-Year Review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act Section 121(c), 40 Code of Federal Regulation (CFR) Section 300.430(f)(4)(ii) of the National Contingency Plan and EPA policy.

This is the first Five-Year Review for the Rockets, Fireworks, and Flares Superfund Site (Site). The triggering action for this statutory review is the on-site construction start date for a remedial action on September 18, 2015. The Five-Year Review has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

This Five-Year Review focuses on the Source Area Operable Unit, which addresses groundwater near the sources of contamination. The two operable units that are not addressed in this Five-Year Review are the Mid-Basin Operable Unit, which addresses contaminated groundwater downgradient of the Source Area Operable Unit, and the Soils Operable Unit, which addresses contaminated soil in an area known as the 160-acre area where Site contaminants are believed to have been released to the environment. EPA signed the Record of Decision (ROD) for the Source Area Operable Unit on September 30, 2010. RODs have not been finalized for Mid-Basin Operable Unit or Soils Operable Unit and therefore review of these operable units are not included in this Five-Year Review.

The Rockets, Fireworks, and Flares Superfund Site Five-Year Review was led by Wayne Praskins (EPA, Remedial Project Manager). Participants included U.S. Army Corps of Engineers staff Leanna Woods Pan (environmental engineer) and Benino McKenna (hydrogeologist). The review began on October 30, 2018.

**Table 1. Five-Year Review Summary Form**

| SITE IDENTIFICATION | | |
|---|---|---|
| **Site Name:** Rockets, Fireworks, and Flares Superfund Site | | |
| **EPA ID:** CAN000905945 | | |
| **Region:** 9 | **State:** CA | **City/County:** San Bernardino County |
| **SITE STATUS** | | |
| **NPL Status:** Final | | |
| **Multiple OUs?** Yes | **Has the site achieved construction completion?** No | |
| **REVIEW STATUS** | | |
| **Lead agency:** EPA | | |
| **Author name (Federal or State Project Manager):** Wayne Praskins | | |
| **Author affiliation:** EPA | | |
| **Review period:** 10/30/2018 - 9/18/2020 | | |
| **Date of site inspection:** 1/14/2020 | | |
| **Type of review:** Statutory | | |
| **Review number:** 1 | | |
| **Triggering action date:** 9/18/2015 | | |
| **Due date *(five years after triggering action date)*:** 9/18/2020 | | |

## 1.1. Background

The Rockets, Fireworks and Flares Superfund Site (Site), located east of the city of Los Angeles, includes soil and groundwater contaminated with perchlorate, trichloroethylene (TCE), and other volatile organic compounds in a largely suburban area in San Bernardino County, California. The Source Area Operable Unit of the Site includes groundwater at a 160-acre source area where contaminants entered the groundwater and testing has identified the highest levels of groundwater contamination. The Source Area Operable Unit also includes contaminated groundwater that has spread as far as approximately 2.5 miles downgradient from the 160-acre area (Figure 1).

In 1942, the U.S. Army acquired and developed land that includes the 160-acre area. The property was sold in 1946 and portions of the 160-acre area have been owned or used by a variety of defense contractors, fireworks manufacturers, and others who used perchlorate salts and other chemicals in their manufacturing processes or in their products. Contaminant release mechanisms are believed to have included onsite disposal in one or more unlined pits, leakage or overflow from an onsite impoundment, airborne dispersion of material handled during manufacturing, disposal of contaminated rinse water onto unpaved areas, and one or more explosions. Releases are likely to have begun in the 1950s, and possibly earlier.

Most of the Site is located in the Rialto-Colton Groundwater Basin. Four water utilities are responsible for the majority of the groundwater pumping in the Basin: the City of Rialto, West Valley Water District, the City of Colton, and Fontana Water Company. A 1961 decree entered in San Bernardino County Superior Court restricts pumping of groundwater from the Rialto-Colton Groundwater Basin to parties to the decree.

## 1.2. Physical Characteristics

The 160-acre source area is square-shaped and bounded by West Casa Grande Drive on the north, Locust Avenue on the east, Alder Avenue on the west, and an extension of Summit Avenue on the south. Various buildings and structures are located throughout the 160-acre area and several roadways run through it, including West Lowell Street and several unimproved roads. Portions of the site are used for commercial or industrial purposes, and other areas are vacant or open space. The County of San Bernardino's Mid-Valley Sanitary Landfill is located immediately southwest of the 160-acre area. Some adjacent properties are developed with industrial facilities or residences.

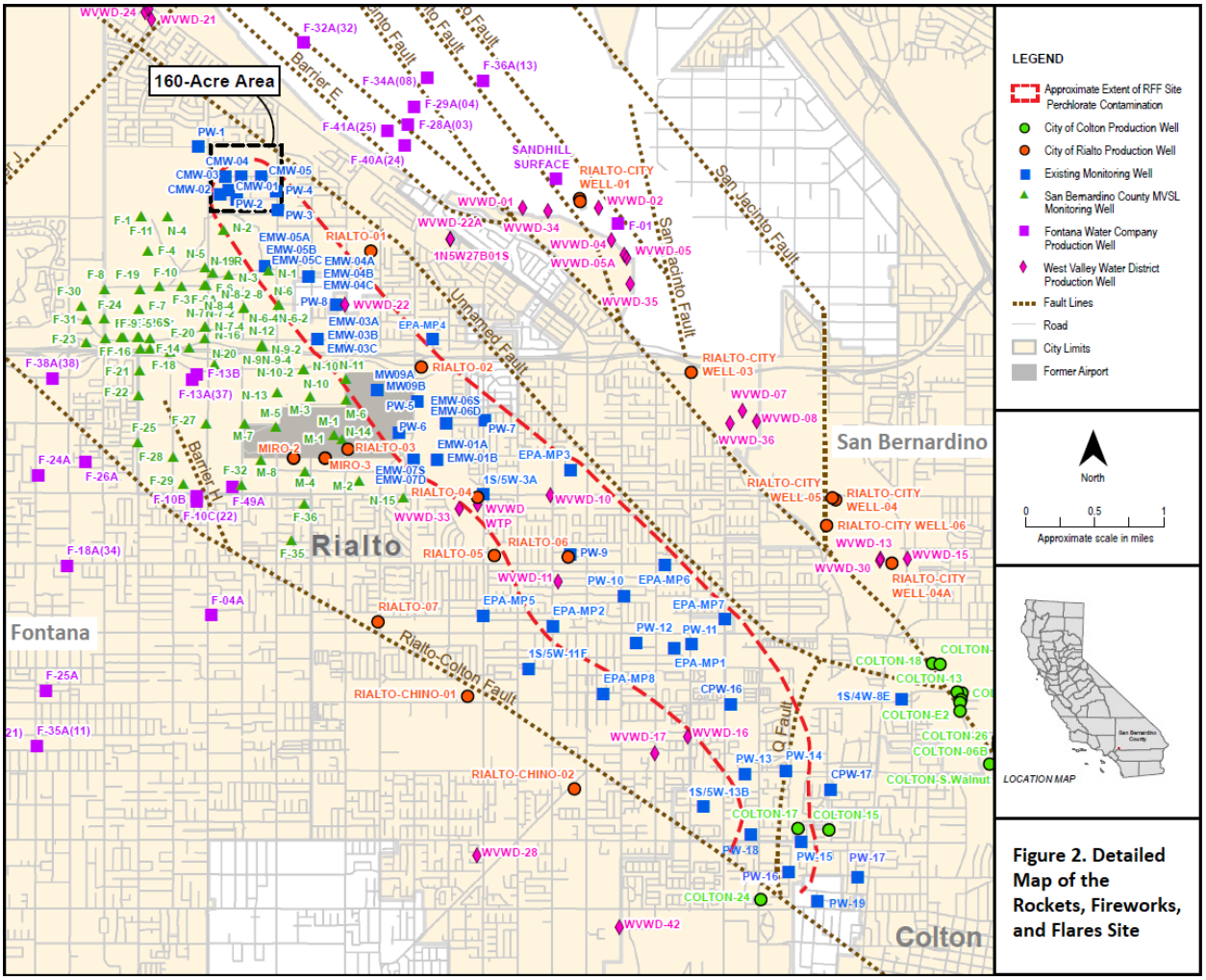



Figure 2. Detailed Map of the Rockets, Fireworks, and Flares Site

Modified from Figure produced by Jacobs Engineering in July 2019

**Figure 1. Map for the Rockets, Fireworks, and Flares Superfund Site**

## 1.3. Hydrology

The 40-square-mile Rialto-Colton Groundwater Basin is located in western San Bernardino County, California, east of the City and County of Los Angeles. The Rialto-Colton Groundwater Basin is bounded on the northwest by the San Gabriel Mountains and southeast by the Badlands, a series of hills located at the margin of the basin. The basin is approximately 10 miles long, from 1.5 to 3.5 miles wide, and it is bounded by geologic faults on its western, northern, and eastern sides. The San Jacinto Fault forms the northeastern boundary, and the Rialto-Colton Fault forms the southwestern boundary. The Santa Ana River cuts across the southeastern part of the basin, and Warm and Lytle Creeks join the Santa Ana River near the eastern edge of the basin. Except in the southeastern part of the basin, the San Jacinto and Rialto-Colton faults appear to restrict groundwater flow into and out of the basin (USGS, 1997).

The Rialto-Colton Groundwater Basin is filled with unconsolidated alluvial material consisting of sand, gravel, and boulders interbedded with lenticular deposits of silt and clay. Alluvial sediments in much of the basin are about 500 to 1,000 feet deep. The unconsolidated alluvium is underlain by partly consolidated continental deposits formed as lenticular bodies consisting of somewhat compacted gravel, sand, silt, and clay. The basement complex consists of metamorphic and igneous rocks. The unconsolidated alluvial material contains groundwater in multiple water-bearing layers. At the Site's 160-acre area, the depth to groundwater in the first layer, known as the Intermediate Aquifer, is currently about 400 to 450 feet below ground surface. The Intermediate Aquifer is unconfined, about 50 to 100 feet thick, and is underlain by a laterally extensive aquitard. The Intermediate Aquifer is comprised of multiple thin water-bearing units separated by thin aquitards and dry intervals. The deeper water-bearing layer, known as the Regional Aquifer, is generally unconfined to partly confined, and is about 300 to 500 feet thick. Both the Intermediate and Regional Aquifers are comprised of unconsolidated alluvial material consisting of sand, gravel and boulders. Potentiometric heads are as much as 150 feet higher in the Intermediate Aquifer than in the underlying Regional Aquifer, resulting in a strong downward hydraulic gradient between the two aquifers. About one to one and half miles to the southeast of the Site's 160-acre area, the Intermediate Aquifer merges with the Regional Aquifer (Figure 2).

Groundwater flow in the Rialto-Colton Groundwater Basin is strongly influenced by the presence of several geologic faults that restrict groundwater flow. Groundwater in the Intermediate Aquifer generally flows to the southeast, parallel to two major faults, up to several feet per day. Groundwater in the Regional Aquifer generally flows to the southeast at an average rate of about one foot per day. Groundwater elevations and flow rates in the Rialto-Colton Groundwater Basin vary both seasonally and year to year. The primary cause of this variability is year to year change in precipitation and associated recharge. Seasonal and year-to-year variability in groundwater pumping also affects water levels.

Historical water level measurements from water supply wells screened in the Regional Aquifer indicate that water levels varied by more than 100 feet from 1962-2009 due to periodic drought and increased groundwater production.

The groundwater at or near the Site is a vital resource for residents of the cities of Rialto and Colton. Most of the Site lies within the Rialto-Colton Groundwater Basin, which has in recent years supplied drinking water to tens of thousands of area residents. The contamination has forced the closure of many drinking water supply wells in the basin.

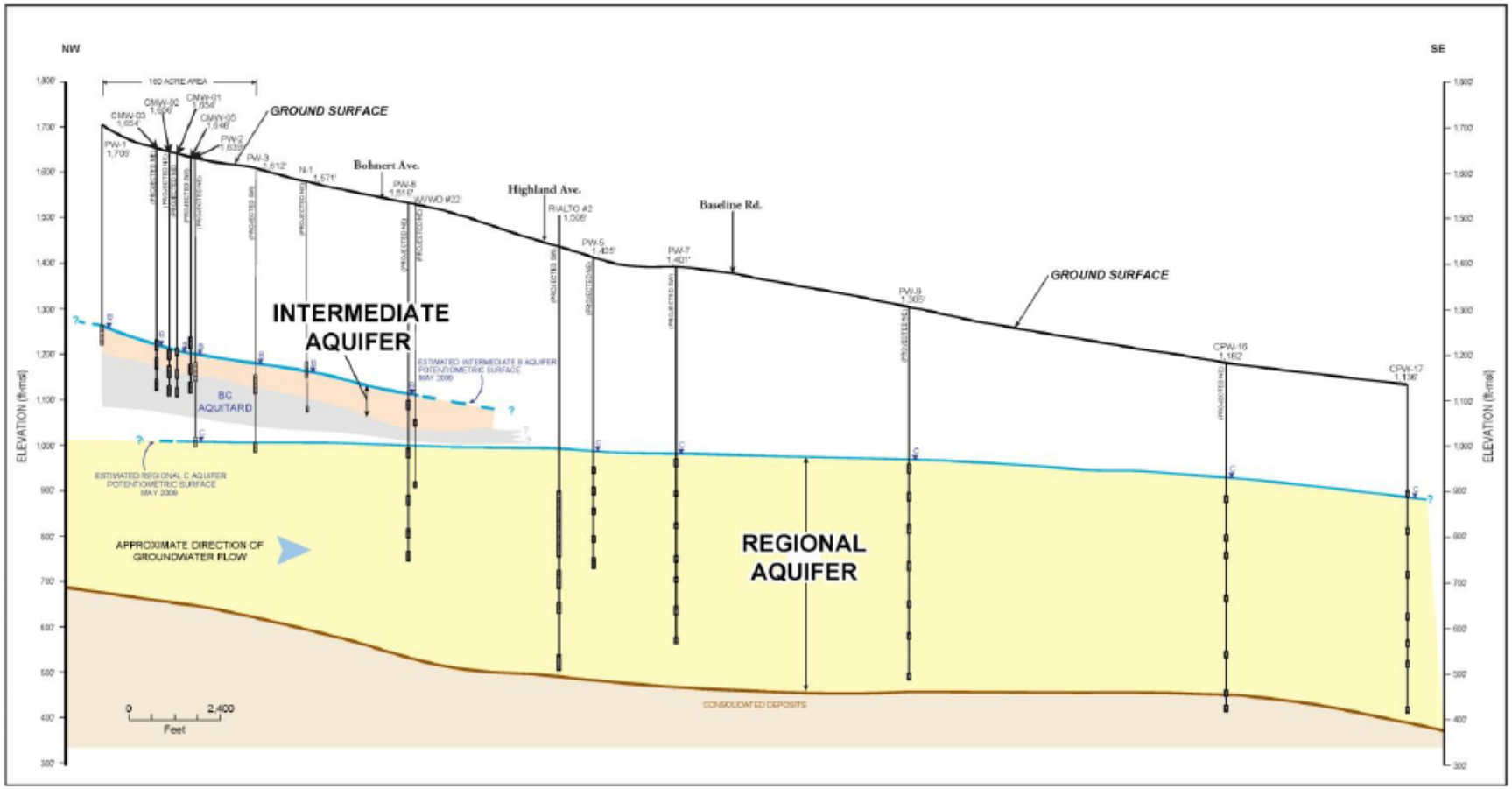



**Figure 2. Rialto-Colton Groundwater Basin Aquifers**

# 2. Remedial Actions Summary

## 2.1. Basis for Taking Action

The contaminants of concern in groundwater at the Site include perchlorate, TCE, carbon tetrachloride, chloroform, and methylene chloride. Perchlorate salts are inorganic chemicals used as oxidizers in rocket propellant, flares, fireworks, and other products. TCE and carbon tetrachloride are cleaning solvents used extensively in the 1950s and 1960s. Employees of businesses that operated in the Site's 160-acre area in the 1950s and 1960s have testified that perchlorate, TCE, and other solvents were handled or used at the Site. Perchlorate and TCE are the most frequently detected contaminants in groundwater at the Site and the primary contaminants of concern . Perchlorate, TCE, and carbon tetrachloride can persist in groundwater for decades.

EPA is taking action because the groundwater at the Site is a current source of drinking water to tens of thousands of residents and businesses, the levels of contamination in groundwater exceed federal or state drinking water standards, and contaminated groundwater continues to spread into uncontaminated and less contaminated portions of the groundwater aquifer.

EPA identified exposure pathways in the 2010 Remedial Investigation and Feasibility Study Report based on the Conceptual Site Model for the Site. Receptors that could potentially be exposed to the contaminated groundwater include current and future residents that receive drinking water from groundwater wells near the Site. Exposure could occur through inhalation (TCE, carbon tetrachloride, chloroform, and methylene chloride only) or ingestion (TCE, carbon tetrachloride, chloroform, methylene chloride and perchlorate) of the contaminants present in the groundwater. Inhalation of contaminants can occur during showering and other activities that enhance the movement of volatile chemicals from water to air. Exposure through dermal contact is not expected to be a significant pathway for these constituents. There is currently no known exposure pathway in which ecological receptors could be exposed to contaminated groundwater.

## 2.2. Remedy Selection

EPA issued the Interim ROD for the Source Area Operable Unit in September 2010.

The selected remedy is the first of at least two planned remedies to address contaminated groundwater at the Site. This interim action is necessary to stabilize the Site, prevent further environmental degradation, and achieve significant risk reduction while a final remedial solution is being developed.

The Interim ROD identified the following Remedial Action Objectives for the Source Area Operable Unit:

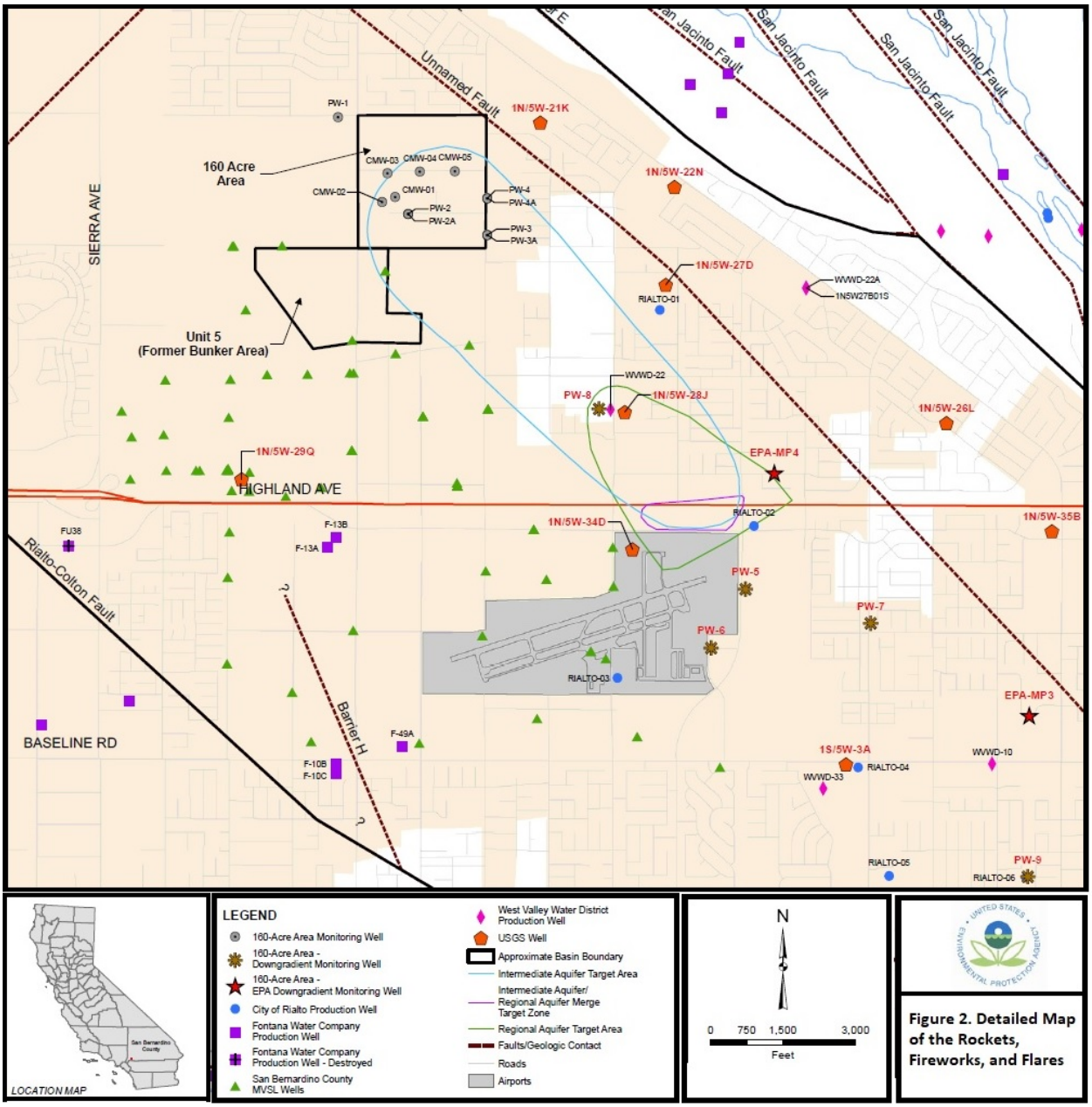
- Protect water supply wells and groundwater resources by limiting the spread of contaminated groundwater from the 160-acre area.
- Remove the contaminants from the groundwater.

EPA's selected remedy for the Source Area Operable Unit is a groundwater pump and treat system and included the following components:

- Groundwater extraction wells located no more than 1,500 feet downgradient of the Intermediate and Regional Aquifer Target Area (defined below).
- Water treatment systems to reduce the concentrations of TCE and other volatile contaminants from the extracted groundwater below levels allowed by federal and state drinking water standards.
- Water treatment systems to reduce the concentrations of perchlorate from the extracted groundwater below the level allowed by the state drinking water standard.
- Pipelines and pumps to convey the contaminated groundwater from the extraction wells to the treatment plant.
- Pipelines and pumps to convey the treated water from the treatment plant to one or more local water utilities for distribution as municipal water supply or to reinjection wells for groundwater recharge.
- A groundwater monitoring program.

The remedy is intended to intercept and provide hydraulic control of contaminated groundwater moving from the 160-acre source area in targeted areas of contamination (defined below). The targeted areas include locations where contaminants entered the groundwater and downgradient areas where high levels of groundwater contamination have been measured. The targeted area of groundwater contamination encompasses portions of the Intermediate and Regional Aquifers as described below:

- The *Intermediate Aquifer Target Area* is the portion of the aquifer within the footprint of and downgradient of the 160-acre area where contaminant concentrations in groundwater exceed chemical-specific ARARs. The upgradient boundary of the Target Area is near groundwater monitoring well CMW-3, the northernmost groundwater monitoring well on the 160-acre area where the concentrations of contaminants consistently exceeded chemical-specific ARARs. The downgradient boundary of the Target Area is where the Intermediate Aquifer is no longer present as a distinct aquifer. The downgradient boundary is in the vicinity of the 210 Freeway, approximately one and one-half miles to the southeast of the 160-acre area (Figure 3).
- The *Regional Aquifer Target Area* is the portion of the Regional Aquifer underlying the Intermediate Aquifer Target Area where the concentrations of the contaminants of concern in groundwater exceed chemical-specific ARARs. The upgradient boundary of the Regional Aquifer Target Area is at or upgradient of well WVWD-22 (Figure 3).




Modified Figure 3-2 from CH2MHILL, 2010. Remedial Investigation/Feasibility Study Report B.F. Goodrich Superfund Site Rialto, California. January 25, 2010.

**Figure 3. Footprint of Intermediate and Regional Aquifer Target Areas**

Compliance with EPA objectives will be evaluated based on the achievement of hydraulic control in the targeted areas of contamination and the decrease of contaminant concentrations in groundwater over time at downgradient compliance wells. The groundwater at the Site is an important source of drinking water. Limiting the spread of contaminated groundwater should reduce contaminant mass loading to downgradient areas, reducing human health risk by reducing the likelihood and magnitude of exposure.

EPA did not set numeric cleanup goals for the groundwater in the aquifer during implementation of the interim action. EPA will determine cleanup goals for the aquifer in a future action. In 2010, EPA did

select cleanup goals for each contaminant of concern in the extracted and treated groundwater in the Interim ROD (Table 2).

There are no planned or implemented institutional controls identified in the ROD for this Site.

**Table 2. Treatment Cleanup Goals for Chemicals of Concern (in Extracted and Treated Groundwater)**

| COC | Reporting Units | Federal MCL (µg/L) | California MCL (µg/L) | Cleanup Level | Basis for Cleanup Level |
|---|---|---|---|---|---|
| Carbon Tetrachloride | µg/L | 5 | 0.5 | 0.5 | California MCL |
| Chloroform (Trichloromethane) | µg/L | 80[1] | 80[1] | 80[1] | Federal MCL |
| Methylene Chloride (Dichloromethane) | µg/L | 5 | 5 | 5 | Federal MCL |
| Perchlorate | µg/L | none | 6 | 6 | California MCL |
| Trichloroethene (TCE) | µg/L | 5 | 5 | 5 | Federal MCL |

Notes:
[1]The values listed for chloroform are for the combined concentration of four trihalomethanes: chloroform, dibromochloromethane, bromodichloromethane, and bromoform.

## 2.3. Remedy Implementation

In March 2014, EPA approved the final design for the treatment plant, which has been designed to work in conjunction with an existing treatment plant at an adjacent state-led cleanup site. The Regional Water Quality Control Board provides regulatory oversight of the adjacent cleanup site, which has similar contaminants and a similar remedy (pump and treat). As part of the remedy for the adjacent state-led site, known as the County Remedy, three extraction wells (Rialto-3, Miro-2, and Miro-3) can deliver up to 2,200 gallons extracted groundwater per minute (gpm) to the County Remedy Treatment Plant. The County Remedy Treatment Plant is located at North Linden Ave and Miro Way, adjacent to the Rialto-3 well.

The County Remedy Treatment Plant was expanded to include capacity for treatment of Site groundwater and will henceforth be referred to as the Combined Treatment Plant. The addition of one extraction well (EW-1) has increased pumping capacity to the Combined Treatment Plant by 2,040 gpm to approximately 4,200 gpm. EW-1, along with one or more of the County Remedy extraction wells, are expected to provide hydraulic control of the Target Area of the Site. Three additional fixed ion exchange resin vessels for perchlorate removal and four additional fixed bed liquid-phase granular activated carbon adsorber vessels for volatile organic contaminants removal have been constructed to treat the extracted groundwater at the Combined Treatment Plant. The ion exchange vessels will operate on a lead/mid/lag configuration. Resin change out criteria will assure effective operation without perchlorate breakthrough from the lag vessel and maximize the run time of the system.

A pilot test was conducted until late 2019. The California State Water Resources Control Board's Division of Drinking Water required demonstration of the effectiveness of the ion exchange resin and

lead/mid/lag series design in the Combined Treatment Plant prior to the amendment of the city of Rialto's domestic water supply permit, which is necessary for operation of the remedy.

A first pilot test was initiated by Emhart Industries, Inc. at the Site in early January 2017, delivering Site groundwater extracted from EW-1 at about 1 gpm to a separate, trailer-sized pilot test setup consisting of several columns filled with perchlorate-specific ion exchange resins. The initial pilot test did not perform as expected, with a brownish discoloration visible in the three ion exchange resins and perchlorate "breakthrough" occurring earlier than modeling predictions. Therefore, the initial pilot test was ended in March 2017 and the State Water Resources Control Board Division of Drinking Water advised that it could not permit the operation of the Combined Treatment Plant based on the initial pilot test alone.

An expert committee was assembled to conduct a forensic analysis of the initial pilot test to determine the cause of the observed anomalies and to recommend changes in the design of the pilot test to more closely approximate conditions during full-scale operation. The expert committee determined that the configuration of the initial pilot test, specifically exposing extracted water to atmospheric conditions in holding tanks for extended periods, led to an increase in pH and temperature of the water prior to entering the pilot test equipment. This resulted in significant calcite scaling within the ion exchange resin columns, inhibiting mass transfer, reducing the effective treatment capacity of the resin, and shortening the throughput capacity and breakthrough time.

The expert committee recommended several changes in pilot test configuration to eliminate the conditions that led to calcite scaling during the initial pilot test with the expectation that this would resolve the resin performance issues. The second pilot test was configured to more closely mimic full-scale operating conditions. Design changes made for the second pilot test include:

- Limiting residence time between extraction and treatment of the groundwater by locating the pilot test equipment at EW-1 and continuously pumping water from EW-1 through the pilot system (without storage in holding tanks).
- Constructing ion exchange columns with bed depths equivalent to the full-scale system.
- Operating the pilot system at the same flow rate per cubic foot resin as the full-scale system.

A second pilot test began in January 2018. Perchlorate breakthrough during the second pilot test followed model predictions, establishing that the resins tested in a lead/mid/lag ion exchange vessel configuration would adequately treat extracted site groundwater and provide enough time to implement resin change-outs without impacting performance. The second pilot test was concluded in December 2019. Following regulatory and local agency approval, continuous operation of the remedy is expected to begin in late 2020, with treated groundwater from the Combined Treatment Plant chlorinated and pumped to the city of Rialto municipal water system.

## 2.4. Operation and Maintenance

Continuous operation of the remedy is not expected to begin until late 2020. Therefore, no operation and maintenance has occurred during this review period.

# 3. Progress during this Five-Year Review Period

## 3.1. Work Completed at the Site During this Five-Year Review Period

Construction of the remedy, including expansion of the County Remedy Treatment Plant, was completed during this five-year review period, as detailed in Section 2.3. Components of the treatment plant expansion were documented during the Site Inspection (Appendix G).

Pilot testing of the ion exchange process to be employed in the expanded treatment system was also completed as described in Section 2.3.

## 3.2. Community Notification, Involvement and Site Interviews

A public notice was made available by newspaper posting in the *Rialto Record* on March 19, 2020 stating that there was a five-year review and inviting the public to submit any comments to the U.S. EPA. The results of the review and the report will be made available on the EPA site webpage at: http://epa.gov/superfund/rff.

During the Five-Year Review process, interviews were conducted to document any perceived problems or successes with the remedy. All comments and interviews pertaining to this Five-Year Review were completed with the understanding that at the time of this writing the remedy has not begun operation. A consultant for the County of San Bernardino participated in the Site Interviews. The consultant expressed concern over a potential lack of plume capture by the remedy as constructed and cited the need for an additional extraction well.

In addition, the County of Bernardino, Department of Public Works sent a letter to the USACE to elaborate their concerns with the potential effectiveness of the Source Area Operable Unit remedy and the impact of the Source Area Operable Unit remedy on the County remedy. The letter makes several recommendations: 1) reevaluate the boundaries of the area targeted for remediation in the ROD; 2) describe plans to monitor compliance with the ROD after the remedy begins operation; 3) and reevaluate the groundwater extraction plan for the Source Area Operable Unit remedy. The letter from the County is included in Appendix F.

## 3.3. Data Review

At the time of this report, the selected remedy from the 2010 Interim ROD has largely been constructed but is not yet operational. In the absence of remedy performance data, an evaluation of annual groundwater sampling data has been conducted to assess Site contaminants concentrations at and in the vicinity of the Source Area Operable Unit.

The contaminant data review is limited to carbon tetrachloride, perchlorate and TCE, because according to the Interim ROD, they are the only contaminants of concern for the Source Area Operable Unit that currently or historically exceeded the cleanup standards.

### 3.3.1. Groundwater Elevations

Groundwater levels in this region are influenced by annual precipitation and municipal pumping. In selected wells, contaminant concentrations have shown a correlation with groundwater levels. Figure 4 shows the relationship between perchlorate concentrations in groundwater, TCE concentrations in groundwater, and water levels in a groundwater monitoring well screened in the Intermediate Aquifer in the source area. Groundwater levels have generally been decreasing in both the Intermediate and Regional Aquifers in recent years (AECOM, 2019). The state of California has experienced extended drought conditions during the period of review for the Five-Year Review and for much of the past decade. Despite decreasing groundwater levels, the overall gradients of the Intermediate and Regional Aquifers have generally continued to trend to the southeast.

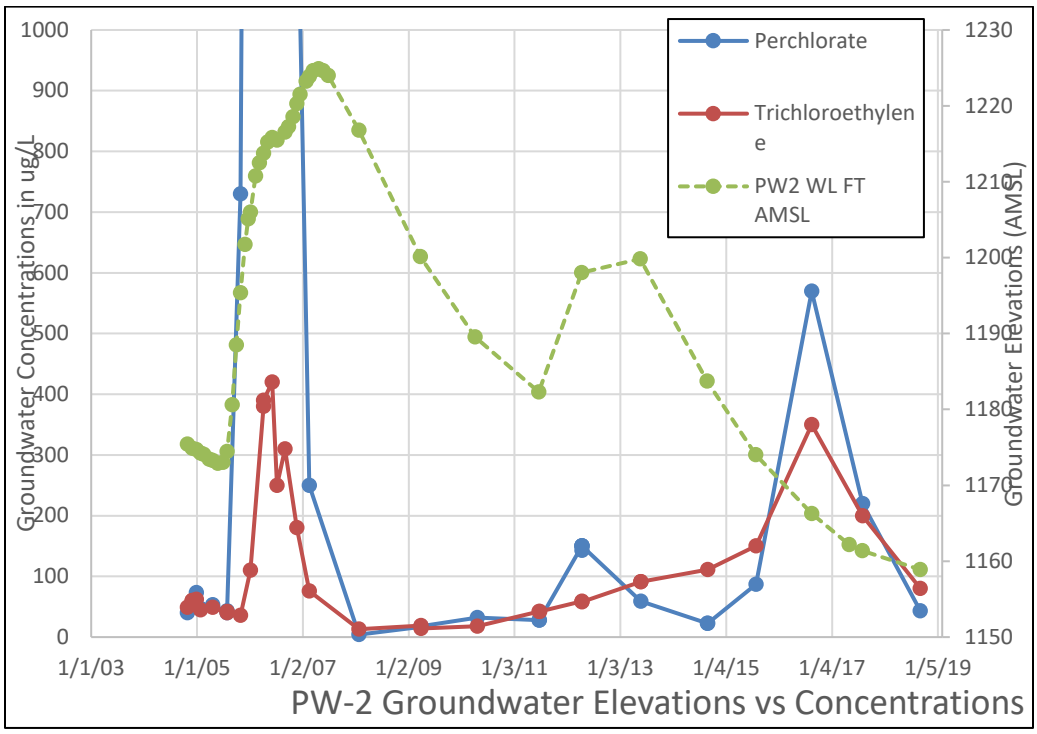



**Figure 4. Well PW-2 Groundwater Elevation vs Concentration Graph**

### 3.3.2. Groundwater Concentrations

To evaluate whether concentrations in groundwater have changed over time, U.S. Army Corps of Engineers applied a statistical test (Mann-Kendall) to data from 20 wells for the period 2008 to 2019. (Earlier data are also available for a limited number of wells.) Three contaminants of concern were evaluated: carbon tetrachloride, perchlorate and TCE. Data were taken from the annual groundwater reports prepared by Emhart Industries (AECOM, 2019) for wells and contaminants that met the minimum statistical requirements. Recently installed extraction well EW-1 had insufficient data to complete a Mann-Kendall analysis.

The trend analyses are intended to provide a baseline for future groundwater evaluations.

#### 3.3.2.1 Intermediate Aquifer

Five groundwater monitoring wells screened in the Intermediate Aquifer were evaluated. Perchlorate concentrations showed decreasing or probably decreasing trends in three of the five wells. One well, PW-2, showed an increasing trend from about 2008 to 2016. No trend was observed in the fifth well. A clear pattern was not apparent in TCE concentrations. TCE concentrations in wells PW2 and EMW-05A increased or probably increased but the other three wells showed stable or decreasing trends.

#### 3.3.2.2 Regional Aquifer

Fifteen groundwater monitoring wells screened in the Regional Aquifer were evaluated. The perchlorate concentrations showed stable or decreasing trends in the majority of the wells. Three wells, PW-6B, 6C, and 6D, showed increasing or probably increasing trends. In contrast, a majority of the wells screened in the Regional Aquifer showed stable or increasing trends in TCE concentrations from 2008 to 2019. Two of the 15 wells showed decreasing TCE concentrations over the same period.

Carbon tetrachloride was not detected in any of the 20 wells, with the exception of EMW-04A which showed a probable decreasing trend.

**Table 3. Summary of Mann-Kendall Analysis for Perchlorate**

| Well | Samples (n)[1] | Number of detects | Mann-Kendall Statistic (S)[2] | Confidence in Trend [3] | Coeffiecient of Variation (COV)[4] | Concentration Trend | Maximum concentration (µg/L) | Comments |
|---|---|---|---|---|---|---|---|---|
| **Intermediate Aquifer Wells** | | | | | | | | |
| PW-2 | 12 | 12 | 32 | 98.4% | 1.45 | Increasing | 570 | **Max Concentration in 2016** |
| PW-8A | 12 | 11 | -25 | 97.0% | 0.56 | Decreasing | 180 | **Max Concentration in 2010** |
| EMW-03A | 9 | 9 | 11 | 88.7% | 0.33 | No Trend | 40 | **Max Concentration in 2017** |
| EMW-04A | 9 | 9 | -14 | 94.6% | 0.52 | Prob Decreasing | 160 | **Max Concentration in 2016** |
| EMW-05A | 7 | 7 | -11 | 97.2% | 0.73 | Decreasing | 130 | **Max Concentration in 2015** |
| **Regional Aquifer Wells** | | | | | | | | |
| EMW-01A | 9 | 8 | 2 | 54.8% | 0.75 | No Trend | 38 | **Max Concentration in 2014** |
| EMW-01B | 9 | 9 | 0 | 45.2% | 0.82 | Stable | 380 | **Max Concentration in 2016** |
| EMW-04B | 9 | 9 | 8 | 80.1% | 0.65 | No Trend | 74.6 | **Max Concentration in 2014** |
| EMW-06D | 4 | 4 | -4 | 83.3% | 0.82 | Stable | 62 | **Max Concentration in 2016** |
| EMW-07D | 4 | 4 | 4 | 83.0% | 0.47 | No Trend | 72 | **Max Concentration in 2019** |
| EMW-07S | 4 | 4 | 0 | 37.5% | 0.16 | Stable | 68 | **Max Concentration in 2018** |
| EPA-MW9A | 7 | 7 | -3 | 64.0% | 0.57 | Stable | 199 | **Max Concentration in 2013** |
| EW-1 | Insufficient Number of Data Points | | | | | | | |
| PW-5A | 12 | 12 | -30 | 99.0% | 0.6 | Decreasing | 169 | **Max Concentration in 2013** |
| PW-5B | 12 | 12 | -29 | 97.4% | 0.43 | Decreasing | 192 | **Max Concentration in 2013** |
| PW-5C | 12 | 12 | -27 | 96.3% | 1.23 | Decreasing | 1000 | **Max Concentration in 2008** |
| PW-5D | 12 | 11 | -49 | 99.9% | 0.5 | Decreasing | 1600 | **Max Concentration in 2010** |
| PW-5E | 12 | 10 | 11 | 81.0% | 0.50 | No Trend | 560 | **Max Concentration in 2012** |
| PW-6B | 12 | 12 | 42 | 99.8% | 0.76 | Increasing | 140 | **Max Concentration in 2015** |
| PW-6C | 12 | 12 | 43 | 99.9% | 0.89 | Increasing | 160 | **Max Conc. In 2016/2017** |
| PW-6D | 12 | 9 | 15 | 92.5% | 0.06 | Prob Increasing | 430 | **Max Concentration in 2015** |

Notes:

[1] Number of samples used during the Mann-Kendall Statistic analysis.

[2] The Mann-Kendall Statistic (s) measures the trend of the data. Positive values indicate an increase of concentrations over time, whereas negative values indicate a decrease in concentrations over time.

[3] The Confidence in Trend is the statistical confidence that the constituent concentration is increasing (S-0).

[4] The coefficient of variation (COV) is a statistical measure of how the individual data points vary about the mean value. The coefficient of variation, defined as the standard deviation divided by the average. Valuies near 1 indicate that the data form a relatively close group about the mean value. Values other larger or smaller than 1.0 indicate that the data show a greater degree of scatter about the mean.

### Table 4. Summary of Mann-Kendall Analysis for TCE

| Well | Samples (n)[1] | Number of detects | Mann-Kendall Statistic (S)[2] | Confidence in Trend [3] | Coeffiecient of Variation (COV)[4] | Concentration Trend | Maximum concentration (µg/L) | Comments |
|---|---|---|---|---|---|---|---|---|
| **Intermediate Aquifer Wells** | | | | | | | | |
| PW-2 | 12 | 12 | 44 | 99.9% | 0.95 | Increasing | 350 | **Max Concentration in 2016** |
| PW-8A | 12 | 12 | -43 | 99.9% | 0.68 | Decreasing | 70 | **Max Concentration in 2011** |
| EMW-03A | 9 | 7 | 12 | 87.0% | 0.59 | No Trend | 1.5 | **Max Concentration in 2018** |
| EMW-04A | 9 | 9 | -2 | 54.0% | 0.2 | Stable | 25 | **Max Concentration in 2019** |
| EMW-05A | 7 | 7 | 11 | 93.2% | 1.2 | Prob Increasing | 20 | **Max Concentration in 2017** |
| **Regional Aquifer Wells** | | | | | | | | |
| EMW-01A | 9 | 6 | -21 | 98.3% | 0.43 | Decreasing | 2.6 | **Max Concentration in 2014** |
| EMW-01B | 9 | 8 | 14 | 91.0% | 0.68 | Prob Increasing | 9.1 | **Max Concentration in 2018** |
| EMW-04B | 9 | 9 | 24 | 99.4% | 0.77 | Increasing | 30 | **Max Concentration in 2019** |
| EMW-06D | 4 | 4 | -4 | 83.3% | 1 | Stable | 11 | **Max Concentration in 2016** |
| EMW-07D | 4 | 4 | 6 | 95.8% | 0.82 | Increasing | 6.2 | **Max Concentration in 2019** |
| EMW-07S | 4 | 4 | -3 | 72.9% | 0.38 | Stable | 4 | **Max Concentration in 2017** |
| EPA-MW9A | 7 | 6 | -2 | 55.7% | 0.59 | Stable | 7.5 | **Max Concentration in 2013** |
| EW-1 | Insufficient Number of Data Points | | | | | | | |
| PW-5A | 12 | 8 | -20 | 97.8% | 1.57 | Decreasing | 23 | **Max Concentration in 2008** |
| PW-5B | 13 | 13 | 16 | 87.5% | 0.37 | No Trend | 39 | **Max Concentration in 2015** |
| PW-5C | 12 | 12 | 26 | 95.7% | 0.4 | Increasing | 34 | **Max Concentration in 2015** |
| PW-5D | 13 | 13 | 42 | 99.5% | 0.56 | Increasing | 35 | **Max Concentration in 2015** |
| PW-5E | 12 | 9 | 27 | 99.8% | 0.71 | Increasing | 24 | **Max Concentration in 2018** |
| PW-6B | 13 | 10 | 41 | 99.9% | 0.71 | Increasing | 11 | **Max Concentration in 2019** |
| PW-6C | 12 | 10 | 43 | 99.9% | 1.22 | Increasing | 35 | **Max Concentration in 2019** |
| PW-6D | 13 | 8 | 23 | 99.9% | 0.46 | Increasing | 25 | **Max Concentration in 2019** |

Notes:

[1] Number of samples used during the Mann-Kendall Statistic analysis.

[2] The Mann-Kendall Statistic (s) measures the trend of the data. Positive values indicate an increase of concentrations over time, whereas negative values indicate a decrease in concentrations over time.

[3] The Confidence in Trend is the statistical confidence that the constituent concentration is increasing (S-0).

[4] The coefficient of variation (COV) is a statistical measure of how the individual data points vary about the mean value. The coefficient of variation, defined as the standard deviation divided by the average. Valuies near 1 indicate that the data form a relatively close group about the mean value. Values other larger or smaller than 1.0 indicate that the data show a greater degree of scatter about the mean.

## 3.4. Site Inspection and Interviews

The site inspection was conducted by Benino McKenna from the U.S. Army Corps of Engineers Seattle District on January 14, 2020. In attendance were Wayne Praskins, EPA Remedial Project Manager; David Towell, Senior Project Manager Jacobs, Eng.; Kamran Javandel, representing Emhart Industries Inc.; Tom Crowley, Utilities Manager for the City of Rialto; David Terry, Project Manager with Veolia; Andrew Coleman, Field Supervisor with Veolia; Jerry Zimmerle, Project Manager AECOM; Tom Munoz, Construction Manager AECOM; and Diana Chacon, Geologist with Geo-Logic Consultants. The purpose of the inspection was to assess the protectiveness of the remedy.

The participants met at the Combined Treatment Plant located on North Linden Ave in the City of Rialto, then toured the groundwater treatment plant and the EW-1 well location. A summary of the site inspection, trip report, and site photos are included in Appendix G.

The portion of the Combined Treatment Plant constructed as part of County Remedy appeared to be in good condition and functioning as intended. The new equipment installed as part of Source Area Operable Unit also appeared to be in good condition but was not in service at the time of the site visit. The groundwater extraction components of the Source Area Operable Unit observed during the site inspection

that will supply the Combined Treatment Plant also appeared to be in good condition. A more complete evaluation of the remedy will be possible when the system begins operation.

# 4. Technical Assessment

## 4.1. Question A: Is the remedy functioning as intended by the decision documents?

The remedy is not yet operating, but it is in the final stages of construction and permitting. Perchlorate breakthrough during the second pilot test followed model predictions, establishing that the ion exchange resin and the vessel configuration would adequately treat extracted site groundwater. Upon permitting by the State, remedy operation is expected to commence in 2020. Based on review of project-related documents and data, as well as the site inspection, the remedy is expected to function as intended by the ROD. It is expected that the remedy will achieve the remedial action objectives of protecting water supply wells and groundwater resources by limiting the spread of contaminated groundwater from the 160-acre area and removing contaminants from groundwater.

## 4.2. Question B: Are the exposure assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of Remedy Selection Still Valid?

Yes, the exposure assumptions, cleanup levels, and remedial action objectives used at the time of the remedy selection are still valid. Groundwater pumping is restricted to water utilities, which test and treat extracted groundwater as necessary. No new human health or ecological routes of exposure or receptors have been identified. In addition, no new contaminants or contamination sources have been identified. ARARs were evaluated and there were some changes to ARARs since finalization of the 2010 Interim ROD (Appendix D). However, none of these changes are substantial and therefore do not affect the protectiveness of the remedy.

## 4.3. Question C: Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No additional information has come to light which would affect the protectiveness of the remedy.

# 5. Issues/Recommendations

No issues were identified in this five-year review.

## 5.1. Other Findings

The following are recommendations that do not affect current and/or future protectiveness and were identified during the Five-Year Review:

- EPA sampled wells Rialto-03, Rialto-06, and EW-1 in November 2017 and March 2018 for per- and polyfluoroalkyl substances (PFAS). Laboratory results show that one type of PFAS (perflourobutylsulfonate) was detected in one untreated groundwater sample from Rialto-06 at a concentration of 77.6 ng/L, which is below EPA's screening level of 400 ng/L. PFAS was not found in any other site samples at or above the reporting limits. It is recommended that this information be formalized in site documentation.

# 6. Protectiveness Statement

**Table 5. Protectiveness Statement**

| Protectiveness Statement(s) | |
|---|---|
| *Operable Unit:1* | *Protectiveness Determination:*<br>Will be Protective |
| *Protectiveness Statement:*<br>The remedy at the Rockets, Fireworks and Flares Superfund Site is expected to be protective of human health and the environment upon completion. In the interim, the remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas. | |

# 7. Next Review

The next five-year review report for the Rockets, Fireworks, and Flares Superfund Site is required five years from the completion date of this review.

# Appendix A: List of Documents Reviewed

AECOM, 2015. April 2015- Additional Groundwater Sampling Data, Source Area Operable Unit, Rockets, Fireworks, and Flares Site. April 27, 2015.

AECOM, 2016. August 2016 Remedial Design Investigation Report, Source Area Operable Unit, Rockets, Fireworks, and Flares Site. November 2016.

AECOM, 2017a. Second Pilot Test Work Plan, Source Area Operable Unit Interim Remedy, Rockets, Fireworks, and Flares Superfund Site Rialto, California. October 2017.

AECOM, 2017b. Remedial Design Investigation Report, Source Area Operable Unit, Rockets, Fireworks, and Flares Site. November 2017.

AECOM, 2018. Remedial Design Investigation Report, Source Area Operable Unit, Rockets, Fireworks, and Flares Site. November 2018.

AECOM, 2019. Remedial Design Investigation Report, Source Area Operable Unit, Rockets, Fireworks, and Flares Site. October 2019.

CH2MHILL, 2010. Remedial Investigation/Feasibility Study Report, B.F. Goodrich Superfund Site, Rialto, California. January 25, 2010.

Emhart Industries, Inc., 2014. Final Design, Source Area Operable Unit, Rockets, Fireworks, and Flares Superfund Site. June 18, 2014.

USEPA, 2010. Superfund Interim Action Record of Decision: Source Area Operable Unit, B.F. Goodrich Superfund Site, San Bernardino County, CA. September 30, 2010.

# Appendix B: Site Chronology

| Events | Date |
|---|---|
| EPA added the Site to the National Priorities List (NPL) | September 23, 2009 |
| Remedial Investigation and Feasibility Study Report | January 25, 2010 |
| Interim Action Record of Decision | September 30, 2010 |
| Consent Decree entered by the U.S. District Court for the Central District of California in City of Colton v. American Promotional Events, Inc. et al., Case No. ED CV 09-01864 PSG (SSx) on 2 July 2013 (Doc. No. 1820). | July 2, 2013 |
| EPA changed the name of the B.F. Goodrich site in Rialto California to Rockets, Fireworks, and Flares (RFF) | December 12, 2013 |
| Final Design Report for expanded treatment system | June 18, 2014 |
| Four Party Implementation Agreement | September 1, 2015 |
| Start of On-Site Construction | September 18, 2015 |
| 2016 Remedial Design Investigation Report to provide current water level measurements and contaminant concentration data for wells in the Source Area Operable Unit vicinity. | November 2016 |
| Initial Pilot Test performed to demonstrate the effectiveness of the ion exchange (IX) resin and lead/mid/lag series design in the Combined Treatment Plant. | December 2016 to March 2017 |
| Second Pilot Test Work Plan | October 2017 |
| 2017 Remedial Design Investigation Report to provide current water level measurements and contaminant concentration data for wells in the Source Area Operable Unit vicinity. | November 2017 |
| 2018 Remedial Design Investigation Report to provide current water level measurements and contaminant concentration data for wells in the Source Area Operable Unit vicinity. | November 2018 |
| Second Pilot Test performed to better simulate full-scale operations. | January 2018 to December 2019 |
| 2019 Remedial Design Investigation Report to provide current water level measurements and contaminant concentration data for wells in the Source Area Operable Unit vicinity. | October 2019 |

# Appendix C: Data Review

**Mann-Kendall Analysis for Groundwater**

The Mann-Kendall test is a non-parametric test for identifying trends in time-series data. The test compares the relative magnitudes of sample data rather than the data values themselves. One benefit of this test is that the data does not need to conform to any one distribution type. Data reported as non-detects can be included by assigning them a common value that is smaller than the lowest detected value in the dataset, although the number of non-detects should not be greater than 50 percent of the sample size (*n*). For the purposes of this evaluation Non-Detectable values are highlighted in red.

Data are evaluated as an ordered time series. Each data value is compared to all subsequent data values. If a data value from a later time is higher than a data value from an earlier time, *S* is incremented by 1. Conversely, if a data value from a later time is lower than a data value from an earlier time, *S* is decremented by 1. The net result of all such increments and decrements yields the final value of *S*. A positive value of *S* is an indicator of a potentially increasing trend. Likewise, a negative value of *S* is an indicator of a potentially decreasing trend. A very high positive *S* is an indicator of a likely significant increasing trend; however, it is necessary to compute the probability associated with *S* and the sample size, *n*, to statistically quantify the significance of the trend.

Kendall describes a normal-approximation test that may be used for datasets with more than 10 values, provided there are not many tied values within the dataset. First, *S* is determined and then the variance (VAR) of *S* is calculated based on the following equation:

$$VAR(S) = [n*(n-1)*(2n+5)]/18$$

A normalized Test Statistic (*Z*) is calculated using the following equations:

$$Z = (S-1)/\sqrt{[VAR(S)]} \quad \text{if } S>0$$

$$Z=0 \quad \text{if } S=0$$

$$Z= (S+1)/\sqrt{[VAR(S)]} \quad \text{if } S<0$$

For a trend to attain at least a 95 percent level of significance, the Test Statistic *Z* must be greater than 1.645 for a positive trend or must be less than -1.645 for a negative trend. If neither of these conditions are met, then the dataset shows no trend at that level of significance.

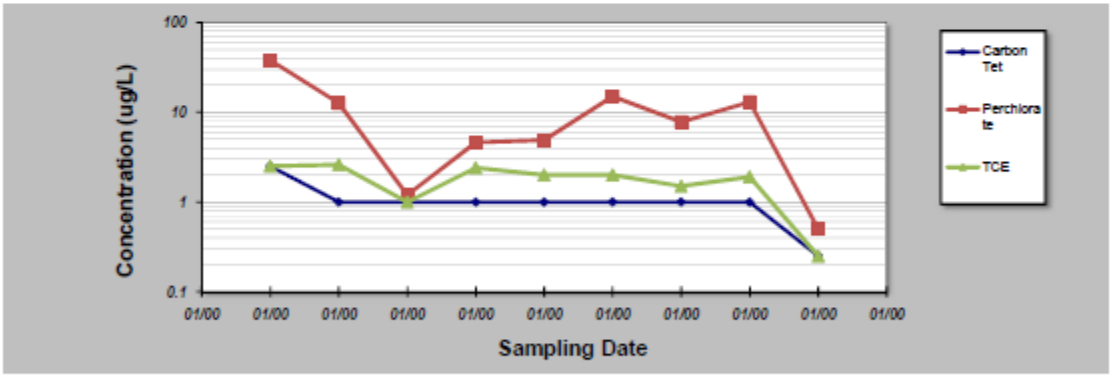
## Figure C-1: Mann-Kendall Statistical Analysis for Well EMW-01A

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 9-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna

Job ID: EMW-01A
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 05/09/2014 | 2.5 | 38 | 2.5 | | | | |
| 2 | 08/26/2014 | 1 | 12.6 | 2.6 | | | | |
| 3 | 11/05/2014 | 1 | 1.2 | 1 | | | | |
| 4 | 04/01/2015 | 1 | 4.6 | 2.4 | | | | |
| 5 | 07/13/2015 | 1 | 4.9 | 2 | | | | |
| 6 | 8/15/2016 | 1 | 15 | 2 | | | | |
| 7 | 1-Aug-17 | 1 | 7.8 | 1.5 | | | | |
| 8 | 8/14/2018 | 1 | 13 | 1.9 | | | | |
| 9 | 16-Aug-19 | 0.25 | 0.5 | 0.25 | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.54 | 0.75 | 0.43 | | | | |
| Mann-Kendall Statistic (S): | | -15 | 2 | -21 | | | | |
| Confidence Factor: | | 92.5% | 54.8% | 98.3% | | | | |
| Concentration Trend: | | Prob. Decreasing | No Trend | Decreasing | | | | |




**Notes:**

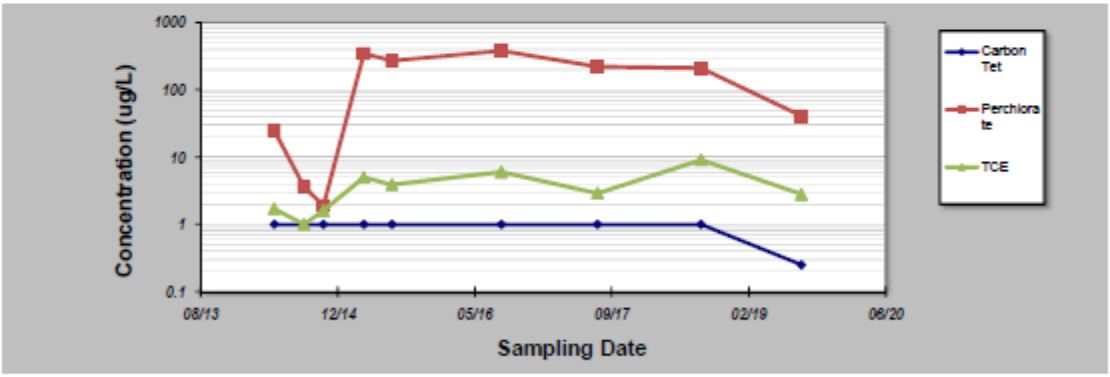
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-2: Mann-Kendall Statistical Analysis for Well EMW-01B

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 3-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna
Job ID: EMW-01B
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 05/09/2014 | 1 | 25.1 | 1.7 | | | | |
| 2 | 08/26/2014 | 1 | 3.6 | 1 | | | | |
| 3 | 11/05/2014 | 1 | 1.9 | 1.6 | | | | |
| 4 | 04/01/2015 | 1 | 345 | 5 | | | | |
| 5 | 07/13/2015 | 1 | 270 | 3.9 | | | | |
| 6 | 08/15/2016 | 1 | 380 | 6 | | | | |
| 7 | 8/1/2017 | 1 | 220 | 2.9 | | | | |
| 8 | 14-Aug-18 | 1 | 210 | 9.1 | | | | |
| 9 | 16-Aug-19 | 0.25 | 41 | 2.8 | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.27 | 0.82 | 0.68 | | | | |
| Mann-Kendall Statistic (S): | | -8 | 0 | 14 | | | | |
| Confidence Factor: | | 76.2% | 45.2% | 91.0% | | | | |
| Concentration Trend: | | Stable | Stable | Prob. Increasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.



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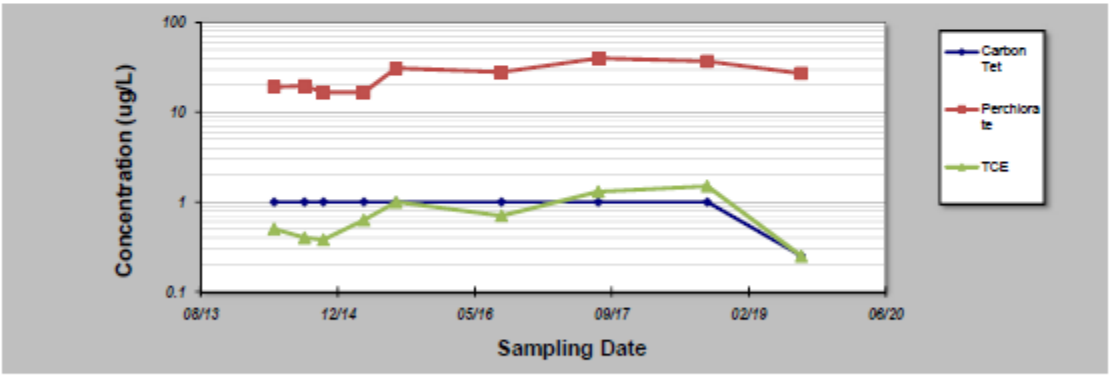
## Figure C-3: Mann-Kendall Statistical Analysis for Well EMW-03A

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 3-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna
Job ID: EMW-03A
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 05/09/2014 | 1 | 19.1 | 0.5 | | | | |
| 2 | 08/28/2014 | 1 | 19.7 | 0.4 | | | | |
| 3 | 11/05/2014 | 1 | 16.7 | 0.38 | | | | |
| 4 | 04/01/2015 | 1 | 16.7 | 0.63 | | | | |
| 5 | 07/28/2015 | 1 | 31 | 1 | | | | |
| 6 | 8/16/2016 | 1 | 28 | 0.7 | | | | |
| 7 | 4-Aug-17 | 1 | 40 | 1.3 | | | | |
| 8 | 6-Sep-18 | 1 | 37 | 1.5 | | | | |
| 9 | 15-Aug-19 | 0.25 | 27 | 0.25 | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.27 | 0.33 | 0.59 | | | | |
| Mann-Kendall Statistic (S): | | -8 | 11 | 12 | | | | |
| Confidence Factor: | | 76.2% | 88.7% | 87.0% | | | | |
| Concentration Trend: | | Stable | No Trend | No Trend | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

*DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.*

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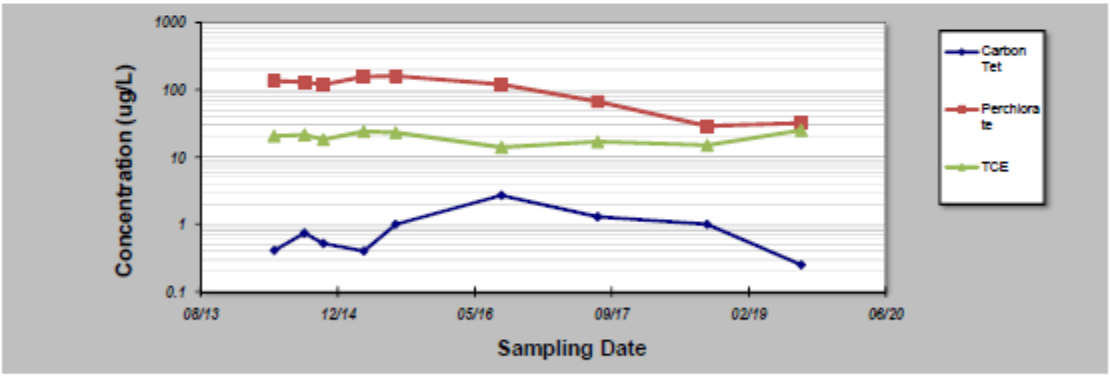
## Figure C-4: Mann-Kendall Statistical Analysis for Well EMW-04A

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 3-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna

Job ID: EMW-04A
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 05/09/2014 | 0.41 | 136 | 20.6 | | | | |
| 2 | 08/28/2014 | 0.74 | 130 | 21.4 | | | | |
| 3 | 11/05/2014 | 0.52 | 119 | 18.3 | | | | |
| 4 | 04/01/2015 | 0.4 | 157 | 24 | | | | |
| 5 | 07/27/2015 | 1 | 160 | 23 | | | | |
| 6 | 16-Aug-16 | 2.7 | 120 | 14 | | | | |
| 7 | 2-Aug-17 | 1.3 | 67 | 17 | | | | |
| 8 | 6-Sep-18 | 1 | 29 | 15 | | | | |
| 9 | 15-Aug-19 | 0.25 | 32 | 25 | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.81 | 0.52 | 0.20 | | | | |
| Mann-Kendall Statistic (S): | | 5 | -14 | -2 | | | | |
| Confidence Factor: | | 65.7% | 94.6% | 54.0% | | | | |
| Concentration Trend: | | No Trend | Prob. Decreasing | Stable | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-5: Mann-Kendall Statistical Analysis for Well EMW-04B

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 3-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna

Job ID: EMW-04B
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 05/09/2014 | 1 | 13.6 | 4.5 | | | | |
| 2 | 08/26/2014 | 1 | 2.8 | 2.9 | | | | |
| 3 | 11/05/2014 | 1 | 74.6 | 10.4 | | | | |
| 4 | 04/01/2015 | 1 | 35.8 | 6.8 | | | | |
| 5 | 07/27/2015 | 1 | 33 | 7.5 | | | | |
| 6 | 08/15/2016 | 1 | 7 | 5.8 | | | | |
| 7 | 8/2/2017 | 1 | 42 | 13 | | | | |
| 8 | 6-Sep-18 | 1 | 36 | 17 | | | | |
| 9 | 15-Aug-19 | 0.25 | 53 | 30 | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
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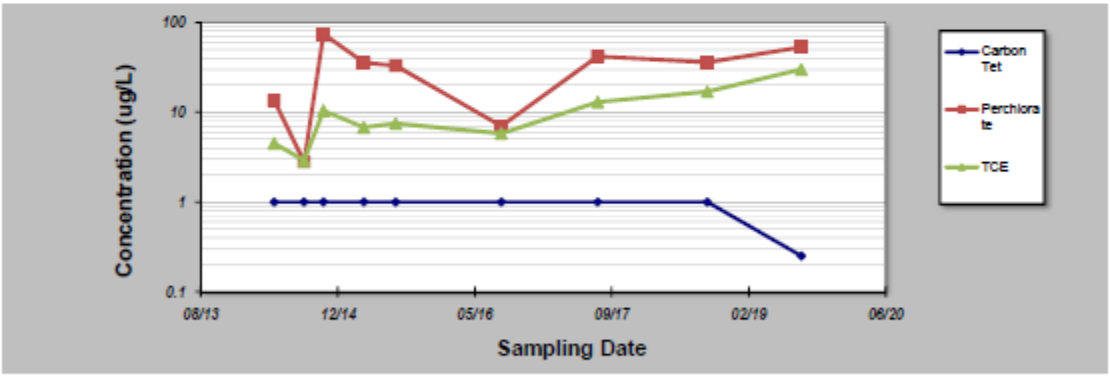
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.27 | 0.65 | 0.77 | | | | |
| Mann-Kendall Statistic (S): | | -8 | 8 | 24 | | | | |
| Confidence Factor: | | 76.2% | 80.1% | 99.4% | | | | |
| Concentration Trend: | | Stable | No Trend | Increasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-6: Mann-Kendall Statistical Analysis for Well EMW-05A

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 3-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna

Job ID: EMW-05A
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 05/09/2014 | 1 | 98.5 | 0.9 | | | | |
| 2 | 08/29/2014 | 1 | 99.2 | 0.89 | | | | |
| 3 | 07/28/2015 | 1 | 130 | 1.1 | | | | |
| 4 | 08/16/2016 | 1 | 81 | 5.4 | | | | |
| 5 | 08/02/2017 | 1 | 27 | 20 | | | | |
| 6 | 9/6/2018 | 1 | 20 | 6 | | | | |
| 7 | 15-Aug-19 | 0.25 | 25 | 4.9 | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
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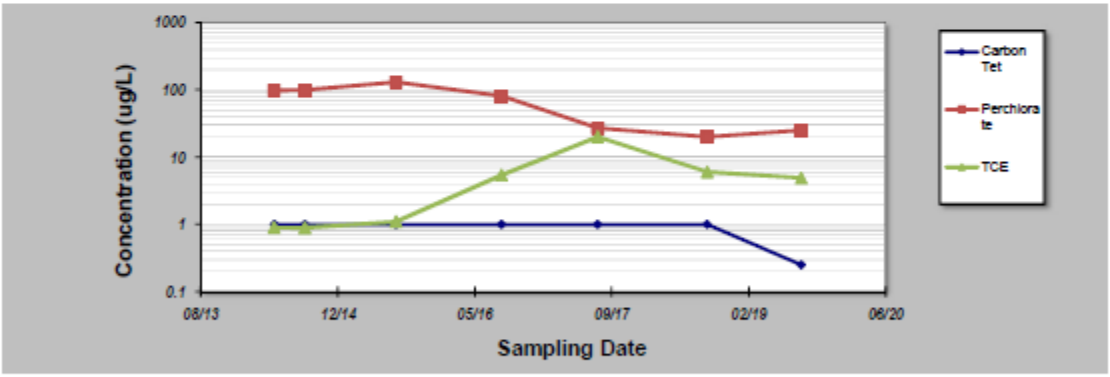
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.32 | 0.73 | 1.20 | | | | |
| Mann-Kendall Statistic (S): | | -6 | -11 | 11 | | | | |
| Confidence Factor: | | 76.4% | 97.2% | 93.2% | | | | |
| Concentration Trend: | | Stable | Decreasing | Prob. Increasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-7: Mann-Kendall Statistical Analysis for Well EMW-6D

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 3-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna
Job ID: EMW-6D
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 08/15/2016 | 1 | 62 | 11 | | | | |
| 2 | 08/02/2017 | 1 | 30 | 5 | | | | |
| 3 | 09/06/2018 | 1 | 9.6 | 0.79 | | | | |
| 4 | 8/15/2019 | 0.25 | 14 | 1.7 | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
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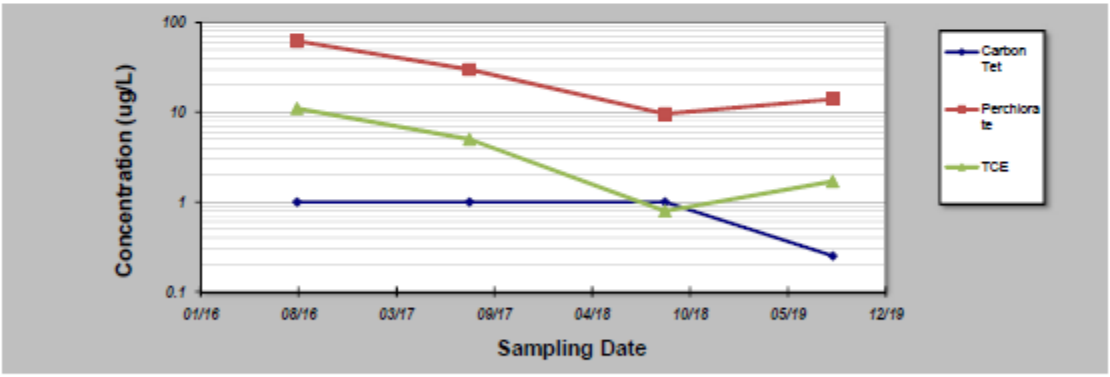
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.46 | 0.60 | 1.00 | | | | |
| Mann-Kendall Statistic (S): | | -3 | -1 | -4 | | | | |
| Confidence Factor: | | 72.9% | | 83.3% | | | | |
| Concentration Trend: | | Stable | | Stable | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-8: Mann-Kendall Statistical Analysis for Well EMW-07D

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 9-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna

Job ID: EMW-07D
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 08/15/2016 | 1 | 33 | 1.1 | | | | |
| 2 | 08/01/2017 | 1 | 25 | 1.2 | | | | |
| 3 | 08/14/2018 | 1 | 46 | 3.1 | | | | |
| 4 | 08/16/2019 | 0.25 | 72 | 6.2 | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
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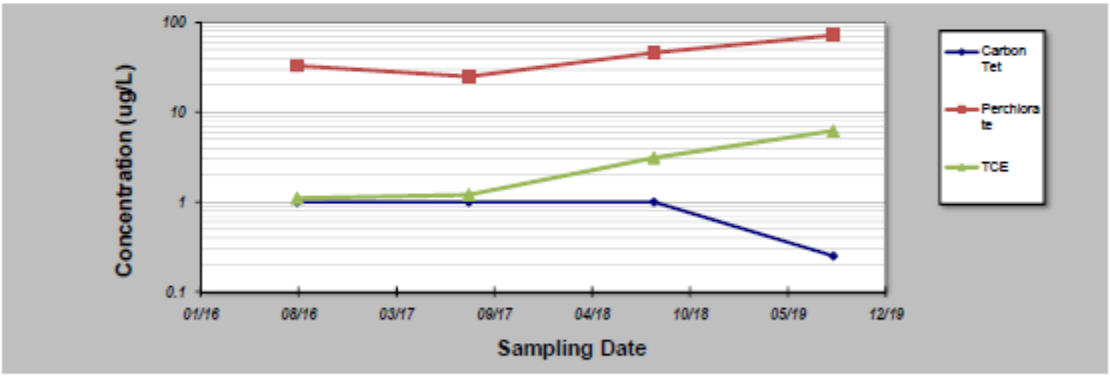
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.46 | 0.49 | 0.82 | | | | |
| Mann-Kendall Statistic (S): | | -3 | 3 | 6 | | | | |
| Confidence Factor: | | 72.9% | | 95.8% | | | | |
| Concentration Trend: | | Stable | | Increasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-9: Mann-Kendall Statistical Analysis for Well EMW-07S

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 3-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna
Job ID: EMW-07S
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 08/15/2016 | 1 | 57 | 2.9 | | | | |
| 2 | 08/01/2017 | 1 | 49 | 4 | | | | |
| 3 | 08/14/2018 | 1 | 68 | 2.9 | | | | |
| 4 | 08/16/2019 | 0.25 | 50 | 1.4 | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
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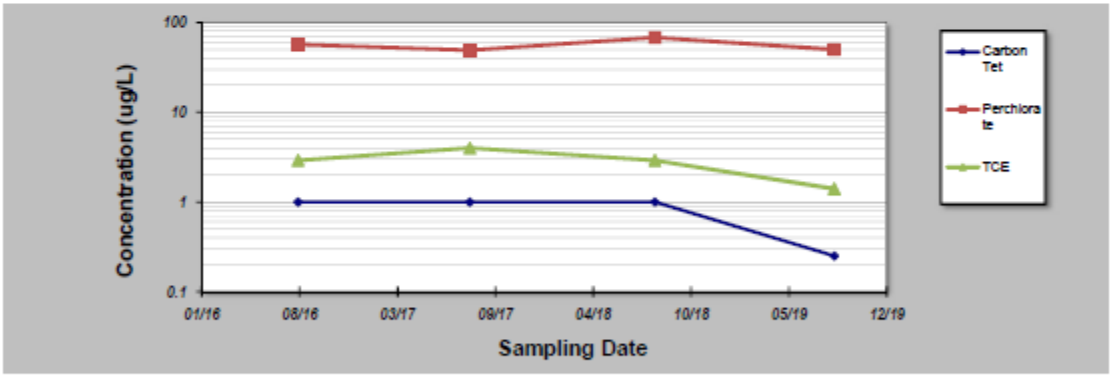
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.46 | 0.19 | 0.38 | | | | |
| Mann-Kendall Statistic (S): | | -3 | 1 | -3 | | | | |
| Confidence Factor: | | 72.9% | | 72.9% | | | | |
| Concentration Trend: | | Stable | | Stable | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

*DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.*

GSI Environmental Inc., www.gsi-net.com

## Figure C-10: Mann-Kendall Statistical Analysis for Well EPA-MW9A

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 9-Feb-20
Facility Name: Rockets, Fireworks, Flares
Conducted By: Ben McKenna

Job ID: EPA-MW9A
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 05/24/2013 | 1.0 | 199.0 | 7.5 | | | | |
| 2 | 08/28/2014 | 1.0 | 2.1 | 1.0 | | | | |
| 3 | 07/30/2015 | 0.5 | 60.0 | 4.4 | | | | |
| 4 | 08/15/2016 | 1.0 | 40.0 | 2.9 | | | | |
| 5 | 08/04/2017 | 1.0 | 37.0 | 4.4 | | | | |
| 6 | 08/14/2018 | 1.0 | 26.0 | 6.1 | | | | |
| 7 | 16-Aug-19 | 0.3 | 35.0 | 1.6 | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
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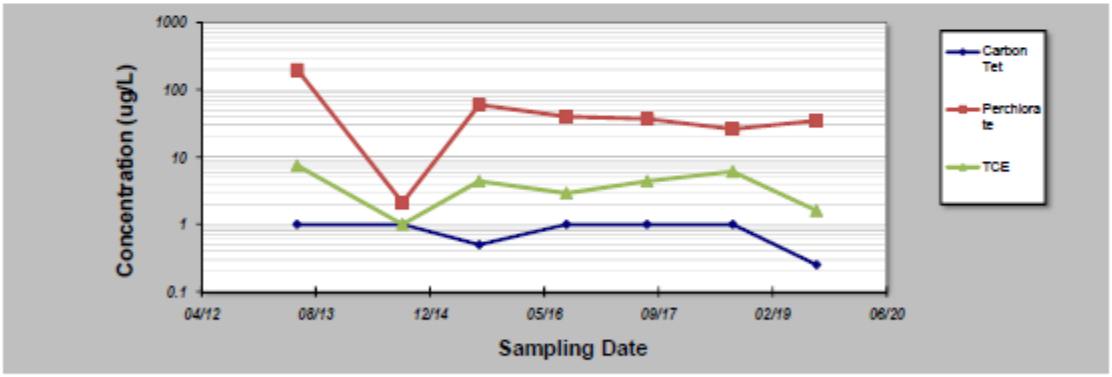
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.38 | 0.57 | 0.59 | | | | |
| Mann-Kendall Statistic (S): | | -5 | -3 | -2 | | | | |
| Confidence Factor: | | 71.9% | 64.0% | 55.7% | | | | |
| Concentration Trend: | | Stable | Stable | Stable | | | | |




**Notes:**

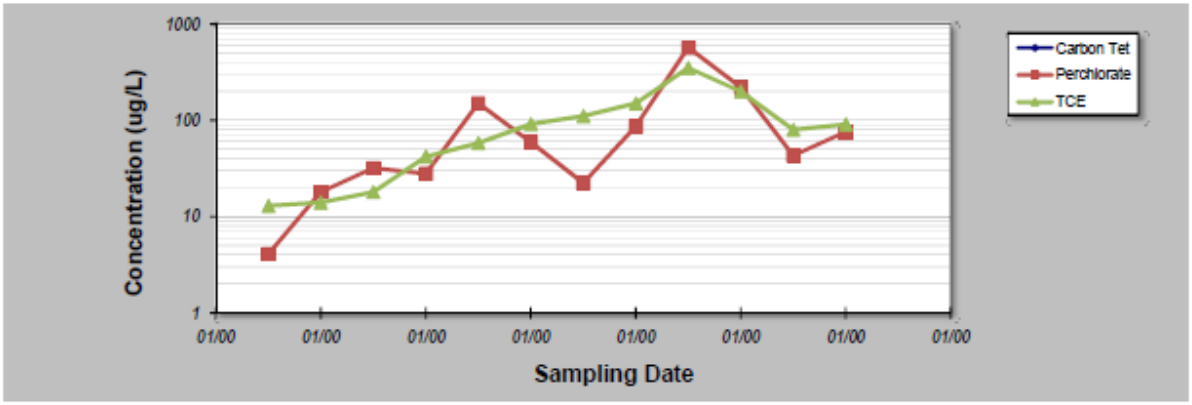
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-11: Mann-Kendall Statistical Analysis for Well PW-2

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

| | | | |
|---|---|---|---|
| Evaluation Date: | 19-Mar-20 | Job ID: | PW-2 |
| Facility Name: | Rockets Fireworks & Flares | Constituent: | |
| Conducted By: | Ben McKenna | Concentration Units: | ug/L |

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/24/2008 | <0.5 | 4.1 | 13 | | | | |
| 2 | 3/27/2009 | | 18 | 14 | | | | |
| 3 | 4/22/2010 | | 32 | 18 | | | | |
| 4 | 6/22/2011 | <0.5 | 28 | 42 | | | | |
| 5 | 4/12/2012 | <0.5 | 150 | 58 | | | | |
| 6 | 05/24/2013 | <1.0 | 59.1 | 91.4 | | | | |
| 7 | 08/28/2014 | <1.0 | 22.4 | 111 | | | | |
| 8 | 07/28/2015 | <1.0 | 87 | 150 | | | | |
| 9 | 08/16/2016 | <5.0 | 570 | 350 | | | | |
| 10 | 08/03/2017 | <2.0 | 220 | 200 | | | | |
| 11 | 09/06/2018 | <1.0 | 43 | 80 | | | | |
| 12 | 8/16/2019 | <0.25 | 76 | 91 | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 1.45 | 0.95 | | | | |
| Mann-Kendall Statistic (S): | | | 32 | 44 | | | | |
| Confidence Factor: | | | 98.4% | 99.9% | | | | |
| Concentration Trend: | | | Increasing | Increasing | | | | |




**Notes:**

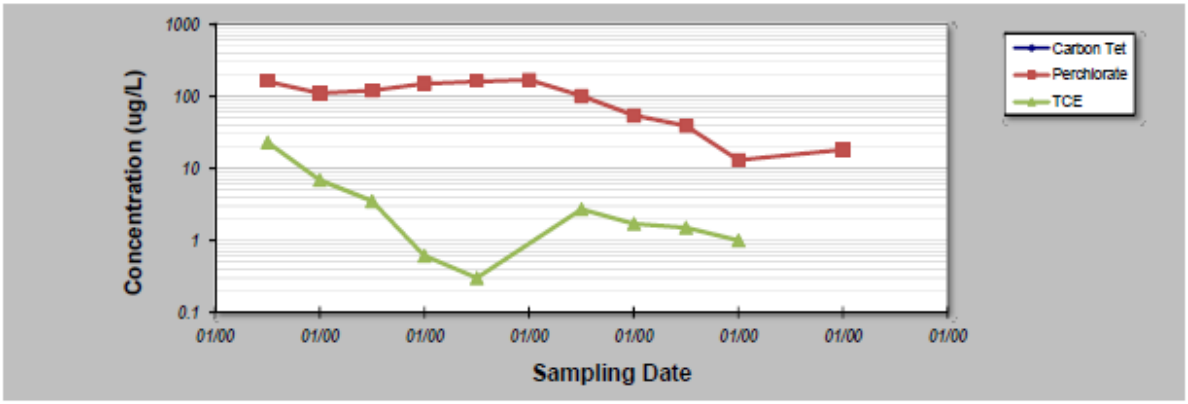
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-12: Mann-Kendall Statistical Analysis for Well PW-5A

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna
Job ID: PW-5A
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| **Sampling Event** | **Sampling Date** | **CONCENTRATION (ug/L)** | | | | | | |
| 1 | 1/21/2008 | <0.5 | 160 | 23 | | | | |
| 2 | 3/18/2009 | | 110 | 6.9 | | | | |
| 3 | 4/19/2010 | | 120 | 3.5 | | | | |
| 4 | 7/6/2011 | <0.5 | 150 | 0.61 | | | | |
| 5 | 4/6/2012 | <0.5 | 160 | 0.3 | | | | |
| 6 | 05/21/2013 | <1.0 | 169 | 0.26 J | | | | |
| 7 | 08/28/2014 | <1.0 | 101 | 2.7 | | | | |
| 8 | 07/16/2015 | <1.0 | 54 | 1.7 | | | | |
| 9 | 08/09/2016 | <1.0 | 39 | 1.5 | | | | |
| 10 | 08/07/2017 | <1.0 | 13 | 1 | | | | |
| 11 | 08/30/2018 | <1.0 | 2.0 J | 0.29 J | | | | |
| 12 | 8/14/2019 | <0.25 | 18 | <0.25 | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 0.60 | 1.57 | | | | |
| Mann-Kendall Statistic (S): | | | -30 | -20 | | | | |
| Confidence Factor: | | | 99.0% | 97.8% | | | | |
| Concentration Trend: | | | Decreasing | Decreasing | | | | |




**Notes:**

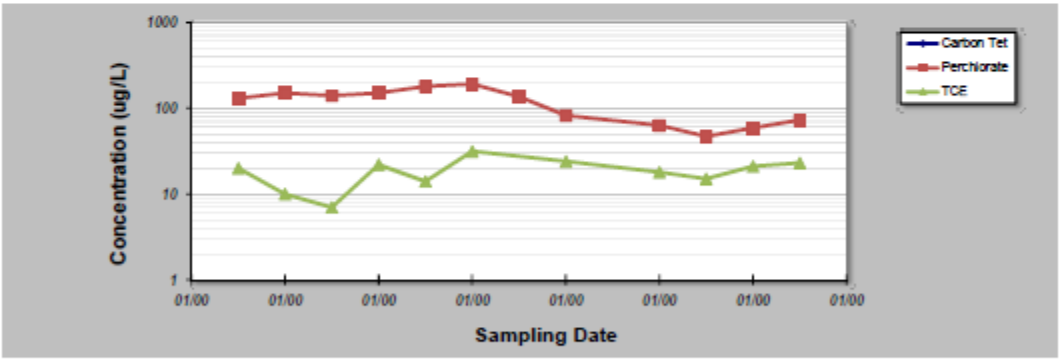
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-13: Mann-Kendall Statistical Analysis for Well PW-5B

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna
Job ID: PW-5B
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/21/2008 | <0.5 | 130 | 20 | | | | |
| 2 | 3/18/2009 | | 150 | 10 | | | | |
| 3 | 4/19/2010 | | 140 | 7 | | | | |
| 4 | 7/6/2011 | <0.5 | 150 | 22 | | | | |
| 5 | 4/6/2012 | <0.5 | 180 | 14 | | | | |
| 6 | 05/21/2013 | <1.0 | 192 | 31.4 | | | | |
| 7 | 08/28/2014 | <1.0 | 136 | 36.3 | | | | |
| 8 | 07/16/2015 | <1.0 | 82 | 24 | | | | |
| 9 | 08/18/2015 | <0.50 | -- | 39 J | | | | |
| 10 | 08/09/2016 | <1.0 | 63 | 18 | | | | |
| 11 | 08/07/2017 | <1.0 | 47 | 15 | | | | |
| 12 | 08/30/2018 | <1.0 | 59 | 21 | | | | |
| 13 | 8/14/2019 | <0.25 | 73 | 23 | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 0.43 | 0.37 | | | | |
| Mann-Kendall Statistic (S): | | | -29 | 16 | | | | |
| Confidence Factor: | | | 97.4% | 87.5% | | | | |
| Concentration Trend: | | | Decreasing | No Trend | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

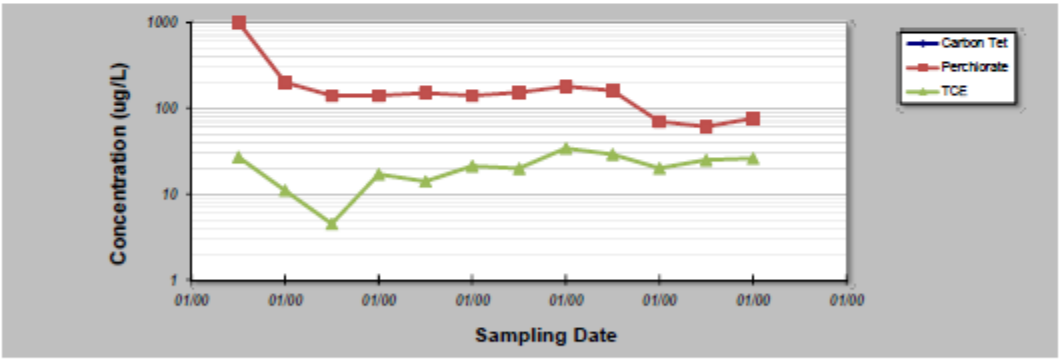
## Figure C-14: Mann-Kendall Statistical Analysis for Well PW-5C

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna

Job ID: PW-5C
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/21/2008 | <0.5 | 1000 | 27 | | | | |
| 2 | 3/18/2009 | | 200 | 11 | | | | |
| 3 | 4/19/2010 | | 140 | 4.5 | | | | |
| 4 | 7/6/2011 | <0.5 | 140 | 17 | | | | |
| 5 | 4/6/2012 | <0.5 | 150 | 14 | | | | |
| 6 | 05/21/2013 | <1.0 | 140 | 21.2 | | | | |
| 7 | 08/28/2014 | <1.0 | 153 | 19.8 | | | | |
| 8 | 07/16/2015 | <1.0 | 180 | 34 | | | | |
| 9 | 08/09/2016 | <1.0 | 160 | 29 | | | | |
| 10 | 08/07/2017 | <1.0 | 70 | 20 | | | | |
| 11 | 08/30/2018 | <1.0 | 61 | 25 | | | | |
| 12 | 8/14/2019 | <0.25 | 76 | 26 | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 1.23 | 0.40 | | | | |
| Mann-Kendall Statistic (S): | | | -27 | 26 | | | | |
| Confidence Factor: | | | 96.3% | 95.7% | | | | |
| Concentration Trend: | | | Decreasing | Increasing | | | | |




**Notes:**

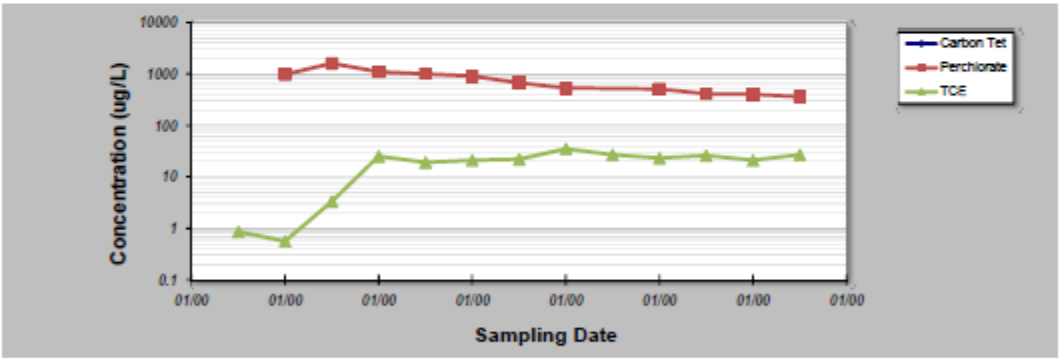
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-15: Mann-Kendall Statistical Analysis for Well PW-5D

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna
Job ID: PW-5D
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/21/2008 | <0.5 | <1.0 | 0.86 | | | | |
| 2 | 3/18/2009 | | 970 | 0.55 | | | | |
| 3 | 4/19/2010 | | 1600 | 3.3 | | | | |
| 4 | 7/6/2011 | <0.5 | 1100 | 25 | | | | |
| 5 | 4/6/2012 | <0.5 | 1000 | 19 | | | | |
| 6 | 05/21/2013 | <1.0 | 908 | 21 | | | | |
| 7 | 08/28/2014 | <1.0 | 666 | 21.9 | | | | |
| 8 | 07/16/2015 | <1.0 | 530 | 35 | | | | |
| 9 | 8/17/2015 | <0.50 | -- | 27 | | | | |
| 10 | 8/9/2016 | <1.0 | 510 | 23 | | | | |
| 11 | 8/7/2017 | <1.0 | 410 | 26 | | | | |
| 12 | 8/30/2018 | <1.0 | 400 | 21 | | | | |
| 13 | 8/14/2019 | <0.25 | 360 | 27 | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 0.50 | 0.56 | | | | |
| Mann-Kendall Statistic (S): | | | -49 | 42 | | | | |
| Confidence Factor: | | | >99.9% | 99.5% | | | | |
| Concentration Trend: | | | Decreasing | Increasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

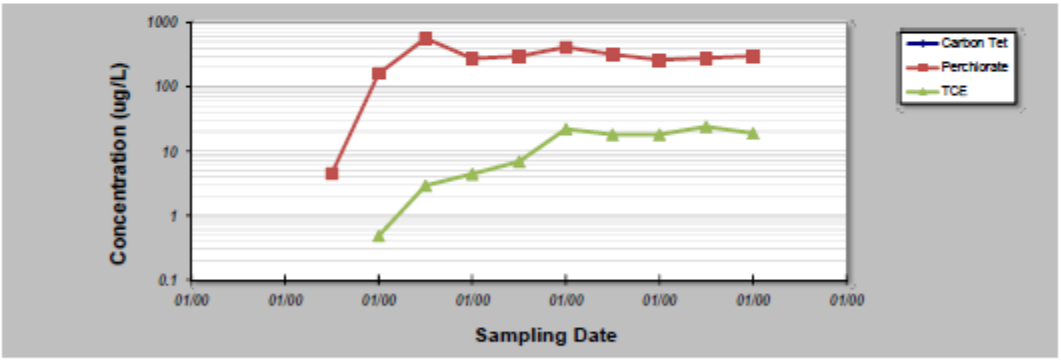
## Figure C-16: Mann-Kendall Statistical Analysis for Well PW-5E

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna

Job ID: PW-5E
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/21/2008 | <0.5 | <1.0 | <0.5 | | | | |
| 2 | 3/18/2009 | | <1.0 | <0.5 | | | | |
| 3 | 4/19/2010 | | 4.5 | <0.5 | | | | |
| 4 | 7/6/2011 | <0.5 | 160 | 0.48 | | | | |
| 5 | 4/6/2012 | <0.5 | 560 | 2.9 | | | | |
| 6 | 05/21/2013 | <1.0 | 274 | 4.4 | | | | |
| 7 | 08/28/2014 | <1.0 | 299 | 6.9 | | | | |
| 8 | 07/16/2015 | <1.0 | 410 | 22 | | | | |
| 9 | 8/9/2016 | <1.0 | 320 | 18 | | | | |
| 10 | 8/7/2017 | <1.0 | 260 | 18 | | | | |
| 11 | 8/30/2018 | <1.0 | 280 | 24 | | | | |
| 12 | 8/14/2019 | <0.25 | 300 | 19 | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 0.50 | 0.71 | | | | |
| Mann-Kendall Statistic (S): | | | 11 | 27 | | | | |
| Confidence Factor: | | | 81.0% | 99.8% | | | | |
| Concentration Trend: | | | No Trend | Increasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

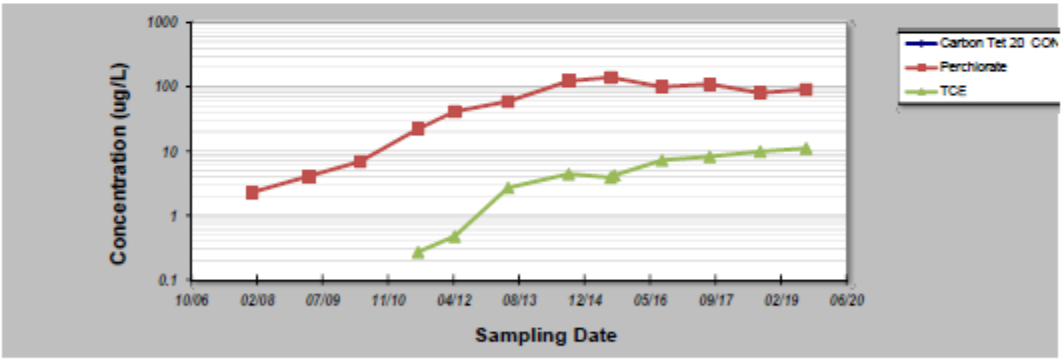
## Figure C-17: Mann-Kendall Statistical Analysis for Well PW-6B

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna

Job ID: PW-6B
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/16/2008 | <0.5 | 2.3 | <0.5 | | | | |
| 2 | 3/25/2009 | | 4.1 | <0.5 | | | | |
| 3 | 4/19/2010 | | 6.9 | <0.5 | | | | |
| 4 | 7/5/2011 | <0.5 | 22 | 0.27 | | | | |
| 5 | 4/9/2012 | <0.5 | 41 | 0.47 | | | | |
| 6 | 5/21/2013 | <1.0 | 59.2 | 2.7 | | | | |
| 7 | 8/27/2014 | <1.0 | 123 | 4.4 | | | | |
| 8 | 7/15/2015 | <1.0 | 140 | 3.9 | | | | |
| 9 | 8/11/2015 | <0.50 | – | 4.2 | | | | |
| 10 | 8/9/2016 | <1.0 | 99 | 7.2 | | | | |
| 11 | 8/8/2017 | <1.0 | 110 | 8.2 | | | | |
| 12 | 8/29/2018 | <1.0 | 80 | 9.9 | | | | |
| 13 | 8/14/2019 | <0.25 | 91 | 11 | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 0.76 | 0.71 | | | | |
| Mann-Kendall Statistic (S): | | | 42 | 41 | | | | |
| Confidence Factor: | | | 99.8% | >99.9% | | | | |
| Concentration Trend: | | | Increasing | Increasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

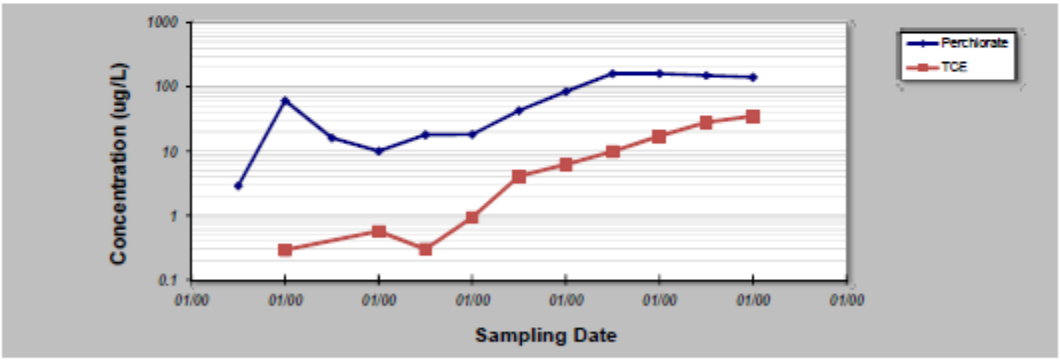
## Figure C-18: Mann-Kendall Statistical Analysis for Well PW-6C

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna

Job ID: PW-6C
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/16/2008 | <0.5 | 2.9 | <0.5 | | | | |
| 2 | 3/25/2009 | | 61 | 0.29 | | | | |
| 3 | 4/19/2010 | | 16 | <0.5 | | | | |
| 4 | 7/5/2011 | <0.5 | 10 | 0.57 | | | | |
| 5 | 4/9/2012 | <0.5 | 18 | 0.3 | | | | |
| 6 | 5/21/2013 | <1.0 | 18.1 | 0.93 | | | | |
| 7 | 8/27/2014 | <1.0 | 42.5 | 4.1 | | | | |
| 8 | 7/15/2015 | <1.0 | 84 | 6.2 | | | | |
| 9 | 8/9/2016 | <1.0 | 160 | 9.9 | | | | |
| 10 | 8/8/2017 | <1.0 | 160 | 17 | | | | |
| 11 | 8/29/2018 | <1.0 | 150 | 28 | | | | |
| 12 | 8/14/2019 | <0.25 | 140 | 35 | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 0.89 | 1.22 | | | | |
| Mann-Kendall Statistic (S): | | | 43 | 43 | | | | |
| Confidence Factor: | | | 99.9% | >99.9% | | | | |
| Concentration Trend: | | | Increasing | Increasing | | | | |




**Notes:**

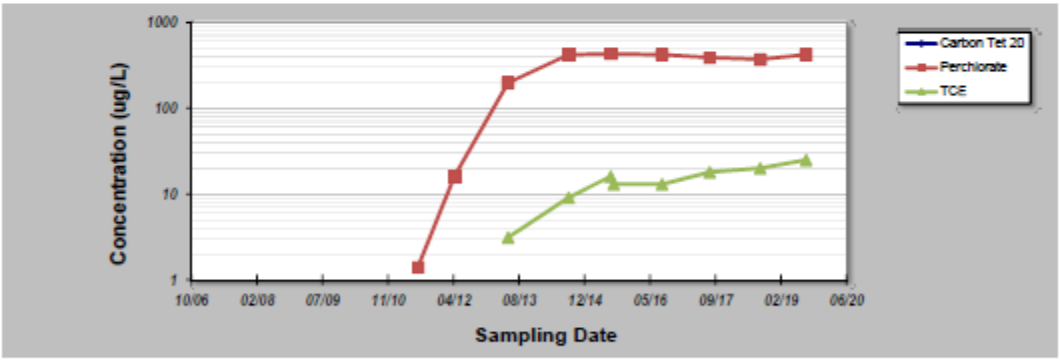
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

## Figure C-19: Mann-Kendall Statistical Analysis for Well PW-6D

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna
Job ID: PW-6D
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/16/2008 | <0.5 | <1.0 | <0.5 | | | | |
| 2 | 3/25/2009 | | <1.0 | <0.5 | | | | |
| 3 | 4/19/2010 | | <1.0 | <0.5 | | | | |
| 4 | 7/5/2011 | <0.5 | 1.4 | <0.5 | | | | |
| 5 | 4/9/2012 | <0.5 | 16 | <0.5 | | | | |
| 6 | 5/21/2013 | <1.0 | 197 | 3.1 | | | | |
| 7 | 8/27/2014 | <1.0 | 420 | 9.1 | | | | |
| 8 | 7/15/2015 | <1.0 | 430 | 16 | | | | |
| 9 | 8/6/2015 | <0.50 | -- | 13 | | | | |
| 10 | 8/9/2016 | <1.0 | 420 | 13 | | | | |
| 11 | 8/8/2017 | <1.0 | 390 | 18 | | | | |
| 12 | 8/29/2018 | <1.0 | 370 | 20 | | | | |
| 13 | 8/14/2019 | <0.25 | 420 | 25 | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | | 0.60 | 0.46 | | | | |
| Mann-Kendall Statistic (S): | | | 15 | 23 | | | | |
| Confidence Factor: | | | 92.5% | 99.9% | | | | |
| Concentration Trend: | | | Prob. Increasing | Increasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

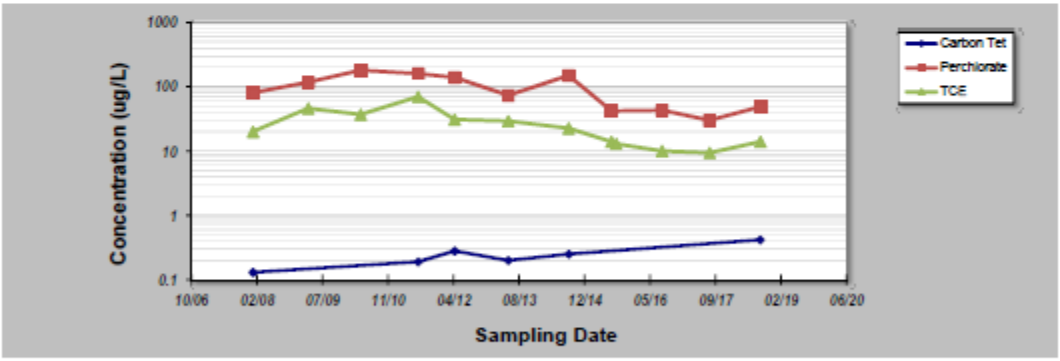
## Figure C-20: Mann-Kendall Statistical Analysis for Well PW-8A

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: 19-Mar-20
Facility Name: Rockets, Fireworks & Flares
Conducted By: Ben McKenna

Job ID: PW-8A
Constituent:
Concentration Units: ug/L

| Sampling Point ID: | Carbon Tet | Perchlorate | TCE | | | | |
|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | CONCENTRATION (ug/L) | | | | | | |
| 1 | 1/22/2008 | 0.13 | 81 | 20 | | | | |
| 2 | 3/20/2009 | | 118 | 46 | | | | |
| 3 | 4/23/2010 | | 180 | 37 | | | | |
| 4 | 7/6/2011 | 0.19 | 160 | 70 | | | | |
| 5 | 4/9/2012 | 0.28 | 140 | 31 | | | | |
| 6 | 5/23/2013 | 0.2 | 73.2 | 29.3 | | | | |
| 7 | 8/28/2014 | 0.25 | 150 | 22.6 | | | | |
| 8 | 7/20/2015 | <1.0 | 42 | 14 | | | | |
| 9 | 8/26/2015 | <0.50 | -- | 13 | | | | |
| 10 | 8/10/2016 | <1.0 | 43 | 10 | | | | |
| 11 | 8/7/2017 | <1.0 | 30 | 9.4 | | | | |
| 12 | 8/30/2018 | 0.42 | 49 | 14 | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| Coefficient of Variation: | | 0.41 | 0.56 | 0.68 | | | | |
| Mann-Kendall Statistic (S): | | 11 | -25 | -43 | | | | |
| Confidence Factor: | | 97.2% | 97.0% | 99.9% | | | | |
| Concentration Trend: | | Increasing | Decreasing | Decreasing | | | | |




**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

# Appendix D: Applicable or Relevant and Appropriate Requirements Assessment

Section 121(d)(1)(A) of CERCLA requires that remedial actions at CERCLA sites attain (or justify the waiver of) any federal or state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). Federal ARARs may include requirements promulgated under any federal environmental laws. State ARARs may only include promulgated, enforceable environmental or facility-siting laws of general application that are more stringent or broader in scope than federal requirements and that are identified by the state in a timely manner. ARARs are identified on a site-specific basis from information about the chemicals at the site, the remedial actions contemplated, the physical characteristics of the site, and other appropriate factors. ARARs include only substantive, not administrative, requirements and pertain only to onsite activities. There are three general categories of ARARs: chemical-specific, location-specific, and action-specific.

Because this remedy is an interim action that does not include restoration of the aquifer as an objective, EPA is not, at this time, establishing chemical-specific ARARs as *in situ* cleanup goals for contaminated groundwater at the Site. In situ cleanup goals will be addressed in a subsequent decision document. While chemical specific ARARs are not cleanup goals for groundwater, they are applicable to the extracted and treated water which will be utilized as drinking water. Chemical-specific ARARs identified in the ROD for the extracted and treated groundwater are shown in Table A.1.

**Table A.1. Summary of Extracted and Treated Groundwater ARAR Changes**

| Contaminants of Concern | 2010 ROD cleanup goals (µg/L) | State MCL (µg/L) | Federal MCL (µg/L) | Is the cleanup goal above the current MCL? |
|---|---|---|---|---|
| Carbon tetrachloride | 0.5 (State) | 0.5 | 5 | No |
| Chloroform (Trichloromethane) | 80[1] (Federal) | 80[1] | 80[1] | No |
| Methylene Chloride (Dichloromethane) | 5 (Federal) | 5 | 5 | No |
| Perchlorate | 6 (State) | 6 | none | No |
| Trichloroethene (TCE) | 5 (Federal) | 5 | 5 | No |

Notes: [1]There is no MCL for chloroform. The values listed for chloroform are for the combined concentration of four trihalomethanes: chloroform, dibromochloromethane, bromodichloromethane, and bromoform.

No Site contaminants of concern have cleanup levels above their respective current maximum contaminant level (MCL) and there have been no changes to State or Federal MCLs since the 2010 Interim ROD. The California Office of Environmental Health Hazard Assessment (OEHHA) published an updated public health goal (PHG) of 1 part per billion (ppb) for perchlorate in drinking water in February 2015. This updates the previous California PHG of 6 ppb perchlorate, which was set in 2004. The updated PHG is lower because it incorporates new research about the effects of perchlorate on infants.

Federal and State laws and regulations other than the chemical-specific ARARs that have been promulgated or changed over the past five years are described in A-2. There have been no revisions to laws or regulations that are pertinent to the Site which affect the protectiveness of the remedy. The table does not include those ARARs identified in the ROD that are no longer pertinent, now that the remedial design is complete. The table also does not include those ARARs identified in the ROD that have not changed since finalization of the 2010 ROD; and therefore, do not affect protectiveness.

Non-pertinent ARARs are listed below:

- National Historic Preservation Act
- Historic Site Act
- Archaeological and Historic Preservation Act
- Archaeological Resources Protection Act
- Endangered Species Act
- California Endangered Species Act
- Native Plants Protection Act
- Migratory Bird Treaty Act
- California Fish and Game Code
- Native American Graves Protection and Repatriation Act
- Executive Order Protection and Enhancement of the Cultural Environment
- Executive Order on Floodplain Management
- Executive Order Protection of Wetlands
- Executive Order Indian Sacred Sites

ARARs that have not changed since the finalization of the 2010 Interim ROD:

- Clean Air Act, South Coast Air Quality Management District (SCAQMD) Regulation XIII, Rules 1301-1304, 1305-1313, 1401 and 401-403
- RCRA Subtitle C Hazardous Waste Identification and Generator Requirements; California Hazardous Waste Regulations, Generator Requirements 22 CCR, Division 4.5, Chapter 11, Articles 2-5 and Article 1 sections 66261.1-66261.3 and sections 66261.6-66261.9.5.
- Federal SDWA Underground Injection Control (UIC) Regulations, 42 U.S.C. §300f et seq.
  - 40 CFR 144.12-144.13
- Resource Conservation and Recovery Act §3020
  - 42 U.S.C. §6939b

- California Porter- Cologne Water Quality Act, California Water Code 13240
  - Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin, Chapters 2(Plans and Policies), 3(Beneficial Uses), and 4 (Water Quality Objectives)
- Federal Water Pollution Control Act 33 USC 1311, 1314(b)
- Federal Water Pollution Control Act 33 USC 1342,1344
  - 33 CFR 323.1 et seq.
- California Toxics Rule
  - 40 CFR 131.36(d)(10)(ii)
- California Land Disposal Restrictions, Requirements for Generators
  - 22 CCR 66268.1 et seq. Also 22 CCR 66268.3, 22 CCR 66268.7, 22 CCR 66268.9, 66268.40 and 22 CCR 66268.50
- California Hazardous Waste Regulations, Generator Requirements
  - 22 CCR 66262.34(a)(1)(A)
- California Hazardous Waste Regulations, Storage of Hazardous Waste
- 22 CCR 66265.170 et seq. (Article 9) 22 CCR 66265.190 et seq. (Article 10)

**Table A-2. Applicable or Relevant and Appropriate Requirements Evaluation**

| **Original ARAR** | **Document and Citation** | Original ARAR requirement | Revised requirement | **Revision Date (between Sept. 2010-present)** | **Effect on Protectiveness** |
|---|---|---|---|---|---|
| Clean Air Act, South Coast Air Quality Management District (SCAQMD) | 2010 Interim ROD<br><br>SCAQMD Regulation XIII, comprising Rules 1301 through 1313 SCAQMD Rule 1401 SCAQMD Rule 1401.1 | Rules 1301 through 1313 establish new source review requirements. Rule 1303 requires that all new sources of air pollution in the district use best available control technology (BACT) and meet appropriate offset requirements. Emissions offsets are required for all new sources that emit in excess of 1 pound per day of volatile organic compounds.<br><br>SCAQMD Rule 1401.1 applies to discharges that are within 500 feet of a school and requires that the discharges from a facility do not create a cancer risk in excess of 1 in 1 million (1 × 10-6) at the school. | Rule 1304.1 requires paying fees for up to the full amount of offsets provided by SCAQMD.<br><br>Rule 1401.1 requires additional direction for staff to provide a report to the stationary source committee regarding the use of historical data in health risk assessments in certain circumstances and receiving and filing the SCAQMD risk assessment procedures for preparing risk assessments for the air toxics 'hot spots' information and assessment act | Rule 1304.1 adopted September 6, 2013<br><br>Rule 1401.1 revision date June 5, 2015 | None. Also, the revised requirement is not substantive to the remedy. |

| **Original ARAR** | **Document and Citation** | Original ARAR requirement | Revised requirement | **Revision Date (between Sept. 2010-present)** | **Effect on Protectiveness** |
|---|---|---|---|---|---|
| RCRA Subtitle C Hazardous Waste Identification and Generator Requirements; California Hazardous Waste Regulations, Generator Requirements | 2010 Interim ROD<br><br>22 CCR, Division 4.5, Chapter 11 Identification and Listing of Hazardous Waste | A solid waste is a RCRA hazardous waste if it exhibits any of the characteristics of ignitability, corrosivity, reactivity, or toxicity identified in 22 CCR 66261.21, 66261.22(a)(1), 66261.22(a)(2), 66261.23, 66261.24(a)(1), 22 CCR 66262.11, and 22 CCR 66260.200, or if it is listed as a hazardous waste in Article 4 of Chapter 11.<br><br>Under the California RCRA program, wastes can be classified as non-RCRA, state-only hazardous wastes if they exceed the soluble threshold limit concentration (STLC) or the total threshold limit concentration (TTLC) values listed in 22 CCR 66261.24(a)(2). | Chapter 11, Article 1, § 66261.4. Exclusions amends subsection (h) stating the CRT panel glass that meets the criteria in section 66273.81 of chapter 23 of this division and destined for disposal is not a hazardous waste for purposes of disposal and is exempt from the generator and hazardous waste disposal fees. Subsection (i) states the CRT panel glass that is managed in accordance with section 25143.2.5 of the Health and Safety Code is not subject to regulation by DTSC pursuant to Health and Safety code and 40 CFR Section 261.4. | Revision date October 22, 2018 | None |

# Appendix E: Public Notice

# Proof of Publication

STATE OF CALIFORNIA.
SS
County of San Bernardino
I declare under penalty of perjury that:

I am a citizen of the United States and a resident of the County aforesaid: I am over the age of eighteen years, and not a party to nor interested in the above entitled matter. I am the principal clerk of the printer of the Rialto Record, a newspaper published in the City of Rialto, County of San Bernardino, State of California, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the City of Rialto, County of San Bernardino, State of California, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to; and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession trade, calling, race, or denomination, or any number of the same, that the notice, or which the annexed is a printed copy has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

March 19, 2020

I certify under penalty of perjury that the foregoing is true and correct.

*Dated: March 19, 2020*

Signature _____

**EPA SEEKS PUBLIC INPUT ON CLEANUP WORK AT ROCKETS, FIREWORKS AND FLARES SUPERFUND SITE**

The U.S. Environmental Protection Agency (EPA) is reviewing its work to clean up the Rockets, Fireworks and Flares Superfund site in and near Rialto, California. This review—called a "Five-Year Review"—will see if the cleanup plan for the site is still working as it was designed and that it still protects human health and the environment. According to the Superfund law, EPA is required to review its cleanup plan, or "remedy," every five years if either the cleanup takes more than five years to complete, or, if hazardous waste remains on site.

The Rockets, Fireworks, and Flares site includes a 160-acre industrial area in Rialto, California where the U.S. Army, defense contractors, fireworks manufacturers, and other businesses have operated since the 1940s. These companies handled perchlorate salts and/or other hazardous chemicals and disposed of chemical wastes on site, contaminating the soil and groundwater.

*This is the first Five-Year Review for the site.*

**What Is Included in a Five-Year Review?**
Five-Year Reviews include:
- an inspection of the site and cleanup technologies;
- *if available, review of monitoring data, operating data, and maintenance records; and*
- a determination if any new relevant regulatory requirements have been established since EPA's original cleanup decision was finalized.

**EPA Wants to Hear from You!**
*EPA invites the community to learn more about the site and welcomes your input about how the site cleanup is going in an interview. If you would like to be interviewed, please contact Wayne Praskins, Remedial Project Manager for the site, at (415) 972-3181 or at praskins.wayne@epa.gov before April 30, 2020.*

*For more site information, visit EPA's web page at: www.epa.gov/superfund/rf*

CNS-3351737#


**RIALTO RECORD**
P.O. Box 110
Colton, CA 92324
Phone (909) 381-9898 • 384-0406 FAX

The Rialto Record was declared a newspaper of general circulation on April 22, 1966 in Judge Joseph T. Ciano's court. Decree Number 26583. Recorded in Book 193, Page 126 of Official Records of San Bernardino County, California.


*A0000053891 20*

# Appendix F: San Bernardino County Response Letter

222 West Hospitality Lane 2nd Floor, San Bernardino, CA 92415-0017 | Phone: 909.386.8701 Fax: 909.386.8900
www.SBCounty.gov

SAN BERNARDINO COUNTY

Department of Public Works
- Flood Control
- Operations
- Solid Waste Management
- Surveyor
- Transportation

Brendon Biggs, M.S., P.E.
Interim Director

February 10, 2020

U.S. Army Corps of Engineers
USACE Seattle District
4735 East Marginal Way
Seattle, WA 98134

Attention: Ben McKenna, PG, Geologist

**RE: County of San Bernardino's Response U.S. Army Corps of Engineers Review Questionnaire Rockets, Fireworks & Flares Superfund Site Rialto, California**

Thank you for allowing the County of San Bernardino (County) to respond to the U.S. Army Corps of Engineers' interview questionnaire regarding the remedy planned by Emhart Industries Inc. (Emhart) for Source Area Operable Unit 1 (SAOU-1) for the Rockets, Fireworks and Flares Superfund Site in Rialto, California (the Remedy). The Remedy is designed to remediate contamination in the northern portion of what is known as the Eastern Perchlorate Plume in the Rialto Colton Basin. Emhart is implementing the Remedy pursuant to a 2012 Consent Decree. The County appreciates this opportunity to provide input to help ensure that the Remedy is effective and does not adversely impact the County's remedy for another, nearby plume, the Western Perchlorate Plume.

**Background**

Since 2005, the County has been operating a separate remedy to address the Western Perchlorate Plume under the oversight of the California Regional Water Quality Control Board. Initially, the County's system extracted water only from City of Rialto Well No. 3 (CR-3). As anticipated, data indicates that the Western Perchlorate Plume has been shifting west for a number of years, and for the last several years, the County has been gradually shifting the focus of its containment program to the west.

In 2013, Emhart completed modeling for its Remedial Design for the Eastern Perchlorate Plume. Emhart's modeling relies on two wells, EW-1 (constructed by Emhart) and CR-3 (constructed by Rialto) to capture the Eastern Perchlorate Plume target area. Emhart's Remedial Design indicates that Emhart will construct a second well (EW-2) if pumping from EW-1 and CR-3 cannot adequately contain the Eastern Perchlorate Plume as part of SAOU-1.

The County entered into an agreement with Emhart in 2015 that allows Emhart to expand the County's existing perchlorate and VOC treatment plant at CR-3, which the County has used to address the Western Perchlorate Plume, to support the Remedy for the Eastern Perchlorate Plume. The agreement between the County and Emhart also allows Emhart to utilize CR-3 to help contain the perchlorate and VOC plume associated with the SAOU-1 even if the County shifts its remedy extraction to other wells. The County and Emhart also entered into an agreement in 2015 with the City of Colton and the City of Rialto in connection with the combined treatment system for these response actions.

**Issues of Concern**

The County has the following comments regarding the ongoing implementation of the SAOU-1. The County raises these issues to facilitate the implementation of the Remedy, now that it is about to become operational.

(1) **Definition of Source Area.** The Record of Decision (ROD) for the SAOU-1 provides for the refinement of the target area for the remedy during remedial design. *See* USEPA, Interim Action Record of Decision (Sept. 30, 2010) at Section 2.4.8, p. 2-15. ("It is expected that additional monitoring wells will be installed during the remedial design phase of the remedy to refine the upgradient and downgradient boundaries of the targeted area."). Emhart's 2013 Modeling Report, too, concludes that installation of additional monitoring wells is necessary to address the uncertainty regarding the northern boundary of the Target Area. *See* ERM Final Groundwater Flow Modeling Report (July 26, 2013), section 6.0, p. 36.

In June 2014 comments on the Remedial Design, USEPA requested that Emhart re-evaluate the boundaries of the Target Area "after installation and sampling of the new groundwater monitoring wells in early 2014." USEPA Response to Comments on Remedial Design, Comment #4. In response, Emhart stated that it would "re-evaluate the boundaries of the Target Area as appropriate based on monitoring data and remedy performance." Though USEPA approved Emhart's Remedial Design, it did not agree with Emhart's plan to re-evaluate the Target Area "as appropriate," and stated that Emhart needed a firm timetable for the re-evaluation. USEPA stated: "[a] re-evaluation is appropriate after sampling data are available in 2014 from the installation of the new groundwater monitoring wells. Data should be available well before the remedy becomes operational." USEPA, Approval of Preliminary Design Report (Nov. 18. 2013), Comment #2. As far as the County is aware, a re-evaluation of the boundaries of the Target Area has not yet been completed, as required by USEPA. An analysis of the Target Area will be important for evaluating the adequacy of the response action to achieve its objectives and how that response action can be optimized over time.

(2) **Measuring Containment.** It is anticipated that the Remedy will begin operating this year. It could be helpful to identify the analytical measures and well locations where containment of the Eastern Perchlorate Plume will be measured. Similarly, it could be useful to identify the metrics for determining adequate containment efficiency and a time-frame for its determination.

(3) **Pumping Rate of CR-3.** Emhart's Remedial Design considers past and potential pumping rates at CR-3, and relies on CR-3 in part for capturing the Eastern Plume. Emhart's 2013 Modeling Report relies upon CR-3 pumping at a rate of 1300 gpm if only CR-3 and EW-1 are used. *See*

ERM Final Groundwater Flow Modeling Report (July 26, 2013), section 6.0, p. 36. *See also* Preliminary Design Report (2013), section 4.2.1. As the Emhart remedy is implemented, and as the County moves the focus of its remedial pumping away from CR-3 to optimize containment of the Western Plume under oversight of the Regional Board, it may be necessary for EPA to re-evaluate the optimal strategy for the Eastern Plume containment program.

**(4) Impact of Current Groundwater Elevations**. Given current groundwater elevations (which for this water year reflect a 39% reduction in key water rights due to lower water levels in the index wells) and other data, it may be prudent to re-evaluate ways to optimize the containment program for the Remedy, including whether an additional extraction well (such as EW-2) should be installed. Emhart originally proposed that the need for a second remedy well (EW-2) will be determined *after* evaluating the performance of the planned remedy well. USEPA has indicated that EW-2 will be necessary if any of the following three conditions occur: data indicating insufficient capture of the plume, monitoring well results indicating a more westerly groundwater flow, and data indicating that the Target Area is larger than assumed in the Final Design. *See* USEPA Comments on the Preliminary Design Report (Nov. 1, 2013), Comment #8. Further, in approving the remedial design, USEPA stated that the need for a second remedy well may become apparent even before Emhart's remedy well (EW-1) begins operation. *See* USEPA, Approval of Preliminary Design Report (Nov. 18. 2013), Comment #4 (stating "As we have commented before, new data may warrant installation of a second new extraction well before the remedy begins operation."). The County believes that these conditions have been met, and that EPA should further evaluate optimization of the remedy, including the potential need for an additional extraction well.

Thank you again for the opportunity to provide comments on the SAOU-1 remedy in the context of the 5-year review. Please contact Ralph Murphy at (909) 781-9021 if you have any questions or would like to schedule a time to discuss this matter.

Respectfully,

for **DARREN J. MEEKA, P.E.**
Interim Deputy Director

DM:MR:co

# Appendix G: Site Inspection Report and Photos

Trip Report
Rockets, Fireworks & Flares Superfund Site, Rialto, California

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1. INTRODUCTION

a. Date of Visit: 14 January 22, 2020

b. Location: Rialto, California

c. Purpose: A site visit was conducted to visually inspect and document the conditions of the remedy, the site, and the surrounding area for inclusion into the Five-Year Review Report.

d. Participants: *List all attendees*

| | | |
|---|---|---|
| Benino McKenna | USACE Seattle District Geologist | (206) 764-3803 |
| Wayne Praskins | USEPA Region 9 Remedial Project Manager (RPM) | (415) 972-3181 |
| Kamran Javandel | Allen Matkins/Emhart Industries, Inc. | (415) 273-7473 |
| Tom Crowley | Utilities Manager, City of Rialto | (909) 820-8056 |
| David Towell | Sr. Project Manager, CH2MHILL/Jacobs | (213) 228-8285 |
| David Terry | Veolia, Project Manager | (909) 222-7648 |
| Andrew Coleman | Veolia, Field Supervisor | (909) 301-9837 |
| Jerry Zimmerle | Project Manager, AECOM | (949) 939-4640 |
| Tom Munoz | Construction Manager, AECOM | (714) 394-8147 |
| Diana Chacon | Geologist, Geo-Logic | (949) 929-4279 |

2. SUMMARY

A site visit to the location of the groundwater treatment plant for the Rockets, Fireworks & Flares (RFF) was conducted on 14 January 2020. The participants toured the groundwater treatment plant, groundwater extraction well location and the location of the recently completed pilot study. The existing groundwater treatment plant is owned and operated by the City of Rialto but was expanded to accept water from the RFF extraction well system to be treated and discharged. The expansion portion of the treatment plant is not currently in operation but is planned to begin in 2020 pending permitting from the State of California.

3. DISCUSSION

On 13 January 2020 Benino McKenna traveled from Seattle, Washington to Ontario, California and met with the site visit participants on 14 January 2020 at the existing groundwater treatment plant owned by the City of Rialto, California. The weather was partly cloudy and cool with an approximate temperature of 56ºF. The site is accessed from North Linden Ave and is located approximately 6.5 miles west of the downtown San Bernardino.

Mr. McKenna arrived on site at 11:00am and met with the site participants. The participants were given a briefing on the purpose of the site visit by Mr. Wayne Praskins and a health and safety briefing from the plant operators from Veolia.

Mr. McKenna proceeded to inspect the existing groundwater treatment system operated by the City of Rialto. The system extracts from one well on site (Rialto 3) and receives additional influent water from offsite extraction wells.

Influent groundwater is filtered through a sand separating unit and 5-micron bag filtration before being treated by ultra-violet (UV) system. After the UV treatment groundwater is sent to a 125,000 gallon equalization tank which distributes groundwater to the existing groundwater treatment system as well as the new expansion of the system for the RFF groundwater. Both the existing treatment system and the new RFF expansion utilize ion exchange (IX) and granular activated carbon (GAC) vessels to treat groundwater before final chlorination before discharging to the municipal water system

The new expansion of the groundwater treatment system that was constructed to treat the groundwater from the RFF extraction wells was not operation at the time of inspection. The treatment vessels did not contain any GAC or IX but did have groundwater actively being cycled through them to prevent any interior corrosion or biofouling. The new expansion is anticipated to come on line in April of 2020.

A Site Inspection Checklist was completed for the existing treatment system even though the new expansion was not active to document the process that will eventually be utilized for the new expansion. All components of the treatment system were in excellent condition with clear signage and all influent, mid and effluent sample ports clearly marked and labeled.

After the groundwater treatment plant walkthrough, part of the team then drove east to an active drilling location where drill crews were installing a 70 foot deep dry well adjacent to the newly installed extraction well EW-1. The new extraction well will eventually be tied into the existing supply lines and supply groundwater to the new expansion of the treatment system. The drilling location was located adjacent to the site of the recent pilot study which was completed to facilitate the permitting of the new treatment plant expansion.

After viewing the drilling operations the majority of the team departed. AECOM Construction Manager Tom Munoz escorted Mr. McKenna into the drill site to document activities and then to existing supply wells Miro-2 and Miro-3.

The site visit concluded at approximately 1530.

4. ACTIONS

The USACE will incorporate information obtained from the site visit into the Five Year Review report.

Benino McKenna
Geologist
CENWS-ENT-G

Site Visit Photos

Combined Treatment Facility

Rialto 3 Supply Well

125,000 gallon EQ Tank and Booster Pumps

Rialto 3 Supply Well Control Panel

Trip Report
Rockets, Fireworks & Flares FYR 3

| | |
|---|---|
|  |  |
| Rialto 3 Supply Well 5-Micron Bag Filters | IX Resin Vessel (front) and GAC Vessels (rear) |
|  |  |
| Expanded Section of Treatment Plant | Chlorination Treatment Building |
|  |  |
| Rialto 3 Influent Sampling Station & Signage | System Effluent Sampling Station & Signage |

Trip Report
Rockets, Fireworks & Flares FYR 4

| | |
|---|---|
|   |  |
| Drill Crews Installing 70-foot Dry Well at EW-1 Site | AECOM Drill Site Showing EW-1 & PZ-1D & PZ-1S |
|  |  |
| Former Pilot Test Area being Cleaned Up | Miro 3 Supply Well Pump House |

Trip Report
Rockets, Fireworks & Flares FYR 5