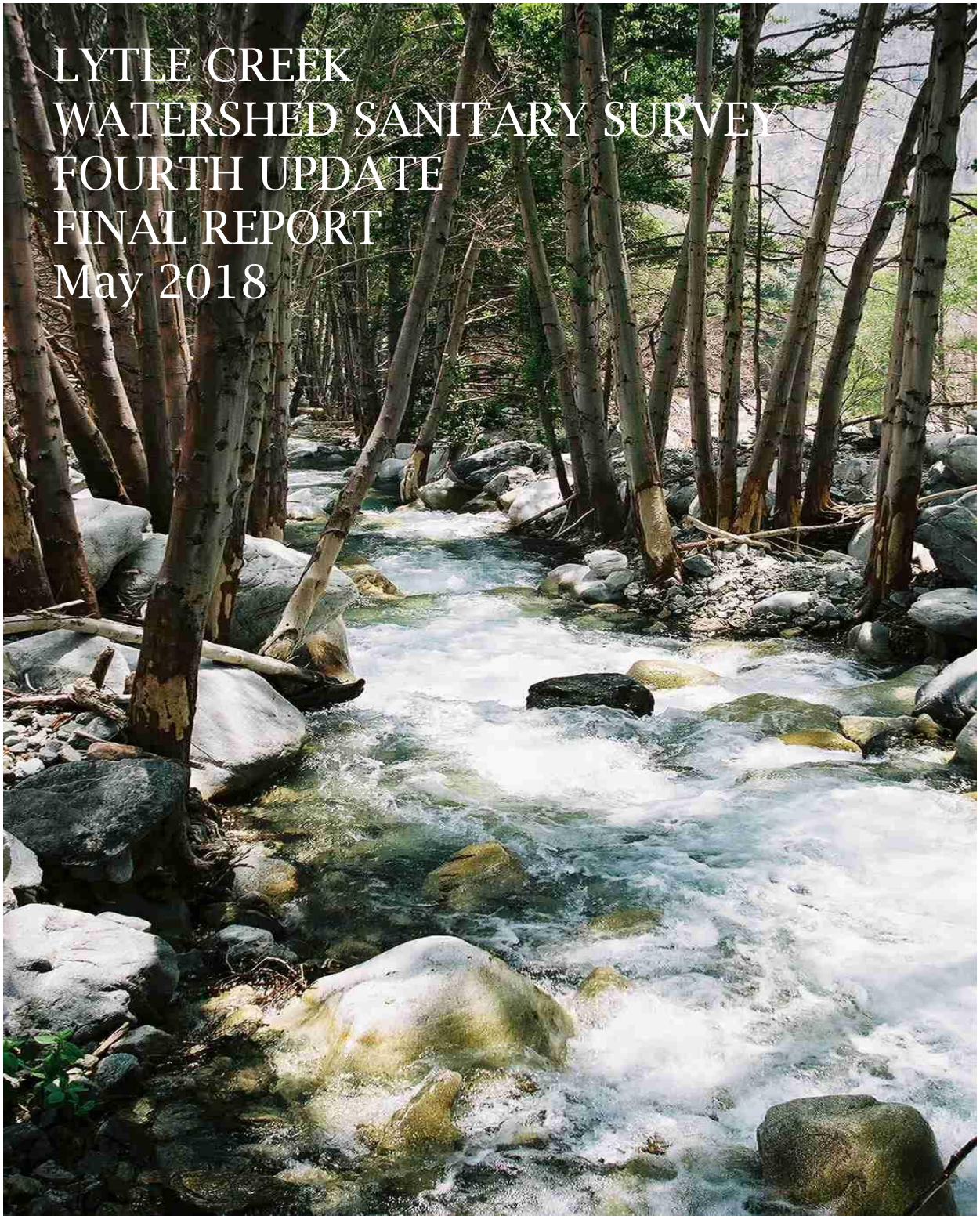
LYTLE CREEK WATERSHED SANITARY SURVEY FOURTH UPDATE FINAL REPORT May 2018



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Lytle Creek Watershed Sanitary Survey
Fourth Update
FINAL REPORT
May 2018

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LIST OF ABBREVIATIONS

ACH – aluminum chlorohydrate
Alum - aluminum sulfate

BAER – Burned Area Emergency Response
BMP – Best Management Practice
BOD – Biological Oxygen Demand

CAP – *Cryptosporidium* Action Plan
CCTV – Closed circuit television
CDPH – California Department of Public Health
CEDEN – California Environmental Data Exchange
CEQA – California Environmental Quality Act
CFE – Combined Filter Effluent
cfs – cubic feet per second
CIWQS – California Integrated Water Quality System
CSBSDD – County of San Bernardino Special Districts Department
CT – Contact Time
CUPA – Certified Unified Program Agency

D/DBP – Disinfectants/Disinfection By-Products
DDW – Division of Drinking Water
DBP – disinfection by-product

E. coli – *Escherichia coli*

FUWC – Fontana Union Water Company
FWC – Fontana Water Company

GAC – granular activated carbon
gpd – gallons per day
gpm – gallons per minute

HAA5 – haloacetic acids

IDSE – Initial Distribution System Evaluation
IESWTR – Interim Enhanced Surface Water Treatment Rule
IFE – individual filter effluent

LRAA – locational running annual average
LT1ESWTR – Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR – Long Term 2 Enhanced Surface Water Treatment Rule

MCL – maximum contaminant level
µg/L - micrograms per liter

mgd – million gallons per day
mg/L – milligrams per liter
MPN/100 mL – most probable number per 100 milliliters

NOI – Notice of Intent
NPDES – National Pollution Discharge Elimination System
NTU – nephelometric turbidity unit

OES – California Office of Emergency Services
OWTS – Onsite Wastewater Treatment System

PCAs – Potential Contaminating Activities
PVC – Polyvinyl Chloride

RAA – running annual average
Regional Board – Santa Ana Regional Water Quality Control Board
RIMS – Response Information Management System
RV – Recreational Vehicle

SBCFCD – San Bernardino County Flood Control District
SCE – Southern California Edison
SDWA – Safe Drinking Water Act
SEMS – Standardized Emergency Management System
SOC – synthetic organic compound
SSMP – Sewer System Management Plan
SSO – Sanitary Sewer Overflow
SPW – State Project Water
SWAMP – Surface Water Ambient Monitoring Program
SWTR – Surface Water Treatment Rule

TMDL – Total Maximum Daily Load
TOC – total organic carbon
TTHM – total trihalomethanes

ug/L – micrograms per liter
USFS – United States Forest Service
USEPA – US Environmental Protection Agency
USGS – US Geological Survey
UV – Ultraviolet light

VOC – volatile organic compound

WDR – Waste Discharge Requirement
WFF – water filtration facility
WQMP – Water Quality Management Plan
WVWD – West Valley Water District

WWTP – Wastewater Treatment Plant

INTRODUCTION

Drinking water utilities that use surface water are required to conduct a watershed sanitary survey for that source, under the California Surface Water Treatment Rule (SWTR). This survey must be updated every five years. This Fourth Update to the Lytle Creek Watershed Sanitary Survey covers the period January 1, 2013 through December 31, 2017.

OBJECTIVES OF THE UPDATE

The overall objective of this Fourth Update is to assess the source water quality of Lytle Creek to ensure the ability of the Oliver P. Roemer Water Filtration Facility (WFF) to continue to provide their customers with drinking water that meets all current drinking water standards. This Fourth Update also accomplishes some other specific objectives including:

- Review and evaluation of selected constituents of interest to identify potential water quality or treatment issues at the water treatment plant. Assess the ability of the Roemer WFF to meet drinking water standards based on current regulatory framework, as well as comment on the appropriate level of treatment for pathogens, specifically for *Giardia*, viruses, and *Cryptosporidium*.

- Review and evaluation of selected potential contaminating activities to identify potential impacts on source water quality.

- Development of recommendations that are economically feasible and within the authority of the West Valley Water District (WVWD) to implement.

KEY FINDINGS AND CONCLUSIONS

The key findings and conclusions for this report are organized as they pertain to source water quality, treatment and regulatory compliance, and watershed contaminant sources. Highlights of these findings and conclusions are presented below.

Source Water Quality

Overall, Lytle Creek provides excellent quality raw water. The raw water can be treated to meet all drinking water standards using conventional treatment processes. Key findings for the constituents of interest are presented below.

Turbidity

The raw water turbidity data reflects the plant influent water, after the Lytle Creek source is blended with State Project Water (SPW). The Roemer WFF has relatively low levels of raw water turbidity, with an average value less than 1 nephelometric turbidity units (NTU).

There are no clear trends in the data, turbidity peaks can occur throughout the year. There was an unusually high turbidity reading in August 2014 and there is no clear cause of the increase, which may be a recording error or an unauthorized discharge from the Mountain Lakes Resort.

Coliform

Total coliform data show generally low levels. Individual samples had an average value of 358 MPN/100 mL, a median value of 240 MPN/100 mL, and 94.4 percent of samples were less than 1,000 MPN/100 mL. Monthly medians had an average value of 312 MPN/100 mL, a median value of 235 MPN/100 mL and 97.5 percent of median values were less than 1,000 MPN/100 mL. Six monthly median calculations, or 2.5 percent, triggered additional log reduction of *Giardia*/viruses under current State Water Resources Control Board Department of Drinking Water (DDW) permit conditions.

Fecal coliform data show generally low levels. Individual samples had an average value of 24 MPN/100 mL, a median value of 7.8 MPN/100 mL, and 99 percent of samples were less than 200 MPN/100 mL. Monthly medians, including *E. coli*, had an average value of 12 MPN/100 mL, a median value of 6.15 MPN/100 mL and 100 percent of median values were equal to or less than 80 MPN/100 mL.

E. coli data show generally low levels. Individual samples had an average value of 6 MPN/100 mL, a median value of 3.1 MPN/100 mL, and 100 percent of samples were less than 50 MPN/100 mL.

Fecal coliform and *E. coli* data support 3/4-log treatment for *Giardia*/viruses is appropriate for all source water quality conditions during the study period. The majority of peak coliform levels occur between late spring and early fall, possibly associated with peak recreational use in the watershed.

Giardia/Cryptosporidium

West Valley Water District (WVWD) conducted the second round of required monthly source water monitoring for *Cryptosporidium*, under the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), from October 2015 through September 2017. Two years of monthly data show no detect of either

Giardia or *Cryptosporidium.* No detect of *Giardia* supports 3-log reduction is appropriate for the Roemer WFF. Maximum running annual average value for *Cryptosporidium* was 0 oocysts/L, well below the Bin 1 limit of 0.075 oocysts/L, which results in a continued Bin 1 classification with no additional action required under the LT2ESWTR.

Disinfection By-Product Precursors

The TOC data for Lytle Creek Influent show very low levels, with average and median values less than 1 mg/L in Lytle Creek. There were three sample events greater than 2 mg/L that were not associated with precipitation or any other specific activity in the watershed. Since these occurred during summer months, they could be associated with algae growth.

Intake Evaluation

Oliver P. Roemer Water Filtration Facility

The Roemer WFF is currently in compliance with all existing drinking water regulations. The Roemer WFF implements conventional filtration processes and meets all current drinking water standards, including maximum contaminant levels (MCLs) and treatment technology requirements. Below is a summary of the selected treatment and regulatory compliance issues.

Turbidity

All combined filter effluent (CFE) turbidity measurements between January 2013 and December 2017 met the turbidity treatment technique limit and were less than 0.153 NTU. The peak daily settled water had an average value of 0.053 NTU and the average daily CFE had an average value of 0.045 NTU. This shows that a large amount of the solids removal is achieved during the pretreatment process of flocculation and sedimentation.

The peak daily settled and average daily CFE average turbidity values were slightly higher post-July 2015, potentially associated with the coagulant conversion from alum to ACH or the increased use of SPW at the Roemer WFF influent. Two periods of extended elevated turbidity (in 2013 and 2016) occurred, but no cause could be identified. These could be associated with algae growth.

Solids removal through plant averages 90 percent, meeting the 80 percent goal for conventional treatment. Removal is most challenging under low raw water turbidity periods.

Microbiological Constituent Review

Distribution system monitoring for coliforms as part of the Total Coliform Rule resulted in a few detections of total coliform in distribution system during the study period. In each month with a detect, less than five percent of samples were positive. Therefore, there were no violations of the total coliform maximum contaminant level (MCL).

In February 2016 two routine samples tested positive for fecal coliform. Repeat samples were collected and found to be non-detectable. DDW was notified of the detections and WVWD refreshed samplers on sampling procedures.

Disinfection Precursors

Lytle Creek provides water relatively low in total organic carbon (TOC), with a range of non-detectable to 2.5 mg/L and an average of 0.61 mg/L. State Project Water has significantly higher TOC, with an average of 2.68 mg/L, which contributes to a higher blended water concentration through the Roemer WFF.

The pretreatment facility provides an average of 29 percent reduction in TOC, with an average effluent TOC value of 1.4 mg/L. Roemer WFF CFE data show an average TOC value of 0.94 mg/L, with 93 percent of samples less than 2 mg/L.

GAC facility provides an average of 39 percent reduction in TOC, with an average effluent TOC value of 0.57 mg/L and 99 percent of samples less than 2 mg/L.

The change in primary coagulant from alum to aluminum chlorohydrate (ACH), as well as the increased use of SPW, may have resulted in reduced removal of TOC through the Roemer WFF, with TOC levels over 100 percent higher after July 2015.

The Plant Effluent sample site was evaluated for quarterly averages and running annual averages and showed that all were less than 2 mg/L. WVWD complies with the Stage 1 D/DBP Rule by meeting an alternative compliance criterion for the enhanced coagulation treatment technique, less than 2 mg/L in source or treated water.

Disinfection By-Products

WVWD converted to the Stage 2 Disinfection/Disinfection By-Products (D/DBP) Rule monitoring sites in June 2012. Only eight distribution sites are required to be monitored under this Rule, and six of those (sites 1 through 6) are located in

the zones that represent water from the Roemer WFF. Locational running annual averages (LRAA) were calculated for all the distribution sites.

Total Trihalomethanes (THM) data is within the primary MCL of 80 µg/L, with all LRAAs less than 65 µg/L. Total Haloacetic Acid (HAA)5 data is well within the primary MCL of 60 µg/L, with all LRAAs less than 12 µg/L. The distribution sites with the highest DBP levels are associated with the Roemer WFF. The only identifiable trend was the increase in DBP levels after July 2015, which may be related to several factors, including; increased use of SPW, conversion of primary coagulant to ACH, or revised distribution system operational practices.

Giardia/Virus/*Cryptosporidium* Reduction Requirements

Based on the total coliform, fecal coliform, *Escherichia coli (E. coli), Giardia,* and *Cryptosporidium* data presented in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* are appropriate reduction requirements for the Roemer WFF.

The Roemer WFF is classified as a conventional filtration water treatment plant, and is therefore granted reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. UV primary disinfection provides 4-log *Giardia,* 0.5-log viruses, and 4-log *Cryptosporidium* reduction credit. Residual disinfection with sodium hypochlorite provides a minimum of 1.5-log inactivation of viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim Enhanced SWTR, and the Long Term 2 ESWTR.

Unregulated Contaminant Monitoring Rule 3

In addition, WVWD participated in the USEPA's Third Unregulated Contaminant Monitoring Rule (UCMR3) between March 2014 and December 2014. This included quarterly sampling of the Roemer WFF treated water effluent (Reservoir) and the distribution system maximum residence time (DSMRT). Six constituents were detected at the Roemer WFF effluent (Reservoir) and seven constituents were detected at DSMRT, as shown in **Table 5-4**. None of the constituents were detected at levels of human health concern.

Watershed Contaminant Sources

There are numerous types of potential contaminating activities (PCAs) in the watershed. Six activities were selected for evaluation in this report based on constituents of interest and predominance in the watershed. Overall, there have been no significant changes in the watershed since the 2012 Update. Selected findings for each of these activities are provided below.

Spills

There were three spills/incidents listed in the State OES Hazardous Materials Release database from 2013 to 2017. Two of the spills involved sewage and one of the spills involved antifreeze.

The two SSOs involving raw sewage spilled in the range of 8,000 to 10,000 gallons. It was reported that no sewage entered Lytle Creek. Although WVWD is on the notification list to be contacted by the County of San Bernardino Special Districts Department if a sewage overflow occurs, no notifications were given for these two spills in 2017.

Recreation

Recreational uses in the Lytle Creek watershed are primarily for camping, picnicking, hiking, fishing, hunting, off-highway vehicle use, and swimming in the creek. The watershed currently receives approximately 50,000 day-use visitors on an annual basis, and can experience as much as 10,000 visitors on peak summer weekends. The USFS does not have resources to actively manage people swimming in Lytle Creek. However, the USFS have placed portable restrooms at key locations along Lytle Creek to provide sanitation facilities for visitors.

Similar to the findings of the 2012 Watershed Sanitary Survey, fecal coliform and *E. coli* levels at the SCE After Bay increase in the summertime, possibly as a result of body contact recreation in Lytle Creek.

WVWD staff continues to be concerned about possible unauthorized discharges from the Mountain Lakes Resort to Lytle Creek. However, there was only one high unexplained turbidity value of 135 NTU on August 14, 2014 at the Roemer WFF influent.

Wastewater

There are no wastewater treatment plants which discharge treated effluent directly to Lytle Creek. However it is possible that the Lytle Creek wastewater treatment plant's percolation ponds may impact water received by WVWD through the Grapeland Tunnel. The Regional Board performs inspections of the Lytle Creek wastewater treatment plant, and the facility has been in compliance during the reporting period.

About 90 percent of Lytle Creek residences receive centralized sewer services, while approximately 10 percent remains off-line. The total number of sewer service connections for the Lytle Creek service area was 798 in 2017. The locations of the existing septic systems in the watershed are unknown.

Developments

Overall, there has been little to no development in the watershed over the past five years. Land uses in the watershed are either open space or residential, with very little commercial and no industrial uses. There were no large construction projects in the watershed.

Fires

The Lytle Creek watershed is entirely a high to extremely high fire risk based on vegetation. The Lytle Creek watershed is entirely a high to extremely high fire risk based on vegetation. The largest wildfire over the reporting period was the Blue Cut Fire which occurred from August 16 to August 23, 2016. It is likely that the blending of SPW with Lytle Creek water lessened first-flush fire-related impacts to the Roemer WFF in the first three months with precipitation after the Blue Cut Fire.

WVWD is able to minimize fire-related impacts to the Roemer WFF by shutting the plant down during times of degraded source water quality.

Floods/Erosion

Flooding and debris flows occur in the Lytle Creek watershed as it is a natural canyon area with steep topography and can receive high amounts of rainfall in a short time period. Debris and flood flows are also uncontrolled in the upper reaches of Lytle Creek, since there are no flood control facilities upstream of the Lytle Creek communities.

Flows in Lytle Creek were lower than normal over this time period, with an average daily discharge of 2.2 cfs. Due to drought conditions, the risk of flooding during the study period was minimal.

WVWD typically avoids using Lytle Creek water during high storm events, in order to prevent high turbidity and china clay from entering the treatment plant.

RECOMMENDATIONS

A number of recommendations covering water quality and watershed management were developed for this Fourth Update. Please refer to **Section 6** for further information on the recommendations.

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INTRODUCTION

This report presents the findings of the Fourth Update to the Lytle Creek Watershed Sanitary Survey. This study covers the period January 1, 2013 through December 31, 2017. The Third Update was completed in June 2013, the Second Update was completed in July 2008, the First Update was completed in August 2003, and the initial Watershed Sanitary Survey was completed in 1998 in accordance with the California Surface Water Treatment Rule (SWTR).

For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the report.

OBJECTIVES OF THE UPDATE

A watershed sanitary survey focuses on the first barrier to contamination of the drinking water supply, namely source water protection. Evaluating source water quality and watershed contaminant sources provides key information to aid in understanding how to maintain and possibly improve the first barrier. In order to fully assess the ability of the West Valley Water District (WVWD) to treat Lytle Creek water, some evaluation of treatment plant capabilities and treated water quality is also necessary.

This Fourth Update is intended to accomplish the following objectives:

1) Fulfillment of the California SWTR and the Interim Enhanced Surface Water Treatment Rule (IESWTR) requirements that surface water agencies conduct a sanitary survey of the source watershed once every five years. Any significant changes within the last five years that affect source water quality are to be identified in each update. In addition, it is required to comment on the appropriate level of treatment for pathogens, specifically for *Giardia*, viruses, and *Cryptosporidium*.

2) Review and evaluation of selected constituents of interest to identify potential water quality or treatment issues at the Oliver P. Roemer Water Filtration Facility (Roemer WFF). Assess the ability of the treatment plant to meet standards based on current regulatory framework.

3) Review and evaluation of selected potential contaminating activities to identify impacts on source water quality. Determine whether it may be useful to conduct additional monitoring to further assess contaminant levels in the source water or contaminants from a particular watershed source.

4) Identification of appropriate watershed management actions to protect and possibly improve source water quality. Development of recommendations for watershed management actions that are economically feasible and within the authority of the WVWD to implement is critical.

CONSTITUENTS AND POTENTIAL CONTAMINATING ACTIVITIES COVERED IN THE FOURTH UPDATE

Several water quality constituents were selected for evaluation as part of the Fourth Update. **Table 1-1** presents a summary of the water quality constituents selected and the reason for selection.

Table 1-1
Water Quality Constituents Selected for Evaluation as Part of the Fourth Update

Constituent	Reason for Inclusion in Fourth Update
Turbidity	Turbidity is a measurement of suspended solids in water. Treated water turbidity levels are regulated in the SWTR and the IESWTR.
Total Coliform	Monthly medians are recommended for evaluation under the SWTR to determine appropriate level of treatment for *Giardia* and viruses.
Fecal Coliform and *E. coli*	Fecal coliform and *E. coli* are more specific surrogates for fecal contamination.
Giardia	*Giardia lamblia* is infectious to humans. Source water levels of *Giardia* are used to determine treatment requirements under the SWTR.
Cryptosporidium	*Cryptosporidium parvum* is infectious to humans. Actual source water levels of *Cryptosporidium* were used to determine treatment requirements as part of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR).
Total Organic Carbon	Total organic carbon (TOC) is a surrogate measure of disinfection by-products (DBP) precursor material in water. TOC levels in either source or treated water are used to determine treatment requirements in the Stage 1 Disinfectant/Disinfection By-Product Rule (D/DBP).
Total Trihalomethanes	Total Trihalomethanes (TTHMs) are disinfection by-products formed in disinfected treated water. Treated water levels are regulated by the Stage 1 D/DBP Rule and further regulated under the Stage 2 D/DBP Rule.
Haloacetic Acids	Haloacetic acids (HAA5) are disinfection by-products formed in disinfected treated water. Treated water levels are regulated by the Stage 1 D/DBP Rule and further regulated under the Stage 2 D/DBP Rule.

Six potential contaminating activities were selected for review as part of the Fourth Update: spills, recreation, wastewater, development, fires, and floods/erosion. Each of

these activities can contribute at least one of the constituents identified in **Table 1-1** to the source water. These activities were selected based on their presence in the watershed, and were identified by the WVWD as key contaminating activities.

DESCRIPTION OF HOW THE FOURTH UPDATE WAS CONDUCTED

The project team consisted of a Technical Committee comprised of representatives from the WVWD and the consultant team of Palencia Consulting Engineers and Starr Consulting. The Technical Committee participated in developing the scope of work and reviewed identification and development of key findings and recommendations.

The consultant team obtained information from the WVWD through a survey that addressed the Roemer WFF's process, including a discussion of treatment challenges and changes since the 2012 Watershed Sanitary Survey. Raw and treated water quality data was also provided by the WVWD.

The consultant team collected information on contaminant sources in the watershed through literature reviews, Internet searches, and discussions with various agencies' staff. A bibliography and list of contacts are provided in **Appendix A**.

REPORT ORGANIZATION

Section 1 – Introduction

This section describes the objectives of the Fourth Update, lists the main constituents and potentially contaminating activities covered in the Fourth Update, describes how the Fourth Update was conducted, and includes a description of the basic report organization.

Section 2- The Watershed and Supply Systems

This section is largely descriptive and provides: (1) a brief overview of the physical, hydrologic, and land use characteristics of the watershed, (2) a description of the existing water supply system, and (3) contains watershed maps delineating the watershed and outlining land use and land ownership in the watershed. For more detailed descriptive information on watershed characteristics, the reader is referred to the 2003 Watershed Sanitary Survey.

Section 3 – Lytle Creek Water Quality Review

This section provides a review of the constituents of interest, including an explanation for their selection and a summary of the data obtained for the period of study for each constituent.

Section 4 – Watershed Contaminant Sources Review

This section describes pertinent characteristics of each of the six potential contaminating activities that were reviewed as part of this Fourth Update. If applicable, each potential contaminating activity will include a discussion on background and occurrence, seasonal patterns, water quality issues and data review, regulation and management, and source water protection activities.

Section 5 - Intake Evaluation

This section contains an evaluation of the Roemer WFF's treated water quality, as well as an evaluation of the Roemer WFF's ability to meet the SWTR as well as other existing regulations.

Section 6 – Recommendations

This section consists of a discussion of source water protection activities taken since the 2012 Watershed Sanitary Survey and a list of recommendations for future source water protection efforts.

SECTION 2 – WATERSHED AND WATER SUPPLY SYSTEMS

WATERSHED DESCRIPTION

This section provides an overall description of the watershed, which summarizes physical, hydrologic, and land use characteristics. Major watershed characteristics such as soils, geology, biology, and topography have changed little since the original 1998 and 2003 Survey. For a more detailed account of this information, the reader is referred to the 2003 Survey. This section provides a description of the West Valley Water District's (WVWD) existing water supply system, including a brief description of the Oliver P. Roemer Water Filtration Facility (Roemer WFF). There is also a discussion of how water is diverted off Lytle Creek and delivered to the Roemer WFF.

The Lytle Creek watershed is located in the Upper Santa Ana River basin at the easternmost extension of the San Gabriel Mountains and is approximately 60 square miles. Lytle Creek flows in a southeasterly direction where it joins Cajon Creek before finally reaching its confluence with the Santa Ana River near Colton. However, the entire watershed is not tributary to water treated by the WVWD as water is diverted from Lytle Creek at two diversion points which are well upstream of where Lytle and Cajon creeks intersect. The portion of the watershed which is tributary to the two diversion points is shown in **Figure 2-1**, and is approximately 47 square miles.

Lytle Creek is a perennial stream that begins at the top of Mt. San Antonio, at an elevation of approximately 10,000 feet and flows eastward in three forks (North Fork, Middle Fork, and South Fork). The area is highly dissected by deep canyons, steep slopes, cliffs, and narrow ridges (United States Forest Service [USFS] Land Management Plan, 2005).

A variety of habitats can be found from chaparral, to lush riparian to high elevation conifers. Vegetation consists of mature stands of mixed conifer with some black oak, scattered areas of scrub oak and chaparral, and some isolated pockets of bigcone Douglas fir (California Wilderness Coalition 2008).

The streams and wilderness areas in the canyon provide important habitats for mountain lion, bear, badger, bighorn sheep, great horned owls, red-tailed hawk, coyotes, kangaroo rats, bald eagles, golden eagles, and a variety of birds. Over the last two decades, the sheep population in the San Gabriel Mountains has declined by 85 to 95 percent for reasons that are poorly understood (USFS Land Management Plan 2005).

Land Ownership

The USFS is the prime landowner in the Lytle Creek watershed, owning approximately 96 percent with the remaining 4 percent unclassified**.** The private lands in the watershed are associated with the communities of Scotland, Happy Jack, and Lytle Creek.

Land use

Most of the land use in the Lytle Creek watershed is vacant, as the majority of the land is owned by the USFS. Approximately 97 percent of the watershed is vacant, 2.2 percent is for open space/recreation, 0.5 percent is residential, and 0.1 percent is public/institutional. There are minimal commercial and no industrial uses in the watershed.

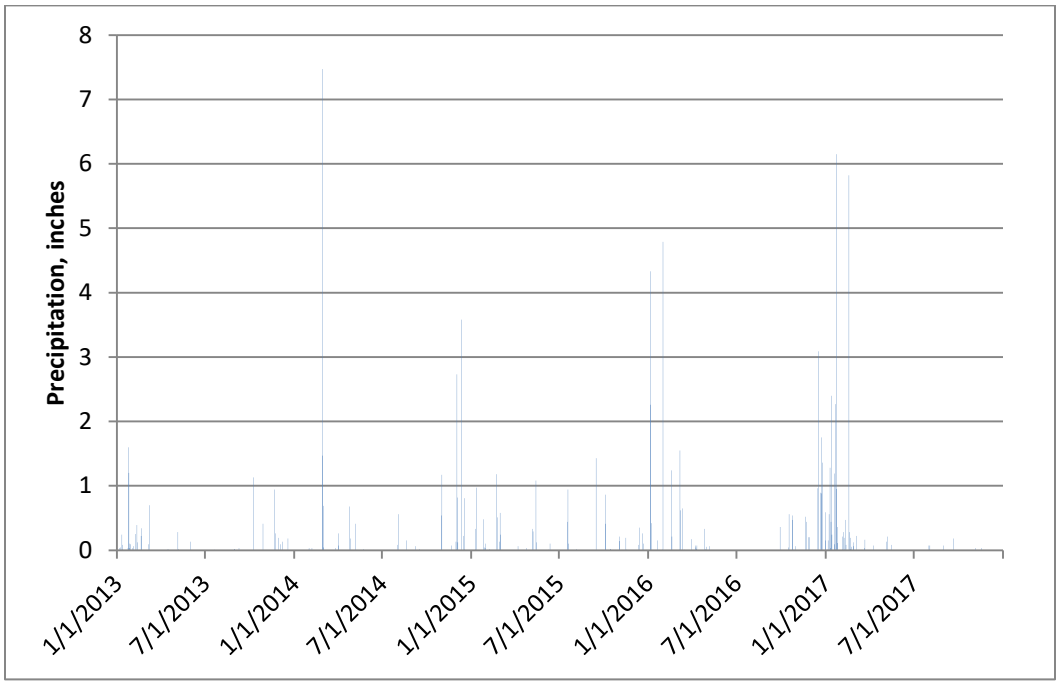
There are no incorporated cities within the watershed. There are several small community clusters such as Scotland, Happy Jack, and Lytle Creek. According to the 2017 Draft Lytle Creek Community Plan, the total population is 699, with a projected population of 724 by 2020. There are 444 total dwelling units, with 330 units occupied and 114 units vacant. The residents of Lytle Creek have a strong desire to maintain present mountain lifestyle, preferring development to be mainly residential. They are opposed to commercial development and would like to keep tourism to a minimum (Lytle Creek Community Plan, 2007). There are a few businesses along Lytle Creek Road, such as a grocery store, post office, restaurant, shooting range and fire station.

Climate and Precipitation

The climate of the watershed ranges from Mediterranean to mountain, from temperate to hot, with cooler temperatures at the higher elevations. Precipitation ranges throughout the watershed, with snow in the winter on the tallest peaks (USFS Land Management Plan, 2005).

Figure 2-2 shows daily precipitation totals from the United States Geological Survey (USGS) rain gauge at Middle Fork Lytle Creek from 2013 to 2017. The highest daily rainfall total was 7.5 inches on February 28, 2014. The highest annual rainfall from 2013 to 2017 was water year 2016-2017 at an annual total of 38 inches, and the lowest annual rainfall was water year 2012-2013 at an annual total of 11.4 inches.

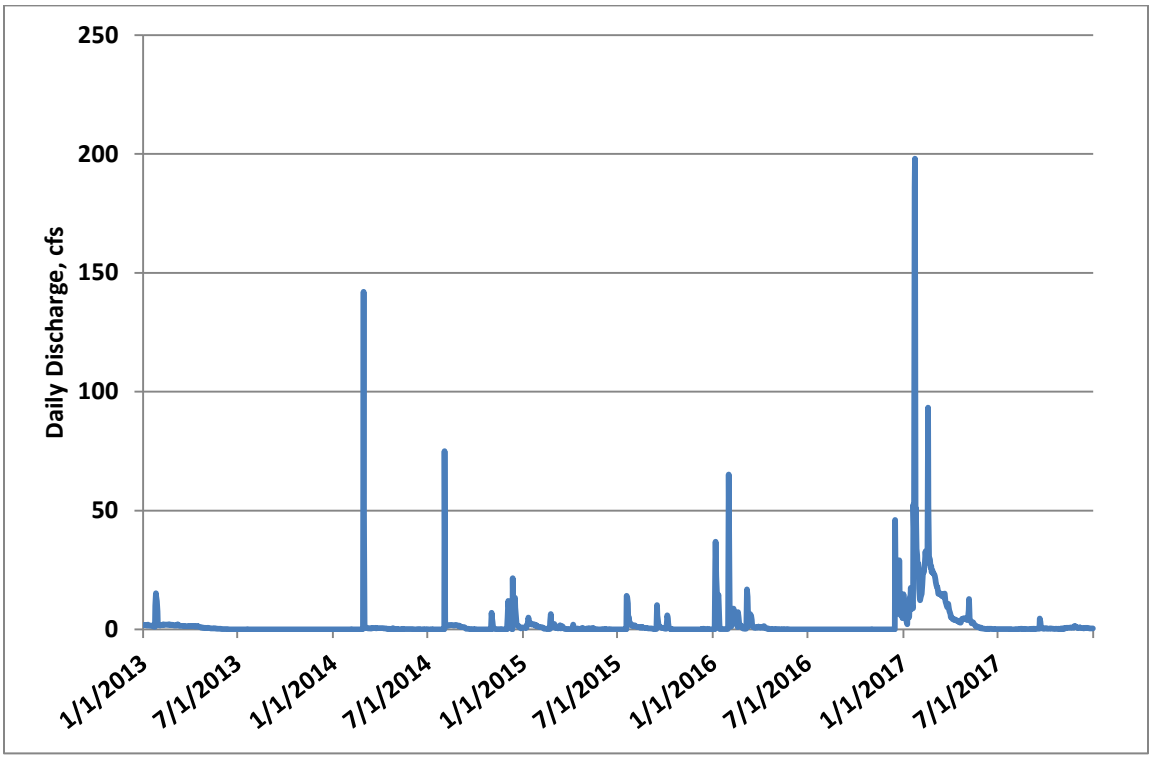
Figure 2-2
Monthly Rainfall Totals at Middle Fork Lytle Creek, 2013-2017



STREAM FLOW

There is no stream flow gage upstream of the upper Southern California Edison (SCE) diversion. The USGS maintains a stream gauge in Lytle Creek which is located about 2.3 miles downstream from the upper SCE diversion and about a ¼ mile downstream from the end of infiltration gallery for the Grapeland Tunnel (site 11062000). **Figure 2-3** shows the flow in Lytle Creek from 2013 to 2017. Flows were lower than normal over this time period, with an average daily discharge of 2.2 cfs.

Figure 2-3
Mean Daily Discharge for Lytle Creek at USGS station 11062000, 2013-2017



DIVERSION FROM LYTLE CREEK TO WEST VALLEY WATER DISTRICT

The Lytle Creek source for WVWD is diverted from Lytle Creek at two facilities along the creek. There is an upper diversion that is owned and operated by SCE and a lower intake structure that is owned by Fontana Union Water Company (FUWC) and operated by Fontana Water Company (FWC). Infiltrated groundwater is also collected from the Grapeland Tunnel by FUWC and blended with the diverted surface water.

SCE diverts water through the Fish Wheel and Sand Box into the upper diversion, and the flow is then conveyed by a penstock pipeline to the SCE Fontana Powerhouse where it is used for power generation. The upper SCE diversion is located approximately four miles north of the lower intake structure. Please see **Figure 2-4** for a diagram showing facility locations.

Creek flow remaining in Lytle Creek after the upper SCE diversion may either continue downstream or it can infiltrate into the ground and be captured in the Grapeland tunnel. According to the 2008 Watershed Sanitary Survey Update Report, the tunnel length was to be 2,850 feet and 4.5 feet wide and 6.5 feet high. Any surface flow in the creek remaining after the upper SCE diversion and infiltration into the Grapeland Tunnel is diverted into the lower intake structure through an earthen diversion dam (soft plug). This soft plug is constructed to blow out in times of high storm/runoff flows. During high

storm/runoff flows all water flows are diverted back into the stream. The lower intake structure is located approximately three miles above the intersection of Riverside Avenue and Lytle Creek Road.

Water from the upper penstock pipeline and waters collected in the Grapeland Tunnel are joined at the FUWC weir 1 diversion structure intake, as well as additional surface flow. The blended water is then transported from the lower intake structure, via underground pipeline, approximately 25,000 feet to the Fontana Powerhouse Forebay owned by FUWC. Lytle Creek water is then transported from this Powerhouse Afterbay to an adjacent facility owned by WVWD. Raw water is delivered by gravity via a 30-inch diameter pipeline to the two 2.0 million gallon influent blending ponds at the Roemer WFF.

WATER SUPPLY SYSTEM – WEST VALLEY WATER DISTRICT

Background

WVWD is a county water district and a public agency of the State of California. The District was formed in 1952 under the name Bloomington County Water Company, which was changed to Semi-tropic County Water District in 1959, then to West San Bernardino County Water District in 1961, and then to West Valley Water District in 2003.

The service area is 29.5 square miles, providing water service to portions of Rialto, Colton, Fontana, North Riverside County and the community of Bloomington. Currently, the WVWD has approximately 21,048 service connections, serving 83,218 water customers.

WVWD has four sources of water: local surface water from Lytle Creek, State Project Water, groundwater, and purchased water from the San Bernardino Valley Municipal Water District. WVWD currently utilizes water from five groundwater basins: Lytle Creek, Rialto, Bunker Hill, North Riverside, and Chino. **Table 2-1** provides the breakdown of water sources used for years 2013 through 2016.

Table 2-1. Percent Breakdown of Water Sources Utilized by WVWD, 2009-2016

Year	Surface Water (local and SPW)	Groundwater	Purchased Well Water
2009	21.5	66.6	11.9
2010	25	61	14
2011	27.5	58	14.4
2012	30.3	60.8	8.8
2013	25	60	15
2014	23	54	23
2015	23	54	23
2016	32	51	17

The Roemer WFF can treat 100 percent Lytle Creek water, 100 percent State Project Water, or a blend. Lytle Creek water is used when available, historically from January through May and again in December. Detailed information about the percent blends treated at the Roemer WFF over the reporting period is discussed in Section 3. WVWD treats Lytle Creek flow based on the combined legal entitlements of the cities of Rialto and San Bernardino, and the WVWD. When Lytle Creek is not in proration, the maximum flows for each are as follows:

City of Rialto - 1,034 gallons per minute (gpm)
City of San Bernardino - 1,350 gpm
WVWD - 2,291 gpm
FUWC – receives remaining flow above three combined entitlements.

Oliver P. Roemer Water Filtration Facility

The WFF currently operates under the 2012 permit which rates the plant capacity at 14.4 million gallons per day (mgd). The plant was classified as a conventional WTP by CDPH's Engineering Report and is therefore granted 2.5/2.0/2.0-log reduction credit for *Giardia*/viruses/*Cryptosporidium*. In October 2017, DDW issued a permit amendment allowing the WVWD to expand the existing granular carbon system by four vessels at the Roemer WFF. The addition of four GAC vessels does not change the nameplate capacity of 14.4 mgd, but it will improve the TOC removal rate to minimize formation of disinfection byproducts in the distribution system.

In order to provide additional solids removal for State Project Water, that water is sent to a pretreatment facility prior to blending with Lytle Creek water. The pretreatment facilities include a flow splitting structure with design capacity of 21.6 mgd and three high-rate conventional treatment trains with a capacity of 7.2 mgd for each train. Each train includes one flocculation basin (serpentine with three stages) and sedimentation basin (inclined plate settlers). Aluminum sulfate was used as the primary coagulant, until July 2015 when aluminum chlorohydrate (ACH) replaced aluminum sulfate. Cationic polymer is also used as a coagulant aid, and there is an option of using sodium

hydroxide for pH control during pretreatment. The Lytle Creek source is typically sent directly to the raw water blending reservoirs. The effluent from the raw water blending reservoirs is then sent to the filtration plant.

The Roemer WFF utilizes coagulation, contact clarification, filtration and post filtration process including a UV system, GAC, and chlorine disinfection.

The filtration plant consists of six Siemens Microfloc Trident 840 package units which provide two-stage filtration. Chemical feed occurs at the influent to the plant and upstream of the Microfloc units. This includes pre-chlorination, coagulation with aluminum sulfate (alum), and cationic polymer as needed. Alum was replaced with ACH in July 2015. Conventional filtration equivalent is provided by the package system consisting of contact absorption clarification and multi-media filtration. The filtered water is then sent through UV reactors for disinfection.

If TOC levels in the filter plant effluent water need to be further reduced prior to disinfection then a portion of the stream will be sent to the GAC filters and then blended back in the filter plant effluent. Finally, the water is post-chlorinated with liquid sodium hypochlorite in a chlorine contact tank to provide a distribution system disinfectant residual.

WVWD has long-term plans to construct a 6.0 mgd microfiltration plant to treat State Project Water or Lytle Creek water, and increase the treatment capacity from 14.4 mgd to 20.4 mgd. This will be called the Phase 4 Expansion.

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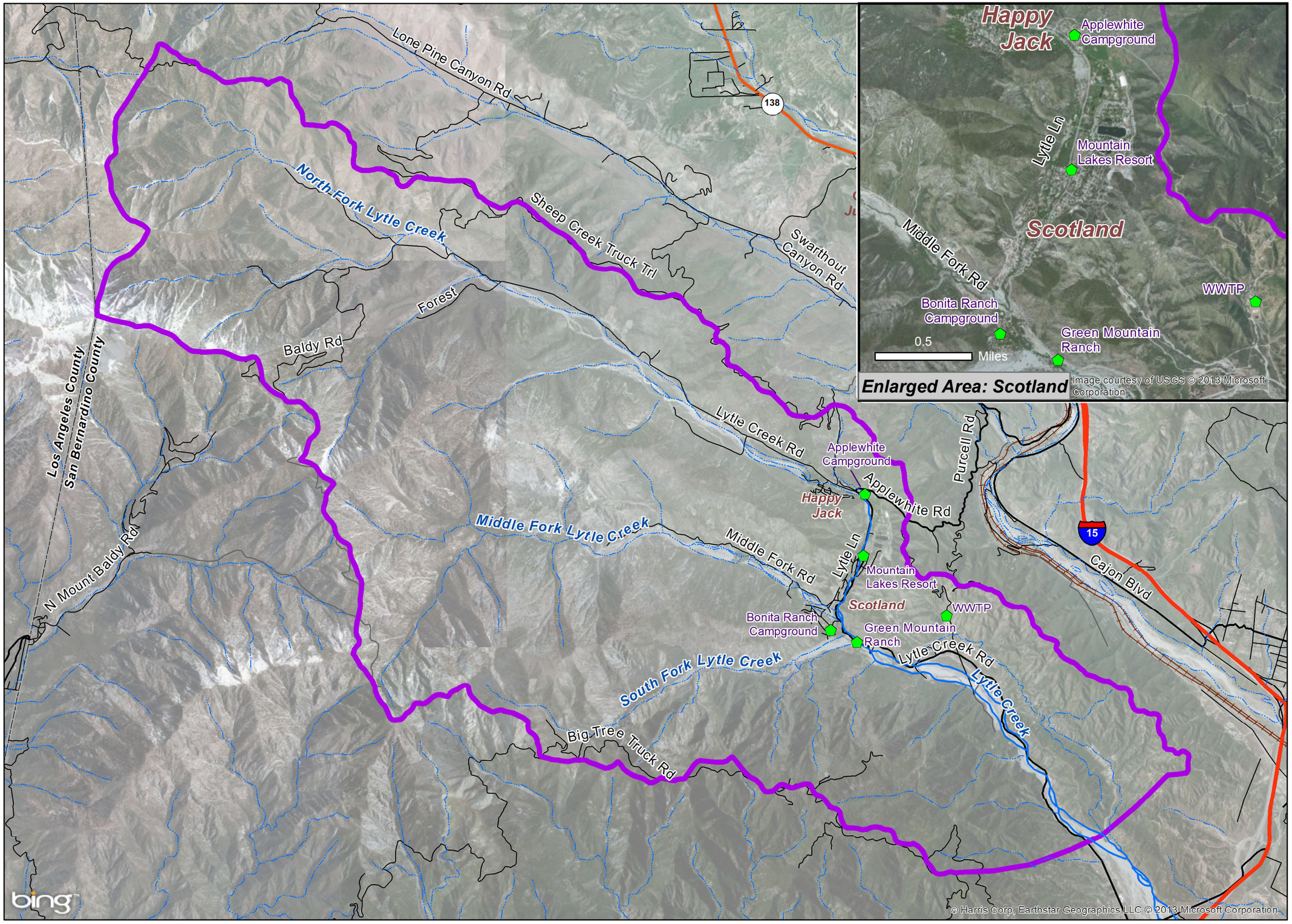


0 0.5 1 Miles

LEGEND

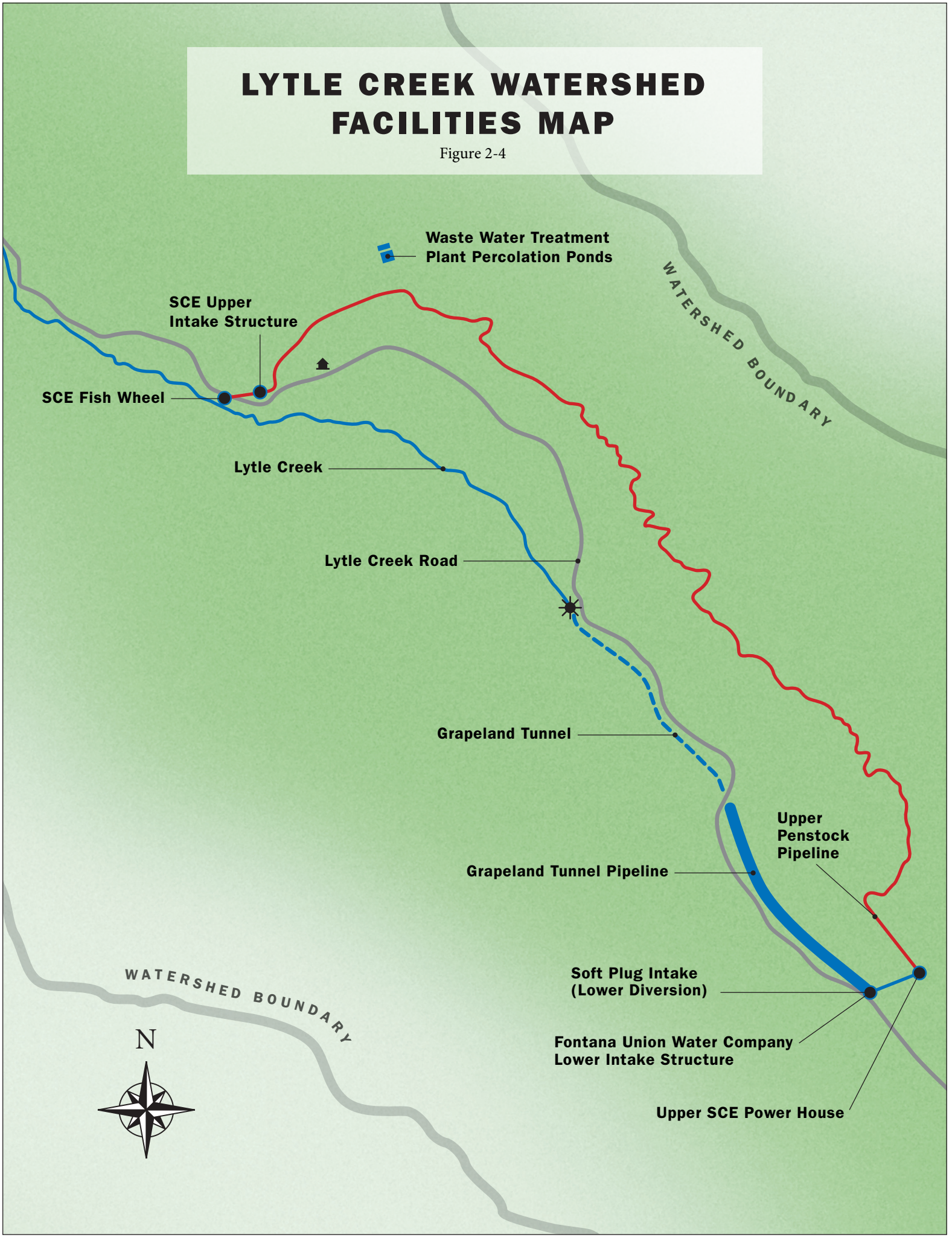
- Watershed Boundary
- Facility

Lytle Creek Watershed

WATERSHED
Figure 2-1

LYTLE CREEK WATERSHED FACILITIES MAP

Figure 2-4



SECTION 3 – LYTLE CREEK WATER QUALITY REVIEW

This section first provides an overall review of the water quality data available for Lytle Creek. A review of the California Environmental Data Exchange Network (CEDEN) website was conducted to identify applicable ambient monitoring data from other programs in the watershed. There were two outside ambient water quality monitoring programs in the study area with available drinking water constituent data for the study period; January 1, 2013 through December 31, 2017. One study was conducted by the Santa Ana Regional Water Quality Board's (Regional Board) Surface Water Ambient Monitoring Program (SWAMP) and one study was conducted by the Southern California Stormwater Monitoring Coalition. Both studies included multiple sites, but had limited constituents and frequencies. Therefore the overall water quality review will be primarily based on the data collected by West Valley Water District (WVWD). **Appendix B** contains a summary of the Oliver P. Roemer Water Filtration Facility (Roemer WFF) intake data used for this review.

This section then provides a review of the constituents of interest, including an explanation for their selection and a summary of the data obtained during the study period.

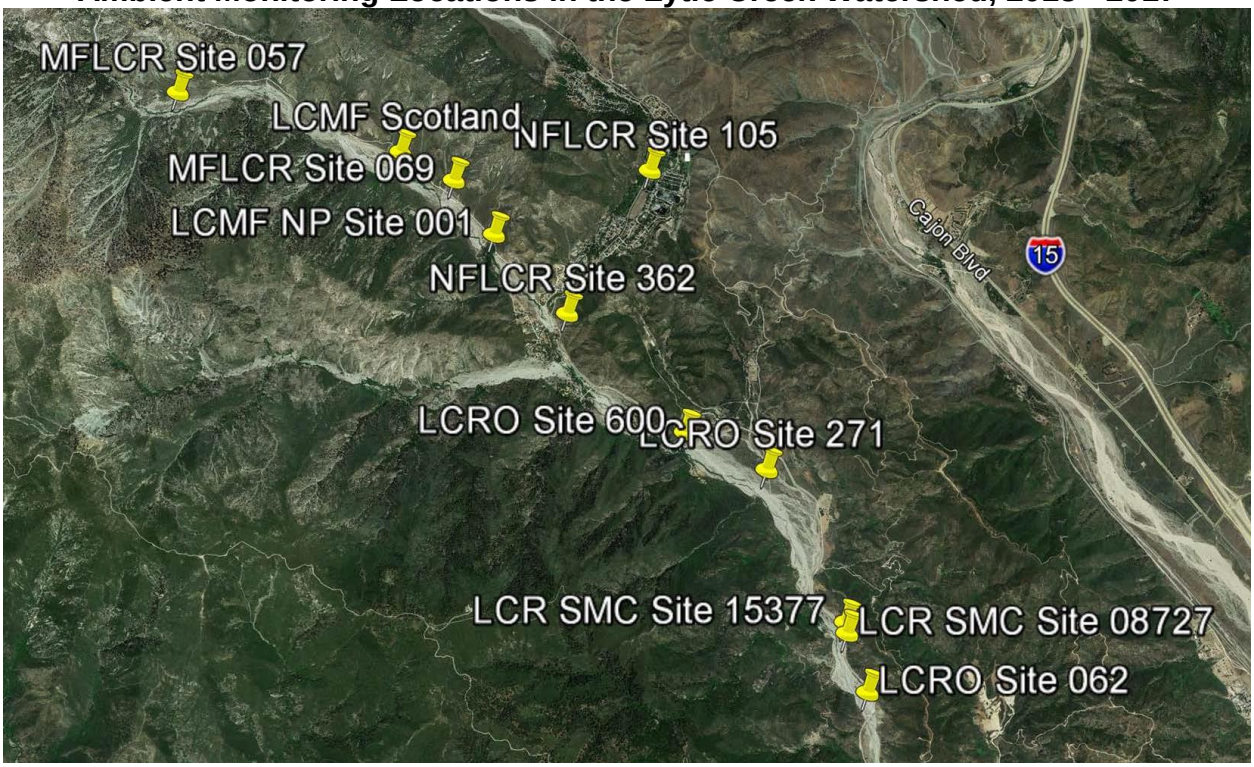
For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the Report.

AMBIENT WATER QUALITY MONITORING

The Southern California Stormwater Monitoring Coalition sampled four sites in the Lytle Creek watershed during the study period. This included three sites on the lower main stem and one site on the upper Middle Fork. The Regional Board's SWAMP sampled seven sites in the Lytle Creek watershed during the study period. This included two sites on the lower main stem, three sites on the upper Middle Fork, and two sites on the upper North Fork. The site names are listed in **Tables 3-1** and **3-2**, and shown on **Figure 3-1**.

The Southern California Stormwater Monitoring Coalition sampled one site twice and the other sites once, all during the summer dry period. Generally, the samples were collected on days with no precipitation, however two of the samples had rain in the days prior to the sample event (as described in **Table 3-1** footnotes). The samples were analyzed for general constituents and selected metals, and the results are presented in **Table 3-1**. The maximum result for each detected constituent is highlighted in yellow. The data is difficult to correlate since it was collected in different years, but most of the analytical results are similar to the data collected by WVWD at their Lytle Creek influent site. There are moderate amounts of alkalinity, hardness, and dissolved solids. There are low amounts of turbidity and organic carbon. Metals are infrequently detected and if detected, at very low levels. In addition, two sites (Site 600 and Site 08727) were sampled one time each for a suite of pyrethroid pesticides in 2013 and 2014. All analytical results were non-detectable.

Figure 3-1
Ambient Monitoring Locations in the Lytle Creek Watershed, 2013 - 2017



The Regional Board's SWAMP sampled all sites once, all during the summer dry period. Generally, the samples were collected on days with no precipitation, however one of the samples had rain in the days prior to the sample event (as described in **Table 3-2** footnotes). The samples were analyzed for general constituents and a wider list of metals. The data collected is difficult to correlate since it was collected in different years, but most the analytical results are similar to the data collected by the Southern California Stormwater Coalition program and WVWD at their Lytle Creek influent site. There are moderate amounts of alkalinity, hardness, and dissolved solids. There are low amounts of turbidity and organic carbon. Metals are infrequently detected and if detected, at very low levels.

There is one notable exception in the water quality for the SWAMP. The results for Site 062, on lower Lytle Creek, included a much higher turbidity result than all the other samples, well out of range for typical levels during the summer period. No rain occurred at, or before, this time. The sample also had very high levels of total aluminum (2,407 ug/L), high levels of dissolved organic carbon (DOC) (2.47 mg/L), and moderate levels of manganese (32.8 ug/L). The analytical results for this sample were validated, however they appear inconsistent with the normal ranges for these constituents and it is questionable if this sample was collected properly. Site 362, on the North Fork, also had a higher turbidity result and an increase in the detection of metals.

Table 3-1
Southern California Stormwater Monitoring Coalition Data, 2013 - 2015

Constituent	Units	Average Result			
		Lytle Creek MF NP Site 001[1]	Lytle Creek RO Site 600[2]	Lytle Creek RSMC Site 08727[3]	Lytle Creek RSMC Site 15377[4]
Alkalinity	mg/L	119	145.6	120	145
DOC	mg/L	<1	<1	NA	<1
Hardness	mg/L	130.4	146.4	130	115.2
Nitrate	mg/L	0.37	0.23	0.36	0.59
Nitrite	mg/L	<0.05	<0.05	<0.1	<0.05
pH	units	7.8	7.8	8.49	8
Specific Conductance	uS/cm	256.1	302	238.3	377
Sulfate, Dissolved	mg/L	13.48	18.48	26	22.15
TDS	mg/L	150	200	NA	217
Turbidity	NTU	0.88	0.45	NA	0.34
Aluminum, total	ug/L	NA	NA	NA	83
Arsenic, total	ug/L	NA	NA	1.8	1.7
Cadmium, total	ug/L	NA	NA	<0.25	<0.4
Chromium, total	ug/L	NA	NA	<0.5	<0.5
Copper, total	ug/L	NA	NA	<0.5	<0.5
Lead, total	ug/L	NA	NA	<0.5	0.1
Manganese, total	ug/L	NA	NA	NA	1.5
Nickel, total	ug/L	NA	NA	<1	<0.5
Selenium, total	ug/L	NA	NA	<1	0.5
Silver, total	ug/L	NA	NA	NA	<1
Zinc, total	ug/L	NA	NA	1.1	0.7

[1] - Two Samples, May 2014 (follow rain) and June 2014 (dry)

[2] - One Sample, June 2014 (dry)

[3] - One Sample, June 2013 (follow rain)

[4] - One Sample, July 2015 (dry)

Highlighted Data Represents Maximum Value For Each Detected Constituent

NA - Not Analyzed

Table 3-2
Regional Board SWAMP Data, 2013 - 2015

Constituent	Units	Average Result						
		Lytle Creek MF 1.3mi above Scotland[1]	Lytle Creek RO Site 062[2]	Lytle Creek RO Site 271[3]	MF Lytle Creek RO Site 057[4]	MF Lytle Creek RO Site 069[5]	NF Lytle Creek RO Site 105[6]	NF Lytle Creek RO Site 362[7]
Alkalinity	mg/L	140	127	139	124	118	178	148.6
DOC	mg/L	<1	2.47	<1	2.28	<1	<1	NA
Hardness	mg/L	131	99.3	135.5	90.9	92.3	189	171.2
Nitrate	mg/L	NA	0.52	0.14	0.24	0.31	0.18	0.15
Nitrite	mg/L	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH	units	8.2	8.16	8.26	8.13	8.04	8.07	7.89
Specific Conductance	uS/cm	97.4	306.8	285.8	260.6	278.1	374.6	343.7
Sulfate, Dissolved	mg/L	12.2	22.42	19.29	14.62	15.14	31.95	NA
TDS	mg/L	NA	559	180	118	165	230	NA
Turbidity	NTU	0.67	10.3	0.14	0.18	0.25	0.78	3.2
Aluminum, total	ug/L	NA	2,407	NA	37	38	NA	452
Antimony, total	ug/L	NA	NA	NA	NA	NA	NA	<0.5
Arsenic, total	ug/L	NA	2.3	NA	3.3	1.9	NA	2.6
Barium, total	ug/L	NA	NA	NA	NA	NA	NA	20.4
Beryllium, total	ug/L	NA	NA	NA	NA	NA	NA	<0.5
Cadmium, total	ug/L	NA	<0.4	NA	<0.4	<0.4	NA	<0.4
Chromium, total	ug/L	NA	2.2	NA	<0.5	<0.5	NA	1.2
Cobalt, total	ug/L	NA	NA	NA	NA	NA	NA	<0.5
Copper, total	ug/L	NA	2	NA	<0.8	<0.8	NA	1.3
Iron, total	ug/L	NA	NA	NA	NA	NA	NA	417
Lead, total	ug/L	NA	1.7	NA	<0.1	<0.1	NA	1.9
Manganese, total	ug/L	NA	32.8	NA	0.7	0.7	NA	8.6
Molybdenum, total	ug/L	NA	NA	NA	NA	NA	NA	3.7
Nickel, total	ug/L	NA	1.4	NA	<0.5	<0.5	NA	0.5
Selenium, total	ug/L	NA	0.7	NA	0.6	0.6	NA	0.5
Silver, total	ug/L	NA	<1	NA	<1	<1	NA	<1
Strontium, total	ug/L	NA	NA	NA	NA	NA	NA	335.8

Table 3-2 Cont'd
Regional Board SWAMP Data, 2013 - 2015

Constituent	Units	Average Result						
		Lytle Creek MF 1.3mi above Scotland[1]	Lytle Creek RO Site 062[2]	Lytle Creek RO Site 271[3]	MF Lytle Creek RO Site 057[4]	MF Lytle Creek RO Site 069[5]	NF Lytle Creek RO Site 105[6]	NF Lytle Creek RO Site 362[7]
Thallium, total	ug/L	NA	NA	NA	NA	NA	NA	<0.5
Tin, total	ug/L	NA	NA	NA	NA	NA	NA	2
Titanium, total	ug/L	NA	NA	NA	NA	NA	NA	13.5
Vanadium, total	ug/L	NA	NA	NA	NA	NA	NA	2.3
Zinc, total	ug/L	NA	8.8	NA	<0.5	0.5	NA	<0.5

[1] - One Sample, May 2013 (follow rain)

[2] - One Sample, July 2015 (dry)

[3] - One Sample, June 2014 (dry)

[4] - One Sample, July 2015 (dry)

[5] - One Sample, July 2015 (dry)

[6] - One Sample, June 2014 (dry)

[7] - One Sample, July 2013 (dry)

Highlighted Data Represents Maximum Value For Each Detected Constituent

NA - Not Analyzed

OVERALL WATER QUALITY REVIEW

The review of overall water quality is based on comparison of the Roemer WFF intake water (also called raw water) to drinking water standards for the constituents currently regulated. This includes all constituents with primary and secondary Maximum Contaminant Levels (MCLs) and unregulated constituents that have Notification Levels. In general, it is assumed that if the raw water is below these limits, then the treated water (also called finished water) will be also. There is an exception for aluminum because it is added to the water as the primary coagulant. Compliance with MCLs and Notification Levels is typically based on treated water sample results.

Overall, Lytle Creek provides excellent quality water. The raw water is treated to meet drinking water standards using conventional filtration processes. There are no constituents present in the raw water that consistently require additional treatment processes. The individual intake evaluation for treated water and regulatory compliance is presented in **Section 5**.

Selected raw water data has been summarized and is included in the summary table below. **Table 3-3** presents the statistics for each selected constituent. It must be noted that the Roemer WFF can treat either 100 percent Lytle Creek water, or a blend of Lytle Creek and State Project Water (SPW). In most years Lytle Creek is predominately used from January through May and again in December. **Figure 3-2** presents a time series plot of the percent of Lytle Creek water in the influent of the Roemer WFF during the study period. **Figure 3-3** presents a comparison of the percent of Lytle Creek water in each year, by month, during the study period. There was no data available for February 2013. The winter and spring months of 2016 used significantly less Lytle Creek water than normal and there was no Lytle Creek water used in October and November 2017. The decreased use of Lytle Creek in 2016 and 2017 was related to drought conditions limiting availability and increased use of SPW.

Some of the sample sites are representative of the Lytle Creek only source, but some of the data represents a blend of the two waters. This report will identify the sources represented in each data set evaluated. Also there were periods during the study where the plant was off-line, either due to raw water quality conditions, maintenance, or construction, and no data was collected during those periods.

Table 3-3
Summary of Raw Water Quality Data for the Roemer WFF

Constituent	Units	Range	Average	Median	95th Percentile
Turbidity[1]	NTU	0.1 – 135	0.742	0.433	1.701
Total Coliform[2,3]	MPN/ 100 mL	<2 - 2000	358	240	1140
Fecal Coliform[2,4]	MPN/ 100 mL	<1 - 500	24	7.8	80
E.coli[2,5]	MPN/ 100 mL	<1 - 41	6	3.1	20.9
Giardia[6,7]	cysts/L	0	0	0	0
Cryptosporidium[6,8]	oocysts/L	0	0	0	0
Total Organic Carbon[2,9]	mg/L	<0.15 – 2.5	0.61	0.47	1.62

[1]Based on peak daily value for raw water turbidity, representing a blend of Lytle Creek and SPW, from January 1, 2013 through December 31, 2017 during operational periods only
[2]Based on Lytle Creek Influent
[3]Total coliform based on data from January 1, 2013 through December 31, 2017
[4]Fecal coliform based on data from January 1, 2013 through March 15, 2013 and June 1, 2014 through December 31, 2017
[5]*E. coli* based on data from March 16, 2013 through May 31, 2014
[6]Based on a Blend of Lytle Creek and SPW at Plant Influent
[7]Based on data from October 2015 through February 2017
[8]Based on data from October 2015 through September 2017
[9]Based on data from January 9, 2013 through December 5, 2017

Figure 3-2
Percent Lytle Creek at Roemer WFF Influent, 2013 - 2017

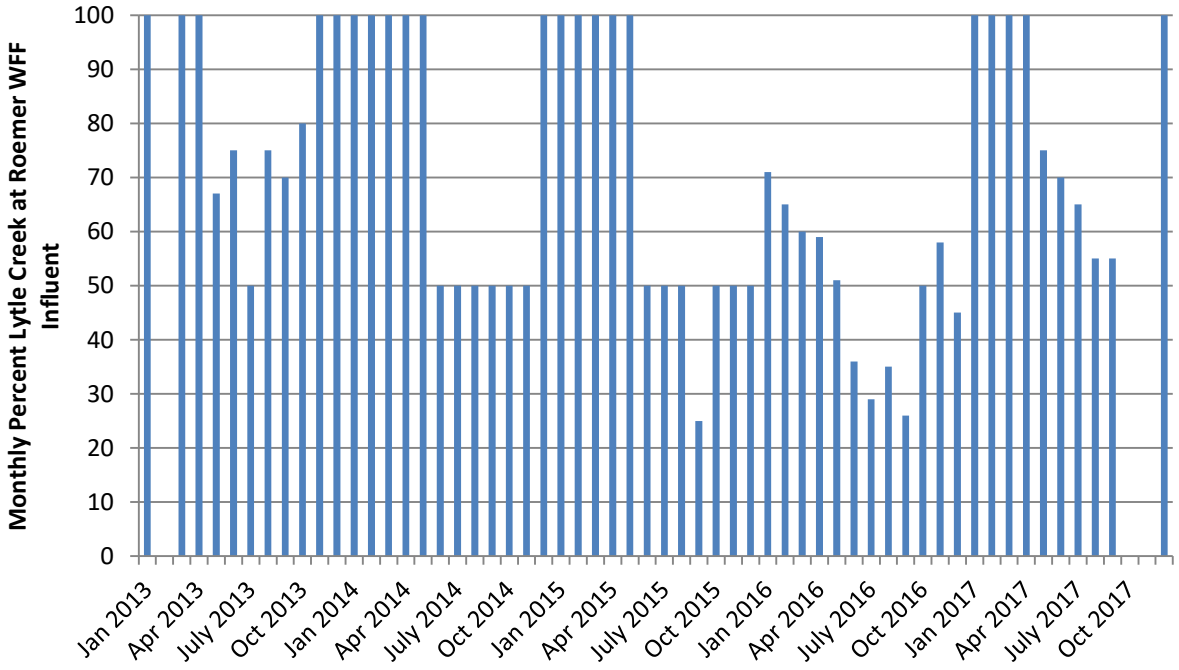
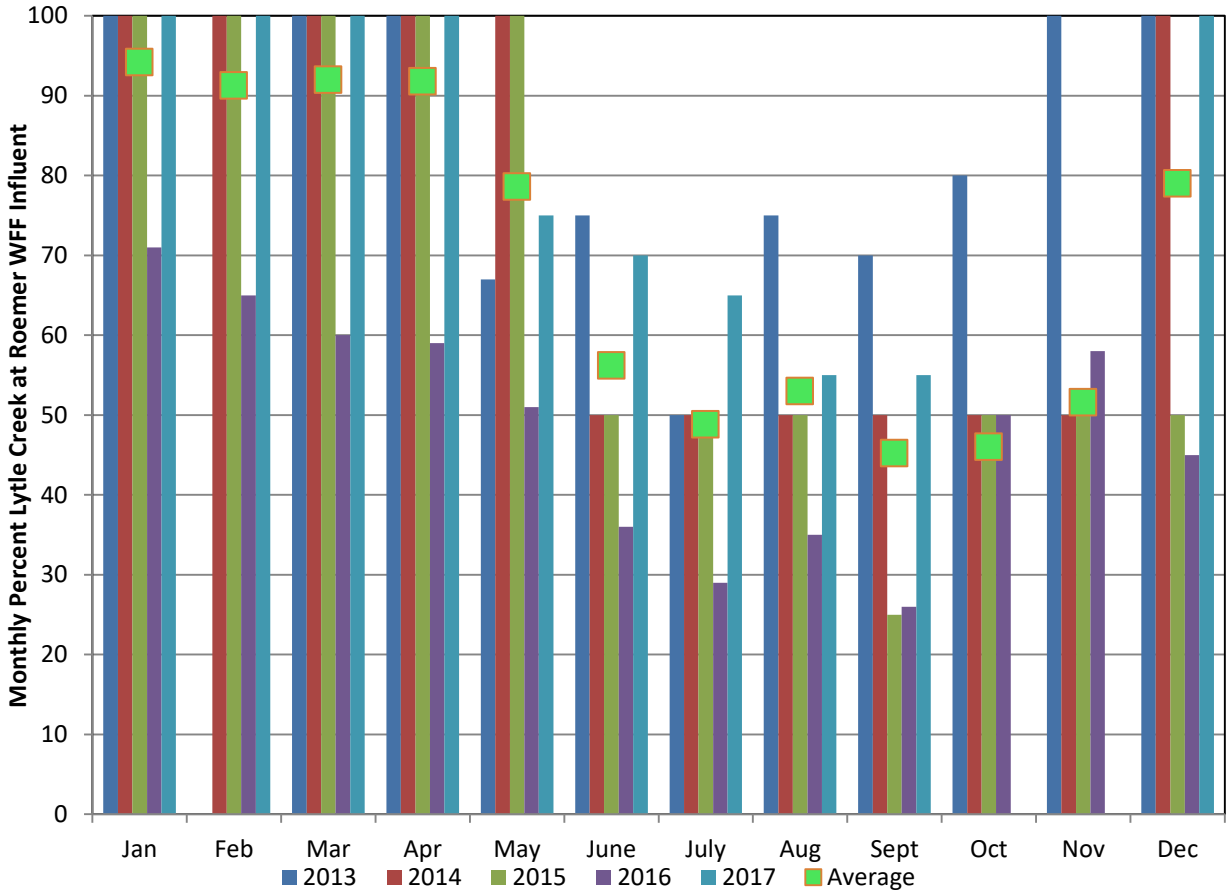


Figure 3-3
Comparison of Monthly Lytle Creek Use at Roemer WFF, 2013 - 2017



SELECTED CONSTITUENT REVIEW

This section contains a general discussion of selected water quality constituents and the reasons why they were selected for further evaluation. The constituents selected for further review in this section include turbidity, total coliform, fecal coliform, *E. coli*, *Giardia*, *Cryptosporidium*, and total organic carbon (TOC). The constituents' general characteristics, seasonal and historical trends, and significance with respect to existing and potential future regulations are presented, along with data analysis and review. Additional evaluation of these constituents, with respect to treated water quality and regulatory compliance, is presented in **Section 5**.

The constituents selected for further review were selected based on several criteria including; existing or upcoming regulatory standards, critical operational evaluation parameters, and relevance to significant potential contaminating activities. These items are discussed in the background section for each constituent. **Table 3-4** shows the relationship between potential contaminating activities and water quality constituents.

Table 3-4
Relationship Between Potential Contaminating Activities and Water Quality

	Wastewater	Recreation	Floods/ Erosion	Spills	Fires	Development
Turbidity	√	√	√		√	√
Microbial Constituents	√	√	√	√		√
TOC	√		√		√	√

Turbidity

General Characteristics and Background

Turbidity is the measurement of light scatter in water and provides a measure of the degradation of clarity in water. Clarity is typically degraded by suspended colloids and fine suspended solids such as clay, organic particulates, and microorganisms such as *Giardia* and *Cryptosporidium*, if present. Turbidity is measured to evaluate the efficiency of the treatment process at removing these particles and also to comply with regulatory requirements.

Turbidity was selected for further evaluation since most utilities, including WVWD, optimize pretreatment processes to maximum turbidity removal in order to reduce the potential for pathogens, such as *Giardia* and *Cryptosporidium*, in treated drinking water. Turbidity is monitored throughout the water treatment plant to ensure that particles are removed. Turbidity has been assumed to be an indicator organism for the presence of *Giardia* and C*ryptosporidium*. However, turbidity alone may be a poor predictor of microbiological quality.

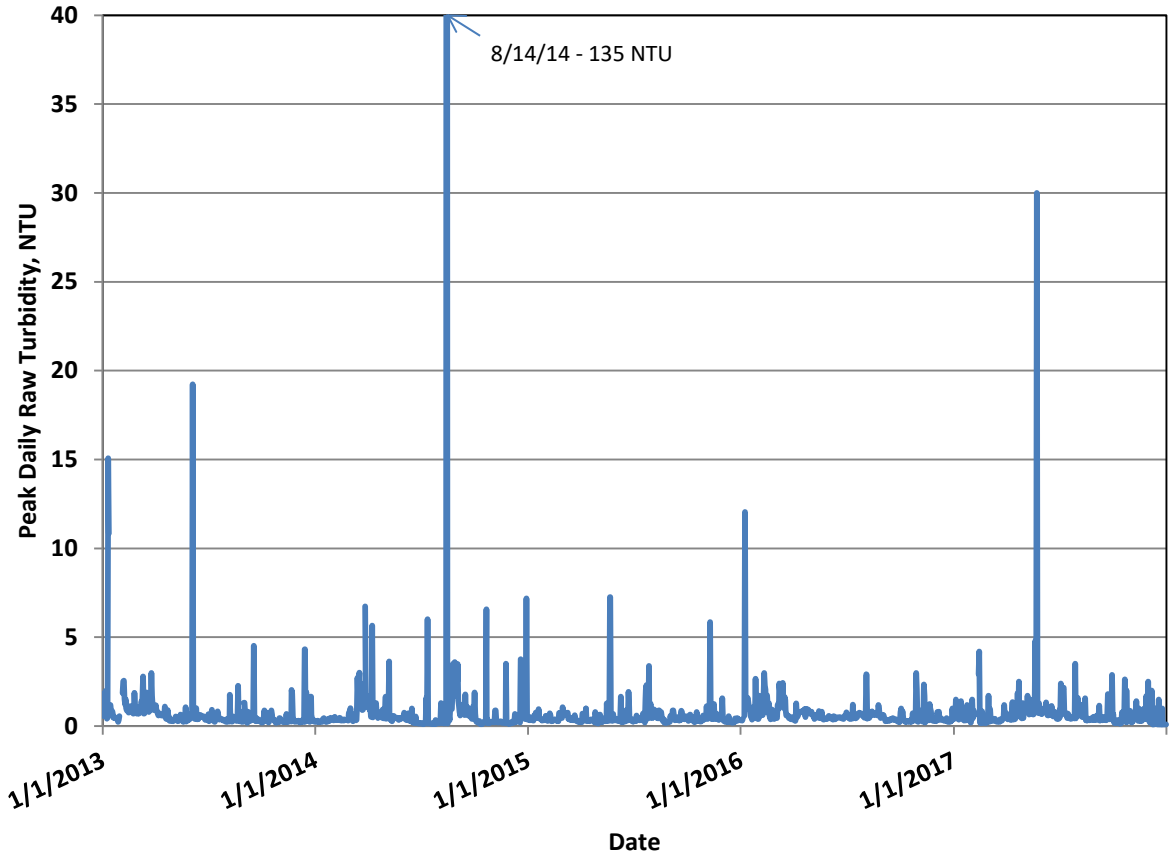
Current drinking water regulations require that the combined filtered effluent be less than 0.3 nephelometric turbidity units (NTU) in 95 percent of monthly measurements and the turbidity may never exceed 1 NTU. Continuous turbidity monitoring for individual filters is required. Turbidity has also been indirectly regulated in drinking water as part of the Filter Backwash Rule. This rule requires that recycled waste streams return to the plant headworks upstream of all chemical feed systems and recommends return at a controlled, small percentage of total flow (less than 10 percent) to ensure that chemical feed is adjusted for blended water quality, including potential increases in turbidity caused by recycle streams.

High turbidity levels in surface water sources, such as creeks and lakes, are typically the result of erosion and sediment transport during precipitation and high flow events, and are undesirable because high turbidity can mask the presence of harmful particulates. The principal source of turbidity is general watershed runoff, and can also be contributed by other potential contaminating activities such as fires, floods/erosion, and wastewater. It is common for turbidities to vary seasonally as a result of precipitation and flow. It has also been found that the presence of suspended matter can interfere with disinfection of microorganisms.

Evaluation

Turbidity has been selected for evaluation not only because it is a regulated constituent, but also because it is commonly used as an indicator of general water quality and overall plant performance. The average, median, minimum, maximum, and 95th percentile has been summarized for the plant influent at the Roemer WFF in **Table 3-3,** keep in mind that this represents Lytle Creek blended with SPW. A time series plot has been developed for peak daily raw water turbidity from January 1, 2013 through December 31, 2017 for the Roemer WFF (**Figure 3-4)**.

Figure 3-4
Peak Daily Raw Water Turbidity for the Roemer WFF



Turbidity at the Roemer WFF influent did not correlate well with local precipitation in Lytle Creek. This is likely due to the influence of the solids load associated with the SPW, which is blended in upstream of the plant influent turbidity reading location. Turbidity fluctuated through the study period, with peaks occurring throughout the year and without consistent trends. There was an unusually high result on August 14, 2014, at 135 NTU. During this month the influent was an equal blend of Lytle Creek and SPW, and there was no local precipitation. The results for the days before and after were less than 0.2 NTU, so it is possible that this was a recording error and not a representative sample. No specific activities in the watershed were able to be

attributable to this increase, except for possibly an unauthorized discharge from Mountain Lakes Resort, as discussed further in **Section 4.**

Summary of Results for Turbidity

- The raw water turbidity data reflects the plant influent water, after the Lytle Creek source is blended with SPW.
- The Roemer WFF has relatively low levels of raw water turbidity, with an average value less than 1 NTU.
- There are no clear trends in the data, turbidity peaks can occur throughout the year.
- There was an unusually high turbidity reading in August 2014 and there is no clear cause of the increase.

Microbiological Constituents

General Characteristics and Background

The major microbiological constituents of concern include total coliform, fecal coliform, *Escherichia coli (E. coli)*, *Giardia lamblia*, and *Cryptosporidium parvum*. Generally speaking, pathogenic organisms carried by mammalian species may be infectious to humans although this depends on the species of micrororganism. Pathogens infecting other types of animals, such as birds and reptiles, are usually not infectious to humans. However, some types of animals, such as birds, may be vectors for human pathogens. Each of these constituents was identified for further evaluation because they are currently regulated. The presence of the constituents in the raw water governs the overall treatment requirements for the water treatment plants.

Coliform and *E. coli* have been used to indicate the potential presence of pathogenic microorganisms in source waters. Although coliform levels have not been shown to correlate well with pathogenic microorganisms, they continue to be used as indicators due to the lack of affordable and reliable direct analytical methods for detecting pathogens. The United States Environmental Protection Agency (USEPA) has determined that the most practical surrogate for protozoa at this time is *E. coli*, as required under the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). Potential sources of coliform bacteria include general watershed runoff, agricultural drainage, recreation, wastewater, urban runoff, and animal populations. Coliform levels in treated water are currently regulated directly through the Total Coliform Rule, to ensure the effectiveness of the disinfection process throughout the distribution system.

Giardia lamblia is a species of the protozoa genus *Giardia* that infects humans and can cause the gastrointestinal disease giardiasis. *Giardia* is found in the environment as a cyst from the feces of humans and animals; both wild and domestic animals may be hosts. Sources close to waterbodies have the most potential to introduce viable cysts to the source water. Cysts may be destroyed naturally in the environment by desiccation

and/or heat. The cysts are effectively inactivated using chlorine disinfection. The detectability of *Giardia* has been greatly improved with USEPA Method 1623, which is better able to establish concentrations, but still does not determine viability. *Giardia* may be carried in urban runoff, agricultural runoff, and wastewater sources or may be contributed directly as a result of body-contact recreation or animal defecation.

Giardia lamblia is currently regulated by the Surface Water Treatment Rule (SWTR) and the Interim Enhanced Surface Water Treatment Rule (IESWTR). Surface water supplies must provide for 3-log reduction of *Giardia* through physical removal and chemical inactivation. Additional reduction may be required for impaired water supplies. The USEPA provided guidance with the SWTR that indicated additional reduction would be appropriate if measured *Giardia* levels in the source water were greater than 0.01 cysts per liter. However, in the 1980's there was no practical means to measure *Giardia*, therefore the California Division of Drinking Water (DDW, formerly the California Department of Public Health) prepared guidance under the SWTR that indicated that 3-log reduction would likely be appropriate when monthly median levels of total coliform in the raw water were less than 1,000 most probable number per 100 milliliter (MPN/100 mL). In recent years DDW has allowed for the substitution of fecal coliform or *E. coli* levels in raw water since they are more specific indicators. The DDW have set the guidance level for increased treatment at raw water monthly fecal or *E. coli* median levels greater than 200 MPN/100 mL, based on the historic ratio of five total coliform to one fecal coliform.

Cryptosporidium parvum is a species of the protozoa genus *Cryptosporidium* that infects humans and can cause the gastrointestinal disease cryptosporidiosis. *Cryptosporidium* is found in the environment as an oocyst principally from the feces of domestic animals, although both wild and domestic animals are known to be hosts. Like *Giardia*, *Cryptosporidium* oocysts may be destroyed naturally in the environment by desiccation and/or heat. Once in the source water, however, viable oocysts are very resistant to traditional chemical inactivation using chlorine. Stronger disinfectants such as ozone or ultraviolet (UV) light are required to inactivate these pathogens. The detectability of *Cryptosporidium* has been greatly improved with USEPA Methods 1622 and 1623, which are able to establish truer concentrations, but still do not determine viability. *Cryptosporidium* may be carried in urban runoff, agricultural runoff, and wastewater sources or may be contributed directly as a result of body-contact recreation or animal defecation.

Cryptosporidium is currently regulated through the IESWTR and the Long Term 1 ESWTR (LT1ESWTR), which require 2-log reduction, and the LT2ESWTR which potentially requires additional log action based on source water monitoring results for *Cryptosporidium*. Under the IESWTR and LT1ESWTR well-operated conventional and direct treatment plants are granted a 2-log removal credit for *Cryptosporidium* if they meet all treated water turbidity standards. The LT2ESWTR further regulates *Cryptosporidium* and requires additional action (treatment or protection) if the source water quality is determined to be impaired based on direct *Cryptosporidium* monitoring of the source, with a running annual average level greater than 0.075 oocysts per liter.

The DDW also developed the *Cryptosporidium* Action Plan (CAP) in the mid-1990's to address *Cryptosporidium* while federal regulations were being formed. The CAP identified recommended turbidity limits for settled water, treated water and recycled water in lieu of treated water *Cryptosporidium* levels. The CAP was developed to help utilities optimize treatment processes to ensure maximum removal of *Cryptosporidium* oocysts and reduce the risk of waterborne illness. This plan was intended for utilities with over 1,000 service connections.

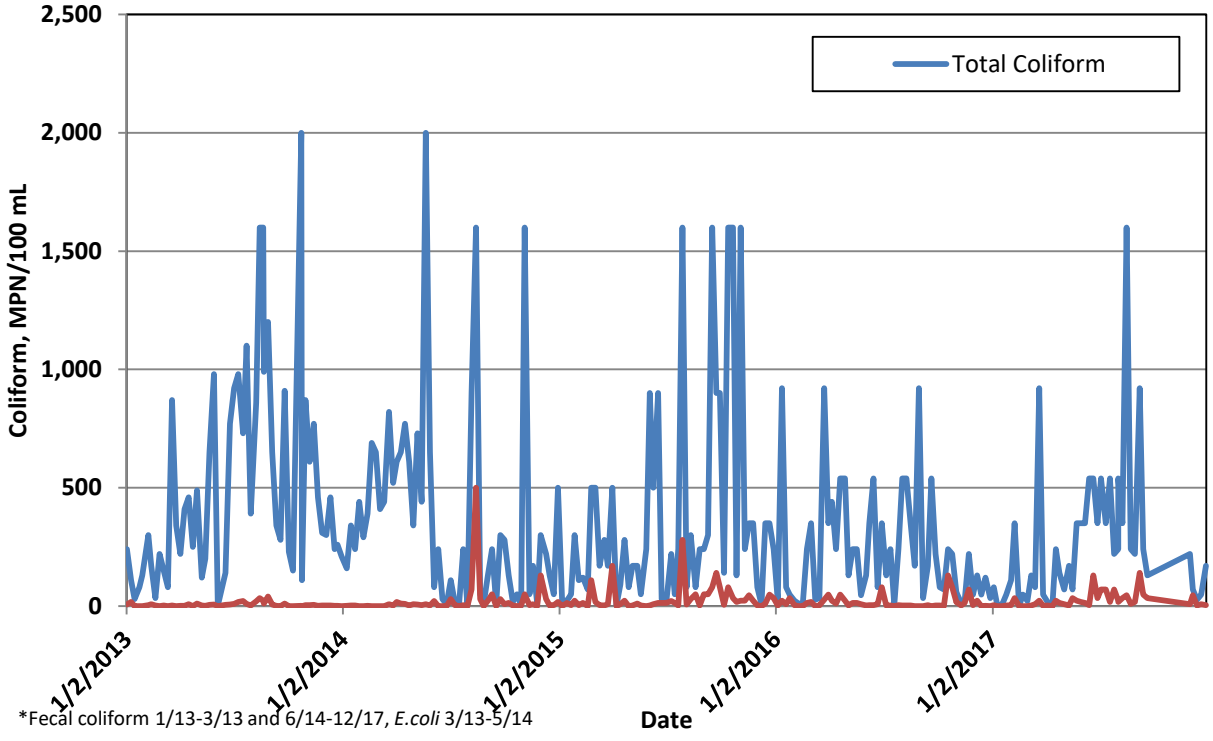
Evaluation for Total Coliform, Fecal Coliform, and E. coli

WVWD monitored the raw water for total coliform and either fecal coliform or *E. coli* on a weekly basis for the Lytle Creek source, at the Influent which is indicative of Lytle Creek water only. WVWD currently has a DDW water supply permit requirement that triggers additional log reduction for *Giardia* and viruses when the monthly median value, calculated weekly, for total coliform exceeds 1,000 MPN/100 mL.

Alternatively, DDW does allow other water utilities to use monthly median fecal coliform or *E. coli* levels as a guide for increased *Giardia*/virus treatment requirements, with 200 MPN/100mL as the designated level for increased log reduction. Many water utilities have opted to change their monitoring programs to focus on either fecal or *E. coli*, instead of total coliform, based on USEPA and DDW regulatory direction.

Figure 3-5 provides a timeseries plot of the coliform data during the study period.

Figure 3-5
Lytle Creek Influent Coliform, 2013 - 2017



*Fecal coliform 1/13-3/13 and 6/14-12/17, *E.coli* 3/13-5/14

From the chart there is no strong seasonal trend, however most of the highest coliform peaks occur during the dry, summer months. The potential contaminating activity (PCA) research conducted as part of this report that summer season recreation upstream on Lytle Creek may contribute to the increases.

Monthly median data, calculated weekly, for total coliform is used to determine the appropriateness of the level of treatment for *Giardia* and viruses. A monthly median was calculated each week (based on the previous four samples) during the study period for total coliform and fecal coliform/*E. coli*, that data is summarized in **Table 3-5**.

Table 3-5
Calculated Monthly Medians for Coliform, MPN/100 mL

	Minimum	Maximum	Average	Median
Total Coliform	11	1600	312	235
Fecal Coliform/*E. coli*	<1	80	12	6.15

The total coliform calculations show that six, out of 245, calculated monthly medians were greater than 1,000 MPN/100 mL, thus triggering additional log reduction of *Giardia* and viruses as per the DDW water supply permit. These occurred on August 20, 2013, August 21, 2013, August 28, 2013, September 4, 2013, October 21, 2015, and November 3, 2015. The Roemer WFF was using between 50 and 75 percent Lytle Creek source water during these months. This is an increase in the frequency of excursion above 1,000 MPN/100 mL since the 2013 Update, as well as an increase in the average and median values calculated in the 2013 Update. These calculations are provided in **Appendix B**. The calculations for fecal coliform/*E. coli* show that there were no monthly median values above 200 MPN/100 mL, and all were less than or equal to 80 MPN/100 mL. These are similar to the values calculated in the 2013 Update.

Summary of Results for Total Coliform, Fecal Coliform, and E. coli

- The majority of peak coliform levels occur between late spring and early fall, possibly associated with peak recreational use in the watershed.
- Total coliform data show generally low levels. Individual samples had an average value of 358 MPN/100 mL, a median value of 240 MPN/100 mL, and 94.4 percent of samples were less than 1,000 MPN/100 mL. Monthly medians had an average value of 312 MPN/100 mL, a median value of 235 MPN/100 mL and 97.5 percent of median values were less than 1,000 MPN/100 mL. Six monthly median calculations, or 2.5 percent, triggered additional log reduction of *Giardia*/viruses under current DDW permit conditions.
- Fecal coliform data show generally low levels. Individual samples had an average value of 24 MPN/100 mL, a median value of 7.8 MPN/100 mL, and 99 percent of samples were less than 200 MPN/100 mL. Monthly medians, including *E. coli*, had an average value of 12 MPN/100 mL, a median value of 6.15 MPN/100 mL and 100 percent of median values were equal to or less than 80 MPN/100 mL.

- *E. coli* data show generally low levels. Individual samples had an average value of 6 MPN/100 mL, a median value of 3.1 MPN/100 mL, and 100 percent of samples were less than 50 MPN/100 mL.
- Fecal coliform and *E. coli* data support 3/4-log treatment for *Giardia*/viruses is appropriate for all source water quality conditions during the study period.

Evaluation for Giardia and Cryptosporidium

WVWD conducted the second round of required monthly source water monitoring for *Cryptosporidium*, under the LT2ESWTR, from October 2015 through September 2017. The samples from October 2015 through February 2017 were also analyzed for *Giardia*. The sample was collected at the plant influent sample site, which represents a blend of Lytle Creek and SPW. During the sampling period monthly Lytle Creek use ranged from 26 to 100 percent, with an average of 61 percent.

The data show that there were no detects of *Cryptosporidium* during the 24 month sample period. The maximum running annual average of the immunofluorescence assay (IFA) results for *Cryptosporidium* is the regulatory compliance point under the LT2ESWTR. The maximum running annual average was 0 oocysts/L, well below the Bin 1 limit of 0.075 oocysts/L. The Roemer WFF continues to receive a Bin 1 classification of *Cryptosporidium* under the LT2ESWTR. In addition, for the 17 samples with available *Giardia* data there were no detects, for an average concentration of 0 cysts/L.

Summary of Results for Giardia and Cryptosporidium

- Two years of monthly data show no detect of either *Giardia* or *Cryptosporidium.*
- No detect of *Giardia* supports 3-log reduction is appropriate for the Roemer WFF.
- Maximum running annual average value for *Cryptosporidium* was 0 oocysts/L, well below the Bin 1 limit of 0.075 oocysts/L, which results in a continued Bin 1 classification with no additional action required under the LT2ESWTR.

Disinfection By-Product Precursors (Total Organic Carbon)

General Characteristics and Background

Disinfection By-Products (DBPs) are formed when disinfectants added to water react with naturally occurring organic matter or other constituents, such as bromide. Since Lytle Creek does not have detectable levels of bromide, total organic carbon is the key precursor for DBPs. The most common DBPs are total trihalomethanes (TTHMs), which are suspected carcinogens. Other DBPs, including haloacetic acids (HAA5), are suspected mutagens and teratogens. Potential sources of these organic precursors are plant matter, animal matter, and soil, which can be contributed by general watershed runoff, urban runoff, agricultural runoff, recreation, grazing, wastewater sources, and algae growing in the source water or conveyance system.

The Stage 1 Disinfectants/Disinfection Byproduct (D/DBP) Rule requires varying levels of TOC removal if the source water TOC concentrations exceed 2 mg/L and a utility uses conventional filtration. TOC was a selected constituent for further evaluation due to its importance in the formation of DBPs and also as a general indicator of organic contamination in water.

Evaluation

The Lytle Creek source water was monitored at the Influent for TOC from January 2013 through December 2017. The data ranged from non-detectable to 2.5 mg/L, with an average of 0.61 mg/L and a median of 0.47 mg/L. Ninety-five percent of samples were less than 1.62 mg/L. **Figure 3-6** presents the TOC data over the study period.

Figure 3-6
Lytle Creek Influent TOC, 2013 - 2017

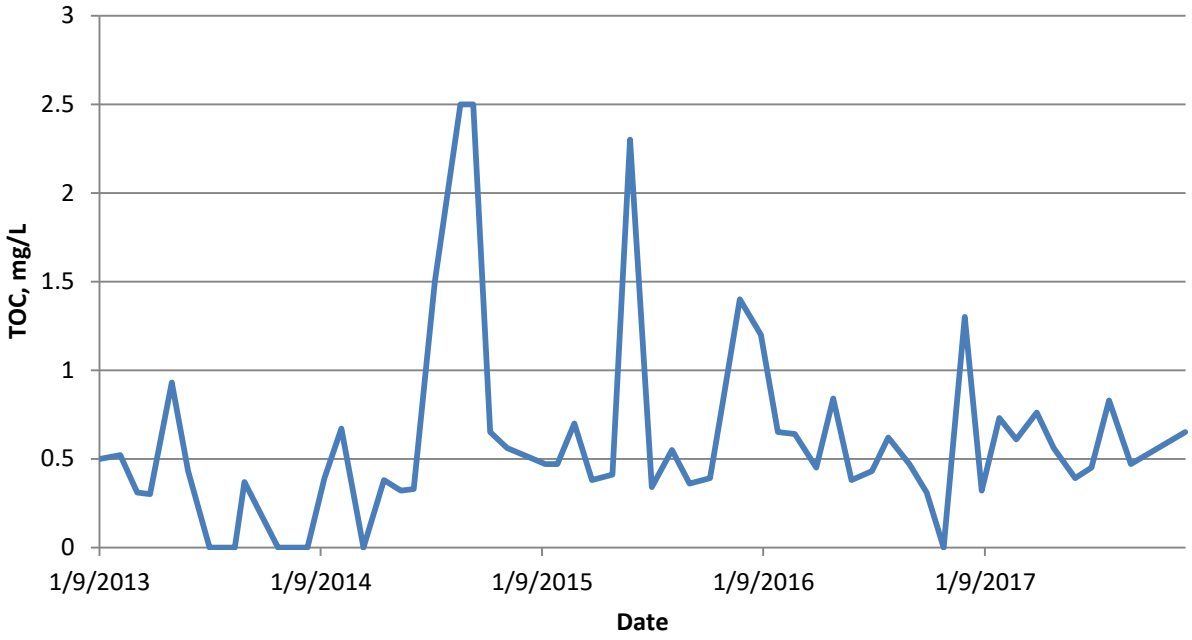


Figure 3-4 shows that generally the TOC levels in Lytle Creek are very low, however there were two periods that peaked over 2 mg/L. This occurred in August and September 2014 and June 2015. There was no rain occurring on these dates, and the conditions were largely dry for weeks prior to the sampling. A review of the PCAs did not indicate any spill associated with these dates. It is possible that algae growth either in Lytle Creek, or the SCE Afterbay, could have contributed to these increases in TOC.

Summary of Results

- The TOC data for Lytle Creek Influent show very low levels, with average and median values less than 1 mg/L in Lytle Creek.

- There were three sample events greater than 2 mg/L that were not associated with precipitation or any other specific activity in the watershed. Since these occurred during summer months, they could be associated with algae growth.

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SECTION 4 – WATERSHED CONTAMINANT SOURCES REVIEW

This section contains an evaluation of six potential contaminant activities (PCAs) which were selected for review for this Fourth Update of the Lytle Creek Watershed Sanitary Survey. The six potential contaminant activities are: (1) spills, (2) recreation, (3) wastewater, (4) development, (5) fires, and (6) floods/erosion. These PCAs were selected based on their presence in the watershed and their potential to impact Lytle Creek water quality.

SPILLS

Background

A hazardous material spill or leak into a surface water body could occur as the result of a vehicular traffic accident, pipeline leak or spill, wastewater treatment plant spill, or other incident. In the event of a leak or spill, timely notification is critical to ensure that the water treatment plant operators are provided with sufficient time and information to best respond to potential treatment concerns.

Spills of raw or partially treated wastewater occur from collection systems and from wastewater treatment plants. A sanitary sewer overflow (SSO) is any overflow, spill, release, discharge, or diversion of untreated or partially treated wastewater from a sanitary sewer system. Major causes of SSOs include grease, root and debris blockages; sewer line flood damage; manhole structure failures; vandalism; pump station mechanical failures; power outages; excessive storm or groundwater inflow/infiltration; improper construction; lack of proper operation and maintenance; insufficient capacity; and contractor-caused damage. Spills of raw or partially treated wastewater occur due to equipment malfunctions or operator errors at wastewater treatment plants. Spills also occur during storm events when stormwater infiltrates a wastewater collection system and the capacity of the wastewater treatment plant is exceeded.

Seasonal Patterns

SSOs typically occur more frequently during the wet season, when stormwater can infiltrate a wastewater collection system or washout a pipeline carrying sewage.

Related Constituents

The most common spills are related to oil and petroleum products or sewage. Therefore, typical constituents of concern range from volatile organic compounds (VOCs) and hydrocarbons to microbial constituents (i.e. viruses, pathogens, *Giardia, Cryptosporidium*). However, hazardous materials emergencies can involve a virtually infinite number of chemicals or chemical combinations.

Occurrence in Watershed

There were three spills/incidents listed in the State Office of Emergency Services (OES) Hazardous Materials Release database from 2013 to 2017 within the watershed. Two of the spills involved sewage and one of the spills involved antifreeze as listed in **Table 4-1**.

The two SSOs involving raw sewage spilled in the range of 8,000 to 10,000 gallons, but it was reported that no sewage entered Lytle Creek.

Table 4-1
Summary of Spills/Incidents Occurring in Lytle Creek Watershed as reported to OES, 2013-2017

Discharger	Spill Date	Spill Location	Type of Spill	Cause of Spill	Volume (gallons)	Receiving Water
Private Citizen	4/17/2013	13954 Hazel Drive, Lytle Creek	Antifreeze	Neighbor using garden hose to flush antifreeze out of his vehicle and it is on street, entering creek	Unknown	Lytle Creek
San Bernardino Co. Special District Water and Sanitation	1/24/2017	Lytle Creek Road at South Fork	Raw Sewage and Storm Water	Storm Surge	8,000 gallons with 2,500 gallons recovered	Release was contained by an earthen berm and did not enter creek
San Bernardino Co. Special District Water and Sanitation	4/2/2017	1209 Lytle Road (next to USFS Ranger Station)	Raw sewage	Debris blockage	10,875 gallons	Release went to a field and did not enter creek

There were no chemical related spills due to traffic accidents. The main transportation route through the watershed is Lytle Creek Road.

The West Valley Water District (WVWD) is on the notification list to be contacted by the County of San Bernardino Special Districts County Service Area 70-S3 if a sewage

overflow occurs. The time, location, and all known information concerning the overflow will be given. However, the WVWD did not receive notification for both SSOs in 2017.

Related Water Quality Issues and Data Review

As discussed above, there were two sewage spills, one occurring on January 24, 2017, and one occurring on April 2, 2017. From January 24 to February 7, 2017, three fecal coliform samples were taken at Lytle Creek influent and ranged from 2 to 33 most probable number per 100 milliliters (MPN/100mL). From April 4 to April 18, 2017, three fecal coliform samples were taken at Lytle Creek influent and ranged from non-detect (ND) to 23 MPN/100mL. As the fecal coliform median was 7.8 MPN/100mL, the fecal coliform levels appear slightly elevated after both spills.

Regulation and Management

When a hazardous materials spill or leak of a reportable quantity occurs, notification to an emergency response agency is required by state and federal law. A sewage spill is required to be reported if 1,000 gallons or more are released or if discharge goes to surface water or a drainage channel. An oil or petroleum product spill is required to be reported if 42 gallons or more are released. Any other hazardous materials spill is required to be reported if there is a reasonable belief that the release poses a significant present or potential hazard to human health and safety, property, or the environment. When a hazardous materials spill or leak occurs, it is the owner's or operator's responsibility to notify the local designated emergency response agency, which is called the Certified Unified Program Agency (CUPA), as well as the OES.

For the Lytle Creek watershed, the local CUPA is the San Bernardino Fire Department. The emergency response program is also under the jurisdiction of the San Bernardino Fire Department. As part of the emergency response program, the San Bernardino Fire Department would evaluate whether or not the material is hazardous, determine the extent of contamination, and would secure the site. Depending on the type of spill and where it occurred, other agencies such as California Department of Fish and Game, and the Santa Ana Regional Water Quality Control Board (Regional Board) may be involved. An incident report would then be sent to OES.

Historical hazardous hazmat spills were queried from the California Emergency Management Agency website:
http://www.caloes.ca.gov/FireRescueSite/Pages/Spill-Release-Reporting.aspx

The County of San Bernardino Special Districts Department (CSBSDD), County Service Area 70 S-3 is mandated to comply with the State Water Resources Control Board Order No. 2006-0003-DWQ. The State Water Board adopted Statewide General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, Water Quality Order No. 2006-03 (Sanitary Sewer Order) on May 2, 2006 to have a consistent statewide approach to reducing SSOs. The Sanitary Sewer Order requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system

management plans (SSMPs) and report all SSOs to the State Water Board's online SSO database. Also, the State Board Sanitary Sewer Order was revised in 2008 (Order No. WQ 2008-0002) to require the discharger to notify the OES, local health agency and the appropriate Regional Board as soon as possible, but no later than two hours for sewage spills that discharge to a drainage channel or surface water. The Sanitary Sewer Order requires the owners and operators of sanitary sewer systems to take all feasible steps to eliminate SSOs and to develop and implement a system-specific SSMP. SSMPs must include provisions to provide proper operation and maintenance while considering risk management and cost. The SSMP must contain a spill response plan that establishes standard procedures for immediate response to an SSO in a manner designed to minimize water quality impacts and potential nuisance conditions. The SSMPs must be updated every five years. The CSBSDD completed their SSMP in February 2011, and it was updated in March 2017.

The CSBSDD has an active wastewater spill response and reporting procedure for the Lytle Creek watershed. The SSMP states that all efforts will be made to contain, control and clean-up after all SSO occurrences. Also, corrective actions will be taken to prevent future occurrences.

Some of the major highlights for spill response procedures (as stated in the 2011 and 2017 SSMP) are:

1) Assess spill and what is needed to contain or control spill and make work area safe;
2) Contain or control spill (i.e. direct spill with sandbags to a safe place or divert to a downstream manhole);
3) Sampling may be required;
4) Begin to relieve the stoppage using hydroflushing or mechanical rodding;
5) Provide rough estimate on spill volume;
6) Post area with proper warning signage;
7) Thoroughly clean the mainline sewer;
8) Conduct clean-up measures and ensure all liquids and solids are removed from the affected area, including washdown water;
9) Closed circuit television (CCTV) the sewer line following the cleaning;
10) Complete the spill report form to OES and local agencies.

The SSMP also states that when sewage enters receiving waters, the San Bernardino County Flood Control District must be notified and bacteriological sampling must be performed. Samples shall be collected for total coliform, fecal coliform and fecal streptococci. The samples must be taken upstream of the entry point, just below the entry point, and distance downstream of entry point.

Source Water Protection Activities

In order to prevent sewage overflows, the CSBSDD has an annual goal of cleaning or televising ten percent of a service area's linear footage every year. Since the linear

footage of Lytle Creek sewer lines is approximately 10.7 miles, at least one mile of sewer lines are cleaned or televised every year. There are known hot spots within the Lytle Creek area that are subject to infiltration during storm events, and the County targets these areas for more frequent cleaning. In addition, the CSBSDD televises five percent of recently cleaned sewer lines as a quality assurance procedure to ensure the cleaning process was effective. The County also has on-going programs for manhole rehabilitation, smoke testing and slip lining the sewer lines.

The 2017 SSMP was reviewed and the contact information for West Valley Water District was outdated. It is recommended to contact the CSBSDD to update contact information and to express that the WVWD would appreciate notification of spills to Lytle Creek.

Summary of Findings for Spills

- There were three spills/incidents listed in the State OES Hazardous Materials Release database from 2013 to 2017.

- Two of the spills involved sewage and one of the spills involved antifreeze.

- The two SSOs involving raw sewage spilled in the range of 8,000 to 10,000 gallons. It was reported that no sewage entered Lytle Creek. Although WVWD is on the notification list to be contacted by the CSBSDD County Service Area 70-S3 if a sewage overflow occurs, no notifications were given for these two spills in 2017.

- There were no chemical related spills due to traffic accidents. The main transportation route through the watershed is Lytle Creek Road.

RECREATION

Background

Recreational uses in the Lytle Creek watershed consist primarily of camping, picnicking, hiking, fishing, hunting, off-highway vehicle use, and swimming in the creek. The lack of open space in nearby urban areas, as well as hot temperatures in San Bernardino Valley, may explain why many people visit Lytle Creek on summer weekend days.

As the population of San Bernardino County is projected to increase from 1.72 million to 2.56 million by 2025 (48.9 percent increase), the continued increase of visitors to Lytle Creek is expected. The watershed currently receives approximately 50,000 day-use visitors on an annual basis (Email, Jon Rishi, U.S. Forest Service (USFS), March 2018).

Seasonal Patterns

Although recreation occurs year-round, camping and swimming occur primarily from Memorial Day to Labor Day weekend.

Related Constituents

Body contact recreation in general has long been known to be a source of pathogen contamination, resulting partly from personal sanitary conduct and partly from a natural shedding process. Pathogens shed by recreationalists include bacteria, viruses, and protozoa. Moreover, because their origin is human, microorganisms shed by recreationalists are transmittable to other humans.

Occurrence in Watershed

San Bernardino National Forest

As stated above, Lytle Creek serves as year-round stream gathering place for urban families. The 2005 United States Forest Service (USFS) Land Management Plan states that water resources are affected by the large numbers of recreationalists that come into contact with the water. Access to the area is primarily gained through the County Road system with further dispersal of recreation via the national forest road system.

The USFS Land Management Plan states that unlawful activities, such as trash dumping, shooting, fire-building, unauthorized off-road vehicle use, graffiti, and property vandalism are reoccurring difficulties. Funding to mitigate these activities comes from the USFS recreation budget, but this funding is decreasing. Dispersed picnicking by large groups near the creek bed has resulted in large amounts of litter in the watershed. Heavy, continuous dispersed recreation impacts Lytle Creek, especially sanitation issues.

The San Bernardino National Forest has one developed campground located on the North Fork of Lytle Creek, the Applewhite Campground. The Applewhite Campground has 44 sites and no reservations are required. There are flush restrooms, but no showers or dump station. Across the road from the campground is a picnic area where visitors can find drinking water, tables, restrooms, and barbecues. There is easy access to Lytle Creek, where fishing and water play are popular. The Applewhite Campground was closed after the 2016 Blue Cut Fire, but it is planned to be reopened later in 2018.

Lytle Creek is a popular location for swimming in the summertime. According to the USFS, people access the creek for swimming or water play at multiple locations along the creek, concentrated primarily along the canyon bottoms of the Middle and North Forks of Lytle Creek. The most popular sites are the Applewhite picnic area, the Middle Fork area, the Green Mountain area, and just upstream of where Southern California Edison (SCE) diverts water from the creek. In order to provide sanitation services for visitors to Lytle Creek, portable restrooms were installed at the start of the Bonita Falls

hiking trail and at the Long Bridge (where road crosses creek) year-round. Permanent restrooms are located at the Lytle Creek ranger station, Applewhite campground, Applewhite picnic area, and Middle Fork.

There are also a number of undeveloped campsites located within the watershed, as shown in **Table 4-2.** The undeveloped campsites have no facilities or amenities, just a post and a fire ring.

Table 4-2
Undeveloped Campgrounds Within Lytle Creek Watershed

Campground Name	Location
Paiute	North Fork Lytle Creek
Gobbler's Knob	North Fork Lytle Creek
Big Horn	North Fork Lytle Creek
Coldwater	North Fork Lytle Creek
Third Stream Crossing	Middle Fork Lytle Creek
Stone House	Middle Fork Lytle Creek
Commanche	Middle Fork Lytle Creek
Joe Elliot Tree Memorial	South Fork Lytle Creek

Portions of the Pacific Crest Trail border the northern edge of the watershed, and the trailhead into the Cucamonga Wilderness area is the Middle Fork Trail Head**.** According to the USFS Land Management Plan, there is a lack of designated trails originating from the Applewhite campground and picnic area, as well as easy access loops for families hiking in the canyons.

The USFS also has a number of homes which are located on USFS land within the Lytle Creek watershed, primarily concentrated in the Happy Jack area. According to the USFS, there are approximately 33 residences in the Lytle Creek area (Personal Communication, Jon Rishi, USFS, April 2018). All of the current 33 residences are on a centralized sewer system. The 20-year permits for the recreational residences located in the Lytle Creek area expired in 2008, but were renewed with no changes to the previous permit. There were no additional or new permits issued.

The Lytle Creek Firing Line is located on USFS land, but is operated by a private concessionaire.

Private Campgrounds

The Bonita Ranch Recreational Vehicle (RV) Campground is located at 900 South Fork Road in Lytle Creek. There are 90 RV campsites, with 30 sites providing electrical, water and sewer hookups, and 60 sites providing electrical hookup only. There are two dump stations, showers, and public restrooms. Lytle Creek runs through the campground on the east end of the park. The creek is mostly for water play rather than swimming during the summer months, as the creek flow is low and the stream bed is fairly rocky. There is also a waterfall within one mile of the campground.

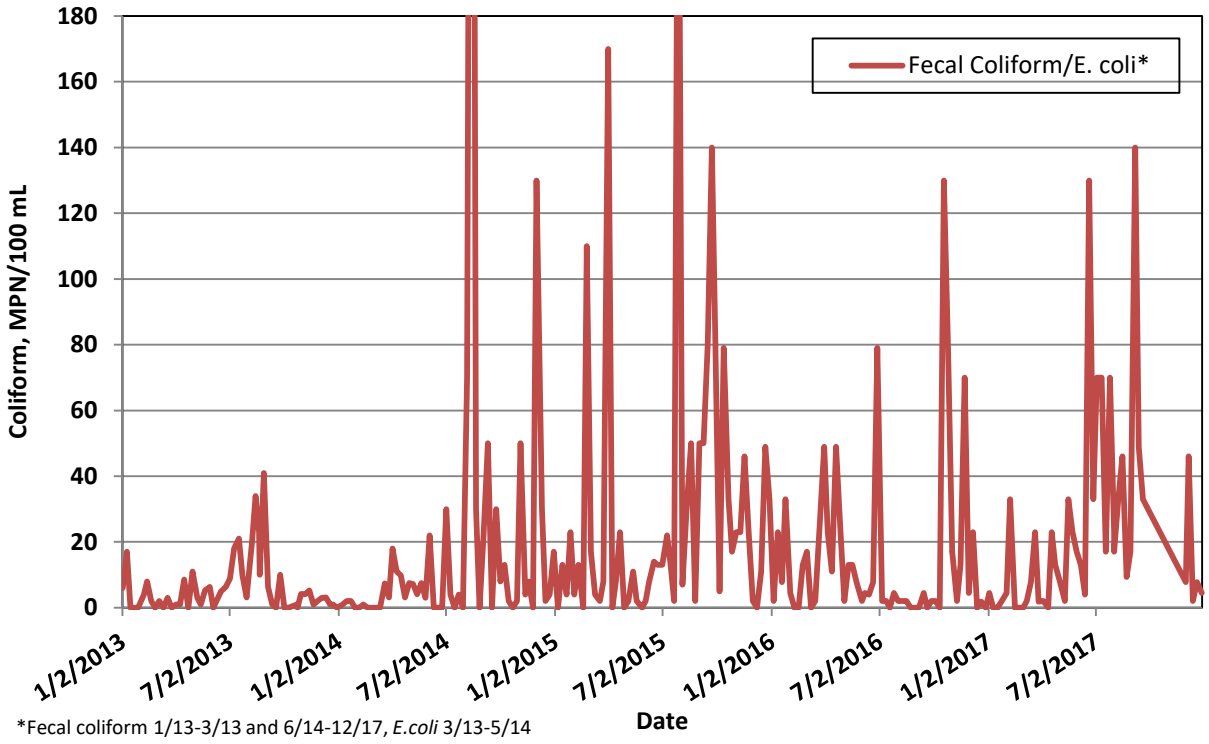
Mountain Lakes Resort is a members-only resort located at 277 Lytle Creek Road in Lytle Creek. There are 514 campsites with full hookups and six cabins available for overnight stay. The resort has two fishing lakes and Lytle Creek runs through the property. Other amenities are an on-site restaurant, three swimming pools, country store, paddle boats, and picnic areas.

Related Water Quality Issues and Data Review

As shown in **Figure 4-1**, there is no strong seasonal trend for fecal coliform/*E. coli*, however most of the highest peaks occur during the dry, summer months. Therefore, it is likely that these increased concentrations are due to body-contact recreation in Lytle Creek. However, the overall median for fecal coliform/*E. coli* is low, at 6.1 most MPN/100mL.

Additionally, WVWD conducted the second round of required monthly source water monitoring for *Cryptosporidium*, under the LT2ESWTR, from October 2015 through September 2017. The samples from October 2015 through February 2017 were also analyzed for *Giardia*. The data show that there were no detects of *Cryptosporidium* during the 24 month sample period. In addition, for the 17 samples with available *Giardia* data there were no detects, for an average concentration of 0 cysts/L.

Figure 4-1 Lytle Creek Influent Fecal Coliform/*E. coli,* 2013 - 2017



*Fecal coliform 1/13-3/13 and 6/14-12/17, *E.coli* 3/13-5/14

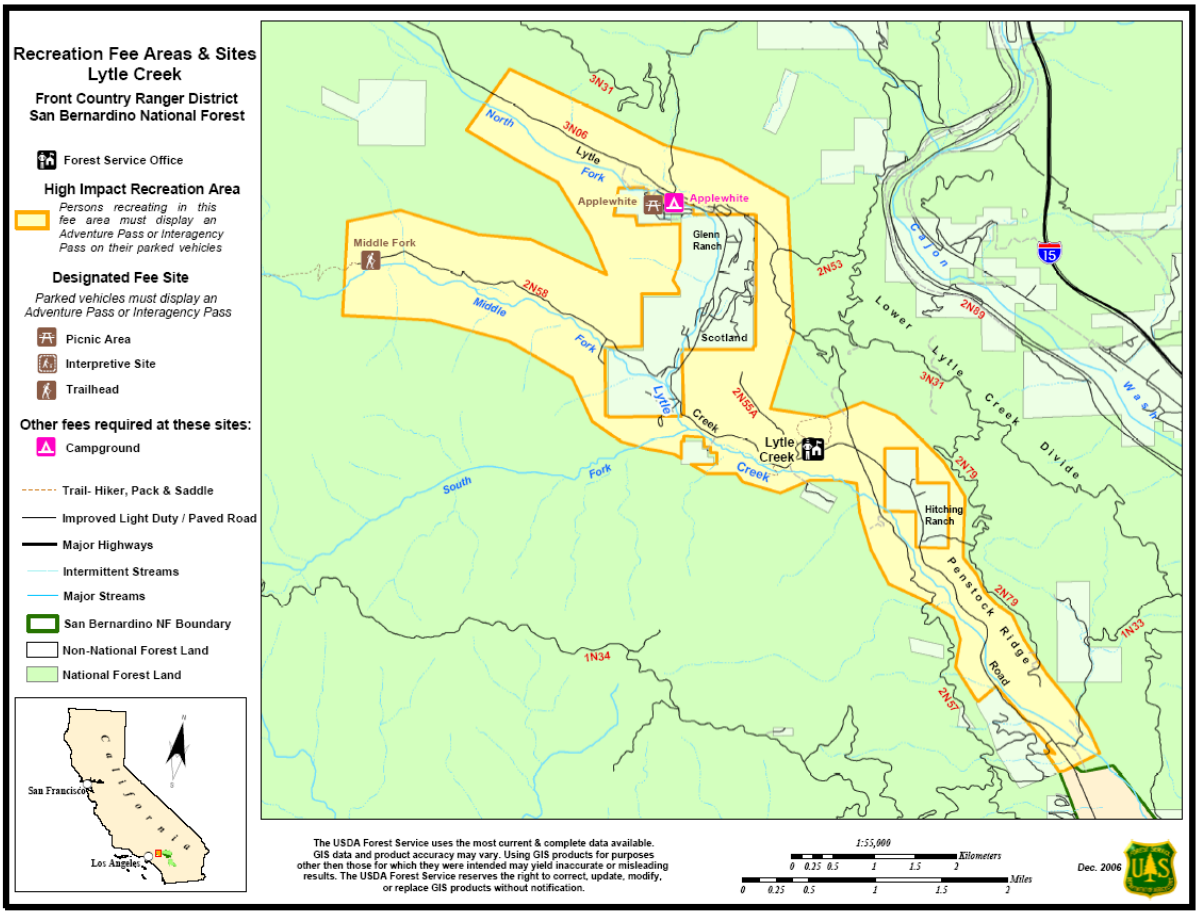
Regulation and Management

United States Forest Service

In 1996, the USFS began requiring an Adventure Pass for vehicles traveling to specific sites in the San Bernardino National Forest, and for heavily impacted recreation areas that have specific amenities including toilets, parking, trash receptacles, picnic tables, interpretation, and security. An adventure pass is required in high impact recreation areas, or at sites such as the Applewhite campground and picnic area, the Middle Fork Trail Head and the Lytle Creek Firing Line. **Figure 4-2** shows the designated fee sites and the high impact recreation area for the Lytle Creek watershed.

At the same time the Adventure Pass was implemented, the USFS began controlling the number of visitors by setting up a checkpoint at the mouth of the canyon on the five predicted busiest days of the year and closing the road when the vehicle capacity is reached. According to the USFS, road closures still occur for Memorial Day, Fourth of July, and Labor Day.

Figure 4-2
San Bernardino National Forest Recreation Fee Areas and Designated Fee Sites for the Lytle Creek Watershed



Source: San Bernardino National Forest Website

The USFS is the site operator for the Applewhite Campground and picnic area. The USFS does not have resources to actively manage people swimming in Lytle Creek, but have installed portable restrooms along the creek to minimize contamination of the creek.

Mountain Lakes Resort

The Mountain Lakes Resort used to hold a National Pollutant Discharge Elimination System (NPDES) permit for lake overflow and lake drainage discharge for their two fishing lakes and recreational lagoon. According to the permit (Order 86-93), the waters in the lakes and lagoon were treated with chemicals containing copper for weed and algae control. The permit was rescinded by the Regional Board in 1992. WVWD staff has visited the Mountain Lakes Resort in the past and noted the use of aluminum sulfate for the fishing lakes.

According to the Regional Board, the Mountain Lakes Resort diverted Lytle Creek water into their recreational fishing ponds and continuously flowed the same amount of water back into the creek at the time the permit was rescinded. Occasionally, discharge would occur during heavy storms, but the facility was not allowed to drain their ponds. (Personal Communication, Gary Stewart, Regional Board, February 13, 2008).

The permit was rescinded in 1992 for a number of reasons: 1) chemical use at the Mountain Lakes Resort was minimal, 2) the facility had been monitored by the Regional Board for ten years without any issues, and 3) the discharge was considered not to be a waste discharge. The WVWD was previously very concerned about the Mountain Lakes facility, and the possibility that the facility was flushing/draining their fishing lakes. However, there have been no elevated coliforms, turbidity or total organic carbon (TOC) in the past five years, except for one 8am reading on August 14, 2014 when the influent turbidity was 135 nephelometric turbidity units (NTU), as discussed in **Section 3**. There was also no precipitation for 10 days prior to this date, and the blend being treated at the Roemer WTP was 50 percent Lytle Creek and 50 percent State Project Water.

It is recommended to document current operations if a high turbidity event occurs. If there is no rain, and 100 percent Lytle Creek is being treated, it could be indicative of discharges from Mountain Lakes Resort.

Green Mountain Ranch

Green Mountain Ranch is located at 955 Lytle Creek Road, and is currently used for weddings, special events and private parties. There is one pond on the property which is fed by diverted water from Lytle creek, and the pond outlet then returns water back to the main stem of Lytle Creek. There is no body contact or fishing conducted at the pond.

Summary of Findings for Recreation

- Recreational uses in the Lytle Creek watershed are primarily for camping, picnicking, hiking, fishing, hunting, off-highway vehicle use, and swimming in the creek. The watershed currently receives approximately 50,000 day-use visitors on an annual basis, and can experience as much as 10,000 visitors on peak summer weekends.

- The USFS does not have resources to actively manage people swimming in Lytle Creek. However, the USFS has placed portable restrooms at key locations along Lytle Creek to provide sanitation facilities for visitors and monitors visitors on peak summer holidays.

- Water quality data collected to date indicate that fecal coliform levels at the SCE Afterbay increase in the summertime, likely as a result of body contact recreation in Lytle Creek.

WASTEWATER

Background

Various types of wastewater facilities such as wastewater treatment plants and septic systems will be discussed in this section.

Wastewater is known to contain pathogenic microorganisms. Wastewater treatment plants remove and/or inactivate some, though not all, of these organisms through various treatment processes.

Seasonal Patterns

There are no wastewater treatment plants which discharge treated effluent directly to Lytle Creek. There is one wastewater treatment plant in the watershed, the Lytle Creek wastewater treatment plant, which is operated year-round by the CSBSDD County Service Area 70-S3.

Related Constituents

Wastewater is a blend of sewage, washwater from showers, kitchens, etc., and any effluent from industrial facilities within the sewer collection system. Potential contaminants of concern in wastewater include microbial pathogens (such as bacteria, viruses, and protozoa), TOC, nutrients, VOCs, and synthetic organic compounds (SOCs). Septic tank effluent typically contains high concentrations of total dissolved solids (TDS), chlorides, phosphates, nitrates, bacteria, and viruses.

Occurrence in Watershed

Lytle Creek Wastewater Treatment Plant

About 90 percent of the residences within the Lytle Creek watershed area are provided centralized sewer service by the CSBSDD County Service Area 70-S3 (Lytle Creek Community Plan, 2007). The main communities within the watershed are Happy Jack, Scotland, Bonita, and the Applewhite Campground. As of June 2010, the population served by the County Service Area 70 S-3 was 1,290 and as of February 2017, the population served was 2,953 with 798 sewer connections. **Figure 4-4** shows the 70-S3 County Service Area.

Figure 4-4. County of San Bernardino Special Districts
County Service Area 70-S3

Source: County of San Bernardino Special Districts

The sewer collection system is approximately eleven miles of gravity flow pipeline, ranging in size from 6-inches to 10-inches in diameter. Lift Station #1 is located on the western portion of Lytle Creek Canyon near the Bonita RV Park. Lift Station #2 is located on the eastern most portion of Lytle Creek Canyon, 1,000 feet east of the Lytle Creek Ranger Station and approximately 1,300 feet downstream of the Lytle Creek Wastewater Treatment Plant. The collection system discharges to the Lytle Creek wastewater treatment plant which was designed for a maximum flow of 160,000 gallons per day (gpd). The wastewater treatment plant consists of preliminary treatment with bar screening, secondary treatment with an oxidation ditch and clarification, two percolation ponds, and six sludge drying beds. The effluent is discharged to land.

According to the CSBSDD, there have been no changes to the treatment train since 1982, and the wastewater treatment plant does not use any chemicals, including chlorine (Personal communication, CSBSDD, March 2018). There are also no downstream monitoring wells for the percolation ponds (Personal communication, Kathy Whalen, CSBSDD, February 14, 2008).

Although the wastewater treatment plant does not directly discharge treated wastewater effluent into Lytle Creek, there is a possibility that the percolation ponds may eventually impact water received by the WVWD through the Grapeland Tunnel, as the tunnel infiltrates groundwater. Based on a 1997 groundwater contour map developed for the Regional Board, the general direction of groundwater flow is to the southeast (Wildermuth Environmental, 2000) indicating a potential impact from the percolation ponds to the Grapeland Tunnel. Based on the Wildermuth report, predominant recharge to the groundwater reservoirs in the San Bernardino Valley is from infiltration of stream flow out of the San Gabriel and San Bernardino Mountains. In general, groundwater flow mimics surface drainage patterns (Wildermuth Environmental, 2000) for the San Bernardino Valley.

The WVWD indicated that the percolation ponds associated with the Lytle Creek wastewater treatment plant have also overflowed in the past during heavy rains, resulting in surface discharge to Lytle Creek. However, this did not occur over the current reporting period.

Septic Systems

As stated above, about 90 percent of Lytle Creek residences receive centralized sewer services, while approximately 10 percent remains off-line. The off-line areas are isolated sites that have been developed with septic tanks and leach field systems. The County of San Bernardino Department of Public Health was contacted to determine the parcel locations which have existing septic systems. The locations of the existing septic systems in the watershed are difficult to quantify as the County's database can only be queried with specific addresses or assessor's parcel numbers (APN). All of the APNs in the watershed would have to be queried one by one, in order to obtain the location of septic systems.

Using the San Bernardino County Land Use Services database, it was possible to check on issued permits for new septic systems. No new permits for septic systems were on file. http://cms.sbcounty.gov/lus/BuildingSafety/Permits/PermitsIssued.aspx

Due to a 1973 Discharge Prohibition issued by the Regional Board, it is prohibited to have a septic system installed above elevation 2600 feet in the Lytle Creek area, unless approved by the Regional Board. According to the County of San Bernardino Department of Public Health, there have been no septic systems installed above elevation 2600 feet in the last ten years.

Related Water Quality Issues and Data Review

The Waste Discharge Requirement Order 95-32 for the Lytle Creek wastewater treatment plant specifies discharge limitations for biochemical oxygen demand, total suspended solids, total dissolved solids and pH, and requires monitoring for electrical conductivity, total hardness, chloride, sulfate, boron, fluoride, and sodium. As stated in the WDR, "these requirements are intended to meet the water quality objectives established to protect groundwater and to ensure that the discharge will not create conditions of pollution or nuisance."

As the Lytle Creek wastewater treatment plant discharges to land through the percolation ponds, the monitored constituents in the effluent are focused on protecting groundwater quality. Therefore, this data has limited value in evaluating surface water quality of Lytle Creek.

According to the State Water Resources Control Board's California Integrated Water Quality System (CIWQS) database, there have been no violations with this WDR over the reporting period. Additionally, the Regional Board staff inspected the plant in October 2016 and indicated that the plant was in good working order.

Regulation and Management

Lytle Creek Wastewater Treatment Plant

The discharge of treated wastewater to percolation ponds at the Lytle Creek wastewater plant is regulated under WDR Order No. 95-32, which was issued by the Regional Board on September 1, 1995.

The Regional Board performs inspections of the Lytle Creek wastewater treatment plant, and the facility has been in compliance during the reporting period. Under Order 95-32, the Regional Board requires that the effluent is sampled prior to discharge into the percolation ponds.

The discharge limits and sample frequency are shown in **Table 4-3**.

Table 4-3
Lytle Creek Wastewater Treatment Plant Discharge Limits and Sample Frequency

Parameter	Effluent Limit	Sample Frequency
Biological Oxygen Demand	30 mg/L (30 day average)	Weekly
Suspended Solids	30 mg/L (30 day average)	Weekly
pH	6.5 to 8.5 at all times	Weekly
Total Dissolved Solids	490 mg/L (12 month average)	Bi-monthly
Electrical Conductivity	none	Bi-monthly
Total Hardness	none	Annually
Chloride	none	Annually
Sodium	none	Annually
Sulfate	none	Annually
Fluoride	none	Annually
Boron	none	Annually

Septic Systems

San Bernardino County Code of Enforcement is responsible for responding to reports of overflowing sewage and failed systems. However, they do not keep an electronic database of inspection results. Additional information may have been extracted by reviewing individual reports, but this level of review was not warranted for this report. Again, ninety percent of the Lytle Creek area receives centralized sewer service.

San Bernardino County does not have any specific ordinances for septic tanks in the Lytle Creek area. Construction requirements for septic systems must follow the Uniform Plumbing Code.

The State Water Resources Control Board developed a draft State Policy for Water Quality Control for Siting, Design, Operation, and Management of Onsite Wastewater Treatment Systems (OWTS) which took effect on May 13, 2013. In response, the San Bernardino County Environmental Health revised their Local Area Management Plan in May 2017 to address the new requirements of the OWTS policy.

A brief review of the policy indicates that each septic system will need to be placed into one of four tiers, which will indicate what action is needed. Refer to the OWTS policy for detailed information on the design requirements for each tier.

- **Tier 0** – These are existing septic systems that are properly functioning and do not require corrective action. No further action is needed.
- **Tier 1** – These are either new or replacement septic system that are considered low risk. These systems must meet Tier 1 design requirements.
- **Tier 2** – This tier is to be defined by local agency management programs, as California has an extreme range of geological and climatic conditions. In other words, local agencies may need to specify certain design requirement to address local conditions, in lieu of the Tier 1 design requirements.
- **Tier 3** – Septic systems within 600 feet of an impaired water body for either nitrogen or pathogens. If there is a total maximum daily load (TMDL), these septic systems will need to be addressed through the TMDL implementation program, or any special provisions by the local management agency. If there is no TMDL or special provisions, new or replacement septic systems must meet the requirements of Tier 3.
- **Tier 4**- Septic systems that require corrective action or are either presently failing or fail at any time, must meet Tier 4 requirements.

Source Water Protection Activities

The WVWD is not currently engaged in specific source water activities regarding wastewater as a potential contaminant source.

Summary of Findings for Wastewater

- There are no wastewater treatment plants which discharge treated effluent directly to Lytle Creek. However, it is possible that the Lytle Creek wastewater treatment plant's percolation ponds may impact water received by WVWD through the Grapeland Tunnel's connection to Lytle Creek.

- The Regional Board performs inspections of the Lytle Creek wastewater treatment plant, and the facility has been in compliance during the reporting period.

- The total number of sewer service connections for the Lytle Creek service area was 798 in 2017.

- About 90 percent of Lytle Creek residences receive centralized sewer services, while approximately 10 percent remains off-line. The locations of the remaining septic systems in the watershed are unknown.

DEVELOPMENT

Background

In general, conversion of natural lands to developed areas can affect surface and groundwater quality. Because of the high degree of imperviousness, urban areas typically generate higher per acre volumes of runoff than undeveloped or agricultural lands.

Seasonal Patterns

Urban runoff occurs on a year-round basis and includes wet and dry weather discharges. Wet weather runoff results from seasonal storms. Wet weather runoff is of relatively short duration and can have highly variable pollutant concentrations. Dry weather runoff results from activities such as lawn irrigation and car washing.

Related Constituents

Urban runoff can be a source of TOC, suspended solids, nutrients, metals, bacteria, and other constituents such as pesticides and other organic compounds. Generally, the impact is greater during the wet season, immediately following a first-flush event.

Occurrence in Watershed

The San Bernardino County Land Use Service Department reviews all land development applications, such as subdivision and conditional use permits to assure conformance with adopted plans, regulations, and state law, including state and county environmental guidelines. In order to query the amount of potential development within the last five years, the County provided a link for all applications filed by the County Planning Department.
http://cms.sbcounty.gov/lus/Planning/ApplicationsAccepted.aspx

According to this database, there have been no private projects built in the watershed from 2013 to 2017 except for four single-family homes. The San Gabriel Valley Water Company applied for conditional use permit for two 1-MG reservoirs, treatment facility, and hydroelectric facility. A soils and geotechnical report was submitted in 2015, but no structural plans were submitted

In addition to querying the San Bernardino County Land Use Department's database, the San Bernardino County Flood Control District (SBCFCD) was also contacted. As required by the municipal storm water permit for San Bernardino County, (per the Regulation and Management section below), the SBCFCD is responsible for maintaining a database of commercial, industrial, and construction sites which could potentially impact water quality discharged through the storm drain system on a yearly basis. The 2014-2015 Annual Report was examined, and all of the sites listed were

located in the Muscoy area, approximately near the intersection of Lytle and Cajon creeks, which is outside of the Lytle Creek watershed pertinent to WVWD.

Related Water Quality Issues and Data Review

As there are limited urbanized areas within the Lytle Creek watershed, the area is not monitored for urban runoff by the SBCFCD. However, as described in **Section 3**, the Southern California Stormwater Monitoring Coalition conducted limited sampling in the watershed during the reporting period. Most of the analytical results are similar to the data collected by WVWD at the Lytle Creek influent site. Examination of the Lytle Creek raw water does not show any levels of concern for metals or organics typically associated with urban runoff.

Regulation and Management

Prior to any construction and/or land disturbing activity, the San Bernardino County Land Use Services Department requires a pre-construction inspection report permit or erosion control permit as well an on-site inspection. This is required in order to obtain approval or clearance for subsequent building permits. A grading permit is required for an excavation greater than two feet in depth, or a fill one foot or more in thickness, or if the grading is over 5,000 cubic yards.

Urban runoff from the unincorporated communities in the Lytle Creek watershed are regulated through a municipal storm water permit for San Bernardino County and all the incorporated cities within its jurisdiction. The San Bernardino County NPDES permit number is R8-2010-0036. The permit named the SBCFCD the principal permittee and San Bernardino County and the incorporated cities as the co-permittees.

For construction projects within the unincorporated areas of San Bernardino County, such as the Lytle Creek watershed, urban runoff and stormwater issues are addressed through the California Environmental Quality Act (CEQA) process, through inspection of construction sites, and by requiring a project-specific Water Quality Management Plan (WQMP).

A project-specific WQMP is intended to identify potential post-project pollutants and hydrologic impacts associated with the development; identify proposed mitigation measures for identified impacts including site design, source control and treatment control post-development best management practices (BMPs); and identify sustainable funding and maintenance mechanisms for the BMPs.

Additionally, for projects that disturb at least one acre of land, a Notice of Intent (NOI) must be filed with the Regional Board to obtain coverage under the General Stormwater Permit for Construction Activities. Proof of submittal of an NOI must be provided prior to issuance of a grading or building permit.

Source Water Protection Activities

No specific source water protection activities have been conducted by WVWD during the study period.

Summary of Findings for Development

- Overall, there has been little to no development within the watershed within the past five years.

- There are little to no commercial and industrial uses within the watershed, as it is primarily residential and open space.

FIRES

Background

The aftermath of a wildfire or prescribed burn can impact source water quality. In general, the load of dissolved substances to streams will increase following a wildfire, due to increased runoff. Increased runoff can occur following a fire because the formation of a hydrophobic organic layer in the soil increases the water repellency of soils (DeBano, 2000). A U.S. Geological Survey (USGS) study concluded that measurable effects of fires on stream water quality are most likely to occur if the fire was severe enough to burn large amounts of organic matter, if windy conditions were present during the fire, if heavy rain occurred following the fire, and if the fire occurred in a watershed with steep slopes and soils with little cation-exchange capacity (USGS, 2004).

Seasonal Patterns

In the literature reviewed, many of the highest nitrate concentrations in streams and rivers have been measured during storms in the weeks to months following a fire. In general, elevated concentrations of phosphorus decline one to two years post-fire, while the elevated concentrations of nitrogen, particularly nitrate, decline at a slower rate, three to five years post-fire.

Related Constituents

The magnitude of the effects of fire on water quality is dependent on how fire characteristics (frequency, intensity, duration, and spatial extent of burning) interact with watershed characteristics (weather, slope, soil type, geology, land use, timing of regrowth of vegetation, and burn history). This interaction is complex and highly variable so that even fires in the same watershed can burn with different characteristics and produce variable effects on water quality. Typically, stormwater runoff from burned forested areas contains high concentrations of phosphorus, nitrogen, dissolved organic carbon, sediment, and metals such as mercury, lead, and arsenic.

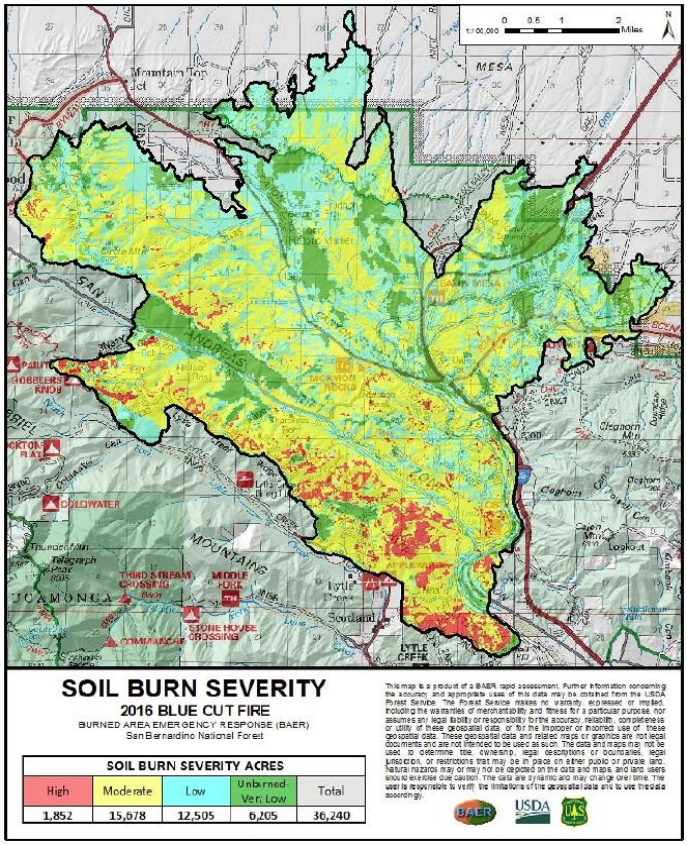
Occurrence in Watershed

There was one large wildfire which occurred over the study period; the Blue Cut Fire in August 2016. The Blue Cut Fire started on August 16, 2016 and was contained on August 23, 2016. A total of 36,240 acres were burned, however much less area was burned within the Lytle Creek watershed. The areas of most concern in the Lytle Creek watershed are near Happy Jack, the Applewhite campground and behind Mountain Lakes.

A Burned Area Emergency Response (BAER) assessment team developed a long-term recovery strategy for the watershed and also conducted modeling to determine the peak flow and erosion rates before and after the fire. This will be discussed in further detail in the Floods/Erosion section. The BAER report identified increased sedimentation, ash, and turbidity as the main impacts to water quality. No hill slope treatments such as hydromulching, aerial seeding, and straw application were recommended as they were infeasible and would not reduce the probability of damage to assets.

Due to public safety issues, the USFS closed the burned areas within the San Bernardino National Forest for one year, beginning in September 2016. The Applewhite campground was still closed at the time of report writing, but expected to open later in 2018.

Figure 4-5 Blue Cut Fire Burn Perimeter



Related Water Quality Issues and Data Review

The first rains after the Blue Cut Fire occurred in the months of October, November and December 2016. During these months, the Roemer Water Filtration Facility (WFF) was treating a blend of State Project Water (SPW), with SPW percentage ranging from 42 to 55 percent. The blends of SPW likely reduced first-flush fire-related impacts to the source water received by the Roemer WFF, as the raw water turbidities to the Roemer WFF were less than 2 NTU from October to December 2016. Although the Roemer WFF began treating 100 percent Lytle Creek water from January 2017 to April 2017, raw water turbidities stayed below 5 NTU and TOC remained low, ranging from 0.61 to 0.76 mg/L. Based on this information, it does not appear that the Blue Cut Fire impacted the source water to the Roemer WFF.

Regulation and Management

Fire protection services are mainly provided by the San Bernardino County Service Area 38. The San Bernardino County Fire Department provides services to Lytle Creek through the West Valley Division of their department, as the West Valley Division has a station located within the Lytle Creek community. Other agencies providing fire protection services include the California Department of Forestry and Fire Protection, the USFS, and the Fire Safe Council.

The use of approved long-term retardants in wildland fire suppression is standard in fire management and planning. The retardants are most often delivered in fixed or rotor-wing aircraft. A current list of qualified products and approved uses is listed on the U.S. Forest Service Wildland Fire Chemical Systems website (http://www.fs.fed.us/rm/fire). According to the USFS, the fire retardant commonly used is Phos-Check. The use of fire retardants can impact water quality if chemicals are accidentally dropped into a water body, or if heavy rains occur before the product has had time to naturally degrade.

Post-fire water quality monitoring for streams near four wildfires showed that aerial application of fire retardant near but not into streams had minimal effect on surface water quality (Crouch et al, 2006). Ammonia and phosphorus from the burning of wood and other organics in burn area streams where fire retardant was not used were found in concentrations similar to those found in area where fire retardant was aerially applied.

The National Interagency Fire Center has developed *Interagency Standards for Fire and Fire Aviation Operations* which are annually revised. The *Interagency Standards for Fire and Fire Aviation Operations* states, references, or supplements policy for the U.S. Bureau of Land Management, the USFS, the U.S. Fish and Wildlife Service, and the National Park Service. Regarding the use of fire retardants, the Aerial Application Guidelines are to "avoid aerial or ground application of retardant or foam within 300 feet of waterways." (http://www.fire.blm.gov/Standards/redbook.htm). This policy was recently upheld in a December 2011 Record of Decision, Nationwide Aerial Application of Fire Retardant on National Forest System Land, USFS.

Source Water Protection Activities

Source water protection from fire-related impacts is generally in place as the Roemer WFF can be shutdown when turbidity increases, or other changes in source water quality occur. It is recommended to contact the Lytle Creek Ranger Station whenever there is a wildfire within the watershed and attend BAER team meetings if possible.

Summary of Findings for Fires

- The Lytle Creek watershed is entirely a high to extremely high fire risk based on vegetation. The largest wildfire over the reporting period was the Blue Cut Fire which occurred from August 16 to August 23, 2016.

- It is likely that the blending of SPW with Lytle Creek water lessened first-flush fire-related impacts to the Roemer WFF in the first three months with precipitation after the Blue Cut Fire.

- WVWD is able to minimize fire-related impacts to the Roemer WFF by shutting the plant down during times of degraded source water quality.

FLOODS/EROSION

Background

Floods and erosion are naturally-occurring phenomenon for the Lytle Creek watershed. Erosion can be caused by either wind, gravity, or running water. Lytle Creek is an erosive watershed, particularly because the San Gabriel Mountains are considered a fast growing mountain range. Therefore, erosion occurs in both dry and wet conditions.

Although no major flood problems exist within the Lytle Creek study area as defined by the National Flood Insurance maps, the steepness of the terrain can cause flooding and flood related problems for properties adjacent to major drainage courses. The steep slopes in Lytle Creek create a high velocity of water flow in streambeds. This high velocity causes greater than normal erosion to occur in, and adjacent to, drainage courses. Residents want to prevent the conversion of natural watercourses to culverts, storm drains, or other underground structures except by special permit (2007 Lytle Creek Community Plan).

Additionally, Lytle Creek is a high to very high fire risk watershed. Rainfall on burned basins can transport and deposit large volumes of sediment, both within and down-channel from the burned area (Cannon et al 2003). Debris flows are among the most hazardous consequences of rainfall on burned hillslopes. Debris flows and landslides pose a distinct hazard because of their unique destructive power.

Seasonal Patterns

On average, about 75 percent of California's average annual precipitation falls between November and March; half occurs between December and February. The Lytle Creek watershed is also subject to short-duration, high-intensity summer monsoon rains. Please refer to **Section 2** for rainfall records from 2013 to 2017 in the Lytle Creek watershed.

Related Constituents

Debris flows may consist of mud, rocks, trees, and boulders. It is generally a muddy slurry, capable of transporting a mixture of materials**,** including very large boulders over gentle slopes.

WVWD staff report that china clay, or kaolinite, is eroded and then transported from the stream bed during storms. Kaolinite is a clay mineral with the chemical composition $Al_2Si_2O_5(OH)_4$. It is a soft, earthy, usually white mineral (dioctahedral phyllosilicate clay), produced by the chemical weathering of aluminum silicate minerals like feldspar.

Occurrence in Watershed

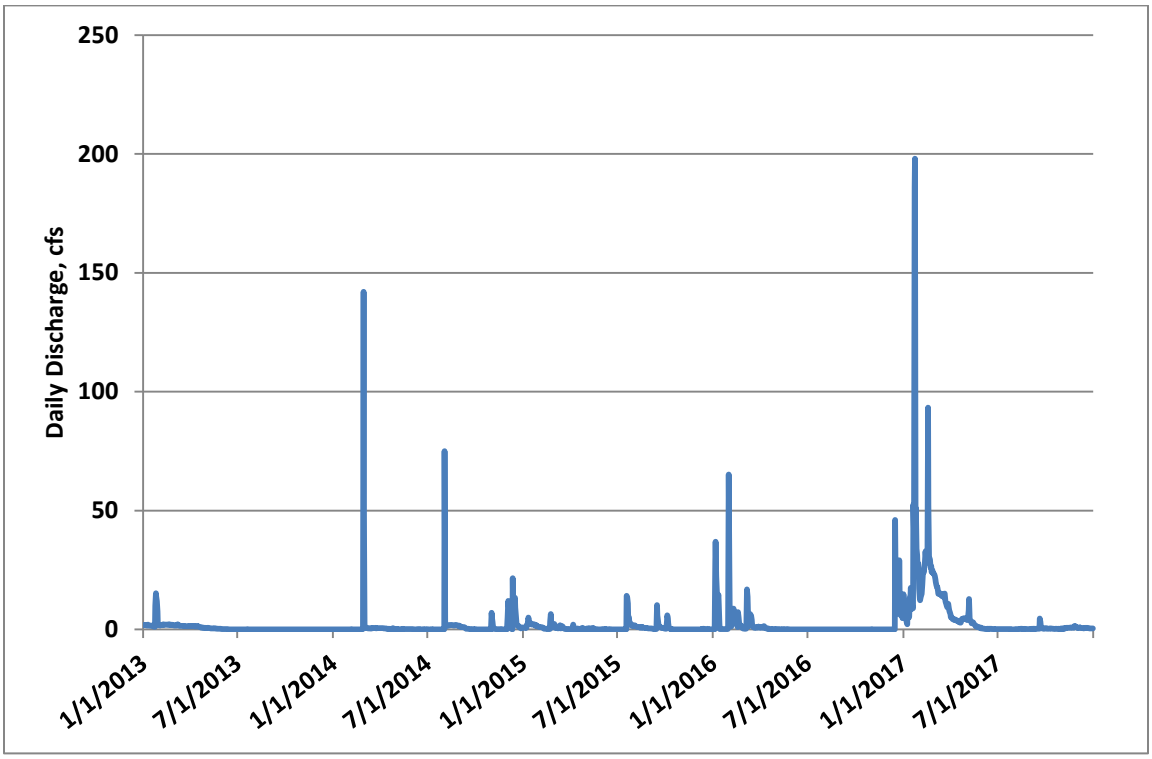
Flooding and debris flows occur in the Lytle Creek watershed as it is a natural canyon area with steep topography and can receive high amounts of rainfall in a short time period. Debris and flood flows are also uncontrolled in the upper reaches of Lytle Creek, since there are no major flood-control facilities upstream of the Lytle Creek communities.

Stream flow data for Lytle Creek was obtained over the reporting time period to study the occurrence of high flows. **Figure 4-6** shows the total flow in Lytle Creek from 2013 to 2017. Flows were lower than normal over this time period, with an average daily discharge of 2.2 cubic feet per second (cfs). Due to drought conditions, the risk of flooding during the study period was minimal.

After the Blue Cut Fire in 2016, modeling was conducted by the BAER team to predict the increase in peak discharge (cfs/square mile) following the Blue Cut Fire. The BAER report states “field observations and modeling of the burned area support a general trend of increased flow, sedimentation, and erosion post-fire”. Risk of debris flows has been significantly increased as a result of the fire.

For small, steep, burned basins located near recreation residences, recreation areas, and private land in Lytle Creek, a storm which normally occurs every two years will produce runoff, sediment and erosion comparable to a storm which occurs every 5 years. Additionally, runoff during a typical 5 year storm is estimated to respond as a 15 to 25 year storm event and short steep slopes in the area are expected to deliver ~1300% of normal sediment delivery.

Figure 4-6
Mean Daily Discharge for Lytle Creek, Station 11062000, 2013-2017



Related Water Quality Issues and Data Review

As discussed in the Fires section, the Roemer WFF remained on-line after the Blue Cut Fire. The blends of SPW likely reduced first-flush fire-related impacts to the source water received by the Roemer WFF, as the raw water turbidities to the Roemer WFF were less than 2 NTU from October to December 2016. Although the Roemer WFF began treating 100 percent Lytle Creek water from January 2017 to April 2017, raw water turbidities stayed below 5 NTU and TOC remained low, ranging from 0.61 to 0.76 mg/L. Based on this information, it does not appear that the Blue Cut Fire impacted the source water to the Roemer WFF.

Regulation and Management

The SBCFCD is responsible for providing flood control and related services throughout San Bernardino County, including the city incorporated areas. However, there are no major flood-control facilities in the watershed.

Source Water Protection Activities

West Valley Water District

Similar to fires, source water protection from flooding and erosion is generally in place as the Roemer WFF can be shutdown when turbidity increases, or other changes in source water quality occur. For example, the WVWD typically avoids using Lytle Creek water during high storm events, in order to prevent china clay from entering the treatment plant.

United States Forest Service

For over twenty years, the San Bernardino National Forest has conducted a self-evaluation of how effectively they have implemented best management practices to control water pollution from National Forest lands. Typically, the types of Forest Service administered projects (or facilities) that are evaluated fall into one of the following categories: timber harvest, recreation, roads, grazing, fuel reduction/fire, mining, and vegetative activities. The San Bernardino National Forest produces an annual report which discusses their findings. According to the USFS staff, one of the primary water quality concerns is sediment transport from roads. It is helpful to know that the USFS does annually evaluate whether or not their facilities are impacting water sources. For example, the USFS is aware that runoff from the parking lot and Applewhite picnic area is transported to Lytle Creek, however they indicated that a solution would likely require an engineered redesign of the site.

Summary of Findings for Floods/Erosion

- Flooding and debris flows occur in the Lytle Creek watershed as it is a natural canyon area with steep topography and can receive high amounts of rainfall in a short time period.

- Debris and flood flows are also uncontrolled in the upper reaches of Lytle Creek, since there are no flood control facilities upstream of the Lytle Creek communities.

- Flows were lower than normal over this time period, with an average daily discharge of 2.2 cfs. Due to drought conditions, the risk of flooding during the study period was minimal.

- WVWD typically avoids using Lytle Creek water during high storm events, in order to prevent high turbidity and china clay from entering the treatment plant.

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SECTION 5 – INTAKE EVALUATION

The purpose of this section is to evaluate the Oliver P. Roemer Water Filtration Facility (Roemer WFF) for its compliance with existing drinking water regulations.

For assistance with abbreviations and acronyms, the reader is referred to the List of Abbreviations at the front of the report.

Highlights of Selected Existing Drinking Water Regulations

NIPDWR and Phase I, II, and V Regulations. Set MCLs for many inorganic chemicals, synthetic organic compounds (SOCs), and volatile organic compounds (VOCs).

Surface Water Treatment Rule (SWTR). Set minimum 3/4-log reduction requirement for *Giardia* and viruses, respectively. Set turbidity requirements, which have since been tightened by the Interim Enhanced Surface Water Treatment Rule.

Interim Enhanced SWTR (IESWTR) and Filter Backwash Rule. Set minimum 2-log reduction requirement for *Cryptosporidium*. Requires continuous monitoring of individual filter effluents (IFE) and combined filter effluent (CFE). Tightened treated water turbidity requirements: CFE < 0.3 NTU in 95 percent of monthly measurements, and not to exceed 1 NTU. Set IFE reporting and evaluation requirements. Requires recycling of all return flows to the headworks, upstream of chemical feed.

Stage 1 Disinfection/Disinfection By-Product (D/DBP) Rule. Set a treatment technology for DBP precursor removal (enhanced coagulation) based on source water total organic carbon (TOC) levels. Varying levels of removal are required if the source water concentrations are > 2 mg/L. Sets maximum contaminant levels (MCLs) for TTHMs and HAA5 at 80/60 µg/L, respectively, in the distribution system as system-wide running annual average (RAA).

Long Term 2 Enhanced SWTR. Requires *Cryptosporidium*, or *Escherichia coli (E. coli)* source water monitoring depending on system size. Source water bin classification dependent on monitoring results. If average *Cryptosporidium* value is > 0.075 oocysts/L, bin classification will require additional action (which could be additional log reductions or other actions, including source water protection). Also requires disinfection profiling and benchmarking if monitoring for *Cryptosporidium*. A second round of source water monitoring was conducted six years after initial bin classification.

Stage 2 D/DBP Rule. Requires compliance with distribution system MCLs for TTHM and HAA5 to be based on locational running annual average (LRAA). In Stage 2 compliance is based on LRAA of 80/60 µg/L. Initial Distribution System Evaluations were completed to identify long term routine monitoring locations. Compliance schedules will depend on system size and source type. For combined distributions systems, all systems will be on schedule of earliest system.

OLIVER P. ROEMER WATER FILTRATION FACILITY

System Description

The Roemer WFF receives Lytle Creek water from the Fontana Union Water Company (FUWC) Powerhouse Afterbay. This water consists of a blend of source waters from the Southern California Edison (SCE) upper diversion, the FUWC lower intake structure, and the Grapeland Tunnel groundwater infiltration. In addition to the Lytle Creek source, the Roemer WFF receives State Project Water. Typically, these waters are blended based on source water availability and to achieve optimum raw water quality. **Chapter 3** presented a summary of the monthly use of Lytle Creek at the Roemer WFF.

The West Valley Water District's (WVWD) California Division of Drinking Water (DDW) Water Supply Permit was most recently amended in October 2017 to add new granular activated carbon (GAC) units to the plant, which has a capacity of 14.4 million gallons per day (mgd). The permit confirms:

- 3/4/2-log reduction requirements for *Giardia*/viruses/*Cryptosporidium*,
- Classification of the treatment process as equivalent to conventional filtration and awards 2.5/2/2-log reduction credit for physical removal of *Giardia*/viruses/*Cryptosporidium*,
- UV disinfection as the primary disinfectant and awards 4/0.5/4-log inactivation credit for *Giardia*/viruses/*Cryptosporidium*, and
- Chlorination disinfection as the residual disinfect and requires 1.5-log virus inactivation via chlorination.

The Roemer WFF currently consists of a series of treatment processes. The plant was expanded in 2007, 2012, and 2017 to increase capacity and upgrade the facilities to allow for increased use of State Project Water and during periods of lower Lytle Creek quality. The Roemer WFF has a pretreatment facility to provide additional solids removal primarily for the State Project Water, and possibly the Lytle Creek source during periods of lower water quality. This facility includes flocculation and sedimentation. The pretreatment effluent is sent to the two raw water blending reservoirs. The Lytle Creek source is typically sent directly to the raw water blending reservoirs. The effluent from the raw water blending reservoirs is then sent to the filtration plant.

The filtration plant consists of six Microfloc Trident 840E package units which provide two-stage filtration. Chemical feed occurs at the influent to the plant and includes pre-chlorination, coagulation (aluminum-based), and cationic polymer as needed. Conventional filtration equivalent is provided by the package system consisting of contact absorption clarification and multi-media filtration. The filter loading rate is 6 gallons per minute per square foot (gpm/sf) and the filters are backwashed based on filter run time, effluent turbidity, and head loss. The filter backwash water is sent to the decant basins and is now recycled to the inlet header upstream of the pretreatment

basins the plant. After backwashing, the filters are normally wasted for 10-15 minutes before returning to service.

The filtered water is then sent through three parallel ultraviolet (UV) light reactors for disinfection. This is a Trojan UV Swift TM Model 6L24. If total organic carbon (TOC) levels in the plant effluent water need to be further reduced prior to disinfection then a portion of the stream will be sent to the GAC units and then blended back in the plant effluent. Approximately one-third of the flow is generally sent to the GAC units. Finally, the water is post-chlorinated in a chlorine contact tank to provide a distribution system disinfectant residual. The typical residual leaving the plant ranges from 1.0 – 1.5 milligrams per liter (mg/L).

WVWD has long-term plans to construct a 6.0 mgd membrane filtration plant to treat State Project water or Lytle Creek water and increase the treatment capacity from 14.4 mgd to 20.4 mgd.

Highlights of Changes Since the 2013 Update

There was one significant change in the Roemer WFF during the study period. On July 14, 2015 WVWD converted primary coagulant from aluminum sulfate (alum) to aluminum chlorohydrate (ACH). In addition, WVWD added four new GAC units in December 2017. There are now 10 units, operated in a lead-lag process through five trains.

Significant Potential Contaminating Activities

The diverted water from Lytle Creek is subject to recreation, development, fires, floods/erosion, spills, and wastewater. The water from the Grapeland Tunnel is mixed in with the diverted Lytle Creek water and its vulnerability to potential contaminating activities (PCAs) is uncertain, but may include the wastewater treatment plant percolation ponds near the United States Forest Service Ranger Station. The most significant watershed activities which impact the water quality of Lytle Creek is body-contact and dispersed recreation in Lytle Creek, as well as spills and suspected illegal discharges.

Water Quality Summary

Below is a discussion of each of the constituents of interest and any notable compliance issues for each constituent during the period of study.

Turbidity

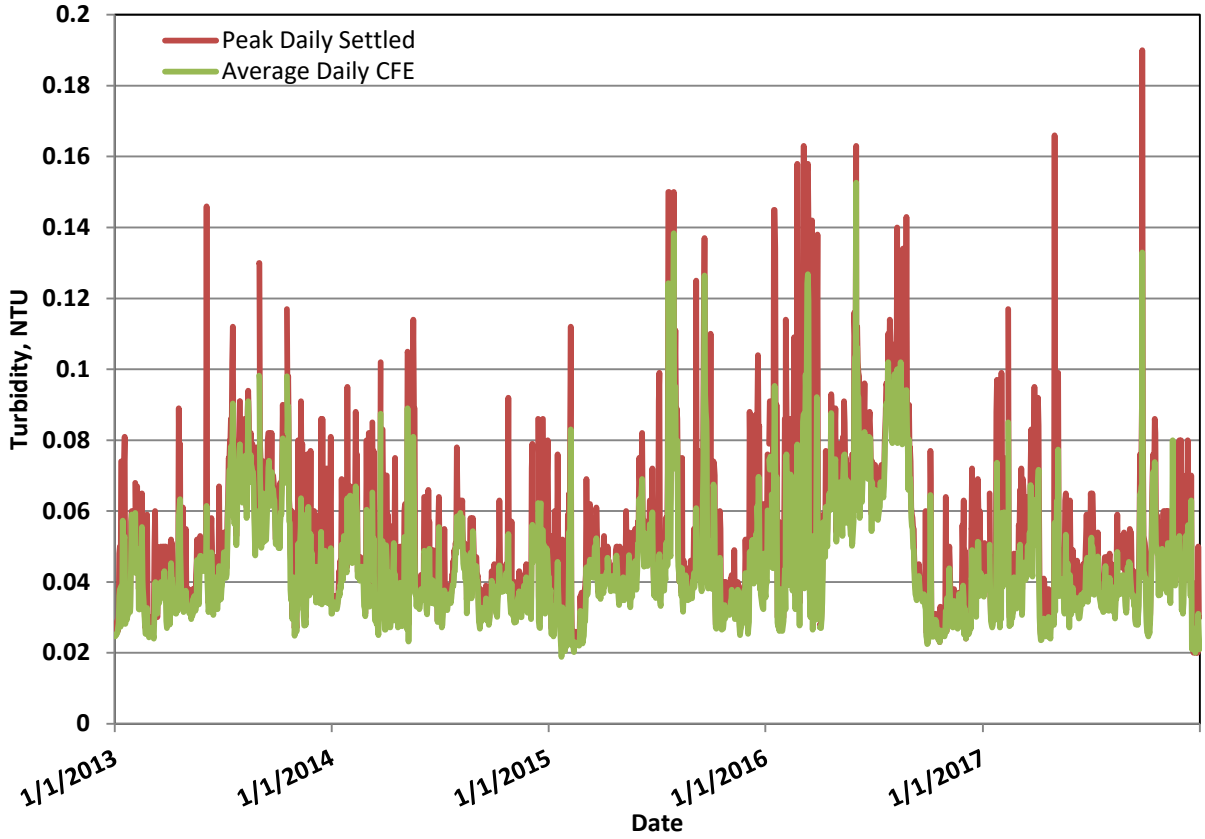
The turbidity measurements of the peak daily settled water and combined filter effluent (CFE) from January 2013 through December 2017 were included in this evaluation. A review of the data shows that the CFE was well within regulatory limits, with all average

daily measurements below 0.153 nephelometric turbidity units (NTU), well below the treatment technique requirement of 0.3 NTU.

When comparing the peak daily raw water turbidity to the average daily CFE, the percent solids reduction can be calculated. Conventional filtration is required to provide 80 percent solids reduction. The daily solids reduction ranged from 47 to 100 percent, with an average and median value of 90 percent, exceeding the 80 percent requirement. When looking at monthly average solids reduction, all months except one (July 2014 – 78 percent) exceeded the 80 percent requirement. See **Appendix B**.

Figure 5-1 shows a time series plot of settled and treated water turbidities. The Roemer WFF meets all current treated water turbidity standards.

Figure 5-1
Peak Daily Settled and Average Daily CFE Turbidity at Roemer WFF, 2013 - 2017



The peak daily settled water ranged from 0.02 to 0.19 NTU, with an average value of 0.053 NTU and a median value of 0.046 NTU over the entire study period. Ninety-five percent of daily samples were less than 0.096 NTU. These numbers are slightly higher than those reported in the 2013 Update.

The average daily CFE ranged from 0.019 to 0.153 NTU, with an average value of 0.045 NTU and a median value of 0.039 NTU over the entire study period. Ninety-five percent of average daily values were less than 0.08 NTU. These numbers are also slightly higher than those reported in the 2013 Update, but still well within the regulatory threshold of 0.3 NTU.

On July 14, 2015 the primary coagulant was changed from aluminum sulfate (alum) to aluminum chlorohydrate (ACH). The turbidity data before and after that event were sorted and evaluated. The average of the average daily CFE when alum was the primary coagulant was 0.042 NTU, while it was 0.047 NTU when ACH was the primary coagulant. This is an 11 percent increase in turbidity. A comparison of the raw and settled water during the same periods show that the average peak daily raw turbidity when ACH was in use was only 2.4 percent higher, while the average peak daily settled turbidity when ACH was in use was 13.6 percent higher. This indicates that although ACH is working well as a coagulant to meet all turbidity reduction requirements, it may not be as effective in removing solids as the alum was previously.

Due to ongoing drought and water supply management, Roemer WFF used increasing amounts of State Project Water (SPW) through the study period. **Table 5-1** presents the percent Lytle Creek use at the Roemer WFF for each month of the study period. Over the study period Lytle Creek accounted for an average of 69 percent of the source water to the Roemer WFF. From January 2013 through June 2015 (the period with alum use) it accounted for 82 percent of the source water and from July 2015 through December 2017 (the period with ACH use) it accounted for 56 percent of the source water. This shows a distinctly lower proportion of Lytle Creek use beginning July 2015.

Table 5-1
Percent Lytle Creek Use at the Roemer WFF, 2013 - 2017

Month	2013	2014	2015	2016	2017	Overall Average	Average During Alum Use	Average During ACH Use
Jan	100	100	100	71	100	94	100	86
Feb		100	100	65	100	91	100	83
Mar	100	100	100	60	100	92	100	80
Apr	100	100	100	59	100	92	100	80
May	67	100	100	51	75	79	89	63
June	75	50	50	36	70	56	58	53
July	50	50	50	29	65	49	50	48
Aug	75	50	50	35	55	53	63	47
Sept	70	50	25	26	55	45	60	35
Oct	80	50	50	50	0	46	65	33
Nov	100	50	50	58	0	52	75	36
Dec	100	100	50	45	100	79	100	65

*Yellow highlighting indicates alum use, orange highlighting indicates ACH use

Figure 5-1 shows two periods of extended increased peak daily settled and average daily CFE turbidity; July through October 2013 and April through September 2016. During the 2013 period, the monthly Lytle Creek use ranged from 50 to 80 percent and averaged 68.8 percent. During the 2015 period, the monthly Lytle Creek use ranged from 26 to 59 percent and averaged 39.3 percent. These periods used different coagulants, with alum in 2013 and ACH in 2016, and had different proportions of source waters. Both periods were consistently dry. Lake Silverwood, part of the SPW system, had an extensive algae bloom in the summer of 2016. There are no other suspected activities in the watershed that may have contributed to extended elevated turbidity levels. It is unclear what was the cause of these peaks, however both were during summer months so could be associated with algae growth.

- All CFE turbidity measurements between January 2013 and December 2017 met the turbidity treatment technique limit and were less than 0.153 NTU.
- The peak daily settled water had an average value of 0.053 NTU and the average daily CFE had an average value of 0.045 NTU. This shows that a large amount of the solids removal is achieved during the pretreatment process of flocculation and sedimentation.
- The peak daily settled and average daily CFE average turbidity values were slightly higher post-July 2015, potentially associated with the coagulant conversion from alum to ACH or the increased use of SPW at the Roemer WFF influent.
- Solids removal through plant averages 90 percent, meeting the 80 percent goal for conventional treatment. Removal is most challenging under low raw water turbidity periods.
- Two periods of extended elevated turbidity (in 2013 and 2016) occurred, but no cause could be identified. These could be associated with algae growth.

Microbiological Constituent Review

Distribution system monitoring for coliforms as part of the Total Coliform Rule resulted in a few detections of total coliform in distribution system during the study period. In each month with a detect, less than five percent of samples were positive. Therefore, there were no violations of the total coliform maximum contaminant level (MCL).

In February 2016 two routine samples tested positive for fecal coliform. Repeat samples were collected and found to be non-detectable. DDW was notified of the detections and WVWD refreshed samplers on sampling procedures.

Disinfection By-Products and Precursors

WVWD monitored TOC levels at several locations in the treatment process during the study period in order to determine compliance with the TOC removal requirement of the Stage 1 D/DBP Rule. Historically, the Lytle Creek and State Project Water sources were blended to provide a raw water TOC level less than 2.0 mg/L to comply with the alternative compliance criterion. With the implementation of the new treatment

processes, the raw water blending is being balanced with the ability to provide advanced treatment of the raw water to achieve treated water TOC less than 2.0 mg/L, also an alternative compliance criterion. As presented in **Section 3**, the Lytle Creek Influent is monitored and has an average TOC of 0.61 mg/L. The State Project Water Influent is also monitored and has an average TOC of 2.68 mg/L, significantly higher than Lytle Creek.

The Lytle Creek source water enters the Roemer WFF and is frequently blended with State Project Water (SPW), which has higher TOC levels. The SPW is sent through the pre-treatment facility first, which provides TOC reduction prior to blending with the Lytle Creek source at the raw water blending reservoirs. Lytle Creek water can also be supplied to the pretreatment facility. The water moves through the filtration plant to the Granular Activated Carbon (GAC) filters. During the study period, TOC was monitored regularly at the following locations in the Roemer WFF (upstream to downstream); Lytle Creek Influent, State Project Water Influent, Pretreatment Influent and Effluent, CFE, GAC Influent and Effluent, and Plant Effluent. **Table 5-2** provides a summary of the TOC results at each of these sites.

Table 5-2
TOC Levels Through Roemer WFF, 2013 - 2017

Sample Site	Range, mg/L	Average, mg/L	Median, mg/L
Lytle Creek Influent[1]	<0.15 - 2.5	0.61	0.47
SPW Influent[2]	0.72 - 4.2	2.68	2.6
Pretreatment Influent[3]	<0.3 - 6.7	2.1	2.4
Pretreatment Effluent[3]	<0.3 - 4	1.4	1.3
CFE[4]	<0.13 - 2.7	0.94	0.97
GAC Influent[3]	<0.3 - 4.1	1.12	1.1
GAC Effluent[3]	<0.13 - 2.1	0.57	0.54
Plant Effluent[5]	0.31 - 2.7	1.1	0.99

[1] Samples collected between January 2013 and December 2017
[2] Samples collected between April 2013 and October 2017
[3] Samples collected between April 2013 and November 2017
[4] Samples collected between January 2013 and November 2017
[5] Samples collected between August 2015 and November 2017

The plant effluent location is the final sample point before the water enters the distribution system. This location is less than 2.0 mg/L in 90 percent of the individual samples collected. For source or treated waters with a running annual average TOC less than 2.0 mg/L (calculated from quarterly averages), the alternative compliance criterion is met and no TOC removal ratio is required to be calculated. The quarterly averages for this site range from 0.48 to 1.78 mg/L. The running annual average TOC at this site ranged from 0.86 to 1.29 mg/L, within the 2 mg/L limit and meeting the alternative compliance criterion between August 2015 and November 2017. **Figure 5-2** shows the plant effluent TOC levels during the study period.

The pretreatment facility is operated to reduce turbidity and TOC in State Project Water, as well as Lytle Creek. The TOC reduction through the pretreatment facility ranges from zero to 100 percent, with an average reduction of 29 percent and a median

reduction of 25 percent. **Figure 5-3** shows the pretreatment influent and effluent TOC levels during the study period, as well as the monthly percent of Lytle Creek use.

Figure 5-2
Roemer WFF Plant Effluent TOC Levels, 2013 - 2017

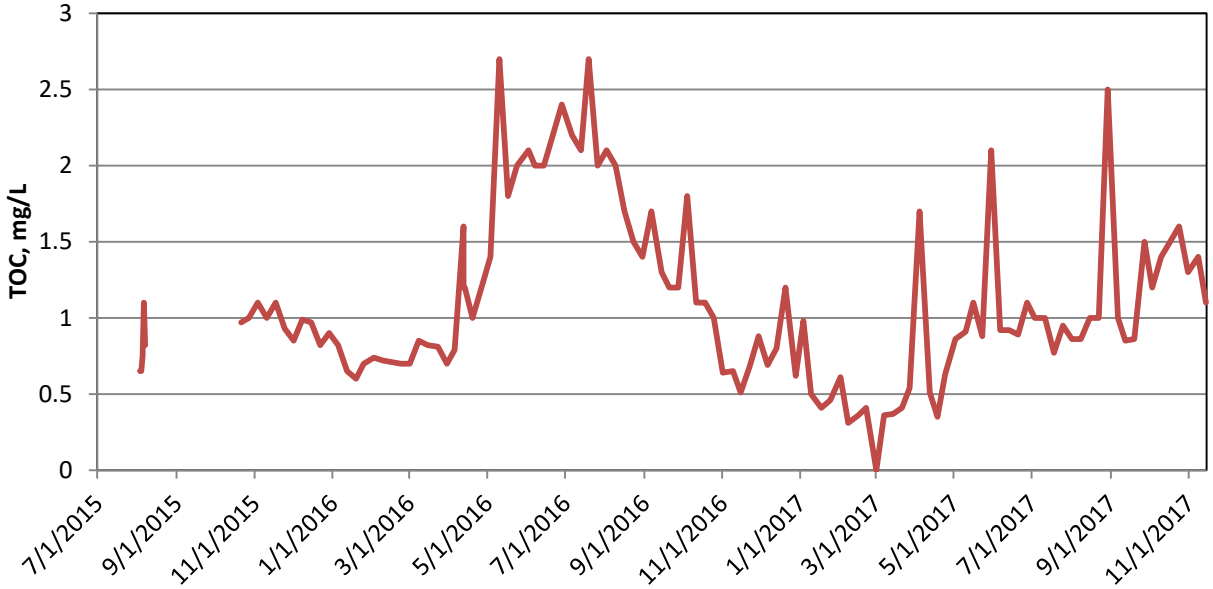
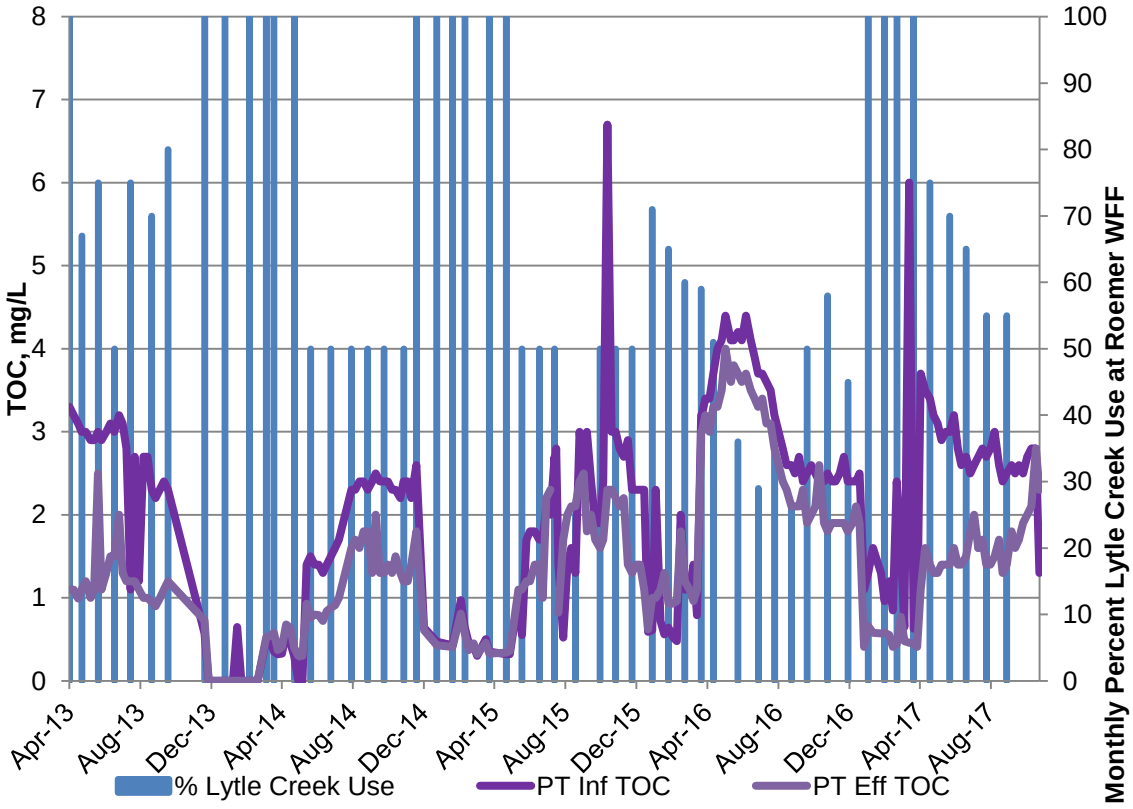


Figure 5-3
Roemer WFF Pretreatment Influent and Effluent TOC Levels, 2013 - 2017

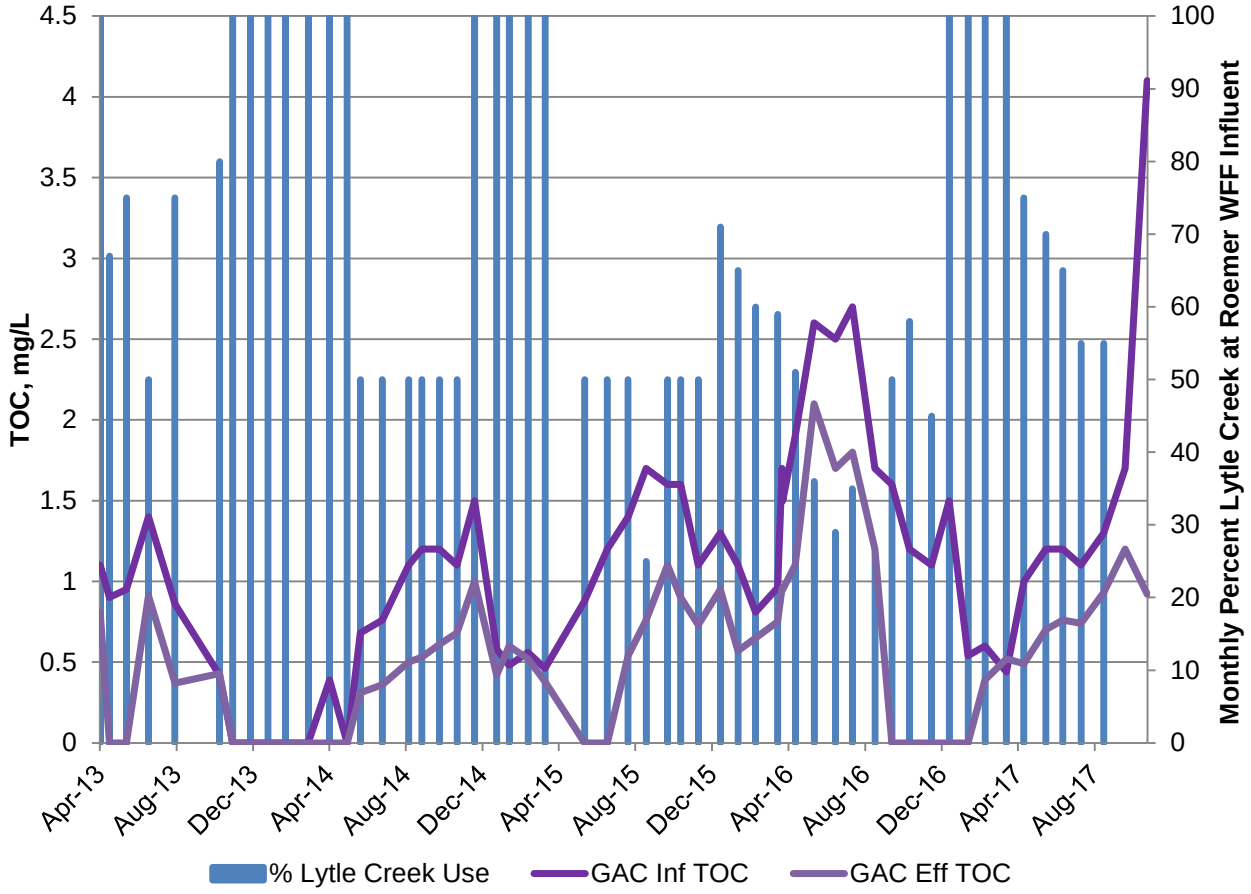


The pretreatment data in **Figure 5-3** shows the clear seasonal increase in TOC over the summer months, when there is increased State Project Water use. In addition, there appears to be an increase in the 2016 and 2017 peak values.

The GAC units are operated to further reduce TOC after the filtration plant. The TOC reduction through the GAC units ranges from zero to 91 percent, with an average reduction of 39 percent and a median reduction of 35 percent. **Figure 5-4** shows the GAC influent and effluent TOC levels during the study period, as well as the monthly percent Lytle Creek use.

The GAC data in **Figure 5-4** shows the clear seasonal increase in TOC over the summer months, when there is increased State Project Water use. In addition, there is a more evident increasing trend over the study period.

Figure 5-4
Roemer WFF GAC Influent and Effluent TOC Levels, 2013 - 2017



Similar to the turbidity evaluation, a comparison of TOC values before and after July 2015 was conducted. Alum was the primary coagulant between January 2013 and mid-July 2015, while ACH was the primary coagulant between mid-July 2015 and December 2017. Lytle Creek was more extensively used prior to July 2015 (82 percent of source water) and less so after July 2015 (56 percent of source water). **Table 5-3** presents a

summary of the average and median TOC values at each location during the two periods. It can be seen that there was a general increase in TOC levels at all sample sites after July 2015, when increased use of SPW and conversion to ACH occurred. The table also presents the percent TOC increase at the various sample sites after July 2015, which was significant.

Table 5-3
TOC Levels Through Roemer WFF By Coagulant Type, 2013 - 2017

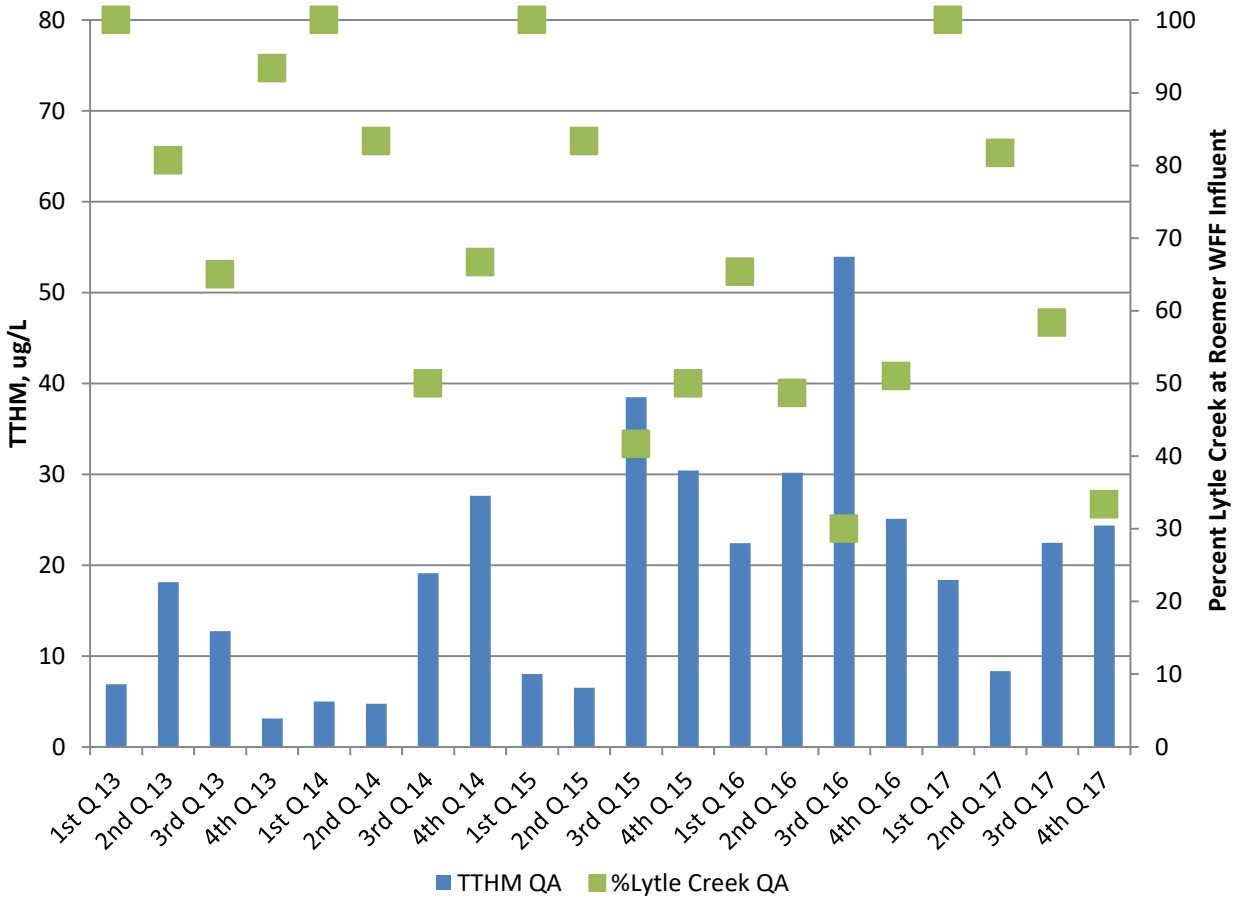
Sample Site	Coagulant Type				Percent TOC Increase After July 2015	
	Alum (1/1/13 - 7/14/15)		ACH (7/15/15 - 12/31/17)			
	Average TOC, mg/L	Median TOC, mg/L	Average TOC, mg/L	Median TOC, mg/L	Average	Median
Lytle Creek Influent	0.6	0.41	0.61	0.56	2%	37%
SPW Influent	2.4	2.4	2.9	2.7	21%	13%
Pretreatment Influent	1.51	1.6	2.52	2.6	67%	63%
Pretreatment Effluent	0.89	0.99	1.87	1.8	110%	82%
CFE	0.6	0.45	1.32	1.2	120%	167%
GAC Influent	0.68	0.72	1.49	1.35	119%	88%
GAC Effluent	0.32	0.37	0.78	0.76	144%	105%
Plant Effluent	-	-	1.1	0.99	-	-

- Lytle Creek provides water relatively low in TOC, with a range of non-detectable to 2.5 mg/L and an average of 0.61 mg/L.
- State Project Water has significantly higher TOC, with an average of 2.68 mg/L, that contributes to a higher blended water concentration through the Roemer WFF.
- Pretreatment facility provides an average of 29 percent reduction in TOC, with an average effluent TOC value of 1.4 mg/L.
- Roemer WFF CFE data show an average TOC value of 0.94 mg/L, with 93 percent of samples less than 2 mg/L.
- GAC facility provides an average of 39 percent reduction in TOC, with an average effluent TOC value of 0.57 mg/L and 99 percent of samples less than 2 mg/L.
- The change in primary coagulant from alum to ACH, as well as the increased use of SPW, may have resulted in reduced removal of TOC through the Roemer WFF, with TOC levels over 100 percent higher after July 2015.
- The Plant Effluent sample site was evaluated for quarterly averages and running annual averages and showed that all were less than 2 mg/L.
- WVWD complies with the Stage 1 D/DBP Rule by meeting an alternative compliance criterion for the enhanced coagulation treatment technique, less than 2 mg/L in source or treated water.

Figure 5-5 provides the quarterly average for the eight distribution system sites for total trihalomethanes (TTHM) during the study period. Also included are the quarterly

averages of monthly Lytle Creek use at the Roemer WFF. Overall, the levels of TTHMs are very low in the distribution system with the average of all individual samples at 19 ug/L and the median of all individual samples at 8 ug/L.

Figure 5-5
Quarterly Average TTHM for Distribution System, 2013 - 2017



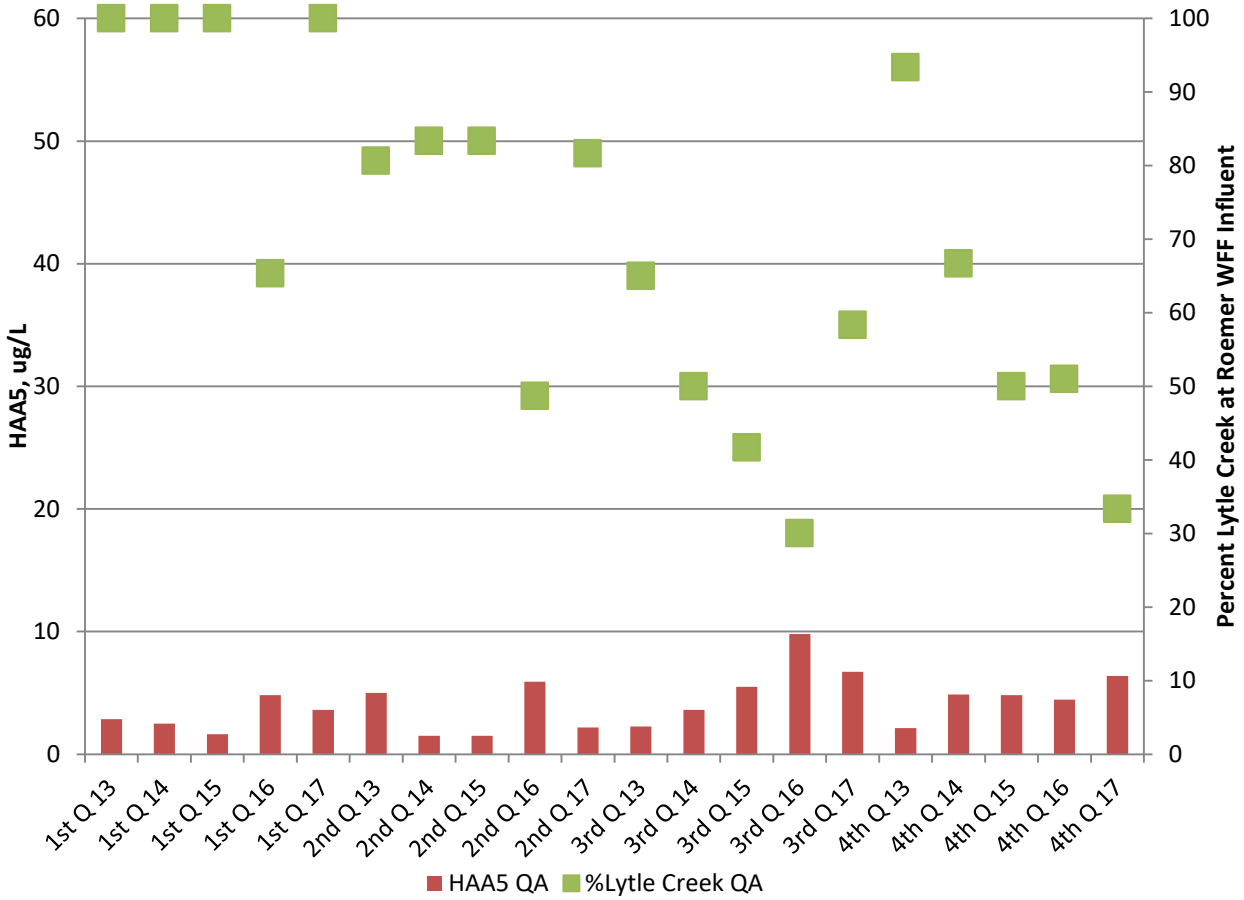
The data are impacted by the blending of source waters at the Roemer WFF, the presence of groundwater in the distribution system, and distribution system operational management strategies implemented by WVWD. The quarterly averages ranged from 3 to 54 ug/L and generally speaking, the third quarter has the highest TTHM levels. These peaks could have been caused by warmer temperatures, higher chlorine demands, and source water contributions. The highest levels of TTHMs are seen at the sites located in pressure zones 6, 7, and 8, which receive the highest amounts of water from the Roemer WFF. **Figure 5-5** shows an increasing trend in the quarterly averages starting in the third quarter of 2015. This timing coincides with an increase in the use of SPW and conversion of the primary coagulant from alum to ACH. As discussed above, the levels of TOC in the treated water also increased during this period and are likely to be the cause of the increased TTHM levels after July 2015.

WVWD converted to the Stage 2 D/DBP Rule monitoring sites in June 2012. Only eight distribution sites are required to be monitored under this Rule, and six of those (sites 1

through 6) are located in the zones that represent water from the Roemer WFF. Locational running annual averages (LRAA) were calculated for all the distribution sites. The LRAAs ranged from non-detect to 65 µg/L, with an average value of 18.5 µg/L and a median value of 14 ug/L, all well below the MCL of 80 µg/L. The highest levels of TTHMs occur at sites 2, 5, 4, and 6, which are all in zones fed by Roemer WFF.

Figure 5-6 provides the quarterly average for the eight distribution system sites for haloacetic acids (HAA5) during the study period. Also included are the quarterly averages of monthly Lytle Creek use at the Roemer WFF. Similar to TTHMs, the levels of HAA5 are very low in the distribution system with the average of all individual samples at 4 ug/L and the median of all individual samples at 3 ug/L.

Figure 5-6
Quarterly Average HAA5 for Distribution System, 2013 - 2017



Similar to TTHMs, the data are impacted by the blending of source waters at the Roemer WFF, the presence of groundwater in the distribution system, and distribution system operational management strategies implemented by WVWD. The quarterly averages ranged from 2 to 10 ug/L. There generally was an increase in HAA5 levels during the third quarter. These peaks could have been caused by warmer temperatures, higher chlorine demands, and source water contributions. The highest levels of TTHMs are seen at the sites located in pressure zones 6, 7, and 8, which

receive the highest amounts of water from the Roemer WFF. **Figure 5-6** shows similar, but more subtle, increasing trend in the quarterly averages starting in the third quarter of 2015 that is potentially associated with the increased use of SPW and conversion to ACH as the primary coagulant.

LRAA were calculated for all the distribution sites under the Stage 2 D/DBP Rule monitoring. The LRAAs ranged from non-detect to 12 µg/L, with an average value of 3.9 µg/L and a median value of 4 ug/L, all well below the MCL of 60 µg/L. The highest levels of HAA5s continue to occur at sites 2, 4, 5, and 6, which are all associated with the Roemer WFF.

- TTHM data is within the primary MCL of 80 µg/L, with all LRAAs less than 65 µg/L.
- HAA5 data is well within the primary MCL of 60 µg/L, with all LRAAs less than 12 µg/L.
- The distribution sites with the highest DBP levels are associated with the Roemer WFF.
- The only identifiable trend was the increase in DBP levels after July 2015, which may be related to several factors, including; increased use of SPW, conversion of primary coagulant to ACH, or revised distribution system operational practices.

Unregulated Contaminant Monitoring Rule 3

In addition, WVWD participated in the USEPA's Third Unregulated Contaminant Monitoring Rule (UCMR3) between March 2014 and December 2014. This included quarterly sampling of the Roemer WFF treated water effluent (Reservoir) and the distribution system maximum residence time (DSMRT). Six constituents were detected at the Roemer WFF effluent (Reservoir) and seven constituents were detected at DSMRT, as shown in **Table 5-4**. None of the constituents were detected at levels of human health concern.

Giardia/Virus/Cryptosporidium Reduction Requirements

Based on the total coliform, fecal coliform, *Escherichia coli (E. coli), Giardia,* and *Cryptosporidium* data presented in **Section 3**, 3/4/2-log reduction of *Giardia*/virus/*Cryptosporidium* are appropriate reduction requirements for the Roemer WFF.

The Roemer WFF is classified as a conventional filtration water treatment plant, and is therefore granted reduction credit for 2.5-log *Giardia,* 2.0-log viruses, and 2-log *Cryptosporidium* for physical removal. UV primary disinfection provides 4-log *Giardia,* 0.5-log viruses, and 4-log *Cryptosporidium* reduction credit. Residual disinfection with sodium hypochlorite provides a minimum of 1.5-log inactivation of viruses. This meets all of the current microbial removal/inactivation requirements of the SWTR, the Interim Enhanced SWTR, and the Long Term 2 ESWTR.

Table 5-4
UCMR3 Data Summary Related to Roemer WFF, 2014

Site	Constituent	Sample Results, ug/L				Human Health Threshold
		3/6/2014	6/24/2014	6/16/2014	12/5/2014	
Reservoir (EPTDS for Roemer WFF)						
	Chlorate	65	180	240	47	State Board Notification Level – 800 ug/L
	Chromium	<0.2	1	0.78	0.37	CA MCL - 50 ug/L
	Hexavalent Chromium	0.22	0.94	0.93	0.03	CA MCL Repealed (10 ug/L)
	Molybdenum	4	2.5	2.2	4.7	USEPA Lifetime Health Advisory – 40 ug/L
	Strontium	270	320	290	320	USEPA Lifetime Health Advisory – 4,000 ug/L
	Vanadium	1.5	2.1	3.6	4.5	State Board Notification Level – 50 ug/L
DSMRT for Roemer WFF						
	Chlorate	68	62	69	44	State Board Notification Level – 800 ug/L
	Chromium	<0.2	0.75	0.37	0.44	CA MCL - 50 ug/L
	Hexavalent Chromium	0.2	0.39	0.27	0.092	CA MCL Repealed (10 ug/L)
	Cobalt	<1	1.2	<1	<1	No Drinking Water Threshold
	Molybdenum	4	3.9	4.4	4.9	USEPA Lifetime Health Advisory – 40 ug/L
	Strontium	260	330	330	330	USEPA Lifetime Health Advisory – 4,000 ug/L
	Vanadium	1.6	6.7	4.1	5.2	State Board Notification Level – 50 ug/L

Regulatory Compliance Evaluation

WVWD has been monitoring the raw and treated water for the Roemer WFF for all required Title 22 compliance constituents. **Table 5-5** lists the existing drinking water regulations and a compliance evaluation for these standards at the Roemer WFF. The Roemer WFF is currently in compliance with existing regulations.

Table 5-5
Regulatory Compliance Evaluation
West Valley Water District – Roemer WFF

	Targeted Compounds	Key Issues Compliance Status
Existing Regulations		
Phase I, II, and V	IOCs, VOCs, SOCs	Monitored as required. The Annual Consumer Confidence Reports from the study period indicate that all MCLs are met in the treated water.
SWTR	Microbial and Turbidity	Coliform and *Giardia* data support 3/4—log reduction requirement for *Giardia*/viruses. All operations, monitoring and reporting requirements are met and all treated water turbidity standards are met.
Interim Enhanced SWTR and Filter Backwash Rule	Microbial and Turbidity	All new turbidity standards met. 2-log reduction credit for *Cryptosporidium* applicable.
Stage 1 D/DBP Rule	Disinfectants and Disinfection By-Products	TOC <1.0 mg/L in Lytle Creek source. Blending of SPW and Lytle Creek is implemented, along with pre-treatment to bring plant influent levels to <2 mg/L. Treated water running annual averages are consistently <2 mg/L. Therefore, no TOC removal ratio is required to be calculated. TTHM/HAA5 RAAs at D/DBP Rule sites comply with drinking water standards (<80/60 µg/L, respectively).
Long Term 2 Enhanced SWTR	Microbial	*Cryptosporidium* second round LT2 monitoring resulted in a maximum running annual average concentration of 0 oocysts/L and a continued Bin 1 classification. No further action required.
Stage 2 D/DBP Rule	Disinfectants and Disinfection By-Products	WVWD converted over to the Stage 2 monitoring sites in June 2012. TTHM/HAA5 LRAAs for Stage 2 data are well below drinking water standards (<80/60 µg/L, respectively).

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SECTION 6 – RECOMMENDATIONS

This section discusses source water protection activities taken since the 2012 Update Watershed Sanitary Survey and a list of recommendations for future source water protection efforts.

SOURCE WATER PROTECTION ACTIVITIES SINCE THE 2012 UPDATE WATERSHED SANITARY SURVEY

The West Valley Water District (WVWD) has implemented source water protection efforts as recommended in the 2012 Update Report. Some of the recommendations were determined to be no longer relevant, and were not completed. It is important to note the following source water protection efforts:

- In July 2013, WVWD sent a letter to the Division of Drinking Water (DDW) to revise the Permit 05-13-12PA-037 to confirm that the Oliver P. Roemer Water Filtration Facility (WFF) is a conventional water treatment plant which is awarded 2.5-log reduction of *Giardia* (99.7 percent), 2-log reduction of *Cryptosporidium* (99 percent), and 2-log reduction of viruses (99 percent), when all turbidity standards are met. This correction was revised in a letter from DDW to WVWD, dated April 17, 2014.

- In July 2013, WVWD sent a letter to the DDW requesting the revision for Permit 05-13-12PA-037 (permit condition 13) related to additional log treatment to be based on monthly median *E. coli* level, with a trigger level of 200 most probable number per 100 milliliters (MPN/100 mL). This request was denied, so WVWD continues to use total coliform as the trigger for additional log treatment.

- WVWD continued to optimize treatment during times of potentially reduced source water quality by adjusting coagulant dose, optimizing polymers, implementing alternative treatment processes (granular activated carbon [GAC]/ultraviolet light [UV]), reducing flow if possible to increase hydraulic detention times and reduce filtration loading rates, and ensuring adequate disinfection contact time (CT). WVWD also changed the primary coagulant from aluminum sulfate to aluminum chlorohydrate (ACH) in July 2015.

- WVWD has continued to conduct monthly visual inspections of the watershed.

- WVWD added four additional granular activated carbon (GAC) vessels at the Roemer WFF in December 2017.

- As the coagulant doses are very low with ACH (less than 1 milligram per liter [mg/L]), a streaming current detector to assist with dosing strategy is not likely to optimize further.

- WVWD did not continue to investigate the feasibility of installing a turbidimeter at Fish Wheel to provide early detection of illicit discharges to Lytle Creek, as there was only one turbidity peak in the plant influent over the reporting period.

RECOMMENDATIONS

The following recommendations have been developed for this Fourth Update, and are listed by subject area and not by priority. Development of recommendations for watershed management actions that are economically feasible and within the authority of the WVWD is critical. Recommendations will be implemented by the WVWD as resources are available.

Water Quality

- Continue to provide 3/4/2-log reduction of *Giardia*/virus/ *Cryptosporidium* at the Roemer WFF.

- Continue to optimize treatment during times of potentially reduced source water quality – i.e. adjust coagulant dose, optimize polymers, implement alternative treatment processes (granular activated carbon [GAC]/ultraviolet light [UV]), reduce flow if possible to increase hydraulic detention times, reduce filtration loading rates, and ensure adequate disinfection contact time (CT).

- Ensure maximum TOC removal during periods of reduced Lytle Creek source water contribution to prevent increased distribution system DBP levels.

- Continue monitoring TOC at Plant Effluent site and consider qualitative identification of potential causes when Roemer WFF effluent levels of TOC increase (i.e. water supply, presence of algae, storm events).

Watershed Contaminant Sources

- It is recommended to contact the County of San Bernardino Special Districts Department to update WVWD contact information as listed in the County's 2017 Sewer System Management Plan and to express that the WVWD would appreciate notification of spills to Lytle Creek.

- It is recommended to document current operations at the Roemer WFF if a high turbidity event occurs. If there is no rain, and 100 percent Lytle Creek is being treated, it could be indicative of discharges from Mountain Lakes Resort.

- It is recommended to contact the Lytle Creek Ranger Station whenever there is a wildfire within the watershed and attend Burned Area Emergency Report (BAER) team meetings if possible.

APPENDIX A
BIBLIOGRAPHY AND LIST OF CONTACTS

BIBLIOGRAPHY

Annual Report for Fiscal Year 2014-2015 – Order No. R8-2010-0036 NPDES permit No. CAS618036, prepared by San Bernardino County Stormwater Program.

Sewer System Management Plan for County Service Area 70 S-3 Lytle Creek, prepared by County of San Bernardino Special Districts Department, March 2017.

Local Agency Management Program for Onsite Wastewater Treatment Systems, May 2017. Prepared by San Bernardino County Division of Environmental Health Services.

Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems, June 2012. Prepared by State Water Resources Control Board.

Nationwide Aerial Application of Fire Retardant on National Forest System Land, Record of Decision, December 2011, prepared by US Forest Service.

Crouch, R.L., H.J. Timmenga, T.R. Barber, and P.C. Fuchsman. 2006. Post-fire surface water quality: comparison of fire retardant versus wildfire-related effects. Chemosphere 62:874-889.

Lytle Creek Community Plan, April 12, 2007 prepared by URS Corporation, Hogle-Ireland, Inc., Jacobson and Wack, RBF Consulting, Stanley R. Hoffman Associates, Inc., ISMS, Inc., Economics Politics, Inc. for the San Bernardino County General Plan.

2017 Draft Lytle Creek Community Plan.

Waste Discharge Requirements for San Bernardino County Special Districts' Lytle Creek Wastewater Treatment Plant, Lytle Creek, San Bernardino County, Order No. 95-32.

Blue Cut Fire – San Bernardino National Forest, Front Country Ranger District, prepared by USDA Forest Service, September 2016.

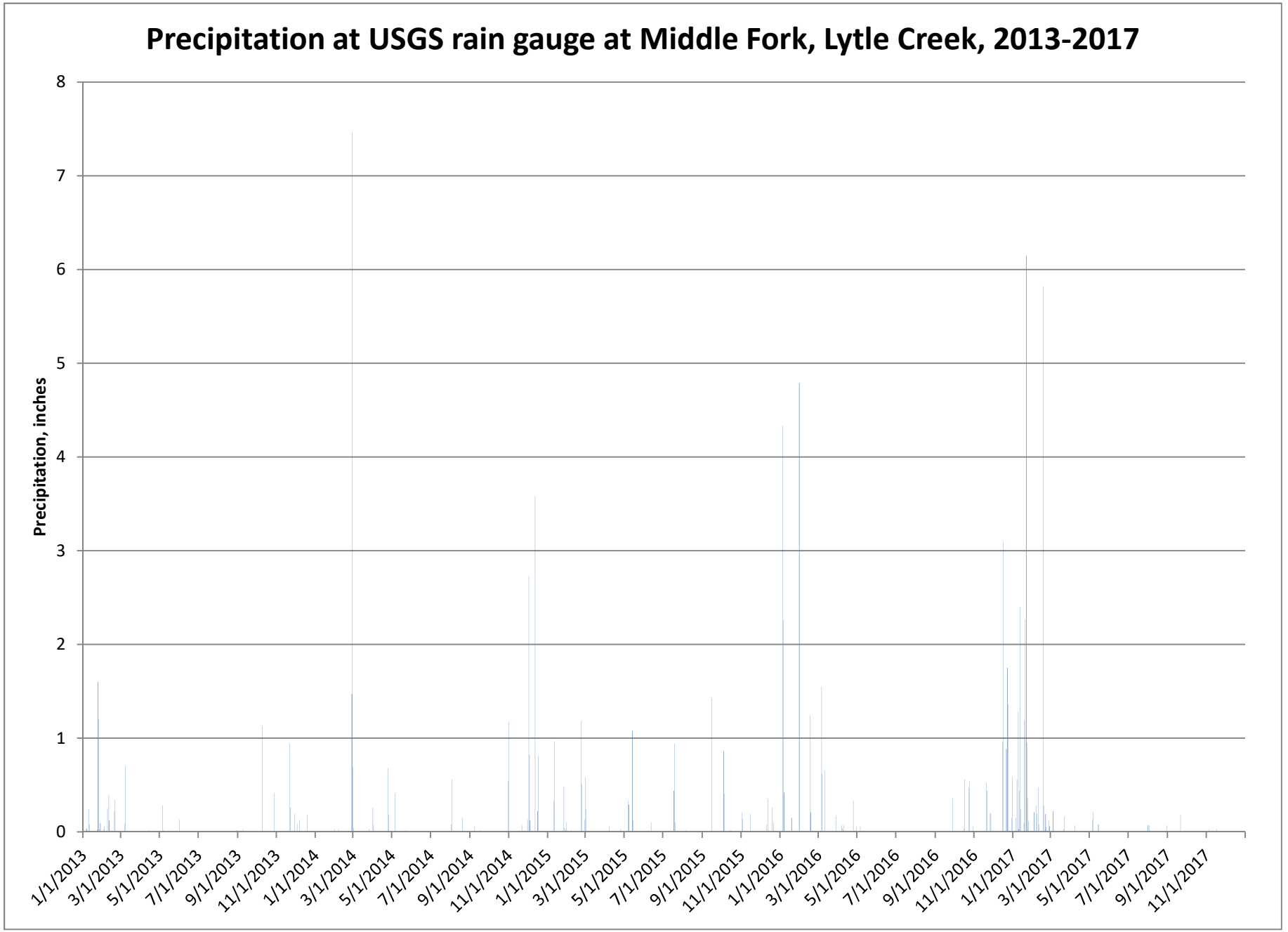
San Bernardino County Planning
http://cms.sbcounty.gov/lus/Planning/ApplicationsAccepted.aspx

Wildermuth Environmental. July 2000. TIN/TDS Study of Santa Ana Watershed. Development of groundwater management zones. Estimation of Historical and Current TDS and Nitrogen Concentrations in Groundwater. United States Department of Agriculture Forest Service. Land Management Plan.

CONTACT LIST

Name	Agency	Phone number/email
Jared Beyeler	San Bernardino County Special Districts - Spills	(760)962-1505 jbeyeler@sdd.sbcounty.gov
Jon Rishi	USFS – residences and recreation	(909)382-2940 jrishi@fs.fed.us
Jason Phillippe	San Bernardino County Dept. of Public Health – septic systems	(800)442-2283 Jason.Phillippe@dph.sbcounty.gov
Arlene Chun	San Bernardino County Dept. Public Works – Storm Water Program Manager	arlene.chun@dpw.sbcounty.gov (909) 387-8109

APPENDIX B
WATER QUALITY DATA


Precipitation at USGS rain gauge at Middle Fork, Lytle Creek, 2013-2017
Precipitation, inches
8
7
6
5
4
3
2
1
0
1/1/2013
3/1/2013
5/1/2013
7/1/2013
9/1/2013
11/1/2013
1/1/2014
3/1/2014
5/1/2014
7/1/2014
9/1/2014
11/1/2014
1/1/2015
3/1/2015
5/1/2015
7/1/2015
9/1/2015
11/1/2015
1/1/2016
3/1/2016
5/1/2016
7/1/2016
9/1/2016
11/1/2016
1/1/2017
3/1/2017
5/1/2017
7/1/2017
9/1/2017
11/1/2017

OLIVER P. ROEMER WATER FILTRATION FACILITY
BLEND RATIO

2013 Lytle Creek to SWP Blend Ratio	
Jan	100% LC
Feb	Cannot locate data
Mar	100% LC
Apr	100% LC
May	67% LC/33% SWP
Jun	75% LC/25% SWP
Jul	50% LC/50% SWP
Aug	75% LC/25% SWP
Sep	70% LC/30% SWP
Oct	80% LC/20% SWP
Nov	100% LC
Dec	100% LC

2014 Lytle Creek to SWP Blend Ratio	
Jan	100% LC
Feb	100% LC
Mar	100% LC
Apr	100% LC
May	100% LC
Jun	50% LC/50% SWP
Jul	50% LC/50% SWP
Aug	50% LC/50% SWP
Sep	50% LC/50% SWP
Oct	50% LC/50% SWP
Nov	50% LC/50% SWP
Dec	100% LC

2015 Lytle Creek to SWP Blend Ratio	
Jan	100% LC
Feb	100% LC
Mar	100% LC
Apr	100% LC
May	100% LC
Jun	50% LC/50% SWP
Jul	50% LC/50% SWP
Aug	50% LC/50% SWP
Sep	25% LC/75% SWP
Oct	50% LC/50% SWP
Nov	50% LC/50% SWP
Dec	50% LC/50% SWP

2016 Lytle Creek to SWP Blend Ratio	
Jan	71% LC/29% SWP
Feb	65% LC/35% SWP
Mar	60% LC/40% SWP
Apr	59% LC/41% SWP
May	51% LC/49% SWP
Jun	36% LC/64% SWP
Jul	29% LC/71% SWP
Aug	35% LC/65% SWP
Sep	26% LC/74% SWP
Oct	50% LC/50% SWP
Nov	58% LC/42% SWP
Dec	45% LC/55% SWP

2017 Lytle Creek to SWP Blend Ratio	
Jan	100% LC
Feb	100% LC
Mar	100% LC
Apr	100% LC
May	75% LC/25% SWP
Jun	70% LC/30% SWP
Jul	65% LC/35% SWP
Aug	55% LC/45% SWP
Sep	55% LC/45% SWP
Oct	100% SWP
Nov	100% SWP
Dec	100% LC

Report Name: Water System Data Report

Facility:	Lytle and State; Lytle Creek
Sampling Point:	Lytle Creek Influent (7-1-SR, 16EED)

1,1,1 -Trichloroethane

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.13	ug/L

1,1,2,2-Tetrachloroethane

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.13	ug/L

1,1,2-Trichloro-1,2,2-trifluroethane

08/13/2013 11:30	< 10	ug/L
08/01/2017 07:00	< 0.18	ug/L

1,1,2-Trichloroethane

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.10	ug/L

1,1-Dichloroethane

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.11	ug/L

1,1-Dichloroethylene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.16	ug/L

1,2,3-Trichloropropane

07/13/2016 12:12	< 0.0050	ug/L

1,2,4-Trichlorobenzene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.10	ug/L

1,2-Dibromo-3-chloropropane / DBCP

08/13/2013 11:30	< 0.010	ug/L
08/01/2017 07:00	< 0.0040	ug/L

1,2-Dichlorobenzene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.10	ug/L

1,2-Dichloroethane

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.12	ug/L

1,2-Dichloropropane

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.15	ug/L

1,3-Dichloropropene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	ND	ug/L

1,4-Dichlorobenzene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.10	ug/L

2,3,7,8-Tetrachlorodibenzo-p-dioxin / TCDD

08/13/2013 11:30	< 0.0000050	ug/L

2,4,5-TP / Silvex

08/13/2013 11:30	< 1.0	ug/L

2,4-Dichlorophenoxyacetic acid / 2,4-D

08/13/2013 11:30	< 10	ug/L

Aggressiveness Index

08/13/2013 11:30	12.4	

Alachlor

08/13/2013 11:30	< 1.0	ug/L

Alkalinity (total, as CaCO3)

01/09/2013 15:18	160	mg/L	81	
02/12/2013 11:05	170	mg/L	180	
03/12/2013 12:47	160	mg/L	154	
04/02/2013 14:04	160	mg/L	160	
05/08/2013 13:15	130	mg/L		
06/04/2013 11:45	160	mg/L		
07/09/2013 10:40	150	mg/L		
08/13/2013 11:30	160	mg/L		
08/20/2013 11:15	160	mg/L		
09/05/2013 11:00	150	mg/L		
10/30/2013 10:25	150	mg/L		
11/20/2013 11:30	170	mg/L		
12/18/2013 13:55	160	mg/L		
01/15/2014 11:15	170	mg/L		
02/12/2014 11:50	170	mg/L		
03/20/2014 10:20	170	mg/L		
04/23/2014 12:00	170	mg/L		
05/21/2014 12:25	160	mg/L		
06/11/2014 09:15	160	mg/L		
07/16/2014 11:50	81	mg/L		
08/27/2014 13:10	86	mg/L		
09/17/2014 13:15	90	mg/L		
10/15/2014 14:00	160	mg/L		
11/12/2014 11:25	170	mg/L		
12/10/2014 09:45	180	mg/L		
01/14/2015 10:20	160	mg/L		
02/03/2015 11:55	140	mg/L		
03/03/2015 12:40	160	mg/L		
04/01/2015 10:00	160	mg/L		
05/05/2015 10:30	160	mg/L		
06/03/2015 10:00	87	mg/L		
07/09/2015 11:40	160	mg/L		
08/11/2015 08:45	160	mg/L		
08/11/2015 09:00	160	mg/L		
09/09/2015 08:30	160	mg/L		
10/13/2015 09:50	150	mg/L		
11/03/2015 10:40	160	mg/L		
12/01/2015 11:50	130	mg/L		
01/05/2016 10:15	120	mg/L		
02/02/2016 10:33	160	mg/L		
03/01/2016 10:52	170	mg/L		
04/05/2016 08:28	160	mg/L		
05/03/2016 13:10	170	mg/L		
06/02/2016 09:35	160	mg/L		
07/06/2016 10:31	160	mg/L		
08/02/2016 11:31	160	mg/L		
08/02/2016 11:45	150	mg/L		
09/06/2016 09:25	170	mg/L		
10/04/2016 11:05	180	mg/L		
11/01/2016 08:43	170	mg/L		
12/06/2016 14:16	180	mg/L		
01/03/2017 09:55	160	mg/L		
02/01/2017 11:55	160	mg/L		
03/01/2017 12:46	140	mg/L		
04/04/2017 09:46	150	mg/L		
05/02/2017 11:20	150	mg/L		
06/06/2017 11:55	160	mg/L		
07/03/2017 06:24	160	mg/L		
08/01/2017 07:00	160	mg/L		
08/01/2017 09:05	170	mg/L		
09/06/2017 07:35	150	mg/L		

Aluminum (total)

08/13/2013 11:30	**0**	mg/L	0.0245	< 0.05
08/11/2015 09:00	0.065	mg/L	0.0165	0.065
08/02/2016 11:45	**0**	mg/L		< 0.014
08/01/2017 07:00	0.033	mg/L		0.033

Anionic Surfactants (MBAS)

08/13/2013 11:30	< 0.10	mg/L
08/11/2015 09:00	< 0.047	mg/L
08/02/2016 11:45	< 0.047	mg/L
08/01/2017 07:00	< 0.047	mg/L

Antimony (total)

08/13/2013 11:30	< 0.0060	mg/L

08/11/2015 09:00	< 0.0029	mg/L		
08/02/2016 11:45	< 0.0029	mg/L		
08/01/2017 07:00	< 0.0029	mg/L		

Arsenic (total)

08/13/2013 11:30	2	ug/L	1.875	
08/11/2015 09:00	3.7	ug/L	1.9	
08/02/2016 11:45	**0**	ug/L		< 0.68
08/01/2017 07:00	1.8	ug/L		

Asbestos

08/13/2013 11:30	< 0.20	MFL		

Atrazine

08/13/2013 11:30	< 0.50	ug/L		

Barium (total)

08/13/2013 11:30	< 0.1	mg/L		
08/11/2015 09:00	< 0.012	mg/L		
08/02/2016 11:45	< 0.012	mg/L		
08/01/2017 07:00	0.023	mg/L		

Bentazon

08/13/2013 11:30	< 2.0	ug/L		

Benzene

08/13/2013 11:30	< 0.50	ug/L		
08/01/2017 07:00	< 0.16	ug/L		

Benzo(a)pyrene

08/13/2013 11:30	< 0.10	ug/L		

Beryllium (total)

08/13/2013 11:30	< 0.0010	mg/L		
08/11/2015 09:00	< 0.000090	mg/L		
08/02/2016 11:45	< 0.000090	mg/L		
08/01/2017 07:00	< 0.000090	mg/L		

Bicarbonate (as HCO3)

08/13/2013 11:30	190	mg/L		
08/11/2015 09:00	200	mg/L		
08/02/2016 11:45	180	mg/L		
08/01/2017 07:00	200	mg/L		

Boron (total)

08/13/2013 11:30	< 0.1	mg/L		
08/11/2015 09:00	< 0.032	mg/L		
08/02/2016 11:45	< 0.032	mg/L		
08/01/2017 07:00	0.033	mg/L		

Bromodichloromethane

08/13/2013 11:30	< 1.0	ug/L		
08/01/2017 07:00	< 0.13	ug/L		

Bromoform

08/13/2013 11:30	< 1.0	ug/L		
08/01/2017 07:00	< 0.15	ug/L		

Cadmium (total)

08/13/2013 11:30	< 0.0010	mg/L		
08/11/2015 09:00	< 0.00013	mg/L		
08/02/2016 11:45	< 0.00013	mg/L		
08/01/2017 07:00	0.0002	mg/L		

Calcium (total)

08/13/2013 11:30	51	mg/L		
08/11/2015 09:00	53	mg/L		
08/02/2016 11:45	49	mg/L		
08/01/2017 07:00	51	mg/L		

Carbofuran

08/13/2013 11:30	< 5.0	ug/L		

Carbon tetrachloride

08/13/2013 11:30	< 0.50	ug/L		
08/01/2017 07:00	< 0.12	ug/L		

Carbonate (as CO3)

08/13/2013 11:30	< 5.0	mg/L
08/11/2015 09:00	ND	mg/L
08/02/2016 11:45	ND	mg/L
08/01/2017 07:00	ND	mg/L

Chloride

08/13/2013 11:30	2.3	mg/L
08/11/2015 09:00	2.5	mg/L
08/02/2016 11:45	2.9	mg/L
08/01/2017 07:00	2.4	mg/L

Chlorine (free)

*** 01/15/2013 10:48**	**0**	**mg/L**
*** 01/23/2013 13:40**	**0**	**mg/L**
*** 03/12/2013 11:32**	**0**	**mg/L**
*** 03/12/2013 12:47**	**0**	**mg/L**
*** 05/08/2013 13:15**	**0**	**mg/L**
*** 06/04/2013 11:45**	**0**	**mg/L**
*** 10/30/2013 10:25**	**0**	**mg/L**
*** 01/15/2014 11:15**	**0**	**mg/L**
*** 02/12/2014 11:50**	**0**	**mg/L**
*** 07/30/2014 10:10**	**0**	**mg/L**
*** 08/21/2014 11:00**	**0**	**mg/L**
*** 09/10/2014 09:00**	**0**	**mg/L**
*** 10/01/2014 11:25**	**0**	**mg/L**
*** 10/15/2014 14:05**	**0**	**mg/L**
*** 10/22/2014 09:50**	**0**	**mg/L**
*** 11/12/2014 11:04**	**0**	**mg/L**
*** 11/12/2014 11:25**	**0**	**mg/L**
*** 11/25/2014 11:30**	**0**	**mg/L**
*** 12/02/2014 10:50**	**0**	**mg/L**
*** 03/03/2015 12:40**	**0**	**mg/L**
*** 05/13/2015 09:42**	**0**	**mg/L**
*** 05/19/2015 14:05**	**0**	**mg/L**
*** 06/23/2015 12:00**	**0**	**mg/L**
*** 07/01/2015 13:30**	**0**	**mg/L**
*** 07/21/2015 11:30**	**0**	**mg/L**
*** 07/28/2015 14:40**	**0**	**mg/L**
*** 08/04/2015 10:30**	**0**	**mg/L**
*** 10/13/2015 09:51**	**0**	**mg/L**
*** 11/03/2015 10:40**	**0**	**mg/L**
*** 01/05/2016 10:15**	**0**	**mg/L**
*** 03/23/2016 14:36**	**0**	**mg/L**
*** 06/14/2016 09:30**	**0**	**mg/L**
*** 08/02/2016 11:31**	**0**	**mg/L**
*** 08/02/2016 11:45**	**0**	**mg/L**
*** 10/04/2016 11:05**	**0**	**mg/L**
*** 12/06/2016 14:16**	**0**	**mg/L**
*** 02/01/2017 11:55**	**0**	**mg/L**
*** 03/01/2017 12:46**	**0**	**mg/L**
*** 04/04/2017 09:46**	**0**	**mg/L**
*** 06/06/2017 11:55**	**0**	**mg/L**

Chlorobenzene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.13	ug/L

Chloroform

08/13/2013 11:30	< 1.0	ug/L
08/01/2017 07:00	< 0.12	ug/L

Chromium (total)

08/13/2013 11:30	< 0.01	mg/L
08/11/2015 09:00	< 0.0020	mg/L
08/02/2016 11:45	< 0.0020	mg/L
08/01/2017 07:00	0.0022	mg/L

Chromium VI (total)

09/17/2014 13:15	< 1.0	ug/L
12/02/2014 10:50	< 1.0	ug/L
03/03/2015 12:40	< 1.0	ug/L
03/23/2016 14:36	< 1.0	ug/L
08/02/2016 11:45	< 0.14	ug/L
08/01/2017 07:00	0.17	ug/L

cis-1,2-Dichloroethylene

08/13/2013 11:30	< 0.50	ug/L		
08/01/2017 07:00	< 0.12	ug/L		
cis-1,3-Dichloropropene				
08/13/2013 11:30	< 0.50	ug/L		
08/01/2017 07:00	< 0.13	ug/L		
Color (apparent)				
08/13/2013 11:30	< 3.0	CU		
08/11/2015 09:00	ND	CU		
08/02/2016 11:45	ND	CU		
Conductivity				
08/13/2013 11:30	350	umho/cm	350	
08/11/2015 09:00	350	umho/cm	350	
08/02/2016 11:45	340	umho/cm		
08/01/2017 07:00	360	umho/cm		
Copper (total)				
08/13/2013 11:30	< 50	ug/L		
08/11/2015 09:00	< 6.5	ug/L		
08/02/2016 11:45	< 6.5	ug/L		
08/01/2017 07:00	< 6.5	ug/L		
Cyanide (total)				
08/13/2013 11:30	< 0.1	mg/L		
08/11/2015 09:00	< 0.027	mg/L		
08/02/2016 11:45	< 0.027	mg/L		
08/01/2017 07:00	< 0.027	mg/L		
Dalapon				
08/13/2013 11:30	< 10	ug/L		
Di(2-ethylhexyl)adipate				
08/13/2013 11:30	< 5.0	ug/L		
Di(2-ethylhexyl)phthalate / DEHP				
08/13/2013 11:30	< 3.0	ug/L		
Dibromochloromethane				
08/13/2013 11:30	< 1.0	ug/L		
08/01/2017 07:00	< 0.10	ug/L		
Dichloromethane				
08/13/2013 11:30	< 0.50	ug/L		
08/01/2017 07:00	< 0.13	ug/L		
Dinoseb				
08/13/2013 11:30	< 2.0	ug/L		
Diquat				
08/13/2013 11:30	< 4.0	ug/L		
Dissolved Organic Carbon				
01/09/2013 15:18	0.5	mg/L	0	0.5
02/12/2013 11:05	0.51	mg/L	2.4	0.51
03/12/2013 12:47	**0**	mg/L	0.53	< 0.30
04/02/2013 14:04	**0**	mg/L	0.42	< 0.30
05/08/2013 13:15	0.94	mg/L		0.94
06/04/2013 11:45	0.41	mg/L		0.41
07/09/2013 10:40	**0**	mg/L		< 0.30
08/20/2013 11:15	**0**	mg/L		< 0.30
09/05/2013 11:00	0.43	mg/L		0.43
10/30/2013 10:25	**0**	mg/L		< 0.30
11/20/2013 11:30	**0**	mg/L		< 0.30
12/18/2013 13:55	**0**	mg/L		< 0.30
01/15/2014 11:15	0.32	mg/L		0.32
02/12/2014 11:50	0.32	mg/L		0.32
03/20/2014 10:20	**0**	mg/L		< 0.30
04/23/2014 12:00	0.34	mg/L		0.34
05/21/2014 12:25	**0**	mg/L		< 0.30
06/11/2014 09:15	0.36	mg/L		0.36
07/16/2014 11:50	1.5	mg/L		1.5
08/27/2014 13:10	2.4	mg/L		2.4
09/17/2014 13:15	2.4	mg/L		2.4
10/15/2014 14:00	0.46	mg/L		0.46
11/12/2014 11:25	0.64	mg/L		0.64

12/10/2014 09:45	0.43	mg/L	0.43
01/14/2015 10:20	0.38	mg/L	0.38
02/03/2015 11:55	0.48	mg/L	0.48
03/03/2015 12:40	0.52	mg/L	0.52
04/01/2015 10:00	0.33	mg/L	0.33
05/05/2015 10:30	0.41	mg/L	0.41
06/03/2015 10:00	2.2	mg/L	2.2
07/09/2015 11:40	**0**	mg/L	< 0.13
08/11/2015 08:45	0.4	mg/L	0.4
09/09/2015 08:30	0.33	mg/L	0.33
10/13/2015 09:50	0.41	mg/L	0.41
11/03/2015 10:40	0.84	mg/L	0.84
12/01/2015 11:50	1.3	mg/L	1.3
01/05/2016 10:15	0.79	mg/L	0.79
02/02/2016 10:33	0.54	mg/L	0.54
03/01/2016 10:52	0.39	mg/L	0.39
04/05/2016 08:28	0.36	mg/L	0.36
05/03/2016 13:10	0.66	mg/L	0.66
06/02/2016 09:35	0.3	mg/L	0.3
07/06/2016 10:31	0.42	mg/L	0.42
08/02/2016 11:31	0.61	mg/L	0.61
09/06/2016 09:25	0.52	mg/L	0.52
10/04/2016 11:05	**0**	mg/L	< 0.13
11/01/2016 08:43	**0**	mg/L	< 0.13
12/06/2016 14:16	1.3	mg/L	1.3
01/03/2017 09:55	0.3	mg/L	0.3
02/01/2017 11:55	0.72	mg/L	0.72
03/01/2017 12:46	0.64	mg/L	0.64
04/04/2017 09:46	0.65	mg/L	0.65
05/02/2017 11:20	0.44	mg/L	0.44
06/06/2017 11:55	0.43	mg/L	0.43
07/03/2017 06:24	0.42	mg/L	0.42
08/01/2017 09:05	0.83	mg/L	0.83
09/06/2017 07:35	0.43	mg/L	0.43

Endothall

08/13/2013 11:30	< 45	ug/L

Endrin

08/13/2013 11:30	< 0.10	ug/L

Escherichia coli / E. coli (MPN / PA)

*	**03/19/2013 13:45**	**3**	**MPN/100ml**
	03/26/2013 11:45	< 1.0	MPN/100ml
*	**04/02/2013 14:04**	**1**	**MPN/100ml**
*	**04/09/2013 11:30**	**1**	**MPN/100ml**
*	**04/16/2013 13:35**	**8.6**	**MPN/100ml**
	04/23/2013 11:45	< 1.0	MPN/100ml
*	**04/30/2013 15:00**	**11**	**MPN/100ml**
*	**05/08/2013 12:34**	**3**	**MPN/100ml**
*	**05/14/2013 12:00**	**1**	**MPN/100ml**
*	**05/21/2013 11:50**	**5.2**	**MPN/100ml**
*	**05/29/2013 08:45**	**6.3**	**MPN/100ml**
	06/04/2013 11:22	< 1.0	MPN/100ml
*	**06/17/2013 16:05**	**5**	**MPN/100ml**
*	**06/25/2013 11:30**	**6.3**	**MPN/100ml**
*	**07/02/2013 10:50**	**8.8**	**MPN/100ml**
*	**07/09/2013 12:00**	**18**	**MPN/100ml**
*	**07/17/2013 14:47**	**21**	**MPN/100ml**
*	**07/23/2013 10:34**	**9.8**	**MPN/100ml**
*	**07/30/2013 11:15**	**3.1**	**MPN/100ml**
*	**08/08/2013 13:10**	**20**	**MPN/100ml**
*	**08/14/2013 09:45**	**34**	**MPN/100ml**
*	**08/20/2013 11:30**	**23**	**MPN/100ml**
*	**08/21/2013 08:20**	**10**	**MPN/100ml**
*	**08/28/2013 11:12**	**41**	**MPN/100ml**
*	**09/04/2013 10:40**	**6.3**	**MPN/100ml**
*	**09/11/2013 14:10**	**1**	**MPN/100ml**
	09/18/2013 10:15	< 10	MPN/100ml
*	**09/25/2013 12:40**	**10**	**MPN/100ml**
	10/02/2013 11:36	< 10	MPN/100ml
	10/09/2013 10:26	< 10	MPN/100ml
*	**10/23/2013 11:20**	**1**	**MPN/100ml**
	10/24/2013 09:30	< 1.0	MPN/100ml
*	**10/30/2013 10:20**	**4.2**	**MPN/100ml**
*	**11/06/2013 14:05**	**4.1**	**MPN/100ml**
*	**11/13/2013 11:00**	**5.2**	**MPN/100ml**

* **11/20/2013 11:35**	**1**	**MPN/100ml**
* **11/27/2013 11:55**	**2**	**MPN/100ml**
* **12/04/2013 14:50**	**3**	**MPN/100ml**
* **12/11/2013 12:15**	**3.1**	**MPN/100ml**
* **12/18/2013 14:05**	**1**	**MPN/100ml**
* **12/23/2013 14:35**	**1**	**MPN/100ml**
12/30/2013 15:30	< 1.0	MPN/100ml
* **01/08/2014 13:40**	**1**	**MPN/100ml**
* **01/15/2014 10:45**	**2**	**MPN/100ml**
* **01/22/2014 09:18**	**2**	**MPN/100ml**
01/29/2014 12:00	< 1.0	MPN/100ml
02/05/2014 11:30	< 1.0	MPN/100ml
* **02/12/2014 11:20**	**1**	**MPN/100ml**
02/19/2014 11:45	< 1.0	MPN/100ml
02/26/2014 11:45	< 1.0	MPN/100ml
03/05/2014 12:29	< 1.0	MPN/100ml
03/12/2014 11:30	< 1.0	MPN/100ml
* **03/20/2014 10:05**	**7.4**	**MPN/100ml**
* **03/27/2014 11:15**	**3.1**	**MPN/100ml**
* **04/02/2014 16:08**	**18**	**MPN/100ml**
* **04/09/2014 10:20**	**11**	**MPN/100ml**
* **04/16/2014 09:25**	**9.8**	**MPN/100ml**
* **04/23/2014 11:55**	**3.1**	**MPN/100ml**
* **04/30/2014 11:50**	**7.5**	**MPN/100ml**
* **05/07/2014 09:35**	**7.2**	**MPN/100ml**
* **05/14/2014 11:30**	**4.1**	**MPN/100ml**
* **05/21/2014 12:25**	**7.5**	**MPN/100ml**
* **05/28/2014 09:30**	**3**	**MPN/100ml**

Ethylbenzene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.12	ug/L

Ethylene dibromide / EDB

08/13/2013 11:30	< 0.020	ug/L
08/01/2017 07:00	< 0.0040	ug/L

Fecal Coliforms (MPN / PA)

01/02/2013 15:15	6	MPN/100ml
01/09/2013 15:20	17	MPN/100ml
01/15/2013 10:48	< 2	MPN/100ml
01/23/2013 13:40	< 2	MPN/100ml
01/28/2013 12:10	< 2	MPN/100ml
02/07/2013 09:10	4	MPN/100ml
02/12/2013 10:56	8	MPN/100ml
02/19/2013 12:00	2	MPN/100ml
02/26/2013 12:45	< 2	MPN/100ml
03/05/2013 11:30	2	MPN/100ml
03/12/2013 11:32	< 2	MPN/100ml
06/04/2014 11:30	22	MPN/100ml
06/11/2014 09:16	< 2	MPN/100ml
06/18/2014 10:25	< 2	MPN/100ml
06/25/2014 13:20	< 2	MPN/100ml
07/02/2014 14:00	30	MPN/100ml
07/09/2014 14:00	4	MPN/100ml
07/16/2014 11:10	< 2	MPN/100ml
07/23/2014 10:10	4	MPN/100ml
07/30/2014 10:10	< 2	MPN/100ml
08/06/2014 10:40	70	MPN/100ml
08/14/2014 15:40	500	MPN/100ml
08/21/2014 11:00	30	MPN/100ml
08/27/2014 13:00	< 2	MPN/100ml
09/03/2014 11:04	23	MPN/100ml
09/10/2014 09:00	50	MPN/100ml
09/17/2014 13:10	< 2	MPN/100ml
09/24/2014 13:50	30	MPN/100ml
10/01/2014 11:25	8	MPN/100ml
10/08/2014 09:50	13	MPN/100ml
10/15/2014 14:05	2	MPN/100ml
10/22/2014 09:50	< 2	MPN/100ml
10/29/2014 10:30	2	MPN/100ml
11/04/2014 13:10	50	MPN/100ml
11/12/2014 11:04	4	MPN/100ml
11/18/2014 11:30	8	MPN/100ml
11/25/2014 11:30	< 2	MPN/100ml
12/01/2014 14:00	130	MPN/100ml
12/10/2014 09:55	30	MPN/100ml

12/16/2014 10:20	2	MPN/100ml
12/23/2014 10:50	4	MPN/100ml
12/30/2014 10:00	17	MPN/100ml
01/06/2015 11:20	< 2	MPN/100ml
01/14/2015 10:15	13	MPN/100ml
01/21/2015 09:40	4	MPN/100ml
01/27/2015 11:10	23	MPN/100ml
02/03/2015 11:30	4	MPN/100ml
02/10/2015 11:00	13	MPN/100ml
02/18/2015 09:30	< 2	MPN/100ml
02/24/2015 10:30	110	MPN/100ml
03/03/2015 11:40	17	MPN/100ml
03/10/2015 10:10	4	MPN/100ml
03/18/2015 10:00	2	MPN/100ml
03/24/2015 12:00	8	MPN/100ml
04/01/2015 10:40	170	MPN/100ml
04/08/2015 10:22	ND	MPN/100ml
04/14/2015 11:25	8	MPN/100ml
04/21/2015 11:25	23	MPN/100ml
04/28/2015 08:45	ND	MPN/100ml
05/05/2015 11:00	2	MPN/100ml
05/13/2015 09:42	11	MPN/100ml
05/19/2015 14:05	2	MPN/100ml
05/28/2015 11:15	ND	MPN/100ml
06/03/2015 09:30	2	MPN/100ml
06/09/2015 09:00	8	MPN/100ml
06/17/2015 13:30	14	MPN/100ml
06/23/2015 12:00	13	MPN/100ml
07/01/2015 13:30	13	MPN/100ml
07/09/2015 11:10	22	MPN/100ml
07/15/2015 11:55	13	MPN/100ml
07/21/2015 11:30	2	MPN/100ml
07/28/2015 14:40	280	MPN/100ml
08/04/2015 10:30	7	MPN/100ml
08/11/2015 10:40	30	MPN/100ml
08/19/2015 10:30	50	MPN/100ml
08/26/2015 10:35	2	MPN/100ml
09/02/2015 09:13	50	MPN/100ml
09/09/2015 08:36	50	MPN/100ml
09/16/2015 10:15	80	MPN/100ml
09/23/2015 12:30	140	MPN/100ml
09/29/2015 10:30	80	MPN/100ml
10/06/2015 10:30	5	MPN/100ml
10/13/2015 09:51	79	MPN/100ml
10/21/2015 10:30	33	MPN/100ml
10/27/2015 09:47	17	MPN/100ml
11/03/2015 10:00	23	MPN/100ml
11/10/2015 10:00	23	MPN/100ml
11/17/2015 11:50	46	MPN/100ml
11/24/2015 10:45	23	MPN/100ml
12/01/2015 11:40	2	MPN/100ml
12/08/2015 13:11	ND	MPN/100ml
12/15/2015 10:00	11	MPN/100ml
12/22/2015 10:20	49	MPN/100ml
12/29/2015 10:10	33	MPN/100ml
01/05/2016 10:25	2	MPN/100ml
01/12/2016 12:15	23	MPN/100ml
01/19/2016 11:00	7.8	MPN/100ml
01/25/2016 14:05	33	MPN/100ml
02/02/2016 11:25	4.5	MPN/100ml
02/09/2016 10:10	< 1.8	MPN/100ml
02/16/2016 15:25	< 1.8	MPN/100ml
02/23/2016 09:58	13	MPN/100ml
03/01/2016 10:43	17	MPN/100ml
03/08/2016 11:45	ND	MPN/100ml
03/15/2016 09:40	2	MPN/100ml
03/23/2016 14:35	27	MPN/100ml
03/30/2016 15:22	49	MPN/100ml
04/05/2016 09:30	23	MPN/100ml
04/12/2016 11:30	11	MPN/100ml
04/19/2016 10:00	49	MPN/100ml
04/27/2016 13:10	23	MPN/100ml
05/03/2016 13:00	2	MPN/100ml
05/10/2016 09:30	13	MPN/100ml
05/17/2016 11:30	13	MPN/100ml
05/24/2016 09:30	7.8	MPN/100ml
06/02/2016 08:30	2	MPN/100ml

06/07/2016 09:30	4.5	MPN/100ml
06/14/2016 08:00	4	MPN/100ml
06/21/2016 09:45	7.8	MPN/100ml
06/28/2016 08:30	79	MPN/100ml
07/06/2016 09:50	2	MPN/100ml
07/13/2016 12:11	2	MPN/100ml
07/19/2016 10:15	ND	MPN/100ml
07/26/2016 09:00	4.5	MPN/100ml
08/02/2016 11:30	2	MPN/100ml
08/09/2016 14:25	2	MPN/100ml
08/16/2016 10:10	2	MPN/100ml
08/23/2016 10:50	ND	MPN/100ml
08/30/2016 09:40	ND	MPN/100ml
09/06/2016 10:00	ND	MPN/100ml
09/14/2016 08:20	4.5	MPN/100ml
09/20/2016 10:30	ND	MPN/100ml
09/27/2016 11:30	2	MPN/100ml
10/04/2016 11:15	2	MPN/100ml
10/11/2016 09:25	ND	MPN/100ml
10/18/2016 10:15	130	MPN/100ml
10/25/2016 11:15	79	MPN/100ml
11/01/2016 08:08	17	MPN/100ml
11/09/2016 13:30	2	MPN/100ml
11/15/2016 09:45	13	MPN/100ml
11/22/2016 10:00	70	MPN/100ml
11/29/2016 10:00	4.5	MPN/100ml
12/06/2016 14:15	23	MPN/100ml
12/13/2016 08:00	ND	MPN/100ml
12/20/2016 09:00	1.8	MPN/100ml
12/28/2016 12:50	ND	MPN/100ml
01/03/2017 10:00	4.5	MPN/100ml
01/09/2017 09:30	ND	MPN/100ml
01/17/2017 11:45	ND	MPN/100ml
01/24/2017 09:15	2	MPN/100ml
02/01/2017 11:56	4.5	MPN/100ml
02/07/2017 15:15	33	MPN/100ml
02/15/2017 09:30	ND	MPN/100ml
02/21/2017 09:30	ND	MPN/100ml
03/01/2017 12:45	ND	MPN/100ml
03/07/2017 09:00	2	MPN/100ml
03/14/2017 09:00	7.8	MPN/100ml
03/21/2017 09:20	23	MPN/100ml
03/27/2017 12:30	1.8	MPN/100ml
04/04/2017 09:45	2	MPN/100ml
04/12/2017 08:00	ND	MPN/100ml
04/18/2017 09:35	23	MPN/100ml
04/24/2017 12:10	13	MPN/100ml
05/02/2017 10:00	7.8	MPN/100ml
05/10/2017 08:25	2	MPN/100ml
05/16/2017 08:25	33	MPN/100ml
05/23/2017 08:30	23	MPN/100ml
05/30/2017 09:25	17	MPN/100ml
06/06/2017 10:42	13	MPN/100ml
06/13/2017 09:50	4	MPN/100ml
06/20/2017 09:00	130	MPN/100ml
06/27/2017 09:00	33	MPN/100ml
07/03/2017 06:35	70	MPN/100ml
07/11/2017 07:20	70	MPN/100ml
07/18/2017 10:05	17	MPN/100ml
07/25/2017 11:00	70	MPN/100ml
08/01/2017 07:00	23	MPN/100ml
08/01/2017 10:10	17	MPN/100ml
08/08/2017 08:30	33	MPN/100ml
08/15/2017 09:30	46	MPN/100ml
08/22/2017 09:50	9.3	MPN/100ml
08/29/2017 09:00	17	MPN/100ml
09/06/2017 07:20	140	MPN/100ml
09/12/2017 07:30	49	MPN/100ml
09/19/2017 10:00	33	MPN/100ml

Fluoride

08/13/2013 11:30	0.39	mg/L
08/11/2015 09:00	0.42	mg/L
08/02/2016 11:45	0.55	mg/L
08/01/2017 07:00	0.41	mg/L

Glyphosate

08/13/2013 11:30	< 25	ug/L	

Gross alpha particle activity

08/13/2013 11:30	5.7	pCi/L	6.233333333
08/02/2016 11:45	13	pCi/L	5.7
11/01/2016 08:43	**0**	pCi/L	

Gross alpha particle activity (error)

08/13/2013 11:30	1.3	pCi/L	1.8
08/02/2016 11:45	2.3	pCi/L	
11/01/2016 08:43	1.8	pCi/L	

Gross alpha particle activity (MDA)

08/13/2013 11:30	0.8	pCi/L	1.333333333
08/02/2016 11:45	1.4	pCi/L	
11/01/2016 08:43	1.8	pCi/L	

Hardness (total, as CaCO3)

08/13/2013 11:30	160	mg/L	162.5
08/11/2015 09:00	170	mg/L	160
08/02/2016 11:45	160	mg/L	
08/01/2017 07:00	160	mg/L	

Heptachlor

08/13/2013 11:30	< 0.010	ug/L	

Heptachlor epoxide

08/13/2013 11:30	< 0.010	ug/L	

Hexachlorobenzene

08/13/2013 11:30	< 0.50	ug/L	

Hexachlorocyclopentadiene / HEX

08/13/2013 11:30	< 1.0	ug/L	

Hydroxide (as OH)

08/13/2013 11:30	< 5.0	mg/L	
08/11/2015 09:00	ND	mg/L	
08/02/2016 11:45	ND	mg/L	
08/01/2017 07:00	ND	mg/L	

Iron (total)

08/13/2013 11:30	< 0.1	mg/L	
08/11/2015 09:00	< 0.014	mg/L	
08/02/2016 11:45	< 0.014	mg/L	
08/01/2017 07:00	0.037	mg/L	

Langelier Index

08/13/2013 11:30	0.6		

Langelier Index (@ 60 C)

08/13/2013 11:30	1.21		

Lead (total)

08/13/2013 11:30	< 5.0	ug/L	
08/11/2015 09:00	< 0.80	ug/L	
08/02/2016 11:45	< 0.80	ug/L	
08/01/2017 07:00	< 0.80	ug/L	

Lindane

08/13/2013 11:30	< 0.20	ug/L	

Magnesium (total)

08/13/2013 11:30	8	mg/L	
08/11/2015 09:00	8.4	mg/L	
08/02/2016 11:45	8.8	mg/L	
08/01/2017 07:00	7.8	mg/L	

Manganese (total)

08/13/2013 11:30	< 0.02	mg/L	
08/11/2015 09:00	< 0.00080	mg/L	
08/02/2016 11:45	< 0.00080	mg/L	
08/01/2017 07:00	0.0025	mg/L	

Mercury (total)

08/13/2013 11:30	< 0.0010	mg/L	
08/11/2015 09:00	< 0.00055	mg/L	

08/02/2016 11:45	< 0.00055	mg/L	
08/01/2017 07:00	< 0.00055	mg/L	

Methoxychlor

08/13/2013 11:30	< 10	ug/L	

Methyl tert-butyl ether / MTBE

08/13/2013 11:30	< 3.0	ug/L	
08/01/2017 07:00	< 0.090	ug/L	

Microcystin-LR

07/13/2016 12:00	< 0.20	ug/L	
08/03/2016 09:30	< 0.20	ug/L	
09/06/2016 09:01	< 0.20	ug/L	

Molinate

08/13/2013 11:30	< 2.0	ug/L	

m-Xylene

08/13/2013 11:30	< 1.0	ug/L	
08/01/2017 07:00	< 0.33	ug/L	

Nickel (total)

08/13/2013 11:30	< 0.01	mg/L	
08/11/2015 09:00	< 0.0012	mg/L	
08/02/2016 11:45	< 0.0012	mg/L	
08/01/2017 07:00	< 0.0012	mg/L	

Nitrate (as N)

08/02/2016 11:45	0.61	mg/L	0.62
08/01/2017 07:00	0.63	mg/L	0.62

Nitrate (as NO3)

08/13/2013 11:30	2	mg/L	2.133333333
03/03/2015 12:40	2.3	mg/L	2.1
08/11/2015 09:00	2.1	mg/L	

Nitrate + Nitrite (as N)

08/13/2013 11:30	0.44	mg/L	
08/11/2015 09:00	0.48	mg/L	
08/02/2016 11:45	0.61	mg/L	
08/01/2017 07:00	0.63	mg/L	

Nitrite (as N)

08/13/2013 11:30	< 400	ug/L	
08/11/2015 09:00	< 170	ug/L	
08/02/2016 11:45	< 170	ug/L	
08/01/2017 07:00	< 170	ug/L	

Odor

08/13/2013 11:30	1	TON	
08/11/2015 09:00	1	TON	
08/02/2016 11:45	1	TON	

Oxamyl

08/13/2013 11:30	< 20	ug/L	

o-Xylene

08/13/2013 11:30	< 0.50	ug/L	
08/01/2017 07:00	< 0.12	ug/L	

Pentachlorophenol / PCP

08/13/2013 11:30	< 0.20	ug/L	

Perchlorate

08/13/2013 11:30	< 4.0	ug/L	
08/11/2015 09:00	< 0.75	ug/L	
08/02/2016 11:45	< 0.75	ug/L	
08/01/2017 07:00	< 0.75	ug/L	

pH

03/12/2013 11:32	7.99		6.44
03/12/2013 12:47	7.99		8.52
04/02/2013 14:04	7.9		7.709375
05/08/2013 13:15	8.07		7.73
06/04/2013 11:45	8.12		
08/13/2013 11:30	8.1		

10/30/2013 10:25	7.63	
02/12/2014 11:50	8.52	
07/30/2014 10:10	7.51	
08/21/2014 11:00	7.75	
09/10/2014 09:00	8.01	
10/01/2014 11:25	6.84	
10/15/2014 14:05	6.44	
10/22/2014 09:50	8.21	
11/12/2014 11:04	7.66	
11/12/2014 11:25	7.87	
11/25/2014 11:30	7.71	
12/02/2014 10:50	7.53	
05/13/2015 09:42	7.33	
05/19/2015 14:05	7.39	
07/28/2015 14:40	7.63	
08/11/2015 09:00	8	
10/13/2015 09:51		
01/05/2016 10:15	7.59	
03/23/2016 14:36	7.79	
08/02/2016 11:31	7.42	
08/02/2016 11:45	8.2	
10/04/2016 11:05	7.22	
12/06/2016 14:16	7.48	
02/01/2017 11:55	7.83	
03/01/2017 12:46	7.41	
06/06/2017 11:55	7.46	
08/01/2017 07:00	8.1	

Picloram

08/13/2013 11:30	< 1.0	ug/L

Polychlorinated Biphenyls / PCBs

08/13/2013 11:30	< 0.50	ug/L

Potassium (total)

08/13/2013 11:30	2.3	mg/L
08/11/2015 09:00	2.7	mg/L
08/02/2016 11:45	2.8	mg/L
08/01/2017 07:00	2.4	mg/L

Selenium (total)

08/13/2013 11:30	< 0.0050	mg/L
08/11/2015 09:00	< 0.00059	mg/L
08/02/2016 11:45	< 0.00059	mg/L
08/01/2017 07:00	< 0.00059	mg/L

Silver (total)

08/13/2013 11:30	< 0.01	mg/L
08/11/2015 09:00	< 0.0026	mg/L
08/02/2016 11:45	< 0.0026	mg/L
08/01/2017 07:00	< 0.0026	mg/L

Simazine

08/13/2013 11:30	< 1.0	ug/L

Sodium (total)

08/13/2013 11:30	7.1	mg/L
08/11/2015 09:00	8.4	mg/L
08/02/2016 11:45	11	mg/L
08/01/2017 07:00	7.7	mg/L

Styrene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.12	ug/L

Sulphate

08/13/2013 11:30	23	mg/L
08/11/2015 09:00	24	mg/L
08/02/2016 11:45	23	mg/L
08/01/2017 07:00	25	mg/L

Temperature

03/12/2013 11:32	58.1	degrees F
03/12/2013 12:47	58.1	degrees F
04/02/2013 14:04	15.5	degrees F
05/08/2013 13:15	64	degrees F
06/04/2013 11:45	65	degrees F

08/13/2013 11:30	68	degrees F
10/30/2013 10:25	60	degrees F
02/12/2014 11:50	60	degrees F
07/30/2014 10:10	73	degrees F
08/21/2014 11:00	70	degrees F
09/10/2014 09:00	73	degrees F
10/01/2014 11:25	65	degrees F
10/15/2014 14:05	71	degrees F
10/22/2014 09:50	67	degrees F
11/12/2014 11:04	62	degrees F
11/12/2014 11:25	63	degrees F
11/25/2014 11:30	59	degrees F
12/02/2014 10:50	58	degrees F
05/13/2015 09:42	60	degrees F
05/19/2015 14:05	67	degrees F
07/28/2015 14:40	71	degrees F
10/13/2015 09:51	0	degrees F
01/05/2016 10:15	68.1	degrees F
03/23/2016 14:36	58.8	degrees F
08/02/2016 11:31	78.2	degrees F
09/06/2016 09:25	66.2	degrees F
10/04/2016 11:05	78.6	degrees F
12/06/2016 14:16	56.1	degrees F
02/01/2017 11:55	77	degrees F
03/01/2017 12:46	69	degrees F
06/06/2017 11:55	73.9	degrees F

Tetrachloroethylene / PCE

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.15	ug/L

Thallium (total)

08/13/2013 11:30	< 0.0010	mg/L
08/11/2015 09:00	< 0.00040	mg/L
08/02/2016 11:45	< 0.00040	mg/L
08/01/2017 07:00	< 0.00040	mg/L

Thiobencarb

08/13/2013 11:30	< 1.0	ug/L

Toluene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.14	ug/L

Total Anions

08/13/2013 11:30	3.7	mEq/L
08/11/2015 09:00	3.8	mEq/L
08/02/2016 11:45	3.6	mEq/L
08/01/2017 07:00	3.9	mEq/L

Total Cations

08/13/2013 11:30	3.6	mEq/L
08/11/2015 09:00	3.8	mEq/L
08/02/2016 11:45	3.7	mEq/L
08/01/2017 07:00	3.6	mEq/L

Total Chlordane

08/13/2013 11:30	< 0.10	ug/L

Total Coliforms (MPN / PA)

01/02/2013 15:15	240	MPN/100ml
01/09/2013 15:20	110	MPN/100ml
01/15/2013 10:48	30	MPN/100ml
01/23/2013 13:40	80	MPN/100ml
01/28/2013 12:10	130	MPN/100ml
02/07/2013 09:10	300	MPN/100ml
02/12/2013 10:56	170	MPN/100ml
02/19/2013 12:00	34	MPN/100ml
02/26/2013 12:45	220	MPN/100ml
03/05/2013 11:30	150	MPN/100ml
03/12/2013 11:32	80	MPN/100ml
03/19/2013 13:45	870	MPN/100ml
03/26/2013 11:45	340	MPN/100ml
04/02/2013 14:04	220	MPN/100ml
04/09/2013 11:30	410	MPN/100ml
04/16/2013 13:35	460	MPN/100ml
04/23/2013 11:45	250	MPN/100ml

	04/30/2013 15:00	490	MPN/100ml
	05/08/2013 12:34	120	MPN/100ml
	05/14/2013 12:00	200	MPN/100ml
	05/21/2013 11:50	650	MPN/100ml
	05/29/2013 08:45	980	MPN/100ml
	06/04/2013 11:22	1	MPN/100ml
	06/17/2013 16:05	140	MPN/100ml
	06/25/2013 11:30	770	MPN/100ml
	07/02/2013 10:50	920	MPN/100ml
	07/09/2013 12:00	980	MPN/100ml
	07/17/2013 14:47	730	MPN/100ml
*	**07/23/2013 10:34**	**1100**	**MPN/100ml**
	07/30/2013 11:15	390	MPN/100ml
	08/08/2013 13:10	860	MPN/100ml
*	**08/14/2013 09:45**	**1600**	**MPN/100ml**
*	**08/20/2013 11:30**	**1600**	**MPN/100ml**
	08/21/2013 08:20	990	MPN/100ml
*	**08/28/2013 11:12**	**1200**	**MPN/100ml**
	09/04/2013 10:40	650	MPN/100ml
	09/11/2013 14:10	340	MPN/100ml
	09/18/2013 10:15	280	MPN/100ml
	09/25/2013 12:40	910	MPN/100ml
	10/02/2013 11:36	230	MPN/100ml
	10/09/2013 10:26	150	MPN/100ml
*	**10/23/2013 11:20**	**2000**	**MPN/100ml**
	10/24/2013 09:30	110	MPN/100ml
	10/30/2013 10:20	870	MPN/100ml
	11/06/2013 14:05	610	MPN/100ml
	11/13/2013 11:00	770	MPN/100ml
	11/20/2013 11:35	460	MPN/100ml
	11/27/2013 11:55	310	MPN/100ml
	12/04/2013 14:50	300	MPN/100ml
	12/11/2013 12:15	460	MPN/100ml
	12/18/2013 14:05	240	MPN/100ml
	12/23/2013 14:35	260	MPN/100ml
	12/30/2013 15:30	210	MPN/100ml
	01/08/2014 13:40	160	MPN/100ml
	01/15/2014 10:45	340	MPN/100ml
	01/22/2014 09:18	240	MPN/100ml
	01/29/2014 12:00	440	MPN/100ml
	02/05/2014 11:30	290	MPN/100ml
	02/12/2014 11:20	390	MPN/100ml
	02/19/2014 11:45	690	MPN/100ml
	02/26/2014 11:45	650	MPN/100ml
	03/05/2014 12:29	410	MPN/100ml
	03/12/2014 11:30	440	MPN/100ml
	03/20/2014 10:05	820	MPN/100ml
	03/27/2014 11:15	520	MPN/100ml
	04/02/2014 16:08	610	MPN/100ml
	04/09/2014 10:20	650	MPN/100ml
	04/16/2014 09:25	770	MPN/100ml
	04/23/2014 11:55	610	MPN/100ml
	04/30/2014 11:50	340	MPN/100ml
	05/07/2014 09:35	730	MPN/100ml
	05/14/2014 11:30	440	MPN/100ml
*	**05/21/2014 12:25**	**2000**	**MPN/100ml**
	05/28/2014 09:30	650	MPN/100ml
	06/04/2014 11:30	80	MPN/100ml
	06/11/2014 09:16	240	MPN/100ml
	06/18/2014 10:25	30	MPN/100ml
	06/25/2014 13:20	8	MPN/100ml
	07/02/2014 14:00	110	MPN/100ml
	07/09/2014 14:00	14	MPN/100ml
	07/16/2014 11:10	8	MPN/100ml
	07/23/2014 10:10	240	MPN/100ml
	07/30/2014 10:10	4	MPN/100ml
	08/06/2014 10:40	900	MPN/100ml
*	**08/14/2014 15:40**	**1600**	**MPN/100ml**
	08/21/2014 11:00	50	MPN/100ml
	08/27/2014 13:00	11	MPN/100ml
	09/03/2014 11:04	130	MPN/100ml
	09/10/2014 09:00	240	MPN/100ml
	09/17/2014 13:10	7	MPN/100ml
	09/24/2014 13:50	300	MPN/100ml
	10/01/2014 11:25	280	MPN/100ml
	10/08/2014 09:50	130	MPN/100ml
	10/15/2014 14:05	17	MPN/100ml

	10/22/2014 09:50	50	MPN/100ml
	10/29/2014 10:30	2	MPN/100ml
*	**11/04/2014 13:10**	**1600**	**MPN/100ml**
	11/12/2014 11:04	50	MPN/100ml
	11/18/2014 11:30	170	MPN/100ml
	11/25/2014 11:30	13	MPN/100ml
	12/01/2014 14:00	300	MPN/100ml
	12/10/2014 09:55	220	MPN/100ml
	12/16/2014 10:20	130	MPN/100ml
	12/23/2014 10:50	50	MPN/100ml
	12/30/2014 10:00	500	MPN/100ml
	01/06/2015 11:20	21	MPN/100ml
	01/14/2015 10:15	23	MPN/100ml
	01/21/2015 09:40	50	MPN/100ml
	01/27/2015 11:10	300	MPN/100ml
	02/03/2015 11:30	110	MPN/100ml
	02/10/2015 11:00	120	MPN/100ml
	02/18/2015 09:30	70	MPN/100ml
	02/24/2015 10:30	500	MPN/100ml
	03/03/2015 11:40	500	MPN/100ml
	03/10/2015 10:10	170	MPN/100ml
	03/18/2015 10:00	280	MPN/100ml
	03/24/2015 12:00	170	MPN/100ml
	04/01/2015 10:40	500	MPN/100ml
	04/08/2015 10:22	4	MPN/100ml
	04/14/2015 11:25	90	MPN/100ml
	04/21/2015 11:25	280	MPN/100ml
	04/28/2015 08:45	80	MPN/100ml
	05/05/2015 11:00	170	MPN/100ml
	05/13/2015 09:42	170	MPN/100ml
	05/19/2015 14:05	50	MPN/100ml
	05/28/2015 11:15	240	MPN/100ml
	06/03/2015 09:30	900	MPN/100ml
	06/09/2015 09:00	500	MPN/100ml
	06/17/2015 13:30	900	MPN/100ml
	06/23/2015 12:00	30	MPN/100ml
	07/01/2015 13:30	23	MPN/100ml
	07/09/2015 11:10	220	MPN/100ml
	07/15/2015 11:55	50	MPN/100ml
	07/21/2015 11:30	240	MPN/100ml
*	**07/28/2015 14:40**	**> 1,600**	**MPN/100ml**
	08/04/2015 10:30	80	MPN/100ml
	08/11/2015 10:40	300	MPN/100ml
	08/19/2015 10:30	80	MPN/100ml
	08/26/2015 10:35	240	MPN/100ml
	09/02/2015 09:13	240	MPN/100ml
	09/09/2015 08:36	300	MPN/100ml
*	**09/16/2015 10:15**	**> 1,600**	**MPN/100ml**
	09/23/2015 12:30	900	MPN/100ml
	09/29/2015 10:30	900	MPN/100ml
	10/06/2015 10:30	140	MPN/100ml
*	**10/13/2015 09:51**	**1600**	**MPN/100ml**
*	**10/21/2015 10:30**	**1600**	**MPN/100ml**
	10/27/2015 09:47	130	MPN/100ml
*	**11/03/2015 10:00**	**1600**	**MPN/100ml**
	11/10/2015 10:00	240	MPN/100ml
	11/17/2015 11:50	350	MPN/100ml
	11/24/2015 10:45	350	MPN/100ml
	12/01/2015 11:40	79	MPN/100ml
	12/08/2015 13:11	6.8	MPN/100ml
	12/15/2015 10:00	350	MPN/100ml
	12/22/2015 10:20	350	MPN/100ml
	12/29/2015 10:10	240	MPN/100ml
	01/05/2016 10:25	22	MPN/100ml
	01/12/2016 12:15	920	MPN/100ml
	01/19/2016 11:00	79	MPN/100ml
	01/25/2016 14:05	49	MPN/100ml
	02/02/2016 11:25	23	MPN/100ml
	02/09/2016 10:10	11	MPN/100ml
	02/16/2016 15:25	7.8	MPN/100ml
	02/23/2016 09:58	240	MPN/100ml
	03/01/2016 10:43	350	MPN/100ml
	03/08/2016 11:45	27	MPN/100ml
	03/15/2016 09:40	33	MPN/100ml
	03/23/2016 14:35	920	MPN/100ml
	03/30/2016 15:22	350	MPN/100ml
	04/05/2016 09:30	440	MPN/100ml

	04/12/2016 11:30	240	MPN/100ml
	04/19/2016 10:00	540	MPN/100ml
	04/27/2016 13:10	540	MPN/100ml
	05/03/2016 13:00	130	MPN/100ml
	05/10/2016 09:30	240	MPN/100ml
	05/17/2016 11:30	240	MPN/100ml
	05/24/2016 09:30	46	MPN/100ml
	06/02/2016 08:30	130	MPN/100ml
	06/07/2016 09:30	350	MPN/100ml
	06/14/2016 08:00	540	MPN/100ml
	06/21/2016 09:45	79	MPN/100ml
	06/28/2016 08:30	350	MPN/100ml
	07/06/2016 09:50	130	MPN/100ml
	07/13/2016 12:11	240	MPN/100ml
	07/19/2016 10:15	4	MPN/100ml
	07/26/2016 09:00	240	MPN/100ml
	08/02/2016 11:30	540	MPN/100ml
	08/09/2016 14:25	540	MPN/100ml
	08/16/2016 10:10	350	MPN/100ml
	08/23/2016 10:50	170	MPN/100ml
	08/30/2016 09:40	920	MPN/100ml
	09/06/2016 10:00	33	MPN/100ml
	09/14/2016 08:20	170	MPN/100ml
	09/20/2016 10:30	540	MPN/100ml
	09/27/2016 11:30	220	MPN/100ml
	10/04/2016 11:15	79	MPN/100ml
	10/11/2016 09:25	70	MPN/100ml
	10/18/2016 10:15	240	MPN/100ml
	10/25/2016 11:15	220	MPN/100ml
	11/01/2016 08:08	58	MPN/100ml
	11/09/2016 13:30	14	MPN/100ml
	11/15/2016 09:45	23	MPN/100ml
	11/22/2016 10:00	220	MPN/100ml
	11/29/2016 10:00	49	MPN/100ml
	12/06/2016 14:15	130	MPN/100ml
	12/13/2016 08:00	49	MPN/100ml
	12/20/2016 09:00	120	MPN/100ml
	12/28/2016 12:50	33	MPN/100ml
	01/03/2017 10:00	79	MPN/100ml
	01/09/2017 09:30	2	MPN/100ml
	01/17/2017 11:45	6.8	MPN/100ml
	01/24/2017 09:15	49	MPN/100ml
	02/01/2017 11:56	110	MPN/100ml
	02/07/2017 15:15	350	MPN/100ml
	02/15/2017 09:30	ND	MPN/100ml
	02/21/2017 09:30	49	MPN/100ml
	03/01/2017 12:45	22	MPN/100ml
	03/07/2017 09:00	130	MPN/100ml
	03/14/2017 09:00	79	MPN/100ml
	03/21/2017 09:20	920	MPN/100ml
	03/27/2017 12:30	49	MPN/100ml
	04/04/2017 09:45	17	MPN/100ml
	04/12/2017 08:00	ND	MPN/100ml
	04/18/2017 09:35	240	MPN/100ml
	04/24/2017 12:10	140	MPN/100ml
	05/02/2017 10:00	70	MPN/100ml
	05/10/2017 08:25	170	MPN/100ml
	05/16/2017 08:25	70	MPN/100ml
	05/23/2017 08:30	350	MPN/100ml
	05/30/2017 09:25	350	MPN/100ml
	06/06/2017 10:42	350	MPN/100ml
	06/13/2017 09:50	540	MPN/100ml
	06/20/2017 09:00	540	MPN/100ml
	06/27/2017 09:00	350	MPN/100ml
	07/03/2017 06:35	540	MPN/100ml
	07/11/2017 07:20	350	MPN/100ml
	07/18/2017 10:05	540	MPN/100ml
	07/25/2017 11:00	220	MPN/100ml
	08/01/2017 07:00	240	MPN/100ml
	08/01/2017 10:10	540	MPN/100ml
	08/08/2017 08:30	350	MPN/100ml
*	**08/15/2017 09:30**	**1600**	**MPN/100ml**
	08/22/2017 09:50	240	MPN/100ml
	08/29/2017 09:00	220	MPN/100ml
	09/06/2017 07:20	920	MPN/100ml
	09/12/2017 07:30	240	MPN/100ml
	09/19/2017 10:00	130	MPN/100ml

Total Dissolved Solids / TDS

08/13/2013 11:30	220	mg/L	211.1111111	
08/11/2015 09:00	230	mg/L	210	
06/14/2016 09:30	210	mg/L		
07/06/2016 10:31	220	mg/L		
08/02/2016 11:31	190	mg/L		
08/02/2016 11:45	200	mg/L		
09/06/2016 09:25	200	mg/L		
10/04/2016 11:05	230	mg/L		
08/01/2017 07:00	200	mg/L		

Total Organic Carbon / TOC

01/09/2013 15:18	0.5	mg/L	0.608421053	0.5
02/12/2013 11:05	0.52	mg/L	0.47	0.52
03/12/2013 12:47	0.31	mg/L		0.31
04/02/2013 14:04	0.3	mg/L		0.3
05/08/2013 13:15	0.93	mg/L		0.93
06/04/2013 11:45	0.43	mg/L		0.43
07/09/2013 10:40	**0**	mg/L		< 0.30
08/20/2013 11:15	**0**	mg/L		< 0.30
09/05/2013 11:00	0.37	mg/L		0.37
10/30/2013 10:25	**0**	mg/L		< 0.30
11/20/2013 11:30	**0**	mg/L		< 0.30
12/18/2013 13:55	**0**	mg/L		< 0.30
01/15/2014 11:15	0.39	mg/L		0.39
02/12/2014 11:50	0.67	mg/L		0.67
03/20/2014 10:20	**0**	mg/L		< 0.30
04/23/2014 12:00	0.38	mg/L		0.38
05/21/2014 12:25	0.32	mg/L		0.32
06/11/2014 09:15	0.33	mg/L		0.33
07/16/2014 11:50	1.5	mg/L		1.5
08/27/2014 13:10	2.5	mg/L		2.5
09/17/2014 13:15	2.5	mg/L		2.5
10/15/2014 14:00	0.65	mg/L		0.65
11/12/2014 11:25	0.56	mg/L		0.56
12/10/2014 09:45	0.52	mg/L		0.52
01/14/2015 10:20	0.47	mg/L		0.47
02/03/2015 11:55	0.47	mg/L		0.47
03/03/2015 12:40	0.7	mg/L		0.7
04/01/2015 10:00	0.38	mg/L		0.38
05/05/2015 10:30	0.41	mg/L		0.41
06/03/2015 10:00	2.3	mg/L		2.3
07/09/2015 11:40	0.34	mg/L		0.34
08/11/2015 08:45	0.55	mg/L		0.55
09/09/2015 08:30	0.36	mg/L		0.36
10/13/2015 09:50	0.39	mg/L		0.39
11/03/2015 10:40	0.82	mg/L		0.82
12/01/2015 11:50	1.4	mg/L		1.4
01/05/2016 10:15	1.2	mg/L		1.2
02/02/2016 10:33	0.65	mg/L		0.65
03/01/2016 10:52	0.64	mg/L		0.64
04/05/2016 08:28	0.45	mg/L		0.45
05/03/2016 13:10	0.84	mg/L		0.84
06/02/2016 09:35	0.38	mg/L		0.38
07/06/2016 10:31	0.43	mg/L		0.43
08/02/2016 11:31	0.62	mg/L		0.62
09/06/2016 09:25	0.47	mg/L		0.47
10/04/2016 11:05	0.31	mg/L		0.31
11/01/2016 08:43	**0**	mg/L		< 0.15
12/06/2016 14:16	1.3	mg/L		1.3
01/03/2017 09:55	0.32	mg/L		0.32
02/01/2017 11:55	0.73	mg/L		0.73
03/01/2017 12:46	0.61	mg/L		0.61
04/04/2017 09:46	0.76	mg/L		0.76
05/02/2017 11:20	0.56	mg/L		0.56
06/06/2017 11:55	0.39	mg/L		0.39
07/03/2017 06:24	0.45	mg/L		0.45
08/01/2017 09:05	0.83	mg/L		0.83
09/06/2017 07:35	0.47	mg/L		0.47

Total Trihalomethanes / TTHM

08/13/2013 11:30	< 1.0	ug/L
08/01/2017 07:00	ND	ug/L

Toxaphene

08/13/2013 11:30	< 1.0	ug/L

trans-1,2-Dichloroethylene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.14	ug/L

trans-1,3-Dichloropropene

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.13	ug/L

Trichloroethylene / TCE

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.10	ug/L

Trichlorofluoromethane

08/13/2013 11:30	< 5.0	ug/L
08/01/2017 07:00	< 0.21	ug/L

Turbidity

08/13/2013 11:30	0.7	NTU
08/11/2015 09:00	1.7	NTU
08/02/2016 11:45	0.6	NTU

Uranium (MDA)

08/02/2016 11:45	0.89	pCi/L

Uranium (plus error)

08/02/2016 11:45	1.5	pCi/L

Uranium (rad.)

08/02/2016 11:45	12	pCi/L

Vanadium (total)

08/13/2013 11:30	< 0.0030	mg/L
08/11/2015 09:00	< 0.0014	mg/L
08/02/2016 11:45	< 0.0014	mg/L
08/01/2017 07:00	0.0029	mg/L

Vinyl chloride

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	< 0.17	ug/L

Xylenes (total)

08/13/2013 11:30	< 0.50	ug/L
08/01/2017 07:00	ND	ug/L

Zinc (total)

08/13/2013 11:30	< 0.05	mg/L
08/11/2015 09:00	< 0.015	mg/L
08/02/2016 11:45	< 0.015	mg/L
08/01/2017 07:00	< 0.015	mg/L

Date	Peak Daily Raw	Peak Daily Settled	Average Daily CFE	%Reduction
1/1/2013	0.6	0.026	0.024666667	95.89%
1/2/2013	0.81	0.027	0.024833333	96.93%
1/3/2013	0.56	0.026	0.025333333	95.48%
1/4/2013	0.6	0.029	0.025333333	95.78%
1/5/2013	1.967	0.026	0.026	98.68%
1/6/2013	0.82	0.028	0.027	96.71%
1/7/2013	0.577	0.031	0.028333333	95.09%
1/8/2013	0.425	0.048	0.036	91.53%
1/9/2013	0.466	0.05	0.038	91.85%
1/10/2013	15.076	0.029	0.027333333	99.82%
1/11/2013	10.843	0.074	0.0388	99.64%
1/12/2013				
1/13/2013	1.155	0.036	0.031666667	97.26%
1/14/2013	1.196	0.068	0.057333333	95.21%
1/15/2013	0.84	0.063	0.047833333	94.31%
1/16/2013	0.83	0.073	0.052166667	93.71%
1/17/2013	0.832	0.081	0.052833333	93.65%
1/18/2013	0.629	0.031	0.028166667	95.52%
1/19/2013	0.463	0.052	0.036	92.22%
1/20/2013	0.512	0.037	0.031166667	93.91%
1/21/2013	0.509	0.031	0.029333333	94.24%
1/22/2013	0.443	0.033	0.030666667	93.08%
1/23/2013	0.441	0.034	0.030833333	93.01%
1/24/2013				
1/25/2013	0.467	0.035	0.03375	92.77%
1/26/2013	0.388	0.033	0.0315	91.88%
1/27/2013	0.245	0.041	0.033	86.53%
1/28/2013	0.339	0.057	0.047	86.14%
1/29/2013	0.553	0.06	0.059	89.33%
1/30/2013				
1/31/2013	0.6			
2/1/2013				
2/2/2013				
2/3/2013				
2/4/2013	1.849	0.068	0.0595	96.78%
2/5/2013	2.518	0.044	0.0425	98.31%
2/6/2013	2.553	0.06	0.0484	98.10%
2/7/2013	1.515	0.067	0.049333333	96.74%
2/8/2013	1.205	0.047	0.044	96.35%
2/9/2013	1.504	0.046	0.044166667	97.06%
2/10/2013	1.009	0.038	0.032333333	96.80%
2/11/2013	0.885	0.051	0.032166667	96.37%
2/12/2013	1.017	0.054	0.043333333	95.74%
2/13/2013	0.813	0.052	0.041666667	94.87%
2/14/2013	0.753	0.045	0.0425	94.36%
2/15/2013	0.799	0.065	0.0555	93.05%
2/16/2013	1.111	0.049	0.0405	96.35%
2/17/2013	0.892	0.04	0.038	95.74%
2/18/2013	0.828	0.039	0.035166667	95.75%
2/19/2013	0.845	0.036	0.031833333	96.23%
2/20/2013	1.141	0.03	0.028333333	97.52%
2/21/2013	1.034	0.027	0.025333333	97.55%
2/22/2013	0.71	0.031	0.025333333	96.43%
2/23/2013	0.7	0.028	0.026833333	96.17%
2/24/2013	1.872	0.059	0.032666667	98.25%
2/25/2013	1.167	0.03	0.026666667	97.71%
2/26/2013	0.975	0.029	0.025166667	97.42%
2/27/2013	0.864	0.025	0.024333333	97.18%
2/28/2013	0.701	0.026	0.024666667	96.48%
3/1/2013	0.7	0.03	0.025	96.43%
3/2/2013	0.7	0.03	0.025	96.43%
3/3/2013	0.8	0.03	0.027	96.63%
3/4/2013	0.7	0.03	0.025	96.43%
3/5/2013	1.1	0.03	0.027	97.55%
3/6/2013	0.8	0.03	0.025	96.88%
3/7/2013	1	0.03	0.024	97.60%
3/8/2013	1.4	0.05	0.031	97.79%

3/9/2013	1.2	0.06	0.039	96.75%
3/10/2013	1.7	0.05	0.04	97.65%
3/11/2013	2.8	0.05	0.035	98.75%
3/12/2013	0.7	0.05	0.032	95.43%
3/13/2013	0.7	0.03	0.031	95.57%
3/14/2013	1.4	0.04	0.035	97.50%
3/15/2013	1.4	0.04	0.036	97.43%
3/16/2013	1.1	0.04	0.034	96.91%
3/17/2013	1.9	0.04	0.036	98.11%
3/18/2013	1.2	0.04	0.039	96.75%
3/19/2013	0.9	0.05	0.04	95.56%
3/20/2013	0.9	0.04	0.036	96.00%
3/21/2013	0.8	0.04	0.038	95.25%
3/22/2013	1	0.05	0.04	96.00%
3/23/2013	0.9	0.04	0.038	95.78%
3/24/2013	1.3	0.04	0.04	96.92%
3/25/2013	3	0.05	0.043	98.57%
3/26/2013	1.7	0.04	0.035	97.94%
3/27/2013	1.4	0.05	0.04	97.14%
3/28/2013	1	0.04	0.029	97.10%
3/29/2013	0.9	0.03	0.027	97.00%
3/30/2013	0.9	0.04	0.03	96.67%
3/31/2013	0.9	0.03	0.032	96.44%
4/1/2013	0.898	0.033	0.032166667	96.42%
4/2/2013	1.176	0.04	0.035166667	97.01%
4/3/2013	0.844	0.03	0.028	96.68%
4/4/2013	0.827	0.05	0.039166667	95.26%
4/5/2013	0.691	0.052	0.045333333	93.44%
4/6/2013	0.604	0.042	0.0405	93.29%
4/7/2013	0.666	0.051	0.040833333	93.87%
4/8/2013	0.731	0.042	0.037833333	94.82%
4/9/2013	0.676	0.036	0.033	95.12%
4/10/2013	0.623	0.035	0.031833333	94.89%
4/11/2013	0.591	0.033	0.031333333	94.70%
4/12/2013	0.599	0.036	0.032833333	94.52%
4/13/2013	0.591	0.032	0.031	94.75%
4/14/2013	0.655	0.033	0.031	95.27%
4/15/2013	0.608	0.034	0.032333333	94.68%
4/16/2013	0.571	0.032	0.031833333	94.42%
4/17/2013	1.11	0.04	0.033666667	96.97%
4/18/2013	0.618	0.089	0.0585	90.53%
4/19/2013	0.434	0.065	0.060666667	86.02%
4/20/2013	0.402	0.079	0.063333333	84.25%
4/21/2013	0.511	0.056	0.048333333	90.54%
4/22/2013	0.907	0.051	0.040666667	95.52%
4/23/2013	0.575	0.037	0.0335	94.17%
4/24/2013	0.578	0.034	0.033	94.29%
4/25/2013	0.31	0.061	0.0365	88.23%
4/26/2013	0.293	0.032	0.0315	89.25%
4/27/2013	0.284	0.035	0.033166667	88.32%
4/28/2013	0.387	0.038	0.034	91.21%
4/29/2013	0.366	0.035	0.034333333	90.62%
4/30/2013	0.32	0.055	0.0375	88.28%
5/1/2013	0.276	0.035	0.0345	87.50%
5/2/2013	0.289	0.035	0.033666667	88.35%
5/3/2013	0.346	0.034	0.032833333	90.51%
5/4/2013	0.342	0.034	0.031833333	90.69%
5/5/2013	0.371	0.038	0.031666667	91.46%
5/6/2013	0.552	0.035	0.031166667	94.35%
5/7/2013	0.333	0.034	0.032333333	90.29%
5/8/2013	0.36	0.035	0.031	91.39%
5/9/2013	0.291	0.031	0.0295	89.86%
5/10/2013	0.281	0.034	0.0315	88.79%
5/11/2013	0.29	0.031	0.0305	89.48%
5/12/2013	0.46	0.038	0.035	92.39%
5/13/2013	0.481	0.037	0.035333333	92.65%
5/14/2013	0.648	0.038	0.036	94.44%
5/15/2013	0.393	0.038	0.036	90.84%

5/16/2013	0.328	0.033	0.031833333	90.29%
5/17/2013	0.309	0.042	0.033166667	89.27%
5/18/2013	0.31	0.046	0.036833333	88.12%
5/19/2013	0.236	0.052	0.046166667	80.44%
5/20/2013	0.526	0.049	0.038	92.78%
5/21/2013	0.324	0.042	0.034833333	89.25%
5/22/2013	0.322	0.036	0.033666667	89.54%
5/23/2013	1.06	0.049	0.041833333	96.05%
5/24/2013	0.258	0.053	0.047333333	81.65%
5/25/2013	0.324	0.048	0.0465	85.65%
5/26/2013	0.597	0.049	0.046	92.29%
5/27/2013	0.33	0.05	0.047166667	85.71%
5/28/2013	0.397	0.048	0.045666667	88.50%
5/29/2013	0.367	0.048	0.046166667	87.42%
5/30/2013	0.402	0.044	0.043	89.30%
5/31/2013	0.46	0.046	0.043833333	90.47%
6/1/2013	0.525	0.046	0.043833333	91.65%
6/2/2013	0.7	0.046	0.043333333	93.81%
6/3/2013	0.546	0.048	0.045666667	91.64%
6/4/2013	19.227	0.146	0.0615	99.68%
6/5/2013	0.501	0.048	0.041333333	91.75%
6/6/2013	0.47	0.044	0.036166667	92.30%
6/7/2013	0.489	0.034	0.0315	93.56%
6/8/2013	0.408	0.037	0.033333333	91.83%
6/9/2013	0.65	0.037	0.035833333	94.49%
6/10/2013	1.016	0.037	0.035666667	96.49%
6/11/2013	0.418	0.053	0.039833333	90.47%
6/12/2013	0.38	0.058	0.048333333	87.28%
6/13/2013	0.457	0.05	0.044333333	90.30%
6/14/2013	0.406	0.038	0.034166667	91.58%
6/15/2013	0.539	0.032	0.030666667	94.31%
6/16/2013	0.539	0.037	0.035666667	93.38%
6/17/2013	0.642	0.04	0.0385	94.00%
6/18/2013	0.544	0.044	0.038166667	92.98%
6/19/2013	0.511	0.047	0.041333333	91.91%
6/20/2013	0.538	0.035	0.034333333	93.62%
6/21/2013	0.525	0.034	0.032833333	93.75%
6/22/2013	0.556	0.036	0.032333333	94.18%
6/23/2013	0.521	0.037	0.034833333	93.31%
6/24/2013	0.529	0.037	0.035833333	93.23%
6/25/2013	0.382	0.067	0.0445	88.35%
6/26/2013	0.347	0.046	0.0405	88.33%
6/27/2013	0.421	0.037	0.035	91.69%
6/28/2013	0.41	0.041	0.035166667	91.42%
6/29/2013	0.384	0.043	0.038166667	90.06%
6/30/2013	0.434	0.042	0.038833333	91.05%
7/1/2013	0.671	0.051	0.041666667	93.79%
7/2/2013	0.282	0.046	0.043166667	84.69%
7/3/2013	0.328	0.054	0.048333333	85.26%
7/4/2013	0.403	0.047	0.0455	88.71%
7/5/2013	0.394	0.044	0.042166667	89.30%
7/6/2013	0.624	0.045	0.043833333	92.98%
7/7/2013	0.926	0.044	0.041166667	95.55%
7/8/2013	0.409	0.044	0.042166667	89.69%
7/9/2013	0.534	0.058	0.049666667	90.70%
7/10/2013	0.3	0.063	0.060833333	79.72%
7/11/2013	0.247	0.075	0.0645	73.89%
7/12/2013	0.246	0.074	0.0715	70.93%
7/13/2013	0.312	0.08	0.071666667	77.03%
7/14/2013	0.448	0.079	0.0715	84.04%
7/15/2013	0.567	0.086	0.078166667	86.21%
7/16/2013	0.546	0.077	0.073	86.63%
7/17/2013	0.83	0.102	0.076666667	90.76%
7/18/2013	0.619	0.112	0.090333333	85.41%
7/19/2013	0.424	0.073	0.058166667	86.28%
7/20/2013	0.36	0.079	0.070333333	80.46%
7/21/2013	0.393	0.064	0.056333333	85.67%
7/22/2013	0.407	0.072	0.0685	83.17%

7/23/2013	0.42	0.073	0.060333333	85.63%
7/24/2013	0.395	0.053	0.050333333	87.26%
7/25/2013	0.351	0.07	0.055833333	84.09%
7/26/2013	0.342	0.072	0.069833333	79.58%
7/27/2013	0.318	0.07	0.068833333	78.35%
7/28/2013	0.358	0.076	0.072333333	79.80%
7/29/2013	0.301	0.081	0.076833333	74.47%
7/30/2013	0.348	0.091	0.078833333	77.35%
7/31/2013	0.23	0.071	0.0685	70.22%
8/1/2013	0.23	0.071	0.0685	70.22%
8/2/2013	0.395	0.067	0.065666667	83.38%
8/3/2013	0.265	0.066	0.062333333	76.48%
8/4/2013	0.267	0.072	0.066833333	74.97%
8/5/2013	0.263	0.075	0.072	72.62%
8/6/2013	0.256	0.079	0.074	71.09%
8/7/2013	1.77	0.086	0.074166667	95.81%
8/8/2013	0.349	0.079	0.075666667	78.32%
8/9/2013	0.297	0.08	0.069666667	76.54%
8/10/2013	0.26	0.061	0.058	77.69%
8/11/2013	0.258	0.071	0.0635	75.39%
8/12/2013	0.465	0.088	0.073833333	84.12%
8/13/2013	0.539	0.094	0.091	83.12%
8/14/2013	0.388	0.087	0.078833333	79.68%
8/15/2013	0.397	0.072	0.068166667	82.83%
8/16/2013	0.372	0.08	0.07	81.18%
8/17/2013	0.356	0.082	0.075833333	78.70%
8/18/2013	0.291	0.079	0.073166667	74.86%
8/19/2013	0.29	0.079	0.0725	75.00%
8/20/2013	0.501	0.079	0.071	85.83%
8/21/2013	2.27	0.077	0.071	96.87%
8/22/2013	0.34	0.07	0.067666667	80.10%
8/23/2013	0.338	0.065	0.057833333	82.89%
8/24/2013	0.271	0.055	0.0505	81.37%
8/25/2013	0.351	0.054	0.0475	86.47%
8/26/2013	0.257	0.059	0.053333333	79.25%
8/27/2013	0.807	0.078	0.06	92.57%
8/28/2013	0.257	0.063	0.059666667	76.78%
8/29/2013	0.239	0.06	0.058	75.73%
8/30/2013				
8/31/2013	1.311	0.13	0.0982	92.51%
9/1/2013	1.311	0.13	0.0972	92.59%
9/2/2013	0.73	0.079	0.070166667	90.39%
9/3/2013	0.411	0.074	0.0625	84.79%
9/4/2013	0.275	0.055	0.049666667	81.94%
9/5/2013	0.203	0.063	0.053833333	73.48%
9/6/2013	0.191	0.058	0.0545	71.47%
9/7/2013	0.816	0.071	0.065	92.03%
9/8/2013	0.336	0.074	0.062833333	81.30%
9/9/2013	0.346	0.055	0.051333333	85.16%
9/10/2013	0.349	0.073	0.06	82.81%
9/11/2013	0.3	0.06	0.0595	80.17%
9/12/2013	0.338	0.06	0.051833333	84.66%
9/13/2013	0.404	0.065	0.056666667	85.97%
9/14/2013	0.385	0.068	0.062666667	83.72%
9/15/2013	0.42	0.08	0.0635	84.88%
9/16/2013	0.528	0.082	0.072166667	86.33%
9/17/2013	4.522	0.082	0.074166667	98.36%
9/18/2013	0.341	0.067	0.063666667	81.33%
9/19/2013	0.325	0.071	0.0615	81.08%
9/20/2013	0.28	0.066	0.0625	77.68%
9/21/2013	0.471	0.082	0.071	84.93%
9/22/2013	0.296	0.068	0.063333333	78.60%
9/23/2013	0.347	0.069	0.064333333	81.46%
9/24/2013	0.32	0.07	0.066166667	79.32%
9/25/2013	0.382	0.068	0.063833333	83.29%
9/26/2013	0.295	0.066	0.063	78.64%
9/27/2013	0.3	0.059	0.057	81.00%
9/28/2013	0.263	0.052	0.050666667	80.74%

9/29/2013	0.242	0.056	0.051	78.93%
9/30/2013	0.207	0.06	0.056666667	72.62%
10/1/2013	0.2	0.055	0.052	74.00%
10/2/2013	0.2	0.062	0.0535	73.25%
10/3/2013	0.216	0.051	0.0495	77.08%
10/4/2013	0.5	0.066	0.056833333	88.63%
10/5/2013	0.882	0.054	0.0495	94.39%
10/6/2013	0.5	0.068	0.056333333	88.73%
10/7/2013	0.758	0.062	0.059666667	92.13%
10/8/2013	0.314	0.066	0.059	81.21%
10/9/2013	0.367	0.072	0.069	81.20%
10/10/2013	0.768	0.09	0.0805	89.52%
10/11/2013	0.395	0.076	0.073	81.52%
10/12/2013	0.204	0.073	0.070333333	65.52%
10/13/2013	0.219	0.077	0.067833333	69.03%
10/14/2013	0.318	0.086	0.076333333	76.00%
10/15/2013				
10/16/2013				
10/17/2013	0.894	0.117	0.098	89.04%
10/18/2013	0.654	0.089	0.082	87.46%
10/19/2013	0.458	0.098	0.089666667	80.42%
10/20/2013	0.398	0.089	0.083666667	78.98%
10/21/2013	0.353	0.063	0.057166667	83.81%
10/22/2013	0.37	0.06	0.056666667	84.68%
10/23/2013	0.326	0.048	0.037833333	88.39%
10/24/2013	0.222	0.045	0.034833333	84.31%
10/25/2013	0.188	0.06	0.038833333	79.34%
10/26/2013	0.196	0.03	0.0295	84.95%
10/27/2013	0.2	0.045	0.030666667	84.67%
10/28/2013	0.282	0.052	0.041333333	85.34%
10/29/2013	0.253	0.047	0.034666667	86.30%
10/30/2013	0.211	0.027	0.024833333	88.23%
10/31/2013	0.446	0.031	0.029333333	93.42%
11/1/2013	0.446	0.031	0.029333333	93.42%
11/2/2013	0.337	0.027	0.026	92.28%
11/3/2013	0.26	0.035	0.032666667	87.44%
11/4/2013	0.294	0.038	0.032	89.12%
11/5/2013	0.304	0.08	0.050833333	83.28%
11/6/2013	0.25	0.059	0.0465	81.40%
11/7/2013	0.248	0.046	0.039666667	84.01%
11/8/2013	0.213	0.072	0.051	76.06%
11/9/2013	0.244	0.073	0.0555	77.25%
11/10/2013	0.226	0.091	0.063666667	71.83%
11/11/2013	0.262	0.06	0.0495	81.11%
11/12/2013	0.689	0.079	0.059166667	91.41%
11/13/2013	0.3	0.04	0.036833333	87.72%
11/14/2013	0.216	0.034	0.030833333	85.73%
11/15/2013	0.297	0.03	0.027666667	90.68%
11/16/2013	0.3	0.03	0.027666667	90.78%
11/17/2013	0.266	0.033	0.029333333	88.97%
11/18/2013	0.303	0.03	0.027833333	90.81%
11/19/2013	0.64	0.049	0.036	94.38%
11/20/2013	0.255	0.076	0.052	79.61%
11/21/2013	2.04	0.052	0.039666667	98.06%
11/22/2013	1.815	0.069	0.061166667	96.63%
11/23/2013	0.557	0.062	0.049	91.20%
11/24/2013	0.325	0.038	0.036166667	88.87%
11/25/2013	0.248	0.051	0.040833333	83.53%
11/26/2013	0.315	0.077	0.0535	83.02%
11/27/2013	0.264	0.039	0.037	85.98%
11/28/2013	0.257	0.056	0.048166667	81.26%
11/29/2013	0.278	0.06	0.043	84.53%
11/30/2013	0.264	0.043	0.0375	85.80%
12/1/2013	0.273	0.04	0.037666667	86.20%
12/2/2013	0.304	0.06	0.044	85.53%
12/3/2013	0.292	0.05	0.044	84.93%
12/4/2013	0.261	0.059	0.0425	83.72%
12/5/2013	0.202	0.037	0.034166667	83.09%

12/6/2013	0.25	0.055	0.044333333	82.27%
12/7/2013	0.246	0.044	0.039166667	84.08%
12/8/2013	0.316	0.041	0.0395	87.50%
12/9/2013	0.321	0.044	0.040666667	87.33%
12/10/2013	0.28	0.041	0.039	86.07%
12/11/2013	0.236	0.052	0.034	85.59%
12/12/2013	0.241	0.054	0.043166667	82.09%
12/13/2013	4.316	0.061	0.049	98.86%
12/14/2013	4.325	0.086	0.054166667	98.75%
12/15/2013	0.264	0.037	0.033666667	87.25%
12/16/2013	1.92	0.086	0.043	97.76%
12/17/2013	0.291	0.036	0.034666667	88.09%
12/18/2013	0.315	0.041	0.036833333	88.31%
12/19/2013	0.358	0.056	0.047	86.87%
12/20/2013	0.274	0.061	0.048833333	82.18%
12/21/2013	0.294	0.045	0.037833333	87.13%
12/22/2013	0.243	0.036	0.034333333	85.87%
12/23/2013	1.667	0.072	0.040833333	97.55%
12/24/2013	1.666	0.044	0.0365	97.81%
12/25/2013	0.63	0.039	0.034	94.60%
12/26/2013	0.44	0.038	0.036	91.82%
12/27/2013	0.265	0.04	0.036333333	86.29%
12/28/2013	0.371	0.039	0.033833333	90.88%
12/29/2013	0.283	0.062	0.041166667	85.45%
12/30/2013	0.255	0.081	0.0495	80.59%
12/31/2013	0.238	0.034	0.031	86.97%
1/1/2014	0.238	0.034	0.031	86.97%
1/2/2014	0.252	0.035	0.033	86.90%
1/3/2014	0.263	0.036	0.034333333	86.95%
1/4/2014	0.241	0.036	0.034	85.89%
1/5/2014	0.311	0.036	0.0335	89.23%
1/6/2014	0.26	0.035	0.033833333	86.99%
1/7/2014	0.234	0.036	0.0335	85.68%
1/8/2014	0.243	0.034	0.032666667	86.56%
1/9/2014	0.26	0.033	0.032333333	87.56%
1/10/2014	0.231	0.034	0.033166667	85.64%
1/11/2014	0.236	0.036	0.034166667	85.52%
1/12/2014	0.274	0.037	0.035333333	87.10%
1/13/2014	0.384	0.043	0.037333333	90.28%
1/14/2014	0.257	0.038	0.036166667	85.93%
1/15/2014	0.453	0.046	0.039333333	91.32%
1/16/2014	0.274	0.04	0.038166667	86.07%
1/17/2014	0.301	0.069	0.0505	83.22%
1/18/2014	0.262	0.061	0.0455	82.63%
1/19/2014	0.292	0.043	0.040333333	86.19%
1/20/2014	0.246	0.046	0.042333333	82.79%
1/21/2014	0.264	0.06	0.053	79.92%
1/22/2014	0.297	0.054	0.045833333	84.57%
1/23/2014	0.424	0.046	0.043333333	89.78%
1/24/2014	0.275	0.046	0.045	83.64%
1/25/2014	0.357	0.046	0.0435	87.82%
1/26/2014	0.397	0.044	0.042666667	89.25%
1/27/2014	0.47	0.095	0.063666667	86.45%
1/28/2014	0.446	0.055	0.046166667	89.65%
1/29/2014	0.406	0.054	0.046833333	88.46%
1/30/2014	0.397	0.059	0.0505	87.28%
1/31/2014	0.328	0.067	0.064333333	80.39%
2/1/2014	0.328	0.067	0.064333333	80.39%
2/2/2014	0.32	0.059	0.053	83.44%
2/3/2014	0.529	0.054	0.0505	90.45%
2/4/2014	0.389	0.05	0.045333333	88.35%
2/5/2014	0.342	0.058	0.0535	84.36%
2/6/2014	0.36	0.064	0.055333333	84.63%
2/7/2014	0.423	0.06	0.055833333	86.80%
2/8/2014	0.35	0.06	0.054833333	84.33%
2/9/2014	0.342	0.063	0.058	83.04%
2/10/2014	0.387	0.088	0.067	82.69%
2/11/2014	0.472	0.065	0.062166667	86.83%

2/12/2014	0.456	0.076	0.059333333	86.99%
2/13/2014	0.324	0.043	0.041333333	87.24%
2/14/2014	0.304	0.042	0.041666667	86.29%
2/15/2014	0.345	0.043	0.042	87.83%
2/16/2014	0.325	0.044	0.042166667	87.03%
2/17/2014	0.328	0.044	0.040333333	87.70%
2/18/2014	0.317	0.047	0.042	86.75%
2/19/2014	0.384	0.045	0.043833333	88.59%
2/20/2014	0.344	0.046	0.044333333	87.11%
2/21/2014	0.342	0.045	0.044	87.13%
2/22/2014	0.34	0.045	0.0435	87.21%
2/23/2014	0.34	0.042	0.0405	88.09%
2/24/2014	0.349	0.038	0.033166667	90.50%
2/25/2014	0.354	0.037	0.0325	90.82%
2/26/2014	0.308	0.031	0.030333333	90.15%
2/27/2014	0.749	0.049	0.0385	94.86%
2/28/2014	0.806	0.08	0.060333333	92.51%
3/1/2014	0.89	0.067	0.057	93.60%
3/2/2014	1.01	0.061	0.0512	94.93%
3/3/2014	0.608	0.051	0.035333333	94.19%
3/4/2014	0.384	0.082	0.039	89.84%
3/5/2014	0.673	0.035	0.033	95.10%
3/6/2014	0.266	0.04	0.037166667	86.03%
3/7/2014	0.298	0.043	0.037	87.58%
3/8/2014				
3/9/2014				
3/10/2014	0.386	0.085	0.06525	83.10%
3/11/2014	0.33	0.049	0.0405	87.73%
3/12/2014	0.351	0.077	0.052333333	85.09%
3/13/2014	0.787	0.06	0.037666667	95.21%
3/14/2014	2.723	0.037	0.029166667	98.93%
3/15/2014	1.617	0.032	0.029333333	98.19%
3/16/2014	2.392	0.039	0.032666667	98.63%
3/17/2014	3.01	0.03	0.028166667	99.06%
3/18/2014	1.764	0.037	0.029166667	98.35%
3/19/2014	2.407	0.03	0.027166667	98.87%
3/20/2014	1.901	0.029	0.025	98.68%
3/21/2014	1.26	0.048	0.032833333	97.39%
3/22/2014	0.91	0.037	0.033	96.37%
3/23/2014	0.914	0.037	0.033	96.39%
3/24/2014	1.101	0.102	0.0875	92.05%
3/25/2014				
3/26/2014				
3/27/2014	6.745	0.083	0.0515	99.24%
3/28/2014	1.307	0.059	0.046	96.48%
3/29/2014	1.084	0.043	0.031666667	97.08%
3/30/2014	1.278	0.041	0.0335	97.38%
3/31/2014	1.704	0.032	0.0265	98.44%
4/1/2014	1.704	0.032	0.0265	98.44%
4/2/2014	1.159	0.07	0.050333333	95.66%
4/3/2014	1.28	0.07	0.046	96.41%
4/4/2014	0.9	0.036	0.0325	96.39%
4/5/2014	1.092	0.059	0.042833333	96.08%
4/6/2014	0.518	0.042	0.034	93.44%
4/7/2014	0.859	0.032	0.029	96.62%
4/8/2014	5.664	0.031	0.029333333	99.48%
4/9/2014	0.49	0.029	0.027166667	94.46%
4/10/2014	0.59	0.03	0.028833333	95.11%
4/11/2014	0.677	0.031	0.0295	95.64%
4/12/2014	0.6	0.035	0.031	94.83%
4/13/2014	0.582	0.043	0.038666667	93.36%
4/14/2014	0.711	0.052	0.044333333	93.76%
4/15/2014	1.3	0.056	0.051	96.08%
4/16/2014	0.736	0.051	0.029166667	96.04%
4/17/2014	0.745	0.075	0.042166667	94.34%
4/18/2014	0.455	0.037	0.035	92.31%
4/19/2014	0.502	0.036	0.030833333	93.86%
4/20/2014	0.731	0.032	0.0305	95.83%

4/21/2014	0.773	0.035	0.031833333	95.88%
4/22/2014	0.552	0.031	0.027166667	95.08%
4/23/2014	0.512	0.037	0.0355	93.07%
4/24/2014	0.483	0.039	0.0365	92.44%
4/25/2014	0.478	0.037	0.0325	93.20%
4/26/2014	0.938	0.05	0.039833333	95.75%
4/27/2014	0.882	0.049	0.037166667	95.79%
4/28/2014	0.438	0.03	0.0295	93.26%
4/29/2014	0.688	0.03	0.0275	96.00%
4/30/2014	0.779	0.043	0.035666667	95.42%
5/1/2014	1.653	0.047	0.0365	97.79%
5/2/2014	0.414	0.048	0.036666667	91.14%
5/3/2014	0.426	0.06	0.052666667	87.64%
5/4/2014	0.798	0.062	0.051666667	93.53%
5/5/2014	0.503	0.047	0.036166667	92.81%
5/6/2014	1.103	0.038	0.028666667	97.40%
5/7/2014	3.648	0.041	0.026666667	99.27%
5/8/2014	0.451	0.105	0.089	80.27%
5/9/2014	0.385	0.104	0.035166667	90.87%
5/10/2014	0.341	0.028	0.023166667	93.21%
5/11/2014	0.371	0.038	0.0365	90.16%
5/12/2014	0.275	0.041	0.037333333	86.42%
5/13/2014	0.385	0.068	0.058166667	84.89%
5/14/2014	0.567	0.085	0.068166667	87.98%
5/15/2014	0.588	0.073	0.069166667	88.24%
5/16/2014	0.469	0.073	0.069166667	85.25%
5/17/2014	0.428	0.096	0.07	83.64%
5/18/2014	0.472	0.114	0.081	82.84%
5/19/2014	0.49	0.089	0.066166667	86.50%
5/20/2014	0.475	0.089	0.049833333	89.51%
5/21/2014	0.433	0.038	0.0365	91.57%
5/22/2014	0.463	0.041	0.036833333	92.04%
5/23/2014	0.445	0.037	0.033	92.58%
5/24/2014	0.35	0.036	0.0345	90.14%
5/25/2014	0.45	0.038	0.0365	91.89%
5/26/2014	0.411	0.036	0.0355	91.36%
5/27/2014	0.437	0.037	0.034833333	92.03%
5/28/2014	0.419	0.037	0.032333333	92.28%
5/29/2014	0.469	0.035	0.033666667	92.82%
5/30/2014	0.483	0.038	0.035666667	92.62%
5/31/2014	0.52	0.042	0.038	92.69%
6/1/2014	0.522	0.042	0.038	92.72%
6/2/2014	0.762	0.04	0.037833333	95.03%
6/3/2014	0.422	0.039	0.036666667	91.31%
6/4/2014	0.403	0.036	0.035	91.32%
6/5/2014	0.371	0.064	0.048833333	86.84%
6/6/2014	0.35	0.064	0.048166667	86.24%
6/7/2014	0.373	0.055	0.042166667	88.70%
6/8/2014	0.323	0.051	0.037833333	88.29%
6/9/2014	0.72	0.038	0.032	95.56%
6/10/2014	0.421	0.038	0.030833333	92.68%
6/11/2014	0.398	0.038	0.035666667	91.04%
6/12/2014	0.3	0.066	0.041	86.33%
6/13/2014	0.28	0.045	0.0415	85.18%
6/14/2014	0.42	0.057	0.049333333	88.25%
6/15/2014	1	0.04	0.037333333	96.27%
6/16/2014	0.235	0.038	0.035666667	84.82%
6/17/2014	0.238	0.044	0.0365	84.66%
6/18/2014	0.186	0.036	0.034	81.72%
6/19/2014	0.233	0.044	0.0405	82.62%
6/20/2014	0.193	0.049	0.039833333	79.36%
6/21/2014	0.187	0.038	0.034166667	81.73%
6/22/2014	0.552	0.036	0.033833333	93.87%
6/23/2014	0.21	0.043	0.035833333	82.94%
6/24/2014	0.216	0.037	0.035	83.80%
6/25/2014	0.162	0.038	0.034833333	78.50%
6/26/2014	0.152	0.037	0.033166667	78.18%
6/27/2014	0.143	0.036	0.0335	76.57%

6/28/2014	0.163	0.029	0.028666667	82.41%	
6/29/2014	0.14	0.056	0.040666667	70.95%	
6/30/2014	0.167	0.064	0.0555	66.77%	
7/1/2014	0.176	0.048	0.036	79.55%	77.54%
7/2/2014	0.148	0.038	0.0365	75.34%	
7/3/2014	0.13	0.035	0.032666667	74.87%	
7/4/2014	0.12	0.03	0.029333333	75.56%	
7/5/2014	0.12	0.028	0.027166667	77.36%	
7/6/2014	0.163	0.031	0.027833333	82.92%	
7/7/2014	0.155	0.04	0.032	79.35%	
7/8/2014	0.141	0.038	0.034	75.89%	
7/9/2014	0.186	0.055	0.037666667	79.75%	
7/10/2014	1.59	0.036	0.033666667	97.88%	
7/11/2014	0.154	0.038	0.035833333	76.73%	
7/12/2014	6.013	0.038	0.035	99.42%	
7/13/2014	0.187	0.036	0.0335	82.09%	
7/14/2014	0.155	0.034	0.032	79.35%	
7/15/2014	0.147	0.039	0.033666667	77.10%	
7/16/2014	0.147	0.037	0.034833333	76.30%	
7/17/2014	0.148	0.038	0.0365	75.34%	
7/18/2014	0.147	0.039	0.0365	75.17%	
7/19/2014	0.134	0.037	0.035833333	73.26%	
7/20/2014	0.143	0.036	0.034	76.22%	
7/21/2014	0.136	0.037	0.0355	73.90%	
7/22/2014	0.167	0.042	0.037833333	77.35%	
7/23/2014	0.152	0.042	0.039166667	74.23%	
7/24/2014	0.171	0.046	0.038833333	77.29%	
7/25/2014	0.134	0.043	0.040666667	69.65%	
7/26/2014	0.338	0.049	0.043	87.28%	
7/27/2014	0.121	0.047	0.043	64.46%	
7/28/2014	0.148	0.051	0.0495	66.55%	
7/29/2014	0.282	0.05	0.048	82.98%	
7/30/2014	0.212	0.078	0.0585	72.41%	
7/31/2014	0.166	0.063	0.053	68.07%	
8/1/2014	0.166	0.063	0.053	68.07%	
8/2/2014	0.158	0.053	0.050166667	68.25%	
8/3/2014	0.236	0.055	0.05	78.81%	
8/4/2014	1.297	0.062	0.058666667	95.48%	
8/5/2014	0.286	0.063	0.0595	79.20%	
8/6/2014	0.208	0.057	0.053166667	74.44%	
8/7/2014	0.188	0.059	0.051833333	72.43%	
8/8/2014	0.171	0.063	0.058166667	65.98%	
8/9/2014	0.173	0.055	0.052	69.94%	
8/10/2014	0.156	0.049	0.045166667	71.05%	
8/11/2014	0.166	0.046	0.043666667	73.69%	
8/12/2014	0.161	0.051	0.047833333	70.29%	
8/13/2014	0.163	0.043	0.040833333	74.95%	
8/14/2014		0.047	0.040833333		135
8/15/2014	0.172	0.045	0.0385	77.62%	
8/16/2014	0.15	0.035	0.031166667	79.22%	
8/17/2014	0.582	0.039	0.035166667	93.96%	
8/18/2014	0.604	0.038	0.035833333	94.07%	
8/19/2014	0.335	0.039	0.037	88.96%	
8/20/2014	1.071	0.045	0.041833333	96.09%	
8/21/2014	0.942	0.046	0.040833333	95.67%	
8/22/2014	1	0.058	0.048166667	95.18%	
8/23/2014	0.95	0.04	0.0385	95.95%	
8/24/2014	2.017	0.038	0.035333333	98.25%	
8/25/2014	3.512	0.042	0.0375	98.93%	
8/26/2014	2.335	0.058	0.054333333	97.67%	
8/27/2014	1.742	0.052	0.044	97.47%	
8/28/2014	3.606	0.045	0.041833333	98.84%	
8/29/2014	3.412	0.043	0.039833333	98.83%	
8/30/2014	1.697	0.041	0.039	97.70%	
8/31/2014	2.524	0.047	0.0445	98.24%	
9/1/2014	2.524	0.047	0.0445	98.24%	
9/2/2014	3.489	0.041	0.039666667	98.86%	
9/3/2014	1.446	0.042	0.040166667	97.22%	

9/4/2014	1.159	0.04	0.034333333	97.04%
9/5/2014	0.8	0.03	0.028666667	96.42%
9/6/2014	0.6	0.03	0.028333333	95.28%
9/7/2014	0.931	0.028	0.026833333	97.12%
9/8/2014	1.19	0.038	0.0295	97.52%
9/9/2014	0.836	0.036	0.032666667	96.09%
9/10/2014	0.671	0.033	0.029	95.68%
9/11/2014	0.737	0.032	0.029666667	95.97%
9/12/2014	0.88	0.031	0.0295	96.65%
9/13/2014	0.65	0.036	0.031	95.23%
9/14/2014	0.638	0.036	0.032666667	94.88%
9/15/2014	1.784	0.033	0.0305	98.29%
9/16/2014	0.775	0.036	0.032	95.87%
9/17/2014	0.695	0.039	0.035333333	94.92%
9/18/2014	0.655	0.037	0.034833333	94.68%
9/19/2014	1.073	0.035	0.030166667	97.19%
9/20/2014	0.638	0.032	0.029	95.45%
9/21/2014	0.586	0.032	0.030833333	94.74%
9/22/2014	0.94	0.029	0.027833333	97.04%
9/23/2014	0.659	0.03	0.029166667	95.57%
9/24/2014	0.523	0.038	0.0325	93.79%
9/25/2014	0.5	0.038	0.035166667	92.97%
9/26/2014	0.41	0.04	0.035166667	91.42%
9/27/2014	0.4	0.043	0.040333333	89.92%
9/28/2014	1.096	0.04	0.0375	96.58%
9/29/2014	0.682	0.042	0.0385	94.35%
9/30/2014	0.894	0.039	0.037166667	95.84%
10/1/2014	1.89	0.045	0.038833333	97.95%
10/2/2014	0.706	0.04	0.035833333	94.92%
10/3/2014	0.302	0.04	0.034	88.74%
10/4/2014	0.235	0.035	0.031333333	86.67%
10/5/2014	0.213	0.033	0.030833333	85.52%
10/6/2014	0.219	0.034	0.030166667	86.23%
10/7/2014	0.193	0.039	0.0355	81.61%
10/8/2014	0.189	0.041	0.037	80.42%
10/9/2014	0.293	0.052	0.043833333	85.04%
10/10/2014	0.128	0.063	0.044666667	65.10%
10/11/2014	0.104	0.046	0.0415	60.10%
10/12/2014	0.114	0.041	0.0375	67.11%
10/13/2014	0.115	0.041	0.037666667	67.25%
10/14/2014	0.12	0.038	0.037166667	69.03%
10/15/2014	0.15	0.043	0.039166667	73.89%
10/16/2014	0.21	0.038	0.037333333	82.22%
10/17/2014	0.237	0.039	0.037833333	84.04%
10/18/2014	0.279	0.041	0.038166667	86.32%
10/19/2014	0.276	0.041	0.038166667	86.17%
10/20/2014	0.29	0.04	0.038333333	86.78%
10/21/2014	6.579	0.045	0.0425	99.35%
10/22/2014	0.189	0.042	0.038666667	79.54%
10/23/2014	0.4	0.04	0.037333333	90.67%
10/24/2014	0.175	0.053	0.044	74.86%
10/25/2014	0.1732	0.092	0.0535	69.11%
10/26/2014	0.17	0.042	0.039333333	76.86%
10/27/2014	0.201	0.039	0.037166667	81.51%
10/28/2014	0.202	0.036	0.033833333	83.25%
10/29/2014	0.236	0.034	0.031166667	86.79%
10/30/2014	0.249	0.057	0.0395	84.14%
10/31/2014	0.221	0.034	0.031666667	85.67%
11/1/2014	0.221	0.034	0.031666667	85.67%
11/2/2014	0.242	0.032	0.030333333	87.47%
11/3/2014	0.213	0.032	0.030833333	85.52%
11/4/2014	0.198	0.031	0.0285	85.61%
11/5/2014	0.89	0.04	0.033333333	96.25%
11/6/2014	0.889	0.034	0.031333333	96.48%
11/7/2014	0.26	0.03	0.028666667	88.97%
11/8/2014	0.23	0.036	0.032833333	85.72%
11/9/2014	0.225	0.035	0.034333333	84.74%
11/10/2014	0.209	0.037	0.0355	83.01%

11/11/2014	0.202	0.038	0.036	82.18%
11/12/2014	0.22	0.043	0.037333333	83.03%
11/13/2014	0.256	0.037	0.033666667	86.85%
11/14/2014	0.252	0.035	0.032166667	87.24%
11/15/2014	0.266	0.032	0.03	88.72%
11/16/2014	0.197	0.032	0.03	84.77%
11/17/2014	0.189	0.036	0.033333333	82.36%
11/18/2014	0.18	0.036	0.0345	80.83%
11/19/2014	0.197	0.036	0.034	82.74%
11/20/2014	0.218	0.042	0.039	82.11%
11/21/2014	0.237	0.041	0.039	83.54%
11/22/2014	0.187	0.04	0.036833333	80.30%
11/23/2014	0.17	0.042	0.037166667	78.14%
11/24/2014	3.506	0.045	0.041333333	98.82%
11/25/2014	0.176	0.039	0.035	80.11%
11/26/2014	0.203	0.032	0.031333333	84.56%
11/27/2014	0.15	0.039	0.036833333	75.44%
11/28/2014	0.16	0.04	0.038833333	75.73%
11/29/2014	0.132	0.043	0.039666667	69.95%
11/30/2014	0.156	0.038	0.036333333	76.71%
12/1/2014	0.159	0.036	0.032	79.87%
12/2/2014	0.156	0.032	0.0295	81.09%
12/3/2014	0.188	0.072	0.044833333	76.15%
12/4/2014	0.249	0.079	0.056166667	77.44%
12/5/2014	0.197	0.049	0.0455	76.90%
12/6/2014	0.196	0.055	0.048333333	75.34%
12/7/2014	0.181	0.056	0.052333333	71.09%
12/8/2014	0.194	0.052	0.047166667	75.69%
12/9/2014	0.693	0.05	0.0465	93.29%
12/10/2014	0.332	0.051	0.047833333	85.59%
12/11/2014	0.222	0.053	0.048666667	78.08%
12/12/2014				
12/13/2014				
12/14/2014	0.556	0.086	0.06225	88.80%
12/15/2014	0.373	0.036	0.028833333	92.27%
12/16/2014	0.266	0.03	0.027166667	89.79%
12/17/2014	0.252	0.03	0.027	89.29%
12/18/2014	0.206	0.07	0.059833333	70.95%
12/19/2014	3.775	0.07	0.062166667	98.35%
12/20/2014				
12/21/2014				
12/22/2014	1.964	0.086	0.05456	97.22%
12/23/2014	0.818	0.041	0.033333333	95.93%
12/24/2014	0.841	0.056	0.050333333	94.02%
12/25/2014	0.563	0.065	0.0455	91.92%
12/26/2014	0.403	0.036	0.031	92.31%
12/27/2014	1.08	0.041	0.035666667	96.70%
12/28/2014	0.658	0.062	0.0495	92.48%
12/29/2014	7.181	0.07	0.048833333	99.32%
12/30/2014	0.423	0.08	0.045833333	89.16%
12/31/2014	0.357	0.053	0.041333333	88.42%
1/1/2015	0.357	0.053	0.041333333	88.42%
1/2/2015	0.36	0.047	0.033166667	90.79%
1/3/2015	0.529	0.05	0.035666667	93.26%
1/4/2015	0.329	0.053	0.037833333	88.50%
1/5/2015	0.36	0.027	0.025333333	92.96%
1/6/2015	0.348	0.027	0.025166667	92.77%
1/7/2015	0.322	0.029	0.028166667	91.25%
1/8/2015	0.35	0.03	0.026833333	92.33%
1/9/2015	0.363	0.025	0.024666667	93.20%
1/10/2015	0.303	0.026	0.0255	91.58%
1/11/2015	0.59	0.06	0.032666667	94.46%
1/12/2015	0.434	0.03	0.029	93.32%
1/13/2015	0.524	0.039	0.0335	93.61%
1/14/2015	0.755	0.036	0.032666667	95.67%
1/15/2015	0.513	0.06	0.042833333	91.65%
1/16/2015	0.715	0.076	0.045666667	93.61%
1/17/2015	0.46	0.049	0.037333333	91.88%

1/18/2015	0.568	0.036	0.0326	94.26%
1/19/2015	0.952	0.043	0.0318	96.66%
1/20/2015	0.47	0.029	0.026166667	94.43%
1/21/2015	0.421	0.027	0.022666667	94.62%
1/22/2015	0.416	0.022	0.018833333	95.47%
1/23/2015	0.36	0.023	0.019833333	94.49%
1/24/2015	0.377	0.052	0.0328	91.30%
1/25/2015	0.316	0.034	0.0255	91.93%
1/26/2015	0.351	0.04	0.022666667	93.54%
1/27/2015	0.372	0.034	0.027	92.74%
1/28/2015	0.328	0.021	0.0205	93.75%
1/29/2015	0.42			100.00%
1/30/2015				
1/31/2015	0.579	0.025	0.021833333	96.23%
2/1/2015	0.579	0.025	0.022183333	96.17%
2/2/2015	0.377	0.059	0.029666667	92.13%
2/3/2015	0.29	0.04	0.035	87.93%
2/4/2015	0.359	0.065	0.054166667	84.91%
2/5/2015	0.356	0.057	0.045333333	87.27%
2/6/2015	0.326	0.081	0.060166667	81.54%
2/7/2015	0.715	0.112	0.083	88.39%
2/8/2015	0.61	0.035	0.028333333	95.36%
2/9/2015	0.32	0.023	0.022166667	93.07%
2/10/2015	0.275	0.025	0.022833333	91.70%
2/11/2015	0.31	0.024	0.021666667	93.01%
2/12/2015	0.295	0.023	0.020166667	93.16%
2/13/2015	0.322	0.023	0.021666667	93.27%
2/14/2015	0.368	0.026	0.023	93.75%
2/15/2015	0.33	0.024	0.022333333	93.23%
2/16/2015	0.379	0.025	0.0225	94.06%
2/17/2015	0.365	0.025	0.022666667	93.79%
2/18/2015	0.349	0.023	0.022166667	93.65%
2/19/2015	0.3	0.024	0.022666667	92.44%
2/20/2015	0.327	0.026	0.022666667	93.07%
2/21/2015	0.283	0.023	0.022	92.23%
2/22/2015	0.27	0.027	0.0235	91.30%
2/23/2015	0.75	0.036	0.031833333	95.76%
2/24/2015	0.71	0.031	0.029833333	95.80%
2/25/2015	0.738	0.037	0.0275	96.27%
2/26/2015	0.711	0.025	0.023333333	96.72%
2/27/2015	0.57	0.025	0.022666667	96.02%
2/28/2015	0.454	0.026	0.024	94.71%
3/1/2015	1.061	0.028	0.024833333	97.66%
3/2/2015	0.905	0.037	0.03	96.69%
3/3/2015	0.656	0.039	0.028833333	95.60%
3/4/2015	0.714	0.042	0.0345	95.17%
3/5/2015	0.664	0.069	0.044166667	93.35%
3/6/2015	0.688	0.06	0.039333333	94.28%
3/7/2015	0.651	0.043	0.036333333	94.42%
3/8/2015	0.707	0.04	0.038	94.63%
3/9/2015	0.727	0.048	0.044	93.95%
3/10/2015	0.753	0.053	0.044166667	94.13%
3/11/2015	0.4	0.062	0.046333333	88.42%
3/12/2015	0.47	0.045	0.041833333	91.10%
3/13/2015	0.377	0.046	0.042	88.86%
3/14/2015	0.35	0.046	0.044	87.43%
3/15/2015	0.42	0.045	0.044	89.52%
3/16/2015	0.476	0.049	0.046333333	90.27%
3/17/2015	0.337	0.046	0.041166667	87.78%
3/18/2015	0.421	0.049	0.044166667	89.51%
3/19/2015	0.321	0.053	0.05	84.42%
3/20/2015	0.364	0.058	0.049333333	86.45%
3/21/2015	0.458	0.046	0.044666667	90.25%
3/22/2015	0.609	0.061	0.052333333	91.41%
3/23/2015	0.412	0.054	0.049666667	87.94%
3/24/2015	0.379	0.048	0.039666667	89.53%
3/25/2015	0.273	0.037	0.036	86.81%
3/26/2015	0.272	0.038	0.036166667	86.70%

3/27/2015	0.278	0.037	0.035833333	87.11%
3/28/2015	0.243	0.039	0.036833333	84.84%
3/29/2015	0.25	0.037	0.035166667	85.93%
3/30/2015	0.239	0.04	0.037666667	84.24%
3/31/2015	0.28	0.049	0.0415	85.18%
4/1/2015	0.28	0.049	0.0415	85.18%
4/2/2015	0.27	0.045	0.038166667	85.86%
4/3/2015	0.222	0.038	0.036833333	83.41%
4/4/2015	0.7	0.053	0.040666667	94.19%
4/5/2015	0.638	0.04	0.038666667	93.94%
4/6/2015	0.361	0.042	0.0405	88.78%
4/7/2015	0.45	0.042	0.041666667	90.74%
4/8/2015	0.355	0.045	0.042666667	87.98%
4/9/2015	0.316	0.045	0.040166667	87.29%
4/10/2015	0.993	0.05	0.046833333	95.28%
4/11/2015	0.305	0.046	0.040333333	86.78%
4/12/2015	0.28	0.046	0.0405	85.54%
4/13/2015	0.29	0.043	0.039666667	86.32%
4/14/2015	0.284	0.042	0.04	85.92%
4/15/2015	0.327	0.04	0.037333333	88.58%
4/16/2015	0.269	0.043	0.040166667	85.07%
4/17/2015	0.289	0.044	0.041666667	85.58%
4/18/2015	0.301	0.043	0.040666667	86.49%
4/19/2015	0.38	0.042	0.040333333	89.39%
4/20/2015	0.338	0.04	0.038666667	88.56%
4/21/2015	0.32	0.038	0.0375	88.28%
4/22/2015	0.349	0.045	0.039333333	88.73%
4/23/2015	0.3	0.045	0.037666667	87.44%
4/24/2015	0.277	0.049	0.046666667	83.15%
4/25/2015	0.199	0.05	0.0475	76.13%
4/26/2015	0.79	0.05	0.044166667	94.41%
4/27/2015	0.626	0.044	0.040166667	93.58%
4/28/2015	0.188	0.04	0.036	80.85%
4/29/2015	0.476	0.036	0.0335	92.96%
4/30/2015	0.218	0.05	0.035666667	83.64%
5/1/2015	0.156	0.038	0.035166667	77.46%
5/2/2015	0.21	0.039	0.0365	82.62%
5/3/2015	0.377	0.038	0.034833333	90.76%
5/4/2015	0.646	0.038	0.035666667	94.48%
5/5/2015	0.322	0.041	0.038333333	88.10%
5/6/2015	0.24	0.048	0.041333333	82.78%
5/7/2015	0.309	0.039	0.035333333	88.57%
5/8/2015	0.223	0.038	0.034833333	84.38%
5/9/2015	0.351	0.047	0.037	89.46%
5/10/2015	0.395	0.044	0.039166667	90.08%
5/11/2015	0.388	0.06	0.040333333	89.60%
5/12/2015	0.38	0.044	0.037166667	90.22%
5/13/2015	0.464	0.044	0.037166667	91.99%
5/14/2015	0.271	0.044	0.035333333	86.96%
5/15/2015	0.37	0.043	0.04	89.19%
5/16/2015	1.274	0.054	0.0476	96.26%
5/17/2015	0.361	0.051	0.038166667	89.43%
5/18/2015	0.294	0.035	0.032833333	88.83%
5/19/2015	0.291	0.041	0.036	87.63%
5/20/2015	0.383	0.046	0.041833333	89.08%
5/21/2015	7.265	0.039	0.035833333	99.51%
5/22/2015	7.261	0.048	0.042166667	99.42%
5/23/2015	0.321	0.054	0.044666667	86.09%
5/24/2015	0.316	0.048	0.0415	86.87%
5/25/2015	0.3	0.051	0.043166667	85.61%
5/26/2015	0.328	0.055	0.045833333	86.03%
5/27/2015	0.684	0.052	0.0405	94.08%
5/28/2015	0.327	0.044	0.037833333	88.43%
5/29/2015	0.321	0.044	0.039333333	87.75%
5/30/2015	0.333	0.052	0.043333333	86.99%
5/31/2015	0.331	0.057	0.050833333	84.64%
6/1/2015	0.331	0.057	0.050833333	84.64%
6/2/2015	0.426	0.075	0.063333333	85.13%

6/3/2015	0.369	0.068	0.060666667	83.56%
6/4/2015	0.3	0.062	0.060166667	79.94%
6/5/2015	0.331	0.065	0.062	81.27%
6/6/2015	0.3	0.07	0.0655	78.17%
6/7/2015	0.408	0.082	0.069	83.09%
6/8/2015	0.425	0.059	0.054666667	87.14%
6/9/2015	1.667	0.056	0.049333333	97.04%
6/10/2015	0.224	0.047	0.044333333	80.21%
6/11/2015	0.213	0.052	0.046333333	78.25%
6/12/2015	0.65	0.055	0.053666667	91.74%
6/13/2015	0.244	0.053	0.048166667	80.26%
6/14/2015	0.425	0.057	0.05	88.24%
6/15/2015	0.365	0.052	0.048333333	86.76%
6/16/2015	0.262	0.049	0.0445	83.02%
6/17/2015	0.311	0.052	0.048666667	84.35%
6/18/2015	0.911	0.053	0.049166667	94.60%
6/19/2015	0.437	0.053	0.048166667	88.98%
6/20/2015	0.318	0.063	0.056333333	82.29%
6/21/2015	0.374	0.062	0.056333333	84.94%
6/22/2015	1.927	0.06	0.052333333	97.28%
6/23/2015	1.13	0.055	0.0515	95.44%
6/24/2015	0.404	0.072	0.059666667	85.23%
6/25/2015	0.421	0.05	0.0458	89.12%
6/26/2015	0.32	0.046	0.044833333	85.99%
6/27/2015	0.396	0.038	0.036166667	90.87%
6/28/2015	0.288	0.045	0.039833333	86.17%
6/29/2015	0.253	0.04	0.036166667	85.70%
6/30/2015	0.323	0.04	0.0355	89.01%
7/1/2015	0.257	0.045	0.040666667	84.18%
7/2/2015	0.308	0.046	0.035833333	88.37%
7/3/2015	0.308	0.046	0.035833333	88.37%
7/4/2015	0.317	0.044	0.039833333	87.43%
7/5/2015	0.274	0.091	0.044	83.94%
7/6/2015	0.605	0.099	0.047833333	92.09%
7/7/2015	0.423	0.038	0.0345	91.84%
7/8/2015	0.374	0.038	0.033166667	91.13%
7/9/2015	0.454	0.047	0.039666667	91.26%
7/10/2015	0.358	0.046	0.043333333	87.90%
7/11/2015	0.329	0.047	0.0455	86.17%
7/12/2015	0.4	0.046	0.043166667	89.21%
7/13/2015				
7/14/2015	0.322	0.04	0.0375	88.35%
7/15/2015	0.4	0.048	0.043	89.25%
7/16/2015	0.557	0.051	0.0405	92.73%
7/17/2015	0.704	0.058	0.0495	92.97%
7/18/2015	0.658	0.055	0.051166667	92.22%
7/19/2015	0.66	0.052	0.0445	93.26%
7/20/2015	0.209	0.071	0.044833333	78.55%
7/21/2015	1.532	0.15	0.124333333	91.88%
7/22/2015	2.032	0.15	0.110166667	94.58%
7/23/2015	2.3	0.149	0.108	95.30%
7/24/2015	0.74	0.06	0.048	93.51%
7/25/2015	0.409	0.065	0.047166667	88.47%
7/26/2015	0.486	0.096	0.080833333	83.37%
7/27/2015	3.392	0.121	0.104833333	96.91%
7/28/2015	0.662	0.109	0.104	84.29%
7/29/2015	0.855	0.137	0.121166667	85.83%
7/30/2015	1.255	0.15	0.138333333	88.98%
7/31/2015	0.476	0.096	0.092833333	80.50%
8/1/2015	0.476	0.096	0.092833333	80.50%
8/2/2015	0.451	0.111	0.095166667	78.90%
8/3/2015	0.488	0.086	0.071833333	85.28%
8/4/2015	0.492	0.089	0.076	84.55%
8/5/2015	0.937	0.086	0.079833333	91.48%
8/6/2015	0.578	0.065	0.0555	90.40%
8/7/2015	0.565	0.048	0.0445	92.12%
8/8/2015	0.501	0.045	0.0425	91.52%
8/9/2015	0.466	0.04	0.04	91.42%

8/10/2015	0.711	0.052	0.044166667	93.79%
8/11/2015	0.635	0.051	0.042333333	93.33%
8/12/2015	0.432	0.037	0.036	91.67%
8/13/2015	0.889	0.075	0.043833333	95.07%
8/14/2015	0.879	0.037	0.034166667	96.11%
8/15/2015	0.66	0.044	0.031583333	95.21%
8/16/2015	0.508	0.046	0.037333333	92.65%
8/17/2015	0.791	0.04	0.037	95.32%
8/18/2015	0.519	0.038	0.035333333	93.19%
8/19/2015	0.354	0.044	0.041833333	88.18%
8/20/2015	0.311	0.043	0.0395	87.30%
8/21/2015	0.254	0.042	0.038666667	84.78%
8/22/2015	0.374	0.041	0.038	89.84%
8/23/2015	0.192	0.037	0.034833333	81.86%
8/24/2015	0.18	0.039	0.0355	80.28%
8/25/2015	0.18	0.039	0.0355	80.28%
8/26/2015	0.255	0.036	0.035166667	86.21%
8/27/2015	0.207	0.037	0.0365	82.37%
8/28/2015	0.193	0.046	0.037833333	80.40%
8/29/2015	0.201	0.04	0.036166667	82.01%
8/30/2015	0.228	0.036	0.035333333	84.50%
8/31/2015	0.232	0.042	0.040166667	82.69%
9/1/2015	0.232	0.042	0.040166667	82.69%
9/2/2015	0.579	0.055	0.0425	92.66%
9/3/2015	0.389	0.041	0.038333333	90.15%
9/4/2015	0.483	0.042	0.040166667	91.68%
9/5/2015	0.517	0.047	0.041666667	91.94%
9/6/2015	0.878	0.125	0.060833333	93.07%
9/7/2015	0.883	0.047	0.0435	95.07%
9/8/2015	0.603	0.045	0.042	93.03%
9/9/2015	0.437	0.077	0.0485	88.90%
9/10/2015	0.326	0.045	0.042	87.12%
9/11/2015	0.394	0.046	0.041833333	89.38%
9/12/2015	0.368	0.045	0.042666667	88.41%
9/13/2015	0.374	0.046	0.044	88.24%
9/14/2015	0.385	0.043	0.0395	89.74%
9/15/2015	0.51	0.045	0.037333333	92.68%
9/16/2015	0.38	0.062	0.051333333	86.49%
9/17/2015	0.31	0.063	0.059833333	80.70%
9/18/2015	0.371	0.083	0.0715	80.73%
9/19/2015	0.325	0.118	0.095666667	70.56%
9/20/2015	0.822	0.137	0.1265	84.61%
9/21/2015	0.875	0.103	0.092833333	89.39%
9/22/2015	0.789	0.092	0.088	88.85%
9/23/2015	0.407	0.098	0.085333333	79.03%
9/24/2015	0.495	0.102	0.079666667	83.91%
9/25/2015	0.399	0.043	0.0395	90.10%
9/26/2015	0.39	0.039	0.038166667	90.21%
9/27/2015	0.549	0.041	0.038166667	93.05%
9/28/2015	0.556	0.042	0.039833333	92.84%
9/29/2015	0.506	0.043	0.0415	91.80%
9/30/2015	0.481	0.11	0.0515	89.29%
10/1/2015	0.437	0.046	0.0415	90.50%
10/2/2015	0.347	0.042	0.039833333	88.52%
10/3/2015	0.3	0.041	0.038	87.33%
10/4/2015	0.518	0.055	0.041333333	92.02%
10/5/2015	0.635	0.074	0.0675	89.37%
10/6/2015	0.647	0.073	0.066333333	89.75%
10/7/2015	0.4	0.07	0.053666667	86.58%
10/8/2015	0.338	0.04	0.0335	90.09%
10/9/2015	0.32	0.028	0.027166667	91.51%
10/10/2015	0.434	0.028	0.026833333	93.82%
10/11/2015	0.5	0.033	0.030333333	93.93%
10/12/2015	0.262	0.032	0.0285	89.12%
10/13/2015	0.225	0.051	0.039	82.67%
10/14/2015	0.216	0.044	0.0335	84.49%
10/15/2015	0.297	0.05	0.045166667	84.79%
10/16/2015	0.297	0.06	0.046833333	84.23%

10/17/2015	0.79	0.055	0.035666667	95.49%
10/18/2015	0.366	0.029	0.026833333	92.67%
10/19/2015	0.345	0.029	0.0265	92.32%
10/20/2015	0.323	0.028	0.026666667	91.74%
10/21/2015	0.298	0.03	0.026833333	91.00%
10/22/2015	0.316	0.03	0.0275	91.30%
10/23/2015	0.257	0.035	0.030166667	88.26%
10/24/2015	0.258	0.04	0.0335	87.02%
10/25/2015	0.258	0.034	0.029666667	88.50%
10/26/2015	0.444	0.04	0.032	92.79%
10/27/2015	0.334	0.034	0.032	90.42%
10/28/2015	0.6	0.034	0.031666667	94.72%
10/29/2015	0.36	0.034	0.030833333	91.44%
10/30/2015	0.39	0.034	0.032	91.79%
10/31/2015				
11/1/2015	0.444	0.032	0.030666667	93.09%
11/2/2015	0.467	0.036	0.031666667	93.22%
11/3/2015	1.123	0.041	0.0345	96.93%
11/4/2015	0.609	0.039	0.035333333	94.20%
11/5/2015	0.405	0.042	0.037833333	90.66%
11/6/2015	0.468	0.038	0.033833333	92.77%
11/7/2015	0.485	0.04	0.0345	92.89%
11/8/2015	0.456	0.035	0.032	92.98%
11/9/2015	5.848	0.049	0.034833333	99.40%
11/10/2015	0.499	0.032	0.0295	94.09%
11/11/2015	0.411	0.037	0.0335	91.85%
11/12/2015	0.44	0.038	0.034833333	92.08%
11/13/2015	0.404	0.037	0.034666667	91.42%
11/14/2015	0.428	0.037	0.033333333	92.21%
11/15/2015	0.443	0.04	0.037833333	91.46%
11/16/2015	1.244	0.038	0.034	97.27%
11/17/2015	0.449	0.038	0.029333333	93.47%
11/18/2015	0.393	0.028	0.026	93.38%
11/19/2015	0.4	0.026	0.025	93.75%
11/20/2015	0.713	0.029	0.0265	96.28%
11/21/2015	0.412	0.031	0.027333333	93.37%
11/22/2015	0.426	0.032	0.030333333	92.88%
11/23/2015	0.64	0.031	0.028333333	95.57%
11/24/2015	0.354	0.033	0.029	91.81%
11/25/2015	0.496	0.036	0.034	93.15%
11/26/2015	0.406	0.039	0.0375	90.76%
11/27/2015	0.405	0.036	0.035166667	91.32%
11/28/2015	0.608	0.052	0.0425	93.01%
11/29/2015	0.423	0.044	0.038166667	90.98%
11/30/2015	1.561	0.042	0.036666667	97.65%
12/1/2015	0.47	0.036	0.031833333	93.23%
12/2/2015	0.301	0.027	0.025333333	91.58%
12/3/2015	0.326	0.032	0.026833333	91.77%
12/4/2015	0.282	0.034	0.028666667	89.83%
12/5/2015	0.241	0.088	0.0485	79.88%
12/6/2015	0.235	0.073	0.047833333	79.65%
12/7/2015	0.363	0.065	0.048666667	86.59%
12/8/2015	0.28	0.052	0.045	83.93%
12/9/2015	0.26	0.063	0.051833333	80.06%
12/10/2015	0.22	0.06	0.044	80.00%
12/11/2015	0.554	0.08	0.051833333	90.64%
12/12/2015	0.247	0.05	0.0395	84.01%
12/13/2015	0.247	0.06	0.044333333	82.05%
12/14/2015	0.293	0.087	0.051	82.59%
12/15/2015	0.251	0.054	0.042833333	82.93%
12/16/2015	0.21	0.076	0.053666667	74.44%
12/17/2015	0.191	0.069	0.040333333	78.88%
12/18/2015	0.202	0.087	0.061333333	69.64%
12/19/2015	0.201	0.104	0.056166667	72.06%
12/20/2015	0.22	0.081	0.069666667	68.33%
12/21/2015	0.211	0.084	0.059166667	71.96%
12/22/2015	0.439	0.05	0.038	91.34%
12/23/2015	0.346	0.042	0.039166667	88.68%

12/24/2015	0.333	0.039	0.036333333	89.09%
12/25/2015	0.286	0.038	0.035	87.76%
12/26/2015	0.455	0.036	0.0335	92.64%
12/27/2015	0.335	0.034	0.032666667	90.25%
12/28/2015	0.327	0.036	0.032333333	90.11%
12/29/2015	0.386	0.062	0.048	87.56%
12/30/2015	0.35	0.045	0.0415	88.14%
12/31/2015		0.039	0.037166667	
1/1/2016	0.32	0.04	0.035666667	88.85%
1/2/2016	0.325	0.045	0.0405	87.54%
1/3/2016	0.306	0.057	0.039833333	86.98%
1/4/2016	0.398	0.076	0.060166667	84.88%
1/5/2016				
1/6/2016				
1/7/2016	0.588	0.079	0.0745	87.33%
1/8/2016	12.051	0.091	0.071666667	99.41%
1/9/2016	1.026	0.09	0.0754	92.65%
1/10/2016				
1/11/2016	0.95	0.074	0.06475	93.18%
1/12/2016	1.597	0.06	0.044	97.24%
1/13/2016	1.569	0.081	0.048166667	96.93%
1/14/2016	1.24	0.059	0.043833333	96.47%
1/15/2016	1.117	0.145	0.072166667	93.54%
1/16/2016	1.07	0.145	0.095333333	91.09%
1/17/2016	0.894	0.134	0.075166667	91.59%
1/18/2016	0.536	0.064	0.046666667	91.29%
1/19/2016	0.533	0.09	0.069666667	86.93%
1/20/2016	0.359	0.071	0.044166667	87.70%
1/21/2016	0.502	0.03	0.0285	94.32%
1/22/2016	0.5	0.03	0.027333333	94.53%
1/23/2016	1.07	0.057	0.034666667	96.76%
1/24/2016	0.534	0.027	0.026166667	95.10%
1/25/2016	0.477	0.04	0.038	92.03%
1/26/2016	2.672	0.047	0.037	98.62%
1/27/2016	0.759	0.044	0.035333333	95.34%
1/28/2016	0.608	0.03	0.0275	95.48%
1/29/2016	0.434	0.028	0.026166667	93.97%
1/30/2016	0.393	0.03	0.0275	93.00%
1/31/2016	0.4	0.03	0.029	92.75%
2/1/2016	1.706	0.058	0.038	97.77%
2/2/2016	1.6	0.086	0.0435	97.28%
2/3/2016	0.559	0.043	0.032166667	94.25%
2/4/2016	1.37	0.114	0.074	94.60%
2/5/2016	0.98	0.092	0.076	92.24%
2/6/2016	0.794	0.073	0.069166667	91.29%
2/7/2016	0.624	0.08	0.0705	88.70%
2/8/2016	0.675	0.056	0.045	93.33%
2/9/2016	1.721	0.043	0.039166667	97.72%
2/10/2016	2.99	0.047	0.042333333	98.58%
2/11/2016	2.284	0.065	0.055666667	97.56%
2/12/2016	2.06	0.086	0.070333333	96.59%
2/13/2016	0.835	0.079	0.068166667	91.84%
2/14/2016	1.67	0.071	0.062833333	96.24%
2/15/2016	1.723	0.043	0.0375	97.82%
2/16/2016	1.164	0.056	0.04	96.56%
2/17/2016	0.734	0.094	0.061333333	91.64%
2/18/2016	1.289	0.109	0.068166667	94.71%
2/19/2016	0.639	0.076	0.041166667	93.56%
2/20/2016	0.479	0.036	0.032333333	93.25%
2/21/2016	0.38	0.042	0.0395	89.61%
2/22/2016	0.636	0.045	0.037833333	94.05%
2/23/2016	0.938	0.158	0.078833333	91.60%
2/24/2016	0.831	0.068	0.038666667	95.35%
2/25/2016	0.474	0.054	0.040333333	91.49%
2/26/2016	0.477	0.064	0.047166667	90.11%
2/27/2016	0.402	0.034	0.027666667	93.12%
2/28/2016	0.52	0.091	0.062	88.08%
2/29/2016	0.756	0.092	0.0495	93.45%

3/1/2016	0.63	0.053	0.041166667	93.47%
3/2/2016	0.505	0.075	0.060333333	88.05%
3/3/2016	0.452	0.086	0.067833333	84.99%
3/4/2016	1.184	0.109	0.085166667	92.81%
3/5/2016	1.255	0.163	0.087333333	93.04%
3/6/2016	0.983	0.051	0.038166667	96.12%
3/7/2016	2.402	0.098	0.080166667	96.66%
3/8/2016	1.993	0.112	0.0985	95.06%
3/9/2016	1.457	0.114	0.0905	93.79%
3/10/2016	1.317	0.11	0.0945	92.82%
3/11/2016	1.42	0.156	0.124166667	91.26%
3/12/2016	1.685	0.158	0.126833333	92.47%
3/13/2016	2.426	0.14	0.119333333	95.08%
3/14/2016	1.168	0.065	0.044333333	96.20%
3/15/2016	1.016	0.042	0.0355	96.51%
3/16/2016	1.637	0.039	0.03	98.17%
3/17/2016	1.469	0.062	0.0395	97.31%
3/18/2016	0.912	0.051	0.0375	95.89%
3/19/2016	0.589	0.142	0.053	91.00%
3/20/2016	0.625	0.03	0.0265	95.76%
3/21/2016	0.581	0.059	0.040333333	93.06%
3/22/2016	0.59	0.08	0.05	91.53%
3/23/2016	0.454	0.054	0.0315	93.06%
3/24/2016	0.468	0.046	0.036	92.31%
3/25/2016	0.46	0.047	0.029333333	93.62%
3/26/2016	0.399	0.082	0.06	84.96%
3/27/2016	0.381	0.104	0.092166667	75.81%
3/28/2016	0.509	0.138	0.076166667	85.04%
3/29/2016	0.502	0.037	0.029666667	94.09%
3/30/2016	0.469	0.053	0.038166667	91.86%
3/31/2016				
4/1/2016	0.346	0.028	0.027166667	92.15%
4/2/2016	0.342	0.028	0.027333333	92.01%
4/3/2016	0.296	0.028	0.027	90.88%
4/4/2016	0.333	0.032	0.0295	91.14%
4/5/2016	1.281	0.041	0.034166667	97.33%
4/6/2016	0.685	0.052	0.043333333	93.67%
4/7/2016	0.517	0.059	0.056833333	89.01%
4/8/2016	0.639	0.057	0.053666667	91.60%
4/9/2016	0.652	0.053	0.050333333	92.28%
4/10/2016	0.795	0.051	0.047	94.09%
4/11/2016	0.79	0.077	0.061166667	92.26%
4/12/2016	0.776	0.059	0.054666667	92.96%
4/13/2016	0.812	0.053	0.0505	93.78%
4/14/2016	0.806	0.055	0.05	93.80%
4/15/2016	0.823	0.072	0.060333333	92.67%
4/16/2016	0.864	0.071	0.062166667	92.80%
4/17/2016	0.857	0.072	0.065	92.42%
4/18/2016	0.766	0.063	0.060166667	92.15%
4/19/2016	0.955	0.074	0.061666667	93.54%
4/20/2016	0.869	0.093	0.087666667	89.91%
4/21/2016	0.502	0.091	0.065666667	86.92%
4/22/2016	0.976	0.076	0.065166667	93.32%
4/23/2016	0.935	0.079	0.070666667	92.44%
4/24/2016	0.866	0.074	0.070066667	91.91%
4/25/2016	0.937	0.074	0.070333333	92.49%
4/26/2016	0.824	0.081	0.073333333	91.10%
4/27/2016	0.789	0.089	0.074666667	90.54%
4/28/2016	0.84	0.069	0.062	92.62%
4/29/2016	0.764	0.054	0.051333333	93.28%
4/30/2016	0.684	0.065	0.055666667	91.86%
5/1/2016	0.817	0.062	0.0575	92.96%
5/2/2016	0.658	0.062	0.054	91.79%
5/3/2016	0.622	0.067	0.062	90.03%
5/4/2016	0.588	0.079	0.067833333	88.46%
5/5/2016	0.618	0.075	0.068166667	88.97%
5/6/2016	0.396	0.065	0.055666667	85.94%
5/7/2016	0.639	0.061	0.057666667	90.98%

5/8/2016	0.552	0.063	0.057666667	89.55%
5/9/2016	0.549	0.069	0.053	90.35%
5/10/2016	0.651	0.081	0.069333333	89.35%
5/11/2016	0.589	0.077	0.0745	87.35%
5/12/2016	0.56	0.091	0.075833333	86.46%
5/13/2016	0.475	0.085	0.076	84.00%
5/14/2016	0.842	0.071	0.067666667	91.96%
5/15/2016	0.799	0.075	0.069	91.36%
5/16/2016	0.445	0.062	0.056666667	87.27%
5/17/2016	0.483	0.069	0.060666667	87.44%
5/18/2016	0.487	0.073	0.0655	86.55%
5/19/2016	0.807	0.072	0.068333333	91.53%
5/20/2016	0.444	0.067	0.0625	85.92%
5/21/2016	0.388	0.065	0.0595	84.66%
5/22/2016	0.367	0.06	0.055833333	84.79%
5/23/2016	0.45	0.058	0.053166667	88.19%
5/24/2016	0.407	0.063	0.058	85.75%
5/25/2016	0.414	0.053	0.050166667	87.88%
5/26/2016	0.415	0.076	0.051	87.71%
5/27/2016	0.402	0.06	0.053833333	86.61%
5/28/2016	0.428	0.06	0.057	86.68%
5/29/2016	0.48	0.116	0.094666667	80.28%
5/30/2016	0.496	0.109	0.103333333	79.17%
5/31/2016	0.573	0.107	0.104	81.85%
6/1/2016	0.544	0.163	0.152666667	71.94%
6/2/2016	0.454	0.068	0.060333333	86.71%
6/3/2016	0.463	0.112	0.106166667	77.07%
6/4/2016	0.423	0.102	0.093	78.01%
6/5/2016	0.415	0.099	0.092	77.83%
6/6/2016	0.392	0.098	0.078166667	80.06%
6/7/2016	0.364	0.085	0.058	84.07%
6/8/2016	0.559	0.074	0.0635	88.64%
6/9/2016	0.538	0.078	0.075166667	86.03%
6/10/2016	0.502	0.076	0.0715	85.76%
6/11/2016	0.387	0.067	0.0625	83.85%
6/12/2016	0.467	0.075	0.0685	85.33%
6/13/2016	0.491	0.088	0.0755	84.62%
6/14/2016	0.484	0.085	0.078833333	83.71%
6/15/2016	0.476	0.096	0.082333333	82.70%
6/16/2016	0.472	0.077	0.072833333	84.57%
6/17/2016	0.475	0.086	0.074333333	84.35%
6/18/2016	0.509	0.079	0.072	85.85%
6/19/2016	0.505	0.08	0.072333333	85.68%
6/20/2016	0.497	0.072	0.070166667	85.88%
6/21/2016	0.463	0.072	0.069	85.10%
6/22/2016	0.428	0.076	0.070666667	83.49%
6/23/2016	0.45	0.085	0.081	82.00%
6/24/2016	0.426	0.088	0.078833333	81.49%
6/25/2016	0.4	0.082	0.0805	79.88%
6/26/2016	0.47	0.073	0.066666667	85.82%
6/27/2016	0.576	0.059	0.054333333	90.57%
6/28/2016	0.563	0.074	0.068166667	87.89%
6/29/2016	0.621	0.065	0.059666667	90.39%
6/30/2016	0.774	0.073	0.061166667	92.10%
7/1/2016	0.656	0.069	0.063333333	90.35%
7/2/2016	0.482	0.064	0.058	87.97%
7/3/2016	0.617	0.073	0.066	89.30%
7/4/2016	0.53	0.07	0.063333333	88.05%
7/5/2016	0.438	0.063	0.0595	86.42%
7/6/2016	0.396	0.063	0.057833333	85.40%
7/7/2016	0.44	0.063	0.0615	86.02%
7/8/2016	0.451	0.061	0.0575	87.25%
7/9/2016	0.609	0.065	0.059	90.31%
7/10/2016	0.412	0.064	0.060333333	85.36%
7/11/2016	1.215	0.065	0.061166667	94.97%
7/12/2016	0.538	0.07	0.068166667	87.33%
7/13/2016	0.449	0.07	0.066166667	85.26%
7/14/2016	0.572	0.073	0.0665	88.37%

7/15/2016	0.545	0.068	0.064	88.26%
7/16/2016	0.44	0.067	0.065166667	85.19%
7/17/2016	0.469	0.068	0.063833333	86.39%
7/18/2016	0.482	0.069	0.067	86.10%
7/19/2016	0.602	0.08	0.0745	87.62%
7/20/2016	0.695	0.082	0.078666667	88.68%
7/21/2016	0.669	0.087	0.082166667	87.72%
7/22/2016	0.753	0.096	0.090333333	88.00%
7/23/2016	0.69	0.095	0.089	87.10%
7/24/2016	0.697	0.092	0.088333333	87.33%
7/25/2016	0.726	0.11	0.102	85.95%
7/26/2016	0.7	0.098	0.090833333	87.02%
7/27/2016	0.604	0.1	0.091166667	84.91%
7/28/2016	0.587	0.114	0.095333333	83.76%
7/29/2016	0.622	0.109	0.0945	84.81%
7/30/2016	0.584	0.098	0.090166667	84.56%
7/31/2016	0.463	0.091	0.082833333	82.11%
8/1/2016	0.515	0.088	0.079166667	84.63%
8/2/2016	0.598	0.107	0.093333333	84.39%
8/3/2016	2.911	0.098	0.084333333	97.10%
8/4/2016	2.908	0.104	0.0955	96.72%
8/5/2016	0.413	0.107	0.098666667	76.11%
8/6/2016	0.474	0.104	0.095833333	79.78%
8/7/2016	0.466	0.096	0.090166667	80.65%
8/8/2016	0.459	0.098	0.0875	80.94%
8/9/2016	0.519	0.14	0.1	80.73%
8/10/2016	0.8	0.085	0.079166667	90.10%
8/11/2016	0.663	0.095	0.084333333	87.28%
8/12/2016	0.674	0.09	0.084166667	87.51%
8/13/2016	0.829	0.102	0.086666667	89.55%
8/14/2016	0.718	0.098	0.0918	87.21%
8/15/2016	0.658	0.129	0.102	84.50%
8/16/2016	0.634	0.098	0.089833333	85.83%
8/17/2016	0.623	0.096	0.083666667	86.57%
8/18/2016	0.656	0.085	0.078833333	87.98%
8/19/2016	0.736	0.134	0.094166667	87.21%
8/20/2016	0.7	0.095	0.085333333	87.81%
8/21/2016	0.669	0.091	0.085666667	87.19%
8/22/2016	0.644	0.127	0.091166667	85.84%
8/23/2016	0.6	0.097	0.089833333	85.03%
8/24/2016	1.2	0.098	0.089	92.58%
8/25/2016	0.96	0.143	0.094166667	90.19%
8/26/2016	0.654	0.09	0.0835	87.23%
8/27/2016	0.613	0.09	0.079333333	87.06%
8/28/2016	0.458	0.073	0.066	85.59%
8/29/2016	0.597	0.09	0.080166667	86.57%
8/30/2016	0.51	0.075	0.068333333	86.60%
8/31/2016	0.634	0.078	0.069333333	89.06%
9/1/2016	0.574	0.074	0.067166667	88.30%
9/2/2016	0.615	0.061	0.058333333	90.51%
9/3/2016	0.495	0.059	0.055666667	88.75%
9/4/2016	0.416	0.058	0.055	86.78%
9/5/2016	0.28	0.055	0.0495	82.32%
9/6/2016	0.3	0.055	0.049	83.67%
9/7/2016	0.336	0.048	0.044	86.90%
9/8/2016	0.339	0.043	0.039333333	88.40%
9/9/2016	0.31	0.039	0.0365	88.23%
9/10/2016	0.286	0.037	0.035833333	87.47%
9/11/2016	0.283	0.036	0.034833333	87.69%
9/12/2016	0.372	0.038	0.0365	90.19%
9/13/2016	0.321	0.038	0.036	88.79%
9/14/2016	0.402	0.044	0.039833333	90.09%
9/15/2016	0.404	0.045	0.041666667	89.69%
9/16/2016	0.37	0.041	0.038833333	89.50%
9/17/2016	0.362	0.038	0.036166667	90.01%
9/18/2016	0.449	0.04	0.035333333	92.13%
9/19/2016	0.38	0.038	0.0365	90.39%
9/20/2016	0.383	0.038	0.035666667	90.69%

9/21/2016	0.349	0.037	0.0345	90.11%
9/22/2016	0.387	0.037	0.034333333	91.13%
9/23/2016	0.375	0.038	0.0365	90.27%
9/24/2016	0.358	0.038	0.036333333	89.85%
9/25/2016	0.29	0.034	0.033166667	88.56%
9/26/2016	0.248	0.06	0.032333333	86.96%
9/27/2016	0.27	0.026	0.024666667	90.86%
9/28/2016	0.243	0.026	0.024166667	90.05%
9/29/2016	0.261	0.023	0.0225	91.38%
9/30/2016	0.241	0.023	0.022666667	90.59%
10/1/2016	0.8	0.03	0.024166667	96.98%
10/2/2016	1	0.034	0.028666667	97.13%
10/3/2016	0.472	0.037	0.0325	93.11%
10/4/2016	0.845	0.077	0.0645	92.37%
10/5/2016	0.754	0.069	0.055333333	92.66%
10/6/2016	0.377	0.031	0.028666667	92.40%
10/7/2016	0.31	0.027	0.024666667	92.04%
10/8/2016	0.297	0.026	0.0245	91.75%
10/9/2016	0.241	0.026	0.0245	89.83%
10/10/2016	0.288	0.028	0.026166667	90.91%
10/11/2016	0.232	0.029	0.027666667	88.07%
10/12/2016	0.246	0.03	0.027166667	88.96%
10/13/2016	0.291	0.031	0.029333333	89.92%
10/14/2016	0.27	0.03	0.028833333	89.32%
10/15/2016	0.281	0.029	0.027	90.39%
10/16/2016	0.293	0.028	0.026	91.13%
10/17/2016	0.246	0.024	0.023833333	90.31%
10/18/2016	0.312	0.025	0.023666667	92.41%
10/19/2016	0.264	0.025	0.024	90.91%
10/20/2016	0.383	0.023	0.023	93.99%
10/21/2016	0.258	0.033	0.026333333	89.79%
10/22/2016	0.716	0.026	0.024666667	96.55%
10/23/2016	0.4	0.027	0.0255	93.63%
10/24/2016	0.342	0.028	0.025033333	92.68%
10/25/2016	0.476	0.028	0.026	94.54%
10/26/2016	0.319	0.027	0.025333333	92.06%
10/27/2016	0.309	0.027	0.025333333	91.80%
10/28/2016	2.99	0.027	0.024666667	99.18%
10/29/2016	2.1	0.028	0.026	98.76%
10/30/2016	0.309	0.064	0.031833333	89.70%
10/31/2016	0.243	0.026	0.026	89.30%
11/1/2016	0.418	0.04	0.0355	91.51%
11/2/2016	0.351	0.035	0.031166667	91.12%
11/3/2016	0.414	0.04	0.034166667	91.75%
11/4/2016	0.591	0.046	0.035166667	94.05%
11/5/2016	0.598	0.05	0.043833333	92.67%
11/6/2016	0.457	0.044	0.037166667	91.87%
11/7/2016	0.9	0.034	0.031333333	96.52%
11/8/2016	0.25	0.03	0.0295	88.20%
11/9/2016	0.26	0.03	0.028833333	88.91%
11/10/2016	2.35	0.03	0.027333333	98.84%
11/11/2016	1.71	0.029	0.027166667	98.41%
11/12/2016	0.2	0.028	0.027333333	86.33%
11/13/2016	0.418	0.038	0.034666667	91.71%
11/14/2016	0.314	0.032	0.0295	90.61%
11/15/2016	0.395	0.03	0.027833333	92.95%
11/16/2016	0.369	0.032	0.028666667	92.23%
11/17/2016	0.33	0.034	0.028833333	91.26%
11/18/2016	0.593	0.03	0.027666667	95.33%
11/19/2016	0.32	0.028	0.026833333	91.61%
11/20/2016	1.251	0.028	0.027333333	97.82%
11/21/2016	0.991	0.037	0.036666667	96.30%
11/22/2016	0.852	0.037	0.034666667	95.93%
11/23/2016	0.456	0.036	0.0335	92.65%
11/24/2016	0.374	0.037	0.031333333	91.62%
11/25/2016	0.357	0.031	0.029	91.88%
11/26/2016	0.294	0.036	0.027333333	90.70%
11/27/2016	0.285	0.056	0.037833333	86.73%

11/28/2016	0.3	0.047	0.039	87.00%
11/29/2016	0.298	0.063	0.035333333	88.14%
11/30/2016	0.34	0.027	0.025166667	92.60%
12/1/2016	0.277	0.049	0.032666667	88.21%
12/2/2016	0.345	0.034	0.028	91.88%
12/3/2016	0.8	0.024	0.024	97.00%
12/4/2016	0.65	0.034	0.025333333	96.10%
12/5/2016	0.493	0.033	0.03	93.91%
12/6/2016	0.82	0.037	0.0295	96.40%
12/7/2016	0.353	0.027	0.025166667	92.87%
12/8/2016	0.427	0.026	0.025333333	94.07%
12/9/2016	0.444	0.027	0.026	94.14%
12/10/2016	0.44	0.036	0.0305	93.07%
12/11/2016	0.402	0.037	0.026833333	93.33%
12/12/2016	0.339	0.055	0.040833333	87.95%
12/13/2016	0.345	0.072	0.049	85.80%
12/14/2016	0.306	0.055	0.038333333	87.47%
12/15/2016	0.315	0.049	0.041	86.98%
12/16/2016	0.317	0.049	0.039666667	87.49%
12/17/2016	0.3	0.04	0.0355	88.17%
12/18/2016	0.357	0.041	0.037	89.64%
12/19/2016	0.46	0.043	0.033	92.83%
12/20/2016	0.26	0.04	0.030166667	88.40%
12/21/2016	0.275	0.06	0.042666667	84.48%
12/22/2016	0.25	0.049	0.041	83.60%
12/23/2016	0.235	0.069	0.051333333	78.16%
12/24/2016	0.263	0.06	0.051166667	80.54%
12/25/2016	0.265	0.045	0.036	86.42%
12/26/2016	0.256	0.06	0.039833333	84.44%
12/27/2016	0.363	0.049	0.040333333	88.89%
12/28/2016	0.316	0.047	0.0425	86.55%
12/29/2016	0.986	0.049	0.041333333	95.81%
12/30/2016	0.538	0.049	0.039333333	92.69%
12/31/2016	0.381	0.044	0.039666667	89.59%
1/1/2017	0.606	0.045	0.0395	93.48%
1/2/2017	0.776	0.039	0.035833333	95.38%
1/3/2017	0.466	0.051	0.039166667	91.60%
1/4/2017	1.5	0.047	0.037333333	97.51%
1/5/2017	1.03	0.043	0.040666667	96.05%
1/6/2017	0.682	0.045	0.0415	93.91%
1/7/2017	0.469	0.042	0.040666667	91.33%
1/8/2017	0.399	0.042	0.040666667	89.81%
1/9/2017	0.364	0.04	0.039	89.29%
1/10/2017				
1/11/2017				
1/12/2017	1.309	0.065	0.0505	96.14%
1/13/2017	1.41	0.037	0.0355	97.48%
1/14/2017	0.523	0.03	0.029	94.46%
1/15/2017	0.477	0.03	0.028	94.13%
1/16/2017	0.377	0.029	0.027166667	92.79%
1/17/2017	0.34	0.03	0.027833333	91.81%
1/18/2017	0.305	0.03	0.0295	90.33%
1/19/2017	0.61	0.047	0.033166667	94.56%
1/20/2017	0.355	0.032	0.0307	91.35%
1/21/2017	0.326	0.032	0.029333333	91.00%
1/22/2017	0.321	0.035	0.032	90.03%
1/23/2017	1.2	0.088	0.049833333	95.85%
1/24/2017	0.643	0.097	0.073666667	88.54%
1/25/2017	0.433	0.08	0.054	87.53%
1/26/2017	0.391	0.08	0.055333333	85.85%
1/27/2017	0.438	0.075	0.0565	87.10%
1/28/2017	0.358	0.049	0.034833333	90.27%
1/29/2017	0.202	0.029	0.027166667	86.55%
1/30/2017	0.197	0.061	0.034666667	82.40%
1/31/2017	0.735	0.038	0.0295	95.99%
2/1/2017	1.5	0.099	0.0595	96.03%
2/2/2017	0.44	0.047	0.047	89.32%
2/3/2017	0.7	0.05	0.0386	94.49%

2/4/2017	0.875	0.063	0.047833333	94.53%
2/5/2017	0.747	0.075	0.059666667	92.01%
2/6/2017	0.672	0.047	0.044	93.45%
2/7/2017	0.652	0.048	0.0418	93.59%
2/8/2017				
2/9/2017				
2/10/2017				
2/11/2017				
2/12/2017	2.919	0.117	0.085	97.09%
2/13/2017	4.2	0.046	0.034333333	99.18%
2/14/2017	0.21	0.03	0.0275	86.90%
2/15/2017	0.223	0.03	0.027833333	87.52%
2/16/2017	0.159	0.031	0.028833333	81.87%
2/17/2017	0.217	0.03	0.028	87.10%
2/18/2017	0.835	0.033	0.031	96.29%
2/19/2017	0.398	0.031	0.029833333	92.50%
2/20/2017	0.184	0.032	0.0315	82.88%
2/21/2017	0.188	0.04	0.035333333	81.21%
2/22/2017	0.18	0.048	0.041333333	77.04%
2/23/2017	0.192	0.04	0.034333333	82.12%
2/24/2017	0.249	0.046	0.035166667	85.88%
2/25/2017	0.19	0.038	0.033666667	82.28%
2/26/2017	0.198	0.038	0.0325	83.59%
2/27/2017	0.207	0.046	0.0355	82.85%
2/28/2017	0.484	0.047	0.038166667	92.11%
3/1/2017	1.714	0.041	0.0345	97.99%
3/2/2017	0.443	0.056	0.0485	89.05%
3/3/2017	0.256	0.053	0.047666667	81.38%
3/4/2017	0.963	0.066	0.0505	94.76%
3/5/2017	0.35	0.05	0.0385	89.00%
3/6/2017	0.461	0.072	0.039833333	91.36%
3/7/2017	0.307	0.038	0.030666667	90.01%
3/8/2017	0.299	0.038	0.032333333	89.19%
3/9/2017	0.329	0.069	0.044333333	86.52%
3/10/2017	0.319	0.066	0.0405	87.30%
3/11/2017	0.356	0.058	0.0455	87.22%
3/12/2017	0.418	0.051	0.0405	90.31%
3/13/2017	0.352	0.05	0.0405	88.49%
3/14/2017	0.263	0.064	0.043833333	83.33%
3/15/2017	0.263	0.051	0.041333333	84.28%
3/16/2017	0.23	0.05	0.043	81.30%
3/17/2017	0.271	0.057	0.050166667	81.49%
3/18/2017	0.28	0.051	0.046166667	83.51%
3/19/2017	0.28	0.06	0.044666667	84.05%
3/20/2017	0.237	0.063	0.053833333	77.29%
3/21/2017	0.39	0.064	0.042833333	89.02%
3/22/2017	0.386	0.072	0.067333333	82.56%
3/23/2017	0.31	0.083	0.051333333	83.44%
3/24/2017	0.314	0.065	0.043	86.31%
3/25/2017	0.395	0.054	0.0415	89.49%
3/26/2017	0.455	0.06	0.053833333	88.17%
3/27/2017	0.49	0.068	0.0525	89.29%
3/28/2017	1.2	0.095	0.063166667	94.74%
3/29/2017	0.574	0.062	0.050333333	91.23%
3/30/2017	0.521	0.068	0.057833333	88.90%
3/31/2017	0.507	0.069	0.053333333	89.48%
4/1/2017	0.729	0.066	0.057666667	92.09%
4/2/2017	0.479	0.081	0.054333333	88.66%
4/3/2017	0.376	0.092	0.068	81.91%
4/4/2017	0.493	0.084	0.071666667	85.46%
4/5/2017	0.565	0.067	0.041666667	92.63%
4/6/2017	0.5	0.04	0.030166667	93.97%
4/7/2017	0.509	0.027	0.0255	94.99%
4/8/2017	0.35	0.025	0.0235	93.29%
4/9/2017	0.4	0.026	0.023666667	94.08%
4/10/2017	0.751	0.028	0.024833333	96.69%
4/11/2017	1.358	0.027	0.0265	98.05%
4/12/2017	0.37	0.028	0.026333333	92.88%

4/13/2017	0.38	0.041	0.029666667	92.19%
4/14/2017	0.407	0.04	0.029333333	92.79%
4/15/2017	0.381	0.03	0.026833333	92.96%
4/16/2017	0.411	0.026	0.024666667	94.00%
4/17/2017	0.619	0.031	0.0265	95.72%
4/18/2017	0.682	0.031	0.026	96.19%
4/19/2017	0.767	0.027	0.025333333	96.70%
4/20/2017	1.85	0.028	0.0255	98.62%
4/21/2017	0.608	0.038	0.030166667	95.04%
4/22/2017	2.5	0.026	0.024333333	99.03%
4/23/2017	0.978	0.026	0.025166667	97.43%
4/24/2017	0.616	0.027	0.024	96.10%
4/25/2017	0.575	0.033	0.029666667	94.84%
4/26/2017	0.468	0.033	0.0285	93.91%
4/27/2017	0.435	0.031	0.029333333	93.26%
4/28/2017	1.301	0.032	0.028	97.85%
4/29/2017	0.604	0.036	0.0295	95.12%
4/30/2017	0.461	0.03	0.027833333	93.96%
5/1/2017	1.258	0.166	0.056666667	95.50%
5/2/2017	0.89	0.041	0.031666667	96.44%
5/3/2017	0.983	0.073	0.053666667	94.54%
5/4/2017	0.99	0.057	0.045666667	95.39%
5/5/2017	1.017	0.082	0.062833333	93.82%
5/6/2017	0.884	0.073	0.053	94.00%
5/7/2017	1.711	0.099	0.077333333	95.48%
5/8/2017	0.824	0.052	0.041666667	94.94%
5/9/2017	0.775	0.045	0.036	95.35%
5/10/2017	0.652	0.048	0.038666667	94.07%
5/11/2017	0.95	0.042	0.037333333	96.07%
5/12/2017	1.013	0.049	0.040833333	95.97%
5/13/2017	0.84	0.042	0.0365	95.65%
5/14/2017	0.837	0.045	0.040666667	95.14%
5/15/2017	0.671	0.045	0.038666667	94.24%
5/16/2017	1.489	0.047	0.0385	97.41%
5/17/2017	0.659	0.038	0.0335	94.92%
5/18/2017	0.689	0.041	0.031	95.50%
5/19/2017	0.766	0.063	0.040833333	94.67%
5/20/2017	4.8	0.065	0.053333333	98.89%
5/21/2017	1.147	0.06	0.043666667	96.19%
5/22/2017	0.812	0.052	0.043166667	94.68%
5/23/2017	30	0.054	0.045166667	99.85%
5/24/2017	0.796	0.043	0.038833333	95.12%
5/25/2017	0.771	0.052	0.042166667	94.53%
5/26/2017	0.717	0.034	0.027166667	96.21%
5/27/2017	1.284	0.063	0.042	96.73%
5/28/2017	0.917	0.046	0.037833333	95.87%
5/29/2017	0.984	0.042	0.030833333	96.87%
5/30/2017	0.948	0.041	0.033833333	96.43%
5/31/2017	0.673	0.047	0.037333333	94.45%
6/1/2017	0.701	0.049	0.038333333	94.53%
6/2/2017	0.8	0.044	0.035166667	95.60%
6/3/2017	0.803	0.041	0.033	95.89%
6/4/2017	0.788	0.042	0.032	95.94%
6/5/2017	0.992	0.035	0.0335	96.62%
6/6/2017	0.914	0.038	0.034	96.28%
6/7/2017	0.997	0.038	0.032666667	96.72%
6/8/2017	1.329	0.046	0.0355	97.33%
6/9/2017	0.848	0.042	0.032666667	96.15%
6/10/2017	0.616	0.036	0.030666667	95.02%
6/11/2017	0.601	0.036	0.029666667	95.06%
6/12/2017	0.706	0.032	0.029833333	95.77%
6/13/2017	0.687	0.036	0.030666667	95.54%
6/14/2017	0.632	0.04	0.032333333	94.88%
6/15/2017	0.835	0.041	0.036333333	95.65%
6/16/2017	0.79	0.043	0.034333333	95.65%
6/17/2017	1.146	0.038	0.033666667	97.06%
6/18/2017	1.021	0.045	0.0345	96.62%
6/19/2017	0.635	0.042	0.037	94.17%

6/20/2017	0.536	0.041	0.036833333	93.13%
6/21/2017	0.838	0.042	0.034666667	95.86%
6/22/2017	0.613	0.046	0.0375	93.88%
6/23/2017	0.548	0.052	0.0445	91.88%
6/24/2017	0.648	0.059	0.0455	92.98%
6/25/2017	0.767	0.051	0.046833333	93.89%
6/26/2017	0.42	0.036	0.034333333	91.83%
6/27/2017	0.406	0.044	0.038833333	90.44%
6/28/2017	0.429	0.045	0.036833333	91.41%
6/29/2017	0.43	0.04	0.036333333	91.55%
6/30/2017	0.418	0.046	0.0375	91.03%
7/1/2017	0.915	0.065	0.046833333	94.88%
7/2/2017	0.52	0.06	0.0525	89.90%
7/3/2017	2.405	0.047	0.039333333	98.36%
7/4/2017	0.935	0.065	0.05	94.65%
7/5/2017	0.871	0.058	0.0465	94.66%
7/6/2017	1.376	0.05	0.040833333	97.03%
7/7/2017	2.085	0.039	0.036333333	98.26%
7/8/2017	2.169	0.051	0.041	98.11%
7/9/2017	0.693	0.046	0.0435	93.72%
7/10/2017	0.689	0.049	0.037166667	94.61%
7/11/2017	0.708	0.045	0.037666667	94.68%
7/12/2017	0.737	0.046	0.0415	94.37%
7/13/2017	0.659	0.054	0.047166667	92.84%
7/14/2017	0.455	0.043	0.037166667	91.83%
7/15/2017	0.697	0.04	0.037166667	94.67%
7/16/2017	0.626	0.037	0.035333333	94.36%
7/17/2017	0.616	0.036	0.034333333	94.43%
7/18/2017	0.47	0.04	0.033833333	92.80%
7/19/2017	0.42	0.033	0.032666667	92.22%
7/20/2017	0.488	0.033	0.0325	93.34%
7/21/2017	0.459	0.033	0.032166667	92.99%
7/22/2017	0.42	0.032	0.0315	92.50%
7/23/2017	0.464	0.032	0.031666667	93.18%
7/24/2017	0.463	0.045	0.04	91.36%
7/25/2017	0.531	0.047	0.039833333	92.50%
7/26/2017	0.43	0.047	0.0445	89.65%
7/27/2017	0.43	0.047	0.038	91.16%
7/28/2017	3.52	0.041	0.037	98.95%
7/29/2017	0.43	0.047	0.038	91.16%
7/30/2017	0.701	0.044	0.0355	94.94%
7/31/2017	0.562	0.044	0.031833333	94.34%
8/1/2017	1.588	0.046	0.036166667	97.72%
8/2/2017	1.4	0.048	0.041166667	97.06%
8/3/2017	1.1	0.043	0.037166667	96.62%
8/4/2017	1.2	0.042	0.036	97.00%
8/5/2017	0.747	0.045	0.038666667	94.82%
8/6/2017	0.571	0.033	0.031833333	94.42%
8/7/2017	0.728	0.038	0.033166667	95.44%
8/8/2017	1.2	0.034	0.0325	97.29%
8/9/2017	0.5	0.035	0.032833333	93.43%
8/10/2017	0.725	0.035	0.031666667	95.63%
8/11/2017	0.551	0.032	0.029666667	94.62%
8/12/2017	0.52	0.04	0.035166667	93.24%
8/13/2017	0.55	0.04	0.035166667	93.61%
8/14/2017	1.566	0.055	0.041333333	97.36%
8/15/2017	0.33	0.059	0.0485	85.30%
8/16/2017	0.356	0.047	0.039	89.04%
8/17/2017	0.304	0.045	0.036333333	88.05%
8/18/2017	0.336	0.053	0.039166667	88.34%
8/19/2017	0.422	0.051	0.037833333	91.03%
8/20/2017	0.412	0.053	0.038666667	90.61%
8/21/2017	0.332	0.052	0.036666667	88.96%
8/22/2017	0.386	0.044	0.038	90.16%
8/23/2017	0.379	0.044	0.037666667	90.06%
8/24/2017	0.443	0.05	0.042	90.52%
8/25/2017	0.415	0.047	0.039166667	90.56%
8/26/2017	0.35	0.054	0.039833333	88.62%

8/27/2017	0.339	0.046	0.038666667	88.59%
8/28/2017	0.527	0.041	0.0335	93.64%
8/29/2017	0.433	0.035	0.0325	92.49%
8/30/2017	0.347	0.032	0.031333333	90.97%
8/31/2017	0.541	0.046	0.036833333	93.19%
9/1/2017	0.452	0.052	0.044166667	90.23%
9/2/2017	0.34	0.05	0.042333333	87.55%
9/3/2017	0.394	0.053	0.045666667	88.41%
9/4/2017	0.592	0.049	0.043	92.74%
9/5/2017	0.624	0.055	0.045333333	92.74%
9/6/2017	0.614	0.054	0.041333333	93.27%
9/7/2017	1.152	0.054	0.038666667	96.64%
9/8/2017	0.316	0.043	0.036333333	88.50%
9/9/2017	0.348	0.043	0.036333333	89.56%
9/10/2017	0.432	0.042	0.0355	91.78%
9/11/2017	0.351	0.043	0.036166667	89.70%
9/12/2017	0.322	0.042	0.033333333	89.65%
9/13/2017	0.526	0.042	0.034833333	93.38%
9/14/2017	0.358	0.03	0.029	91.90%
9/15/2017	0.413	0.029	0.028	93.22%
9/16/2017	0.376	0.03	0.028166667	92.51%
9/17/2017	0.344	0.033	0.029666667	91.38%
9/18/2017	0.36	0.03	0.027833333	92.27%
9/19/2017	0.33	0.031	0.03	90.91%
9/20/2017	0.497	0.04	0.033333333	93.29%
9/21/2017	0.6	0.054	0.048833333	91.86%
9/22/2017	1.802	0.076	0.064833333	96.40%
9/23/2017	0.4	0.07	0.064166667	83.96%
9/24/2017	0.38	0.074	0.066666667	82.46%
9/25/2017	0.573	0.091	0.067666667	88.19%
9/26/2017	1.115	0.19	0.133	88.07%
9/27/2017	0.571	0.082	0.065666667	88.50%
9/28/2017	0.377	0.053	0.043166667	88.55%
9/29/2017	2.88	0.052	0.0425	98.52%
9/30/2017	0.464	0.051	0.041	91.16%
10/1/2017	0.67	0.049	0.041166667	93.86%
10/2/2017	0.295	0.047	0.031666667	89.27%
10/3/2017	0.189	0.041	0.028666667	84.83%
10/4/2017	0.159	0.029	0.025833333	83.75%
10/5/2017	0.231	0.028	0.025333333	89.03%
10/6/2017	0.185	0.026	0.024666667	86.67%
10/7/2017	0.198	0.029	0.026166667	86.78%
10/8/2017	0.2	0.028	0.0255	87.25%
10/9/2017	0.34	0.031	0.0295	91.32%
10/10/2017	0.187	0.037	0.033	82.35%
10/11/2017	0.27	0.044	0.0415	84.63%
10/12/2017	0.148	0.06	0.055666667	62.39%
10/13/2017	0.13	0.07	0.064666667	50.26%
10/14/2017	0.17	0.076	0.071	58.24%
10/15/2017	0.158	0.068	0.065333333	58.65%
10/16/2017	0.78	0.078	0.066833333	91.43%
10/17/2017	0.361	0.086	0.073833333	79.55%
10/18/2017	0.433	0.082	0.0605	86.03%
10/19/2017	0.383	0.055	0.050166667	86.90%
10/20/2017	0.56	0.059	0.049833333	91.10%
10/21/2017	2.624	0.05	0.048166667	98.16%
10/22/2017	0.242	0.055	0.047333333	80.44%
10/23/2017	0.23	0.048	0.036166667	84.28%
10/24/2017	2.02	0.05	0.042	97.92%
10/25/2017	0.235	0.048	0.043666667	81.42%
10/26/2017	0.283	0.04	0.036333333	87.16%
10/27/2017	0.348	0.048	0.043	87.64%
10/28/2017	0.271	0.048	0.043666667	83.89%
10/29/2017	0.261	0.057	0.049333333	81.10%
10/30/2017	0.863	0.055	0.045333333	94.75%
10/31/2017	0.562	0.059	0.0455	91.90%
11/1/2017	0.3	0.06	0.04	86.67%
11/2/2017	0.2	0.05	0.042	79.00%

11/3/2017	0.3	0.05	0.038	87.33%	
11/4/2017	0.3	0.05	0.038	87.33%	
11/5/2017	0.7	0.06	0.044	93.71%	
11/6/2017	0.6	0.04	0.037	93.83%	
11/7/2017	0.6	0.04	0.041	93.17%	
11/8/2017	0.8	0.06	0.051	93.63%	
11/9/2017	1.1	0.06	0.05	95.45%	
11/10/2017	1.4	0.05	0.047	96.64%	
11/11/2017	0.4	0.04	0.036	91.00%	
11/12/2017	0.4	0.04	0.034	91.50%	
11/13/2017	0.3	0.05	0.045	85.00%	
11/14/2017	1	0.05	0.045	95.50%	
11/15/2017	0.8	0.05	0.046	94.25%	
11/16/2017	0.5	0.05	0.08	84.00%	
11/17/2017	0.3	0.06	0.05	83.33%	
11/18/2017	0.4	0.07	0.047	88.25%	
11/19/2017	0.3	0.05	0.041	86.33%	
11/20/2017	0.4	0.04	0.039	90.25%	
11/21/2017	0.4	0.06	0.044	89.00%	
11/22/2017	0.5	0.05	0.042	91.60%	
11/23/2017	1	0.06	0.049	95.10%	
11/24/2017	0.4	0.06	0.048	88.00%	
11/25/2017	0.4	0.06	0.048	88.00%	
11/26/2017	0.4	0.06	0.05	87.50%	
11/27/2017	1.7	0.08	0.053	96.88%	
11/28/2017	0.4	0.05	0.044	89.00%	
11/29/2017	0.5	0.06	0.046	90.80%	
11/30/2017	2.5	0.08	0.047	98.12%	
12/1/2017	0.6	0.04	0.032	94.67%	
12/2/2017	0.3	0.04	0.033	89.00%	
12/3/2017	0.2	0.04	0.031	84.50%	
12/4/2017	1.2	0.04	0.034	97.17%	
12/5/2017	0.3	0.05	0.038	87.33%	
12/6/2017	2	0.06	0.045	97.75%	
12/7/2017	0.2	0.05	0.047	76.50%	
12/8/2017	0.1	0.07	0.053	47.00%	
12/9/2017	0.1	0.05	0.05	50.00%	
12/10/2017	0.1	0.06	0.045	55.00%	
12/11/2017	0.2	0.08	0.054	73.00%	
12/12/2017	1	0.07	0.056	94.40%	
12/13/2017	1	0.05	0.041	95.90%	
12/14/2017	1	0.06	0.043	95.70%	
12/15/2017	0.2	0.06	0.043	78.50%	
12/16/2017	0.1	0.04	0.036	64.00%	
12/17/2017	0.3	0.07	0.063	79.00%	
12/18/2017	1.5	0.03	0.021	98.60%	
12/19/2017	0.1	0.03	0.023	77.00%	
12/20/2017	0.1	0.03	0.027	73.00%	
12/21/2017	0.1	0.02	0.021	79.00%	
12/22/2017	0.1	0.03	0.022	78.00%	
12/23/2017	0.1	0.03	0.022	78.00%	
12/24/2017	1	0.02	0.02	98.00%	
12/25/2017	0.1	0.02	0.022	78.00%	
12/26/2017	0.1	0.02	0.021	79.00%	
12/27/2017	0.1	0.04	0.025	75.00%	
12/28/2017	0.1	0.02	0.022	78.00%	
12/29/2017	0.1	0.05	0.031	69.00%	
12/30/2017	0.1	0.03	0.025	75.00%	
12/31/2017	0.1	0.03	0.021	79.00%	
Min	0.100	0.020	0.019	47.00%	
Max	30.000	0.190	0.153	100.00%	
Average	0.667	0.053	0.045	89.15%	
Median	0.433	0.046	0.039	90.35%	
95th percentile	1.700	0.096	0.080	97.56%	
				79.69%	9% days <80% reduction
	0.659	0.049	0.042	avg alum	
	0.675	0.056	0.047	11% avg ach	

0.384	0.044	0.039	median alum
0.476	0.049	0.041	5% median ach

0.023811868	0.136499203

Date	Total Coliform	Fecal Coliform	E. coli
01/02/2013 15:15	240	6	
01/09/2013 15:20	110	17	
01/15/2013 10:48	30	**0**	
01/23/2013 13:40	80	**0**	
01/28/2013 12:10	130	**0**	
02/07/2013 09:10	300	4	
02/12/2013 10:56	170	8	
02/19/2013 12:00	34	2	
02/26/2013 12:45	220	**0**	
03/05/2013 11:30	150	2	
03/12/2013 11:32	80	**0**	
03/19/2013 13:45	870		3
03/26/2013 11:45	340		**0**
04/02/2013 14:04	220		1
04/09/2013 11:30	410		1
04/16/2013 13:35	460		8.6
04/23/2013 11:45	250		**0**
04/30/2013 15:00	490		11
05/08/2013 12:34	120		3
05/14/2013 12:00	200		1
05/21/2013 11:50	650		5.2
05/29/2013 08:45	980		6.3
06/04/2013 11:22	1		**0**
06/17/2013 16:05	140		5
06/25/2013 11:30	770		6.3
07/02/2013 10:50	920		8.8
07/09/2013 12:00	980		18
07/17/2013 14:47	730		21
07/23/2013 10:34	1100		9.8
07/30/2013 11:15	390		3.1
08/08/2013 13:10	860		20
08/14/2013 09:45	1600		34
08/20/2013 11:30	1600		23
08/21/2013 08:20	990		10
08/28/2013 11:12	1200		41
09/04/2013 10:40	650		6.3
09/11/2013 14:10	340		1
09/18/2013 10:15	280		**0**
09/25/2013 12:40	910		10
10/02/2013 11:36	230		**0**
10/09/2013 10:26	150		**0**
10/23/2013 11:20	2000		1
10/24/2013 09:30	110		**0**
10/30/2013 10:20	870		4.2
11/06/2013 14:05	610		4.1
11/13/2013 11:00	770		5.2
11/20/2013 11:35	460		1
11/27/2013 11:55	310		2
12/04/2013 14:50	300		3
12/11/2013 12:15	460		3.1
12/18/2013 14:05	240		1
12/23/2013 14:35	260		1
12/30/2013 15:30	210		**0**
01/08/2014 13:40	160		1
01/15/2014 10:45	340		2
01/22/2014 09:18	240		2
01/29/2014 12:00	440		**0**
02/05/2014 11:30	290		**0**
02/12/2014 11:20	390		1
02/19/2014 11:45	690		**0**
02/26/2014 11:45	650		**0**
03/05/2014 12:29	410		**0**
03/12/2014 11:30	440		**0**
03/20/2014 10:05	820		7.4
03/27/2014 11:15	520		3.1
04/02/2014 16:08	610		18
04/09/2014 10:20	650		11
04/16/2014 09:25	770		9.8
04/23/2014 11:55	610		3.1
04/30/2014 11:50	340		7.5
05/07/2014 09:35	730		7.2

Date	Total Coliform	MMWRA
01/02/2013 15:15	240	
01/09/2013 15:20	110	
01/15/2013 10:48	30	
01/23/2013 13:40	80	95
01/28/2013 12:10	130	95
02/07/2013 09:10	300	105
02/12/2013 10:56	170	150
02/19/2013 12:00	34	150
02/26/2013 12:45	220	195
03/05/2013 11:30	150	160
03/12/2013 11:32	80	115
03/19/2013 13:45	870	185
03/26/2013 11:45	340	245
04/02/2013 14:04	220	280
04/09/2013 11:30	410	375
04/16/2013 13:35	460	375
04/23/2013 11:45	250	330
04/30/2013 15:00	490	435
05/08/2013 12:34	120	355
05/14/2013 12:00	200	225
05/21/2013 11:50	650	345
05/29/2013 08:45	980	425
06/04/2013 11:22	1	425
06/17/2013 16:05	140	395
06/25/2013 11:30	770	455
07/02/2013 10:50	920	455
07/09/2013 12:00	980	845
07/17/2013 14:47	730	845
07/23/2013 10:34	1100	950
07/30/2013 11:15	390	855
08/08/2013 13:10	860	795
08/14/2013 09:45	1600	980
08/20/2013 11:30	1600	1230
08/21/2013 08:20	990	1295
08/28/2013 11:12	1200	1400
09/04/2013 10:40	650	1095
09/11/2013 14:10	340	820
09/18/2013 10:15	280	495
09/25/2013 12:40	910	495
10/02/2013 11:36	230	310
10/09/2013 10:26	150	255
10/23/2013 11:20	2000	570
10/24/2013 09:30	110	190
10/30/2013 10:20	870	510
11/06/2013 14:05	610	740
11/13/2013 11:00	770	690
11/20/2013 11:35	460	690
11/27/2013 11:55	310	535
12/04/2013 14:50	300	385
12/11/2013 12:15	460	385
12/18/2013 14:05	240	305
12/23/2013 14:35	260	280
12/30/2013 15:30	210	250
01/08/2014 13:40	160	225
01/15/2014 10:45	340	235
01/22/2014 09:18	240	225
01/29/2014 12:00	440	290
02/05/2014 11:30	290	315
02/12/2014 11:20	390	340
02/19/2014 11:45	690	415
02/26/2014 11:45	650	520
03/05/2014 12:29	410	530
03/12/2014 11:30	440	545
03/20/2014 10:05	820	545
03/27/2014 11:15	520	480
04/02/2014 16:08	610	565
04/09/2014 10:20	650	630
04/16/2014 09:25	770	630
04/23/2014 11:55	610	630
04/30/2014 11:50	340	630
05/07/2014 09:35	730	670

Date	Total Coliform	Fecal Coliform/*E. coli* *
01/02/2013 15:15	240	6
01/09/2013 15:20	110	17
01/15/2013 10:48	30	**0**
01/23/2013 13:40	80	**0**
01/28/2013 12:10	130	**0**
02/07/2013 09:10	300	4
02/12/2013 10:56	170	8
02/19/2013 12:00	34	2
02/26/2013 12:45	220	**0**
03/05/2013 11:30	150	2
03/12/2013 11:32	80	**0**
03/19/2013 13:45	870	3
03/26/2013 11:45	340	**0**
04/02/2013 14:04	220	1
04/09/2013 11:30	410	1
04/16/2013 13:35	460	8.6
04/23/2013 11:45	250	**0**
04/30/2013 15:00	490	11
05/08/2013 12:34	120	3
05/14/2013 12:00	200	1
05/21/2013 11:50	650	5.2
05/29/2013 08:45	980	6.3
06/04/2013 11:22	1	**0**
06/17/2013 16:05	140	5
06/25/2013 11:30	770	6.3
07/02/2013 10:50	920	8.8
07/09/2013 12:00	980	18
07/17/2013 14:47	730	21
07/23/2013 10:34	1100	9.8
07/30/2013 11:15	390	3.1
08/08/2013 13:10	860	20
08/14/2013 09:45	1600	34
08/20/2013 11:30	1600	23
08/21/2013 08:20	990	10
08/28/2013 11:12	1200	41
09/04/2013 10:40	650	6.3
09/11/2013 14:10	340	1
09/18/2013 10:15	280	**0**
09/25/2013 12:40	910	10
10/02/2013 11:36	230	**0**
10/09/2013 10:26	150	**0**
10/23/2013 11:20	2000	1
10/24/2013 09:30	110	**0**
10/30/2013 10:20	870	4.2
11/06/2013 14:05	610	4.1
11/13/2013 11:00	770	5.2
11/20/2013 11:35	460	1
11/27/2013 11:55	310	2
12/04/2013 14:50	300	3
12/11/2013 12:15	460	3.1
12/18/2013 14:05	240	1
12/23/2013 14:35	260	1
12/30/2013 15:30	210	**0**
01/08/2014 13:40	160	1
01/15/2014 10:45	340	2
01/22/2014 09:18	240	2
01/29/2014 12:00	440	**0**
02/05/2014 11:30	290	**0**
02/12/2014 11:20	390	1
02/19/2014 11:45	690	**0**
02/26/2014 11:45	650	**0**
03/05/2014 12:29	410	**0**
03/12/2014 11:30	440	**0**
03/20/2014 10:05	820	7.4
03/27/2014 11:15	520	3.1
04/02/2014 16:08	610	18
04/09/2014 10:20	650	11
04/16/2014 09:25	770	9.8
04/23/2014 11:55	610	3.1
04/30/2014 11:50	340	7.5
05/07/2014 09:35	730	7.2

Date	Fecal Coliform/*E. coli*	MMWRA
01/02/2013 15:15	6	
01/09/2013 15:20	17	
01/15/2013 10:48	**0**	
01/23/2013 13:40	**0**	3
01/28/2013 12:10	**0**	0
02/07/2013 09:10	4	0
02/12/2013 10:56	8	2
02/19/2013 12:00	2	3
02/26/2013 12:45	**0**	3
03/05/2013 11:30	2	2
03/12/2013 11:32	**0**	1
03/19/2013 13:45	3	1
03/26/2013 11:45	**0**	1
04/02/2013 14:04	1	0.5
04/09/2013 11:30	1	1
04/16/2013 13:35	8.6	1
04/23/2013 11:45	**0**	1
04/30/2013 15:00	11	4.8
05/08/2013 12:34	3	5.8
05/14/2013 12:00	1	2
05/21/2013 11:50	5.2	4.1
05/29/2013 08:45	6.3	4.1
06/04/2013 11:22	**0**	3.1
06/17/2013 16:05	5	5.1
06/25/2013 11:30	6.3	5.65
07/02/2013 10:50	8.8	5.65
07/09/2013 12:00	18	7.55
07/17/2013 14:47	21	13.4
07/23/2013 10:34	9.8	13.9
07/30/2013 11:15	3.1	13.9
08/08/2013 13:10	20	14.9
08/14/2013 09:45	34	14.9
08/20/2013 11:30	23	21.5
08/21/2013 08:20	10	21.5
08/28/2013 11:12	41	28.5
09/04/2013 10:40	6.3	16.5
09/11/2013 14:10	1	8.15
09/18/2013 10:15	**0**	3.65
09/25/2013 12:40	10	3.65
10/02/2013 11:36	**0**	0.5
10/09/2013 10:26	**0**	0
10/23/2013 11:20	1	0.5
10/24/2013 09:30	**0**	0
10/30/2013 10:20	4.2	0.5
11/06/2013 14:05	4.1	2.55
11/13/2013 11:00	5.2	4.15
11/20/2013 11:35	1	4.15
11/27/2013 11:55	2	3.05
12/04/2013 14:50	3	2.5
12/11/2013 12:15	3.1	2.5
12/18/2013 14:05	1	2.5
12/23/2013 14:35	1	2
12/30/2013 15:30	**0**	1
01/08/2014 13:40	1	1
01/15/2014 10:45	2	1
01/22/2014 09:18	2	1.5
01/29/2014 12:00	**0**	1.5
02/05/2014 11:30	**0**	1
02/12/2014 11:20	1	0.5
02/19/2014 11:45	**0**	0
02/26/2014 11:45	**0**	0
03/05/2014 12:29	**0**	0
03/12/2014 11:30	**0**	0
03/20/2014 10:05	7.4	0
03/27/2014 11:15	3.1	1.55
04/02/2014 16:08	18	5.25
04/09/2014 10:20	11	9.2
04/16/2014 09:25	9.8	10.4
04/23/2014 11:55	3.1	10.4
04/30/2014 11:50	7.5	8.65
05/07/2014 09:35	7.2	7.35

05/14/2014 11:30	440		4.1	05/14/2014 11:30	440	525	05/14/2014 11:30	440	4.1	05/14/2014 11:30	4.1	5.65
05/21/2014 12:25	2000		7.5	05/21/2014 12:25	2000	585	05/21/2014 12:25	2000	7.5	05/21/2014 12:25	7.5	7.35
05/28/2014 09:30	650		3	05/28/2014 09:30	650	690	05/28/2014 09:30	650	3	05/28/2014 09:30	3	5.65
06/04/2014 11:30	80	22		06/04/2014 11:30	80	545	06/04/2014 11:30	80	22	06/04/2014 11:30	22	5.8
06/11/2014 09:16	240	**0**		06/11/2014 09:16	240	445	06/11/2014 09:16	240	**0**	06/11/2014 09:16	**0**	5.25
06/18/2014 10:25	30	**0**		06/18/2014 10:25	30	160	06/18/2014 10:25	30	**0**	06/18/2014 10:25	**0**	1.5
06/25/2014 13:20	8	**0**		06/25/2014 13:20	8	55	06/25/2014 13:20	8	**0**	06/25/2014 13:20	**0**	0
07/02/2014 14:00	110	30		07/02/2014 14:00	110	70	07/02/2014 14:00	110	30	07/02/2014 14:00	30	0
07/09/2014 14:00	14	4		07/09/2014 14:00	14	22	07/09/2014 14:00	14	4	07/09/2014 14:00	4	2
07/16/2014 11:10	8	**0**		07/16/2014 11:10	8	11	07/16/2014 11:10	8	**0**	07/16/2014 11:10	**0**	2
07/23/2014 10:10	240	4		07/23/2014 10:10	240	62	07/23/2014 10:10	240	4	07/23/2014 10:10	4	4
07/30/2014 10:10	4	**0**		07/30/2014 10:10	4	11	07/30/2014 10:10	4	**0**	07/30/2014 10:10	**0**	2
08/06/2014 10:40	900	70		08/06/2014 10:40	900	124	08/06/2014 10:40	900	70	08/06/2014 10:40	70	2
08/14/2014 15:40	1600	500		08/14/2014 15:40	1600	570	08/14/2014 15:40	1600	500	08/14/2014 15:40	500	37
08/21/2014 11:00	50	30		08/21/2014 11:00	50	475	08/21/2014 11:00	50	30	08/21/2014 11:00	30	50
08/27/2014 13:00	11	**0**		08/27/2014 13:00	11	475	08/27/2014 13:00	11	**0**	08/27/2014 13:00	**0**	50
09/03/2014 11:04	130	23		09/03/2014 11:04	130	90	09/03/2014 11:04	130	23	09/03/2014 11:04	23	26.5
09/10/2014 09:00	240	50		09/10/2014 09:00	240	90	09/10/2014 09:00	240	50	09/10/2014 09:00	50	26.5
09/17/2014 13:10	7	**0**		09/17/2014 13:10	7	70.5	09/17/2014 13:10	7	**0**	09/17/2014 13:10	**0**	11.5
09/24/2014 13:50	300	30		09/24/2014 13:50	300	185	09/24/2014 13:50	300	30	09/24/2014 13:50	30	26.5
10/01/2014 11:25	280	8		10/01/2014 11:25	280	260	10/01/2014 11:25	280	8	10/01/2014 11:25	8	19
10/08/2014 09:50	130	13		10/08/2014 09:50	130	205	10/08/2014 09:50	130	13	10/08/2014 09:50	13	10.5
10/15/2014 14:05	17	2		10/15/2014 14:05	17	205	10/15/2014 14:05	17	2	10/15/2014 14:05	2	10.5
10/22/2014 09:50	50	**0**		10/22/2014 09:50	50	90	10/22/2014 09:50	50	**0**	10/22/2014 09:50	**0**	5
10/29/2014 10:30	2	2		10/29/2014 10:30	2	33.5	10/29/2014 10:30	2	2	10/29/2014 10:30	2	2
11/04/2014 13:10	1600	50		11/04/2014 13:10	1600	33.5	11/04/2014 13:10	1600	50	11/04/2014 13:10	50	2
11/12/2014 11:04	50	4		11/12/2014 11:04	50	50	11/12/2014 11:04	50	4	11/12/2014 11:04	4	3
11/18/2014 11:30	170	8		11/18/2014 11:30	170	110	11/18/2014 11:30	170	8	11/18/2014 11:30	8	6
11/25/2014 11:30	13	**0**		11/25/2014 11:30	13	110	11/25/2014 11:30	13	**0**	11/25/2014 11:30	**0**	6
12/01/2014 14:00	300	130		12/01/2014 14:00	300	110	12/01/2014 14:00	300	130	12/01/2014 14:00	130	6
12/10/2014 09:55	220	30		12/10/2014 09:55	220	195	12/10/2014 09:55	220	30	12/10/2014 09:55	30	19
12/16/2014 10:20	130	2		12/16/2014 10:20	130	175	12/16/2014 10:20	130	2	12/16/2014 10:20	2	16
12/23/2014 10:50	50	4		12/23/2014 10:50	50	175	12/23/2014 10:50	50	4	12/23/2014 10:50	4	17
12/30/2014 10:00	500	17		12/30/2014 10:00	500	175	12/30/2014 10:00	500	17	12/30/2014 10:00	17	10.5
01/06/2015 11:20	21	**0**		01/06/2015 11:20	21	90	01/06/2015 11:20	21	**0**	01/06/2015 11:20	**0**	3
01/14/2015 10:15	23	13		01/14/2015 10:15	23	36.5	01/14/2015 10:15	23	13	01/14/2015 10:15	13	8.5
01/21/2015 09:40	50	4		01/21/2015 09:40	50	36.5	01/21/2015 09:40	50	4	01/21/2015 09:40	4	8.5
01/27/2015 11:10	300	23		01/27/2015 11:10	300	36.5	01/27/2015 11:10	300	23	01/27/2015 11:10	23	8.5
02/03/2015 11:30	110	4		02/03/2015 11:30	110	80	02/03/2015 11:30	110	4	02/03/2015 11:30	4	8.5
02/10/2015 11:00	120	13		02/10/2015 11:00	120	115	02/10/2015 11:00	120	13	02/10/2015 11:00	13	8.5
02/18/2015 09:30	70	**0**		02/18/2015 09:30	70	115	02/18/2015 09:30	70	**0**	02/18/2015 09:30	**0**	8.5
02/24/2015 10:30	500	110		02/24/2015 10:30	500	115	02/24/2015 10:30	500	110	02/24/2015 10:30	110	8.5
03/03/2015 11:40	500	17		03/03/2015 11:40	500	310	03/03/2015 11:40	500	17	03/03/2015 11:40	17	15
03/10/2015 10:10	170	4		03/10/2015 10:10	170	335	03/10/2015 10:10	170	4	03/10/2015 10:10	4	10.5
03/18/2015 10:00	280	2		03/18/2015 10:00	280	390	03/18/2015 10:00	280	2	03/18/2015 10:00	2	10.5
03/24/2015 12:00	170	8		03/24/2015 12:00	170	225	03/24/2015 12:00	170	8	03/24/2015 12:00	8	6
04/01/2015 10:40	500	170		04/01/2015 10:40	500	225	04/01/2015 10:40	500	170	04/01/2015 10:40	170	6
04/08/2015 10:22	4	**0**		04/08/2015 10:22	4	225	04/08/2015 10:22	4	**0**	04/08/2015 10:22	**0**	5
04/14/2015 11:25	90	8		04/14/2015 11:25	90	130	04/14/2015 11:25	90	8	04/14/2015 11:25	8	8
04/21/2015 11:25	280	23		04/21/2015 11:25	280	185	04/21/2015 11:25	280	23	04/21/2015 11:25	23	15.5
04/28/2015 08:45	80	**0**		04/28/2015 08:45	80	85	04/28/2015 08:45	80	**0**	04/28/2015 08:45	**0**	4
05/05/2015 11:00	170	2		05/05/2015 11:00	170	130	05/05/2015 11:00	170	2	05/05/2015 11:00	2	5
05/13/2015 09:42	170	11		05/13/2015 09:42	170	170	05/13/2015 09:42	170	11	05/13/2015 09:42	11	6.5
05/19/2015 14:05	50	2		05/19/2015 14:05	50	125	05/19/2015 14:05	50	2	05/19/2015 14:05	2	2
05/28/2015 11:15	240	**0**		05/28/2015 11:15	240	170	05/28/2015 11:15	240	**0**	05/28/2015 11:15	**0**	2
06/03/2015 09:30	900	2		06/03/2015 09:30	900	205	06/03/2015 09:30	900	2	06/03/2015 09:30	2	2
06/09/2015 09:00	500	8		06/09/2015 09:00	500	370	06/09/2015 09:00	500	8	06/09/2015 09:00	8	2
06/17/2015 13:30	900	14		06/17/2015 13:30	900	700	06/17/2015 13:30	900	14	06/17/2015 13:30	14	5
06/23/2015 12:00	30	13		06/23/2015 12:00	30	700	06/23/2015 12:00	30	13	06/23/2015 12:00	13	10.5
07/01/2015 13:30	23	13		07/01/2015 13:30	23	265	07/01/2015 13:30	23	13	07/01/2015 13:30	13	13
07/09/2015 11:10	220	22		07/09/2015 11:10	220	125	07/09/2015 11:10	220	22	07/09/2015 11:10	22	13.5
07/15/2015 11:55	50	13		07/15/2015 11:55	50	40	07/15/2015 11:55	50	13	07/15/2015 11:55	13	13
07/21/2015 11:30	240	2		07/21/2015 11:30	240	135	07/21/2015 11:30	240	2	07/21/2015 11:30	2	13
07/28/2015 14:40	**1600**	280		07/28/2015 14:40	**1600**	230	07/28/2015 14:40	**1600**	280	07/28/2015 14:40	280	17.5
08/04/2015 10:30	80	7		08/04/2015 10:30	80	160	08/04/2015 10:30	80	7	08/04/2015 10:30	7	10
08/11/2015 10:40	300	30		08/11/2015 10:40	300	270	08/11/2015 10:40	300	30	08/11/2015 10:40	30	18.5
08/19/2015 10:30	80	50		08/19/2015 10:30	80	190	08/19/2015 10:30	80	50	08/19/2015 10:30	50	40
08/26/2015 10:35	240	2		08/26/2015 10:35	240	160	08/26/2015 10:35	240	2	08/26/2015 10:35	2	18.5
09/02/2015 09:13	240	50		09/02/2015 09:13	240	240	09/02/2015 09:13	240	50	09/02/2015 09:13	50	40
09/09/2015 08:36	300	50		09/09/2015 08:36	300	240	09/09/2015 08:36	300	50	09/09/2015 08:36	50	50
09/16/2015 10:15	**1600**	80		09/16/2015 10:15	**1600**	270	09/16/2015 10:15	**1600**	80	09/16/2015 10:15	80	50
09/23/2015 12:30	900	140		09/23/2015 12:30	900	600	09/23/2015 12:30	900	140	09/23/2015 12:30	140	65

09/29/2015 10:30	900	80	09/29/2015 10:30	900	900	09/29/2015 10:30	900	80	09/29/2015 10:30	80	80
10/06/2015 10:30	140	5	10/06/2015 10:30	140	900	10/06/2015 10:30	140	5	10/06/2015 10:30	5	80
10/13/2015 09:51	1600	79	10/13/2015 09:51	1600	900	10/13/2015 09:51	1600	79	10/13/2015 09:51	79	79.5
10/21/2015 10:30	1600	33	10/21/2015 10:30	1600	1250	10/21/2015 10:30	1600	33	10/21/2015 10:30	33	56
10/27/2015 09:47	130	17	10/27/2015 09:47	130	870	10/27/2015 09:47	130	17	10/27/2015 09:47	17	25
11/03/2015 10:00	1600	23	11/03/2015 10:00	1600	1600	11/03/2015 10:00	1600	23	11/03/2015 10:00	23	28
11/10/2015 10:00	240	23	11/10/2015 10:00	240	920	11/10/2015 10:00	240	23	11/10/2015 10:00	23	23
11/17/2015 11:50	350	46	11/17/2015 11:50	350	295	11/17/2015 11:50	350	46	11/17/2015 11:50	46	23
11/24/2015 10:45	350	23	11/24/2015 10:45	350	350	11/24/2015 10:45	350	23	11/24/2015 10:45	23	23
12/01/2015 11:40	79	2	12/01/2015 11:40	79	295	12/01/2015 11:40	79	2	12/01/2015 11:40	2	23
12/08/2015 13:11	6.8	**0**	12/08/2015 13:11	6.8	214.5	12/08/2015 13:11	6.8	**0**	12/08/2015 13:11	**0**	12.5
12/15/2015 10:00	350	11	12/15/2015 10:00	350	214.5	12/15/2015 10:00	350	11	12/15/2015 10:00	11	6.5
12/22/2015 10:20	350	49	12/22/2015 10:20	350	214.5	12/22/2015 10:20	350	49	12/22/2015 10:20	49	6.5
12/29/2015 10:10	240	33	12/29/2015 10:10	240	295	12/29/2015 10:10	240	33	12/29/2015 10:10	33	22
01/05/2016 10:25	22	2	01/05/2016 10:25	22	295	01/05/2016 10:25	22	2	01/05/2016 10:25	2	22
01/12/2016 12:15	920	23	01/12/2016 12:15	920	295	01/12/2016 12:15	920	23	01/12/2016 12:15	23	28
01/19/2016 11:00	79	7.8	01/19/2016 11:00	79	159.5	01/19/2016 11:00	79	7.8	01/19/2016 11:00	7.8	15.4
01/25/2016 14:05	49	33	01/25/2016 14:05	49	64	01/25/2016 14:05	49	33	01/25/2016 14:05	33	15.4
02/02/2016 11:25	23	4.5	02/02/2016 11:25	23	64	02/02/2016 11:25	23	4.5	02/02/2016 11:25	4.5	15.4
02/09/2016 10:10	11	**0**	02/09/2016 10:10	11	36	02/09/2016 10:10	11	**0**	02/09/2016 10:10	**0**	6.15
02/16/2016 15:25	7.8	**0**	02/16/2016 15:25	7.8	17	02/16/2016 15:25	7.8	**0**	02/16/2016 15:25	**0**	2.25
02/23/2016 09:58	240	13	02/23/2016 09:58	240	17	02/23/2016 09:58	240	13	02/23/2016 09:58	13	2.25
03/01/2016 10:43	350	17	03/01/2016 10:43	350	125.5	03/01/2016 10:43	350	17	03/01/2016 10:43	17	6.5
03/08/2016 11:45	27	**0**	03/08/2016 11:45	27	133.5	03/08/2016 11:45	27	**0**	03/08/2016 11:45	**0**	6.5
03/15/2016 09:40	33	2	03/15/2016 09:40	33	136.5	03/15/2016 09:40	33	2	03/15/2016 09:40	2	7.5
03/23/2016 14:35	920	27	03/23/2016 14:35	920	191.5	03/23/2016 14:35	920	27	03/23/2016 14:35	27	9.5
03/30/2016 15:22	350	49	03/30/2016 15:22	350	191.5	03/30/2016 15:22	350	49	03/30/2016 15:22	49	14.5
04/05/2016 09:30	440	23	04/05/2016 09:30	440	395	04/05/2016 09:30	440	23	04/05/2016 09:30	23	25
04/12/2016 11:30	240	11	04/12/2016 11:30	240	395	04/12/2016 11:30	240	11	04/12/2016 11:30	11	25
04/19/2016 10:00	540	49	04/19/2016 10:00	540	395	04/19/2016 10:00	540	49	04/19/2016 10:00	49	36
04/27/2016 13:10	540	23	04/27/2016 13:10	540	490	04/27/2016 13:10	540	23	04/27/2016 13:10	23	23
05/03/2016 13:00	130	2	05/03/2016 13:00	130	390	05/03/2016 13:00	130	2	05/03/2016 13:00	2	17
05/10/2016 09:30	240	13	05/10/2016 09:30	240	390	05/10/2016 09:30	240	13	05/10/2016 09:30	13	18
05/17/2016 11:30	240	13	05/17/2016 11:30	240	240	05/17/2016 11:30	240	13	05/17/2016 11:30	13	13
05/24/2016 09:30	46	7.8	05/24/2016 09:30	46	185	05/24/2016 09:30	46	7.8	05/24/2016 09:30	7.8	10.4
06/02/2016 08:30	130	2	06/02/2016 08:30	130	185	06/02/2016 08:30	130	2	06/02/2016 08:30	2	10.4
06/07/2016 09:30	350	4.5	06/07/2016 09:30	350	185	06/07/2016 09:30	350	4.5	06/07/2016 09:30	4.5	6.15
06/14/2016 08:00	540	4	06/14/2016 08:00	540	240	06/14/2016 08:00	540	4	06/14/2016 08:00	4	4.25
06/21/2016 09:45	79	7.8	06/21/2016 09:45	79	240	06/21/2016 09:45	79	7.8	06/21/2016 09:45	7.8	4.25
06/28/2016 08:30	350	79	06/28/2016 08:30	350	350	06/28/2016 08:30	350	79	06/28/2016 08:30	79	6.15
07/06/2016 09:50	130	2	07/06/2016 09:50	130	240	07/06/2016 09:50	130	2	07/06/2016 09:50	2	5.9
07/13/2016 12:11	240	2	07/13/2016 12:11	240	185	07/13/2016 12:11	240	2	07/13/2016 12:11	2	4.9
07/19/2016 10:15	4	**0**	07/19/2016 10:15	4	185	07/19/2016 10:15	4	**0**	07/19/2016 10:15	**0**	2
07/26/2016 09:00	240	4.5	07/26/2016 09:00	240	185	07/26/2016 09:00	240	4.5	07/26/2016 09:00	4.5	2
08/02/2016 11:30	540	2	08/02/2016 11:30	540	240	08/02/2016 11:30	540	2	08/02/2016 11:30	2	2
08/09/2016 14:25	540	2	08/09/2016 14:25	540	390	08/09/2016 14:25	540	2	08/09/2016 14:25	2	2
08/16/2016 10:10	350	2	08/16/2016 10:10	350	445	08/16/2016 10:10	350	2	08/16/2016 10:10	2	2
08/23/2016 10:50	170	**0**	08/23/2016 10:50	170	445	08/23/2016 10:50	170	**0**	08/23/2016 10:50	**0**	2
08/30/2016 09:40	920	**0**	08/30/2016 09:40	920	445	08/30/2016 09:40	920	**0**	08/30/2016 09:40	**0**	1
09/06/2016 10:00	33	**0**	09/06/2016 10:00	33	260	09/06/2016 10:00	33	**0**	09/06/2016 10:00	**0**	0
09/14/2016 08:20	170	4.5	09/14/2016 08:20	170	170	09/14/2016 08:20	170	4.5	09/14/2016 08:20	4.5	0
09/20/2016 10:30	540	**0**	09/20/2016 10:30	540	355	09/20/2016 10:30	540	**0**	09/20/2016 10:30	**0**	0
09/27/2016 11:30	220	2	09/27/2016 11:30	220	195	09/27/2016 11:30	220	2	09/27/2016 11:30	2	1
10/04/2016 11:15	79	2	10/04/2016 11:15	79	195	10/04/2016 11:15	79	2	10/04/2016 11:15	2	2
10/11/2016 09:25	70	**0**	10/11/2016 09:25	70	149.5	10/11/2016 09:25	70	**0**	10/11/2016 09:25	**0**	1
10/18/2016 10:15	240	130	10/18/2016 10:15	240	149.5	10/18/2016 10:15	240	130	10/18/2016 10:15	130	2
10/25/2016 11:15	220	79	10/25/2016 11:15	220	149.5	10/25/2016 11:15	220	79	10/25/2016 11:15	79	40.5
11/01/2016 08:08	58	17	11/01/2016 08:08	58	145	11/01/2016 08:08	58	17	11/01/2016 08:08	17	48
11/09/2016 13:30	14	2	11/09/2016 13:30	14	139	11/09/2016 13:30	14	2	11/09/2016 13:30	2	48
11/15/2016 09:45	23	13	11/15/2016 09:45	23	40.5	11/15/2016 09:45	23	13	11/15/2016 09:45	13	15
11/22/2016 10:00	220	70	11/22/2016 10:00	220	40.5	11/22/2016 10:00	220	70	11/22/2016 10:00	70	15
11/29/2016 10:00	49	4.5	11/29/2016 10:00	49	36	11/29/2016 10:00	49	4.5	11/29/2016 10:00	4.5	8.75
12/06/2016 14:15	130	23	12/06/2016 14:15	130	89.5	12/06/2016 14:15	130	23	12/06/2016 14:15	23	18
12/13/2016 08:00	49	**0**	12/13/2016 08:00	49	89.5	12/13/2016 08:00	49	**0**	12/13/2016 08:00	**0**	13.75
12/20/2016 09:00	120	1.8	12/20/2016 09:00	120	84.5	12/20/2016 09:00	120	1.8	12/20/2016 09:00	1.8	3.15
12/28/2016 12:50	33	**0**	12/28/2016 12:50	33	84.5	12/28/2016 12:50	33	**0**	12/28/2016 12:50	**0**	0.9
01/03/2017 10:00	79	4.5	01/03/2017 10:00	79	64	01/03/2017 10:00	79	4.5	01/03/2017 10:00	4.5	0.9
01/09/2017 09:30	2	**0**	01/09/2017 09:30	2	56	01/09/2017 09:30	2	**0**	01/09/2017 09:30	**0**	0.9
01/17/2017 11:45	6.8	**0**	01/17/2017 11:45	6.8	19.9	01/17/2017 11:45	6.8	**0**	01/17/2017 11:45	**0**	0
01/24/2017 09:15	49	2	01/24/2017 09:15	49	27.9	01/24/2017 09:15	49	2	01/24/2017 09:15	2	1
02/01/2017 11:56	110	4.5	02/01/2017 11:56	110	27.9	02/01/2017 11:56	110	4.5	02/01/2017 11:56	4.5	1
02/07/2017 15:15	350	33	02/07/2017 15:15	350	79.5	02/07/2017 15:15	350	33	02/07/2017 15:15	33	3.25

02/15/2017 09:30	**0**	**0**		02/15/2017 09:30	**0**	79.5		02/15/2017 09:30	**0**	**0**		02/15/2017 09:30	**0**	3.25
02/21/2017 09:30	49	**0**		02/21/2017 09:30	49	79.5		02/21/2017 09:30	49	**0**		02/21/2017 09:30	**0**	2.25
03/01/2017 12:45	22	**0**		03/01/2017 12:45	22	35.5		03/01/2017 12:45	22	**0**		03/01/2017 12:45	**0**	0
03/07/2017 09:00	130	2		03/07/2017 09:00	130	35.5		03/07/2017 09:00	130	2		03/07/2017 09:00	2	0
03/14/2017 09:00	79	7.8		03/14/2017 09:00	79	64		03/14/2017 09:00	79	7.8		03/14/2017 09:00	7.8	1
03/21/2017 09:20	920	23		03/21/2017 09:20	920	104.5		03/21/2017 09:20	920	23		03/21/2017 09:20	23	4.9
03/27/2017 12:30	49	1.8		03/27/2017 12:30	49	104.5		03/27/2017 12:30	49	1.8		03/27/2017 12:30	1.8	4.9
04/04/2017 09:45	17	2		04/04/2017 09:45	17	64		04/04/2017 09:45	17	2		04/04/2017 09:45	2	4.9
04/12/2017 08:00	**0**	**0**		04/12/2017 08:00	**0**	33		04/12/2017 08:00	**0**	**0**		04/12/2017 08:00	**0**	1.9
04/18/2017 09:35	240	23		04/18/2017 09:35	240	33		04/18/2017 09:35	240	23		04/18/2017 09:35	23	1.9
04/24/2017 12:10	140	13		04/24/2017 12:10	140	78.5		04/24/2017 12:10	140	13		04/24/2017 12:10	13	7.5
05/02/2017 10:00	70	7.8		05/02/2017 10:00	70	105		05/02/2017 10:00	70	7.8		05/02/2017 10:00	7.8	10.4
05/10/2017 08:25	170	2		05/10/2017 08:25	170	155		05/10/2017 08:25	170	2		05/10/2017 08:25	2	10.4
05/16/2017 08:25	70	33		05/16/2017 08:25	70	105		05/16/2017 08:25	70	33		05/16/2017 08:25	33	10.4
05/23/2017 08:30	350	23		05/23/2017 08:30	350	120		05/23/2017 08:30	350	23		05/23/2017 08:30	23	15.4
05/30/2017 09:25	350	17		05/30/2017 09:25	350	260		05/30/2017 09:25	350	17		05/30/2017 09:25	17	20
06/06/2017 10:42	350	13		06/06/2017 10:42	350	350		06/06/2017 10:42	350	13		06/06/2017 10:42	13	20
06/13/2017 09:50	540	4		06/13/2017 09:50	540	350		06/13/2017 09:50	540	4		06/13/2017 09:50	4	15
06/20/2017 09:00	540	130		06/20/2017 09:00	540	445		06/20/2017 09:00	540	130		06/20/2017 09:00	130	15
06/27/2017 09:00	350	33		06/27/2017 09:00	350	445		06/27/2017 09:00	350	33		06/27/2017 09:00	33	23
07/03/2017 06:35	540	70		07/03/2017 06:35	540	540		07/03/2017 06:35	540	70		07/03/2017 06:35	70	51.5
07/11/2017 07:20	350	70		07/11/2017 07:20	350	445		07/11/2017 07:20	350	70		07/11/2017 07:20	70	70
07/18/2017 10:05	540	17		07/18/2017 10:05	540	445		07/18/2017 10:05	540	17		07/18/2017 10:05	17	51.5
07/25/2017 11:00	220	70		07/25/2017 11:00	220	445		07/25/2017 11:00	220	70		07/25/2017 11:00	70	70
08/01/2017 07:00	240	23		08/01/2017 07:00	240	295		08/01/2017 07:00	240	23		08/01/2017 07:00	23	46.5
08/01/2017 10:10	540	17		08/01/2017 10:10	540	390		08/01/2017 10:10	540	17		08/01/2017 10:10	17	20
08/08/2017 08:30	350	33		08/08/2017 08:30	350	295		08/08/2017 08:30	350	33		08/08/2017 08:30	33	28
08/15/2017 09:30	1600	46		08/15/2017 09:30	1600	445		08/15/2017 09:30	1600	46		08/15/2017 09:30	46	28
08/22/2017 09:50	240	9.3		08/22/2017 09:50	240	445		08/22/2017 09:50	240	9.3		08/22/2017 09:50	9.3	25
08/29/2017 09:00	220	17		08/29/2017 09:00	220	295		08/29/2017 09:00	220	17		08/29/2017 09:00	17	25
09/06/2017 07:20	920	140		09/06/2017 07:20	920	580		09/06/2017 07:20	920	140		09/06/2017 07:20	140	31.5
09/12/2017 07:30	240	49		09/12/2017 07:30	240	240		09/12/2017 07:30	240	49		09/12/2017 07:30	49	33
09/19/2017 10:00	130	33		09/19/2017 10:00	130	230		09/19/2017 10:00	130	33		09/19/2017 10:00	33	41
11/30/2017	220	7.8		11/30/2017	220			11/30/2017	220	7.8		11/30/2017	7.8	
12/5/2017	70	46		12/5/2017	70			12/5/2017	70	46		12/5/2017	46	
12/12/2017	27	2		12/12/2017	27			12/12/2017	27	2		12/12/2017	2	
12/19/2017	49	7.8		12/19/2017	49	59.5		12/19/2017	49	7.8		12/19/2017	7.8	7.8
12/27/2017	170	4.5		12/27/2017	170	59.5		12/27/2017	170	4.5		12/27/2017	4.5	6.15
min	**0**	**0**	**0**	**min**		**11**		**min**	**0**	**0**		**min**	**0**	**0**
max	**2000**	**500**	**41**	**max**		**1600**		**max**	**2000**	**500**		**max**	**500**	**80**
average	**358**	**24**	**6**	**average**		**312**		**average**	**358**	**19**		**average**	**19**	**12**
median	**240**	**7.8**	**3.1**	**median**		**235**		**median**	**240**	**5.2**		**median**	**5.2**	**6.15**
95th percentile	**1140**	**80**	**20.9**	**97.6 percentile**	<1000	**991.04**						**100th percentile**	<200	**80**
						245								

West Valley Water District
LT2 Sample Results

State Project Water & Lytle Creek Blend				
Date	Cryptosporidium (oocysts)	Escherichia coli (MPN/100mL)	Turbidity (NTU)	Giardia (cysts)
10/6/2015	0	7.4	4.1	0
11/3/2015	0	1.0	6.5	0
12/1/2015	0	2.0	1.5	0
1/5/2016	0	1.0	0.8	0
2/1/2016	0	8.6	1.5	0
3/1/2016	0	1.0	1.3	0
4/5/2016	0	< 1.0	0.9	0
5/3/2016	0	< 1.0	1.1	0
6/7/2016	0	3.1	2.2	0
7/5/2016	0	1.0	1.1	0
8/3/2016	0	< 1.0	1.5	0
9/6/2016	0	< 1.0	1.0	0
10/4/2016	0	< 1.0	1.8	0
11/1/2016	0	3.1	1.1	0
12/6/2016	0	4.1	1.3	0
1/3/2017	0	9.7	1.2	0
2/7/2017	0	< 1.0	0.2	0
3/7/2017	0	91	1.7	
4/4/2017	0	13	1.0	
5/2/2017	0	340	3.1	
6/6/2017	0	*	12.0	
6/12/2017		<1.0		
7/11/2017	0	<1.0	11.0	
8/1/2017	0	<1.0	8.6	
9/5/2017	0	1.0	2.0	

*The laboratory did not receive a bottle for E. coli, once informed we resampled.

Date	TOC	Unit
01/09/2013 15:18	0.5	mg/L
02/12/2013 11:05	0.52	mg/L
03/12/2013 12:47	0.31	mg/L
04/02/2013 14:04	0.3	mg/L
05/08/2013 13:15	0.93	mg/L
06/04/2013 11:45	0.43	mg/L
07/09/2013 10:40	**0**	mg/L
08/20/2013 11:15	**0**	mg/L
09/05/2013 11:00	0.37	mg/L
10/30/2013 10:25	**0**	mg/L
11/20/2013 11:30	**0**	mg/L
12/18/2013 13:55	**0**	mg/L
01/15/2014 11:15	0.39	mg/L
02/12/2014 11:50	0.67	mg/L
03/20/2014 10:20	**0**	mg/L
04/23/2014 12:00	0.38	mg/L
05/21/2014 12:25	0.32	mg/L
06/11/2014 09:15	0.33	mg/L
07/16/2014 11:50	1.5	mg/L
08/27/2014 13:10	2.5	mg/L
09/17/2014 13:15	2.5	mg/L
10/15/2014 14:00	0.65	mg/L
11/12/2014 11:25	0.56	mg/L
12/10/2014 09:45	0.52	mg/L
01/14/2015 10:20	0.47	mg/L
02/03/2015 11:55	0.47	mg/L
03/03/2015 12:40	0.7	mg/L
04/01/2015 10:00	0.38	mg/L
05/05/2015 10:30	0.41	mg/L
06/03/2015 10:00	2.3	mg/L
07/09/2015 11:40	0.34	mg/L
08/11/2015 08:45	0.55	mg/L
09/09/2015 08:30	0.36	mg/L
10/13/2015 09:50	0.39	mg/L
11/03/2015 10:40	0.82	mg/L
12/01/2015 11:50	1.4	mg/L
01/05/2016 10:15	1.2	mg/L
02/02/2016 10:33	0.65	mg/L
03/01/2016 10:52	0.64	mg/L
04/05/2016 08:28	0.45	mg/L
05/03/2016 13:10	0.84	mg/L
06/02/2016 09:35	0.38	mg/L
07/06/2016 10:31	0.43	mg/L
08/02/2016 11:31	0.62	mg/L
09/06/2016 09:25	0.47	mg/L
10/04/2016 11:05	0.31	mg/L
11/01/2016 08:43	**0**	mg/L
12/06/2016 14:16	1.3	mg/L
01/03/2017 09:55	0.32	mg/L
02/01/2017 11:55	0.73	mg/L
03/01/2017 12:46	0.61	mg/L
04/04/2017 09:46	0.76	mg/L
05/02/2017 11:20	0.56	mg/L
06/06/2017 11:55	0.39	mg/L
07/03/2017 06:24	0.45	mg/L
08/01/2017 09:05	0.83	mg/L
09/06/2017 07:35	0.47	mg/L
12/05/2017 00:00	0.65	mg/L

min	<0.15
max	2.5
average	0.61
median	0.47
	1.62

bold - nd set equal to zero

alum avg	0.60
ach avg	0.61
alum median	0.41
ach median	0.56

Date	PT Inf TOC	PT Eff TOC	Units	%Reduction	Date	PT Inf TOC	PT Eff TOC	%Reducti	% Lytle Creek Use
04/23/2013 11:25	3.3	1.1	mg/L	67%	04/23/2013 11:25	3.3	1.1	0.666667	100
04/30/2013 14:20	3.2	1.1	mg/L	66%	04/30/2013 14:20	3.2	1.1	0.65625	
05/08/2013 12:40	3.1	0.99	mg/L	68%	05/08/2013 12:40	3.1	0.99	0.680645	
05/14/2013 12:22	3	1.1	mg/L	63%	05/14/2013 12:22	3	1.1	0.633333	67
05/21/2013 11:45	3	1.2	mg/L	60%	05/21/2013 11:45	3	1.2	0.6	
05/29/2013 08:35	2.9	1	mg/L	66%	05/29/2013 08:35	2.9	1	0.655172	
06/04/2013 11:50	2.9	1.1	mg/L	62%	06/04/2013 11:50	2.9	1.1	0.62069	
06/11/2013 10:30	3	2.5	mg/L	17%	06/11/2013 10:30	3	2.5	0.166667	75
06/17/2013 12:00	2.9	1.1	mg/L	62%	06/17/2013 12:00	2.9	1.1	0.62069	
06/25/2013 11:10	3	1.3	mg/L	57%	06/25/2013 11:10	3	1.3	0.566667	
07/02/2013 10:30	3.1	1.5	mg/L	52%	07/02/2013 10:30	3.1	1.5	0.516129	
07/09/2013 10:10	3	1.5	mg/L	50%	07/09/2013 10:10	3	1.5	0.5	50
07/17/2013 14:37	3.2	2	mg/L	38%	07/17/2013 14:37	3.2	2	0.375	
07/23/2013 10:25	3.1	1.3	mg/L	58%	07/23/2013 10:25	3.1	1.3	0.580645	
07/30/2013 10:55	2.8	1.2	mg/L	57%	07/30/2013 10:55	2.8	1.2	0.571429	
08/06/2013 09:30	1.1	1.2	mg/L	-9%	08/06/2013 09:30	1.1	1.2	0	75
08/13/2013 12:10	2.7	1.2	mg/L	56%	08/13/2013 12:10	2.7	1.2	0.555556	
08/20/2013 11:45	1.2	1.1	mg/L	8%	08/20/2013 11:45	1.2	1.1	0.083333	
08/28/2013 11:20	2.7	1	mg/L	63%	08/28/2013 11:20	2.7	1	0.62963	
09/04/2013 09:50	2.7	1	mg/L	63%	09/04/2013 09:50	2.7	1	0.62963	
09/11/2013 14:00	2.3	0.95	mg/L	59%	09/11/2013 14:00	2.3	0.95	0.586957	70
09/18/2013 10:20	2.2	0.9	mg/L	59%	09/18/2013 10:20	2.2	0.9	0.590909	
09/25/2013 12:30	2.3	0.99	mg/L	57%	09/25/2013 12:30	2.3	0.99	0.569565	
10/02/2013 11:31	2.4	1.1	mg/L	54%	10/02/2013 11:31	2.4	1.1	0.541667	
10/09/2013 10:23	2.3	1.2	mg/L	48%	10/09/2013 10:23	2.3	1.2	0.478261	80
12/11/2013 14:30	0.57	0.73	mg/L	-28%	12/11/2013 14:30	0.57	0.73	0	100
12/18/2013 13:45	< 0.30	<0.3	mg/L		12/18/2013 13:45	**0**	**0**	0	
12/23/2013 14:25	< 0.30	<0.3	mg/L		12/23/2013 14:25	**0**	**0**	0	
12/30/2013 15:13	< 0.30	<0.3	mg/L		12/30/2013 15:13	**0**	**0**	0	
01/08/2014 13:45	< 0.30	<0.3	mg/L		01/08/2014 13:45	**0**	**0**	0	
01/15/2014 10:40	< 0.30	<0.3	mg/L		01/15/2014 10:40	**0**	**0**	0	100
01/22/2014 09:30	< 0.30	<0.3	mg/L		01/22/2014 09:30	**0**	**0**	0	
01/29/2014 12:10	< 0.30	<0.3	mg/L		01/29/2014 12:10	**0**	**0**	0	
02/05/2014 10:45	0.65	<0.3	mg/L		02/05/2014 10:45	0.65	**0**	1	
02/12/2014 11:15	< 0.30	<0.3	mg/L		02/12/2014 11:15	**0**	**0**	0	
02/19/2014 11:50	< 0.30	<0.3	mg/L		02/19/2014 11:50	**0**	**0**	0	
02/26/2014 11:50	< 0.30	<0.3	mg/L		02/26/2014 11:50	**0**	**0**	0	100
03/05/2014 12:25	< 0.30	<0.3	mg/L		03/05/2014 12:25	**0**	**0**	0	
03/12/2014 11:15	< 0.30	<0.3	mg/L		03/12/2014 11:15	**0**	**0**	0	
03/27/2014 11:08	0.49	0.53	mg/L	-8%	03/27/2014 11:08	0.49	0.53	0	100
04/02/2014 15:10	0.51	0.54	mg/L	-6%	04/02/2014 15:10	0.51	0.54	0	
04/09/2014 10:10	0.35	0.58	mg/L	-66%	04/09/2014 10:10	0.35	0.58	0	100
04/16/2014 09:30	0.32	0.37	mg/L	-16%	04/16/2014 09:30	0.32	0.37	0	
04/23/2014 11:45	0.33	0.41	mg/L	-24%	04/23/2014 11:45	0.33	0.41	0	
04/30/2014 11:45	0.57	0.68	mg/L	-19%	04/30/2014 11:45	0.57	0.68	0	
05/07/2014 09:25	0.46	0.64	mg/L	-39%	05/07/2014 09:25	0.46	0.64	0	
05/14/2014 11:20	0.3	0.4	mg/L	-33%	05/14/2014 11:20	0.3	0.4	0	100
05/21/2014 13:10	< 0.30	0.3	mg/L		05/21/2014 13:10	**0**	0.3	0	
05/28/2014 09:20	< 0.30	0.3	mg/L		05/28/2014 09:20	**0**	0.3	0	

06/04/2014 11:15	1.4	0.93	mg/L	34%	06/04/2014 11:15	1.4	0.93	0.335714	
06/11/2014 09:40	1.5	0.76	mg/L	49%	06/11/2014 09:40	1.5	0.76	0.493333	50
06/18/2014 10:30	1.4	0.8	mg/L	43%	06/18/2014 10:30	1.4	0.8	0.428571	
06/25/2014 13:10	1.4	0.79	mg/L	44%	06/25/2014 13:10	1.4	0.79	0.435714	
07/02/2014 13:40	1.3	0.72	mg/L	45%	07/02/2014 13:40	1.3	0.72	0.446154	
07/09/2014 13:45	1.4	0.84	mg/L	40%	07/09/2014 13:45	1.4	0.84	0.4	
07/16/2014 11:40	1.5	0.88	mg/L	41%	07/16/2014 11:40	1.5	0.88	0.413333	50
07/23/2014 10:20	1.6	0.91	mg/L	43%	07/23/2014 10:20	1.6	0.91	0.43125	
07/30/2014 10:03	1.7	1	mg/L	41%	07/30/2014 10:03	1.7	1	0.411765	
08/06/2014 10:45	1.9	1.2	mg/L	37%	08/06/2014 10:45	1.9	1.2	0.368421	
08/13/2014 11:13	2.1	1.4	mg/L	33%	08/13/2014 11:13	2.1	1.4	0.333333	
08/20/2014 14:15	2.3	1.6	mg/L	30%	08/20/2014 14:15	2.3	1.6	0.304348	50
08/27/2014 12:40	2.3	1.7	mg/L	26%	08/27/2014 12:40	2.3	1.7	0.26087	
09/03/2014 11:11	2.4	1.6	mg/L	33%	09/03/2014 11:11	2.4	1.6	0.333333	
09/10/2014 08:40	2.4	1.8	mg/L	25%	09/10/2014 08:40	2.4	1.8	0.25	
09/17/2014 12:30	2.3	1.8	mg/L	22%	09/17/2014 12:30	2.3	1.8	0.217391	50
09/25/2014 10:30	2.4	1.3	mg/L	46%	09/25/2014 10:30	2.4	1.3	0.458333	
10/01/2014 11:15	2.5	2	mg/L	20%	10/01/2014 11:15	2.5	2	0.2	
10/08/2014 10:10	2.4	1.3	mg/L	46%	10/08/2014 10:10	2.4	1.3	0.458333	
10/15/2014 14:15	2.4	1.3	mg/L	46%	10/15/2014 14:15	2.4	1.3	0.458333	50
10/22/2014 09:42	2.4	1.4	mg/L	42%	10/22/2014 09:42	2.4	1.4	0.416667	
10/29/2014 10:20	2.3	1.3	mg/L	43%	10/29/2014 10:20	2.3	1.3	0.434783	
11/04/2014 13:20	2.3	1.5	mg/L	35%	11/04/2014 13:20	2.3	1.5	0.347826	
11/12/2014 11:13	2.2	1.3	mg/L	41%	11/12/2014 11:13	2.2	1.3	0.409091	
11/18/2014 11:20	2.4	1.2	mg/L	50%	11/18/2014 11:20	2.4	1.2	0.5	50
11/25/2014 11:38	2.4	1.2	mg/L	50%	11/25/2014 11:38	2.4	1.2	0.5	
12/01/2014 14:00	2.2	1.4	mg/L	36%	12/01/2014 14:00	2.2	1.4	0.363636	
12/10/2014 10:00	2.6	1.8	mg/L	31%	12/10/2014 10:00	2.6	1.8	0.307692	100
12/23/2014 10:55	0.64	0.61	mg/L	5%	12/23/2014 10:55	0.64	0.61	0.046875	
01/14/2015 10:30	0.47	0.43	mg/L	9%	01/14/2015 10:30	0.47	0.43	0.085106	100
02/10/2015 11:10	0.43	0.41	mg/L	5%	02/10/2015 11:10	0.43	0.41	0.046512	100
02/24/2015 10:15	0.97	0.81	mg/L	16%	02/24/2015 10:15	0.97	0.81	0.164948	
03/03/2015 11:45	0.65	0.58	mg/L	11%	03/03/2015 11:45	0.65	0.58	0.107692	100
03/10/2015 09:55	0.45	0.37	mg/L	18%	03/10/2015 09:55	0.45	0.37	0.177778	
03/18/2015 09:45	0.42	0.45	mg/L	-7%	03/18/2015 09:45	0.42	0.45	0	
03/24/2015 11:45	0.3	0.32	mg/L	-7%	03/24/2015 11:45	0.3	0.32	0	
04/08/2015 10:13	0.5	0.46	mg/L	8%	04/08/2015 10:13	0.5	0.46	0.08	
04/14/2015 11:15	0.35	0.33	mg/L	6%	04/14/2015 11:15	0.35	0.33	0.057143	100
05/13/2015 09:21	0.32	0.34	mg/L	-6%	05/13/2015 09:21	0.32	0.34	0	100
05/19/2015 14:10	0.32	0.36	mg/L	-13%	05/19/2015 14:10	0.32	0.36	0	
06/03/2015 09:20	1	1.1	mg/L	-10%	06/03/2015 09:20	1	1.1	0	
06/09/2015 09:25	0.55	1.1	mg/L	-100%	06/09/2015 09:25	0.55	1.1	0	50
06/17/2015 13:09	1.7	1.2	mg/L	29%	06/17/2015 13:09	1.7	1.2	0.294118	
06/23/2015 11:52	1.8	1.2	mg/L	33%	06/23/2015 11:52	1.8	1.2	0.333333	
07/01/2015 13:20	1.8	1.4	mg/L	22%	07/01/2015 13:20	1.8	1.4	0.222222	
07/09/2015 11:30	1.7	1.4	mg/L	18%	07/09/2015 11:30	1.7	1.4	0.176471	50
07/15/2015 11:45	1.7	1	mg/L	41%	07/15/2015 11:45	1.7	1	0.411765	
07/21/2015 11:00	2.1	2.2	mg/L	-5%	07/21/2015 11:00	2.1	2.2	0	
07/28/2015 14:31	2	2.3	mg/L	-15%	07/28/2015 14:31	2	2.3	0	
08/03/2015 15:00	2.6		mg/L	100%	08/03/2015 15:00	2.6		1	

08/04/2015 08:15	2.7	2.4	mg/L	11%	08/04/2015 08:15	2.7	2.4	0.111111	50
08/04/2015 10:20	2.4		mg/L	100%	08/04/2015 10:20	2.4		1	
08/05/2015 08:46	2.7		mg/L	100%	08/05/2015 08:46	2.7		1	
08/06/2015 10:25	2.7		mg/L	100%	08/06/2015 10:25	2.7		1	
08/07/2015 09:00	2.8		mg/L	100%	08/07/2015 09:00	2.8		1	
08/11/2015 10:20	1.4	0.82	mg/L	41%	08/11/2015 10:20	1.4	0.82	0.414286	
08/19/2015 10:30	0.52	1.7	mg/L	-227%	08/19/2015 10:30	0.52	1.7	0	
08/26/2015 10:27	1.4	2	mg/L	-43%	08/26/2015 10:27	1.4	2	0	
09/02/2015 10:00	1.6	2.1	mg/L	-31%	09/02/2015 10:00	1.6	2.1	0	
09/09/2015 10:00	1.3	2.1	mg/L	-62%	09/09/2015 10:00	1.3	2.1	0	25
09/16/2015 10:20	3	2.4	mg/L	20%	09/16/2015 10:20	3	2.4	0.2	
09/23/2015 12:20	2.4	2.5	mg/L	-4%	09/23/2015 12:20	2.4	2.5	0	
09/29/2015 10:20	3	1.8	mg/L	40%	09/29/2015 10:20	3	1.8	0.4	
10/06/2015 10:25	2.4	2	mg/L	17%	10/06/2015 10:25	2.4	2	0.166667	
10/13/2015 11:45	1.9	1.7	mg/L	11%	10/13/2015 11:45	1.9	1.7	0.105263	
10/21/2015 10:20	1.9	1.6	mg/L	16%	10/21/2015 10:20	1.9	1.6	0.157895	50
10/27/2015 10:55	2.4	1.7	mg/L	29%	10/27/2015 10:55	2.4	1.7	0.291667	
11/03/2015 10:10	6.7	2.3	mg/L	66%	11/03/2015 10:10	6.7	2.3	0.656716	
11/10/2015 10:05	3	2.3	mg/L	23%	11/10/2015 10:05	3	2.3	0.233333	
11/17/2015 11:30	3	2.2	mg/L	27%	11/17/2015 11:30	3	2.2	0.266667	50
11/24/2015 10:40	2.8	2.1	mg/L	25%	11/24/2015 10:40	2.8	2.1	0.25	
12/01/2015 11:35	2.7	2.2	mg/L	19%	12/01/2015 11:35	2.7	2.2	0.185185	
12/08/2015 13:15	2.9	1.4	mg/L	52%	12/08/2015 13:15	2.9	1.4	0.517241	
12/15/2015 09:30	2.3	1.3	mg/L	43%	12/15/2015 09:30	2.3	1.3	0.434783	50
12/22/2015 10:30	2.3	1.4	mg/L	39%	12/22/2015 10:30	2.3	1.4	0.391304	
12/29/2015 09:40	2.3	1.4	mg/L	39%	12/29/2015 09:40	2.3	1.4	0.391304	
01/05/2016 10:20	2.3	1.1	mg/L	52%	01/05/2016 10:20	2.3	1.1	0.521739	
01/12/2016 14:20	0.59	0.62	mg/L	-5%	01/12/2016 14:20	0.59	0.62	0	
01/19/2016 11:15	0.61	1	mg/L	-64%	01/19/2016 11:15	0.61	1	0	71
01/25/2016 13:50	2.3	1	mg/L	57%	01/25/2016 13:50	2.3	1	0.565217	
02/02/2016 10:47	0.72	1.1	mg/L	-53%	02/02/2016 10:47	0.72	1.1	0	
02/09/2016 10:15	0.56	1.3	mg/L	-132%	02/09/2016 10:15	0.56	1.3	0	
02/16/2016 15:11	0.64	0.93	mg/L	-45%	02/16/2016 15:11	0.64	0.93	0	65
02/23/2016 09:23	0.53	0.93	mg/L	-75%	02/23/2016 09:23	0.53	0.93	0	
03/01/2016 11:25	0.48	0.96	mg/L	-100%	03/01/2016 11:25	0.48	0.96	0	
03/08/2016 11:30	2	1.8	mg/L	10%	03/08/2016 11:30	2	1.8	0.1	
03/15/2016 09:50	1.1	1.2	mg/L	-9%	03/15/2016 09:50	1.1	1.2	0	60
03/23/2016 14:46	1.1	1.1	mg/L	0%	03/23/2016 14:46	1.1	1.1	0	
03/30/2016 15:11	1.4	0.96	mg/L	31%	03/30/2016 15:11	1.4	0.96	0.314286	
04/05/2016 09:35	0.79	1.1	mg/L	-39%	04/05/2016 09:35	0.79	1.1	0	
04/12/2016 11:35	3.2	2.9	mg/L	9%	04/12/2016 11:35	3.2	2.9	0.09375	59
04/12/2016 12:40	3.2	3	mg/L	6%	04/12/2016 12:40	3.2	3	0.0625	
04/13/2016 08:05	3.2	3	mg/L	6%	04/13/2016 08:05	3.2	3	0.0625	
04/19/2016	3.4	3.2	mg/L	6%	04/19/2016	3.4	3.2	0.058824	
04/26/2016 13:00	3.4	3	mg/L	12%	04/26/2016 13:00	3.4	3	0.117647	
05/03/2016 12:40	3.7	3.3	mg/L	11%	05/03/2016 12:40	3.7	3.3	0.108108	
05/03/2016 13:10	3.7		mg/L	100%	05/03/2016 13:10	3.7		1	51
05/10/2016 09:45	4	3.3	mg/L	18%	05/10/2016 09:45	4	3.3	0.175	
05/17/2016 11:30	4.1	3.5	mg/L	15%	05/17/2016 11:30	4.1	3.5	0.146341	
05/24/2016 09:30	4.4	4	mg/L	9%	05/24/2016 09:30	4.4	4	0.090909	

06/02/2016 09:00	4.1	3.6	mg/L	12%	06/02/2016 09:00	4.1	3.6	0.121951	
06/07/2016 10:15	4.1	3.8	mg/L	7%	06/07/2016 10:15	4.1	3.8	0.073171	
06/14/2016 09:40	4.2	3.7	mg/L	12%	06/14/2016 09:40	4.2	3.7	0.119048	36
06/21/2016 10:00	4.1	3.6	mg/L	12%	06/21/2016 10:00	4.1	3.6	0.121951	
06/28/2016 09:30	4.4	3.7	mg/L	16%	06/28/2016 09:30	4.4	3.7	0.159091	
07/06/2016 10:20	4.1	3.5	mg/L	15%	07/06/2016 10:20	4.1	3.5	0.146341	
07/13/2016 11:50	3.9	3.4	mg/L	13%	07/13/2016 11:50	3.9	3.4	0.128205	
07/19/2016 10:00	3.7	3.3	mg/L	11%	07/19/2016 10:00	3.7	3.3	0.108108	29
07/26/2016 10:00	3.7	3.4	mg/L	8%	07/26/2016 10:00	3.7	3.4	0.081081	
08/02/2016 11:20	3.6	3.1	mg/L	14%	08/02/2016 11:20	3.6	3.1	0.138889	
08/09/2016 14:30	3.5	3.1	mg/L	11%	08/09/2016 14:30	3.5	3.1	0.114286	
08/16/2016 10:00	3.2	2.8	mg/L	13%	08/16/2016 10:00	3.2	2.8	0.125	35
08/23/2016 11:10	3	2.6	mg/L	13%	08/23/2016 11:10	3	2.6	0.133333	
08/30/2016 08:55	2.8	2.4	mg/L	14%	08/30/2016 08:55	2.8	2.4	0.142857	
09/06/2016 10:10	2.6	2.3	mg/L	12%	09/06/2016 10:10	2.6	2.3	0.115385	
09/14/2016 08:30	2.6	2.1	mg/L	19%	09/14/2016 08:30	2.6	2.1	0.192308	26
09/20/2016 10:15	2.5	2.1	mg/L	16%	09/20/2016 10:15	2.5	2.1	0.16	
09/27/2016 10:00	2.7	2.1	mg/L	22%	09/27/2016 10:00	2.7	2.1	0.222222	
10/04/2016 11:00	2.4	2.3	mg/L	4%	10/04/2016 11:00	2.4	2.3	0.041667	
10/11/2016	2.5	1.9	mg/L	24%	10/11/2016	2.5	1.9	0.24	50
10/18/2016 10:30	2.6	2	mg/L	23%	10/18/2016 10:30	2.6	2	0.230769	
10/25/2016 11:32	2.5	2.1	mg/L	16%	10/25/2016 11:32	2.5	2.1	0.16	
11/01/2016 08:50	2.4	2.6	mg/L	-8%	11/01/2016 08:50	2.4	2.6	0	
11/09/2016 14:00	2.4	1.9	mg/L	21%	11/09/2016 14:00	2.4	1.9	0.208333	
11/15/2016 09:28	2.5	1.8	mg/L	28%	11/15/2016 09:28	2.5	1.8	0.28	58
11/22/2016 09:40	2.4	1.9	mg/L	21%	11/22/2016 09:40	2.4	1.9	0.208333	
11/29/2016 10:20	2.4	1.9	mg/L	21%	11/29/2016 10:20	2.4	1.9	0.208333	
12/06/2016 13:33	2.5	1.9	mg/L	24%	12/06/2016 13:33	2.5	1.9	0.24	
12/13/2016 10:20	2.7	1.9	mg/L	30%	12/13/2016 10:20	2.7	1.9	0.296296	
12/20/2016 09:20	2.4	1.8	mg/L	25%	12/20/2016 09:20	2.4	1.8	0.25	45
12/28/2016 12:40	2.4	1.9	mg/L	21%	12/28/2016 12:40	2.4	1.9	0.208333	
01/03/2017 10:20	2.4	2.1	mg/L	13%	01/03/2017 10:20	2.4	2.1	0.125	
01/09/2017 09:14	2.5	1.9	mg/L	24%	01/09/2017 09:14	2.5	1.9	0.24	
01/17/2017 12:16	1.1	0.41	mg/L	63%	01/17/2017 12:16	1.1	0.41	0.627273	
01/24/2017 09:00	1.3	0.66	mg/L	49%	01/24/2017 09:00	1.3	0.66	0.492308	100
02/01/2017 11:45	1.6	0.58	mg/L	64%	02/01/2017 11:45	1.6	0.58	0.6375	
02/15/2017 09:00	1.3	0.57	mg/L	56%	02/15/2017 09:00	1.3	0.57	0.561538	
02/21/2017 09:38	0.96	0.58	mg/L	40%	02/21/2017 09:38	0.96	0.58	0.395833	100
03/01/2017 12:30	1.2	0.55	mg/L	54%	03/01/2017 12:30	1.2	0.55	0.541667	
03/07/2017 08:30	0.85	0.41	mg/L	52%	03/07/2017 08:30	0.85	0.41	0.517647	
03/14/2017 09:00	2.4	0.44	mg/L	82%	03/14/2017 09:00	2.4	0.44	0.816667	100
03/21/2017 09:20	1.6	0.77	mg/L	52%	03/21/2017 09:20	1.6	0.77	0.51875	
03/27/2017 12:20	0.65	0.48	mg/L	26%	03/27/2017 12:20	0.65	0.48	0.261538	
04/04/2017 10:05	6	0.46	mg/L	92%	04/04/2017 10:05	6	0.46	0.923333	
04/12/2017 08:10	0.63	0.45	mg/L	29%	04/12/2017 08:10	0.63	0.45	0.285714	100
04/18/2017 09:00	0.69	0.41	mg/L	41%	04/18/2017 09:00	0.69	0.41	0.405797	
04/24/2017 11:50	3.7	1.1	mg/L	70%	04/24/2017 11:50	3.7	1.1	0.702703	
05/02/2017 10:40	3.5	1.6	mg/L	54%	05/02/2017 10:40	3.5	1.6	0.542857	
05/10/2017 07:45	3.4	1.4	mg/L	59%	05/10/2017 07:45	3.4	1.4	0.588235	75
05/16/2017 08:35	3.2	1.3	mg/L	59%	05/16/2017 08:35	3.2	1.3	0.59375	

05/23/2017 08:54	3.1	1.3	mg/L	58%	05/23/2017 08:54	3.1	1.3	0.580645	
05/30/2017 09:40	2.9	1.4	mg/L	52%	05/30/2017 09:40	2.9	1.4	0.517241	
06/06/2017 11:26	3	1.4	mg/L	53%	06/06/2017 11:26	3	1.4	0.533333	
06/13/2017 10:10	3	1.4	mg/L	53%	06/13/2017 10:10	3	1.4	0.533333	70
06/20/2017 08:45	3.2	1.6	mg/L	50%	06/20/2017 08:45	3.2	1.6	0.5	
06/27/2017 09:00	2.8	1.4	mg/L	50%	06/27/2017 09:00	2.8	1.4	0.5	
07/03/2017 06:10	2.6	1.4	mg/L	46%	07/03/2017 06:10	2.6	1.4	0.461538	
07/11/2017 08:20	2.7	1.5	mg/L	44%	07/11/2017 08:20	2.7	1.5	0.444444	65
07/18/2017 10:20	2.5	1.8	mg/L	28%	07/18/2017 10:20	2.5	1.8	0.28	
07/25/2017 10:50	2.6	2	mg/L	23%	07/25/2017 10:50	2.6	2	0.230769	
08/01/2017 07:30	2.7	1.6	mg/L	41%	08/01/2017 07:30	2.7	1.6	0.407407	
08/08/2017 09:30	2.8	1.7	mg/L	39%	08/08/2017 09:30	2.8	1.7	0.392857	
08/15/2017	2.7	1.4	mg/L	48%	08/15/2017	2.7	1.4	0.481481	55
08/22/2017 09:05	2.8	1.4	mg/L	50%	08/22/2017 09:05	2.8	1.4	0.5	
08/29/2017 08:45	3	1.5	mg/L	50%	08/29/2017 08:45	3	1.5	0.5	
09/06/2017 09:05	2.6	1.7	mg/L	35%	09/06/2017 09:05	2.6	1.7	0.346154	
09/12/2017 07:15	2.4	1.3	mg/L	46%	09/12/2017 07:15	2.4	1.3	0.458333	
09/19/2017 10:05	2.5	1.4	mg/L	44%	09/19/2017 10:05	2.5	1.4	0.44	55
09/27/2017 07:25	2.6	1.8	mg/L	31%	09/27/2017 07:25	2.6	1.8	0.307692	
10/03/2017 10:50	2.5	1.6	mg/L	36%	10/03/2017 10:50	2.5	1.6	0.36	
10/10/2017 11:00	2.6	1.7	mg/L	35%	10/10/2017 11:00	2.6	1.7	0.346154	
10/17/2017 14:10	2.5	1.9	mg/L	24%	10/17/2017 14:10	2.5	1.9	0.24	0
10/24/2017 10:00	2.7	2	mg/L	26%	10/24/2017 10:00	2.7	2	0.259259	
10/31/2017 09:50	2.8	2.1	mg/L	25%	10/31/2017 09:50	2.8	2.1	0.25	
11/08/2017 14:08	2.8	2.8	mg/L	0%	11/08/2017 14:08	2.8	2.8	0	0
11/14/2017 10:30	1.3	2.3	mg/L	-77%	11/14/2017 10:30	1.3	2.3	0	
min	<0.3	<0.3		-227%	0%				
max	6.7	4		100%					
average	2.2	1.5		24%		2.1	1.4		
median	2.4	1.4		26%		2.4	1.3		

bold - nd set equal to zero

avg alum	1.51	0.89
avg ach	2.52	1.87
median alum	1.60	0.99
median ach	2.60	1.80

Date	CFE TOC	Unit
01/02/2013 15:16	0.31	mg/L
01/09/2013 14:55	**0**	mg/L
01/09/2013 15:16	0.31	mg/L
01/15/2013 10:46	**0**	mg/L
01/23/2013 13:35	0.31	mg/L
01/28/2013 10:49	**0**	mg/L
02/07/2013 09:00	0.38	mg/L
02/12/2013 10:50	0.32	mg/L
02/12/2013 11:00	**0**	mg/L
02/19/2013 11:45	**0**	mg/L
02/26/2013 12:30	**0**	mg/L
03/05/2013 10:55	**0**	mg/L
03/12/2013 11:44	0.31	mg/L
03/12/2013 12:04	**0**	mg/L
03/19/2013 13:35	0.36	mg/L
03/26/2013 11:45	0.34	mg/L
04/02/2013 14:03	**0**	mg/L
04/02/2013 14:08	**0**	mg/L
04/09/2013 11:25	0.34	mg/L
04/16/2013 10:35	0.31	mg/L
04/23/2013 11:20	1.1	mg/L
04/30/2013 13:45	0.99	mg/L
05/08/2013 12:33	0.92	mg/L
05/14/2013 12:12	0.98	mg/L
05/21/2013 11:25	0.98	mg/L
05/29/2013 08:20	0.96	mg/L
06/04/2013 10:25	0.94	mg/L
06/11/2013 10:20	1.9	mg/L
06/17/2013 11:50	1.1	mg/L
06/25/2013 10:40	1.3	mg/L
07/02/2013 10:25	1.3	mg/L
07/09/2013 10:20	1.2	mg/L
07/17/2013 14:30	1.8	mg/L
07/23/2013 10:44	1.3	mg/L
07/30/2013 10:52	1.1	mg/L
08/06/2013 09:45	1	mg/L
08/13/2013 12:20	1.1	mg/L
08/20/2013 10:45	0.87	mg/L
08/28/2013 11:05	0.92	mg/L
09/04/2013 10:15	0.86	mg/L
09/11/2013 14:55	0.94	mg/L
09/18/2013 09:45	0.83	mg/L
09/25/2013 12:25	0.91	mg/L
10/02/2013 11:20	0.83	mg/L
10/23/2013 11:15	0.32	mg/L
10/30/2013 10:22	**0**	mg/L
11/06/2013 14:15	0.31	mg/L
11/13/2013 11:00	0.38	mg/L
11/20/2013 11:00	**0**	mg/L
11/27/2013 11:38	**0**	mg/L
12/04/2013 14:00	**0**	mg/L
12/11/2013 10:45	**0**	mg/L
12/18/2013 10:30	**0**	mg/L
12/23/2013 14:12	**0**	mg/L
12/30/2013 14:53	**0**	mg/L
01/08/2014 13:35	**0**	mg/L
01/15/2014 10:18	**0**	mg/L
01/22/2014 09:15	**0**	mg/L
01/29/2014 11:43	**0**	mg/L
02/05/2014 11:20	**0**	mg/L
02/12/2014 11:00	**0**	mg/L
02/19/2014 11:35	**0**	mg/L
02/26/2014 11:30	**0**	mg/L
03/05/2014 11:55	**0**	mg/L
03/12/2014 11:05	**0**	mg/L
03/20/2014 09:50	**0**	mg/L
03/27/2014 10:50	0.42	mg/L
04/02/2014 15:38	0.43	mg/L
04/09/2014 10:02	0.3	mg/L
04/16/2014 09:10	0.36	mg/L
04/23/2014 11:35	0.39	mg/L

04/30/2014 11:28	0.42	mg/L
05/07/2014 09:15	0.52	mg/L
05/14/2014 11:00	**0**	mg/L
05/21/2014 12:10	**0**	mg/L
05/28/2014 09:25	**0**	mg/L
06/04/2014 11:05	0.64	mg/L
06/11/2014 09:45	1.4	mg/L
06/18/2014 10:33	0.78	mg/L
06/25/2014 13:05	0.78	mg/L
07/02/2014 13:20	0.83	mg/L
07/09/2014 10:35	0.77	mg/L
07/16/2014 10:40	0.77	mg/L
07/23/2014 09:55	0.87	mg/L
07/30/2014 10:51	0.95	mg/L
08/06/2014 10:50	1.1	mg/L
08/13/2014 11:05	1.1	mg/L
08/20/2014 14:05	1.3	mg/L
08/27/2014 12:15	1.1	mg/L
09/03/2014 11:00	1.2	mg/L
09/10/2014 08:52	1	mg/L
09/17/2014 12:45	1.4	mg/L
09/24/2014 13:25	1.2	mg/L
10/01/2014 10:55	1.2	mg/L
10/08/2014 10:05	1.3	mg/L
10/15/2014 14:00	1.2	mg/L
10/22/2014 09:22	1.2	mg/L
10/29/2014 10:05	1.2	mg/L
11/04/2014 13:00	1.4	mg/L
11/12/2014 10:55	1.1	mg/L
11/18/2014 11:00	1.1	mg/L
11/25/2014 11:20	1.1	mg/L
12/01/2014 13:55	1.1	mg/L
12/10/2014 10:30	1.5	mg/L
12/10/2014 10:35	1.4	mg/L
12/16/2014 10:10	0.68	mg/L
12/23/2014 10:30	0.66	mg/L
12/30/2014 10:20	0.48	mg/L
01/06/2015 11:00	0.45	mg/L
01/14/2015 10:20	0.4	mg/L
01/14/2015 10:23	0.44	mg/L
01/21/2015 08:30	0.55	mg/L
01/27/2015 10:45	0.51	mg/L
02/03/2015 11:20	0.41	mg/L
02/03/2015 12:15	0.41	mg/L
02/10/2015 10:35	0.41	mg/L
02/18/2015 09:15	0.44	mg/L
02/24/2015 10:00	0.55	mg/L
03/03/2015 11:00	0.66	mg/L
03/10/2015 10:00	0.44	mg/L
03/18/2015 09:27	0.45	mg/L
03/24/2015 11:35	0.3	mg/L
04/01/2015 10:30	0.36	mg/L
04/08/2015 10:00	0.34	mg/L
04/14/2015 11:00	0.31	mg/L
04/21/2015 11:18	**0**	mg/L
04/28/2015 09:30	**0**	mg/L
05/05/2015 11:00	**0**	mg/L
05/13/2015 09:05	0.33	mg/L
05/19/2015 13:50	0.35	mg/L
05/28/2015 13:30	0.37	mg/L
06/03/2015 09:10	0.89	mg/L
06/09/2015 09:15	1.1	mg/L
06/17/2015 12:00	1.1	mg/L
06/23/2015 11:40	1.1	mg/L
07/01/2015 13:10	1.2	mg/L
07/09/2015 11:15	1.2	mg/L
07/09/2015 11:30	1.3	mg/L
07/15/2015 11:30	0.87	mg/L
07/21/2015 11:20	1.5	mg/L
07/28/2015 14:02	2.1	mg/L
08/04/2015 10:10	2.2	mg/L
08/11/2015 09:45	1.6	mg/L

08/19/2015 10:15	1.5	mg/L
08/26/2015 10:20	1.6	mg/L
09/02/2015 10:15	1.7	mg/L
09/09/2015 09:31	1.7	mg/L
09/16/2015 10:30	2.3	mg/L
09/23/2015 12:08	2.4	mg/L
09/29/2015 10:25	1.5	mg/L
10/06/2015 10:20	2	mg/L
10/13/2015 12:30	1.4	mg/L
10/21/2015 10:40	1.3	mg/L
10/27/2015 09:45	1.5	mg/L
11/03/2015 10:20	1.4	mg/L
11/10/2015 09:45	1.4	mg/L
11/17/2015 11:15	**0**	mg/L
11/24/2015 10:05	1.2	mg/L
12/01/2015 11:30	1.3	mg/L
12/08/2015 13:08	1.2	mg/L
12/15/2015 09:45	1.2	mg/L
12/22/2015 10:00	1	mg/L
12/29/2015 09:30	1.1	mg/L
01/05/2016 10:05	0.99	mg/L
01/12/2016 14:00	0.64	mg/L
01/19/2016 11:00	0.72	mg/L
01/25/2016 13:40	0.88	mg/L
02/02/2016 10:40	1.1	mg/L
02/09/2016 10:00	1.1	mg/L
02/16/2016 15:02	0.91	mg/L
02/23/2016 09:21	0.85	mg/L
03/01/2016 10:00	0.9	mg/L
03/08/2016 11:17	1.4	mg/L
03/15/2016 09:30	0.96	mg/L
03/23/2016 15:00	0.86	mg/L
03/30/2016 15:01	0.88	mg/L
04/05/2016 08:35	1	mg/L
04/12/2016 11:40	1.2	mg/L
04/12/2016 12:40	1.5	mg/L
04/13/2016 08:05	1.2	mg/L
04/19/2016	1.3	mg/L
04/26/2016 13:15	1.5	mg/L
05/03/2016 10:20	1.7	mg/L
05/10/2016 10:00	2.1	mg/L
05/17/2016 11:20	2.1	mg/L
05/24/2016 09:00	2.3	mg/L
06/02/2016 08:40	2.5	mg/L
06/07/2016 09:00	2.4	mg/L
06/14/2016 09:30	2.4	mg/L
06/21/2016 09:30	2.6	mg/L
06/28/2016 09:10	2.7	mg/L
07/06/2016 10:00	2.5	mg/L
07/13/2016 11:40	2.5	mg/L
07/19/2016 09:30	2.3	mg/L
07/26/2016 09:30	2.3	mg/L
08/02/2016 11:10	2.6	mg/L
08/09/2016 14:15	2.2	mg/L
08/16/2016 10:00	2	mg/L
08/23/2016 11:00	1.9	mg/L
08/30/2016 08:50	1.7	mg/L
09/06/2016 10:00	1.6	mg/L
09/14/2016 08:45	1.6	mg/L
09/20/2016 10:45	1.5	mg/L
09/27/2016 10:20	1.3	mg/L
10/04/2016 11:35	1.6	mg/L
10/11/2016 09:30	1.3	mg/L
10/18/2016 10:40	1.3	mg/L
10/25/2016 11:00	1.5	mg/L
11/01/2016 08:33	1.3	mg/L
11/09/2016 14:15	0.87	mg/L
11/15/2016 09:25	0.88	mg/L
11/22/2016 09:30	1.5	mg/L
11/29/2016 10:15	1.2	mg/L
12/06/2016 13:10	1.1	mg/L
12/13/2016 10:10	1.1	mg/L

12/20/2016 09:30	1.2	mg/L
12/28/2016 12:20	0.88	mg/L
01/03/2017 11:30	1.4	mg/L
01/09/2017 09:05	1.5	mg/L
01/17/2017 10:55	0.48	mg/L
01/24/2017 10:00	0.65	mg/L
02/01/2017 11:35	0.58	mg/L
02/07/2017 15:08	0.69	mg/L
02/15/2017 09:30	0.54	mg/L
02/21/2017 09:00	0.43	mg/L
03/01/2017 12:10	0.5	mg/L
03/07/2017 07:10	0.45	mg/L
03/14/2017 09:30	0.47	mg/L
03/21/2017 09:15	0.6	mg/L
03/27/2017 12:15	0.43	mg/L
04/04/2017 11:00	0.68	mg/L
04/12/2017 09:00	0.45	mg/L
04/18/2017 09:15	0.41	mg/L
04/24/2017 12:20	0.61	mg/L
05/02/2017 11:00	0.86	mg/L
05/10/2017 08:05	1.1	mg/L
05/16/2017 08:40	0.93	mg/L
05/23/2017 08:40	0.93	mg/L
05/30/2017 09:00	1.2	mg/L
06/06/2017 12:08	1.2	mg/L
06/13/2017 10:00	1.3	mg/L
06/20/2017 08:25	1.2	mg/L
06/27/2017 09:20	1.3	mg/L
07/03/2017 07:00	1.1	mg/L
07/11/2017 06:40	1.1	mg/L
07/18/2017 10:30	0.98	mg/L
07/25/2017 11:11	0.83	mg/L
08/01/2017 06:50	0.97	mg/L
08/08/2017 09:00	1.1	mg/L
08/15/2017 09:05	1.1	mg/L
08/22/2017 08:30	1.2	mg/L
08/29/2017 10:00	0.96	mg/L
09/06/2017 09:55	1.3	mg/L
09/12/2017 07:10	0.99	mg/L
09/19/2017 09:00	1	mg/L
09/27/2017 08:00	1.8	mg/L
10/03/2017 10:00	1.5	mg/L
10/10/2017 10:20	1.3	mg/L
10/17/2017 14:15	1.8	mg/L
10/24/2017 10:20	1.9	mg/L
10/31/2017 10:00	1.3	mg/L
11/08/2017 09:00	1.4	mg/L
11/14/2017 10:10	1.1	mg/L

min	<0.13	
max		2.7
average		0.94
median		0.97
		2

Bold - set NDs equal to zero

avg alum	0.60
avg ach	1.32
median alum	0.45
median ach	1.20

Date	GAC Inf TOC	GAC Eff TOC	Units	%Reduction	Date	GAC Inf TOC	GAC Eff TOC	%Reducti	% Lytle Creek Use
04/23/2013 11:42	1.1	0.81	mg/L	26%	04/23/2013 11:42	1.1	0.81	0.263636	100
05/08/2013 12:58	0.9	**0.3**	mg/L	67%	05/08/2013 12:58	0.9	**0**	0.666667	67
06/04/2013	0.95	**0.3**	mg/L	68%	06/04/2013	0.95	**0**	0.684211	75
07/09/2013 10:35	1.4	0.91	mg/L	35%	07/09/2013 10:35	1.4	0.91	0.35	50
08/20/2013 11:15	0.86	0.37	mg/L	57%	08/20/2013 11:15	0.86	0.37	0.569767	75
10/30/2013	0.42	0.43	mg/L	-2%	10/30/2013	0.42	0.43	0	80
11/20/2013	**0.3**	**0.3**	mg/L		11/20/2013	**0**	**0**	0	100
12/18/2013 13:30	**0.3**	**0.3**	mg/L		12/18/2013 13:30	**0**	**0**	0	100
01/15/2014 11:04	**0.3**	**0.3**	mg/L		01/15/2014 11:04	**0**	**0**	0	100
02/12/2014 11:42	**0.3**	**0.3**	mg/L		02/12/2014 11:42	**0**	**0**	0	100
03/20/2014 10:27	**0.3**	**0.3**	mg/L		03/20/2014 10:27	**0**	**0**	0	100
04/23/2014 11:55	0.39	**0.3**	mg/L	23%	04/23/2014 11:55	0.39	**0**	0.230769	100
05/21/2014	**0.3**	**0.3**	mg/L		05/21/2014	**0**	**0**	0	100
06/11/2014 10:11	0.68	0.31	mg/L	54%	06/11/2014 10:11	0.68	0.31	0.544118	50
07/16/2014	0.76	0.36	mg/L	53%	07/16/2014	0.76	0.36	0.526316	50
08/27/2014 12:50	1.1	0.5	mg/L	55%	08/27/2014 12:50	1.1	0.5	0.545455	50
09/17/2014 14:00	1.2	0.53	mg/L	56%	09/17/2014 14:00	1.2	0.53	0.558333	50
10/15/2014 14:45	1.2	0.61	mg/L	49%	10/15/2014 14:45	1.2	0.61	0.491667	50
11/12/2014 11:42	1.1	0.68	mg/L	38%	11/12/2014 11:42	1.1	0.68	0.381818	50
12/10/2014 15:00	1.5	1	mg/L	33%	12/10/2014 15:00	1.5	1	0.333333	100
01/14/2015 10:52	0.58	0.42	mg/L	28%	01/14/2015 10:52	0.58	0.42	0.275862	100
02/03/2015 11:35	0.48	0.6	mg/L	-25%	02/03/2015 11:35	0.48	0.6	0	100
03/05/2015 08:50	0.56	0.52	mg/L	7%	03/05/2015 08:50	0.56	0.52	0.071429	100
04/01/2015 10:51	0.46	0.38	mg/L	17%	04/01/2015 10:51	0.46	0.38	0.173913	100
06/03/2015 10:06	0.88	**0.13**	mg/L	85%	06/03/2015 10:06	0.88	**0**	0.852273	50
07/09/2015 11:20	1.2	**0.13**	mg/L	89%	07/09/2015 11:20	1.2	**0**	0.891667	50
08/11/2015 10:05	1.4	0.54	mg/L	61%	08/11/2015 10:05	1.4	0.54	0.614286	50
09/09/2015 10:41	1.7	0.76	mg/L	55%	09/09/2015 10:41	1.7	0.76	0.552941	25
10/13/2015 11:00	1.6	1.1	mg/L	31%	10/13/2015 11:00	1.6	1.1	0.3125	50
11/03/2015 09:45	1.6	0.9	mg/L	44%	11/03/2015 09:45	1.6	0.9	0.4375	50
12/01/2015 11:30	1.1	0.73	mg/L	34%	12/01/2015 11:30	1.1	0.73	0.336364	50
01/05/2016 10:30	1.3	0.95	mg/L	27%	01/05/2016 10:30	1.3	0.95	0.269231	71
02/02/2016 11:10	1.1	0.57	mg/L	48%	02/02/2016 11:10	1.1	0.57	0.481818	65
03/01/2016 11:05	0.81	0.65	mg/L	20%	03/01/2016 11:05	0.81	0.65	0.197531	60
04/05/2016 09:15	0.96	0.75	mg/L	22%	04/05/2016 09:15	0.96	0.75	0.21875	59
04/12/2016 12:40	1.7	0.96	mg/L	44%	04/12/2016 12:40	1.7	0.96	0.435294	
04/13/2016 08:05	1.5	0.95	mg/L	37%	04/13/2016 08:05	1.5	0.95	0.366667	
05/03/2016	1.9	1.1	mg/L	42%	05/03/2016	1.9	1.1	0.421053	51
06/02/2016 09:10	2.6	2.1	mg/L	19%	06/02/2016 09:10	2.6	2.1	0.192308	36
07/06/2016 10:07	2.5	1.7	mg/L	32%	07/06/2016 10:07	2.5	1.7	0.32	29
08/02/2016 11:24	2.7	1.8	mg/L	33%	08/02/2016 11:24	2.7	1.8	0.333333	35
09/07/2016 11:42	1.7	1.2	mg/L	29%	09/07/2016 11:42	1.7	1.2	0.294118	26
10/04/2016 11:41	1.6	**0.15**	mg/L	91%	10/04/2016 11:41	1.6	**0**	0.90625	50
11/01/2016 09:46	1.2	**0.15**	mg/L	88%	11/01/2016 09:46	1.2	**0**	0.875	58
12/06/2016 14:00	1.1	**0.15**	mg/L	86%	12/06/2016 14:00	1.1	**0**	0.863636	45
01/03/2017 11:25	1.5	**0.15**	mg/L	90%	01/03/2017 11:25	1.5	**0**	0.9	100
02/02/2017 12:57	0.54	**0.15**	mg/L	72%	02/02/2017 12:57	0.54	**0**	0.722222	100
03/01/2017 13:08	0.6	0.39	mg/L	35%	03/01/2017 13:08	0.6	0.39	0.35	100

04/04/2017 10:10	0.44	0.52	mg/L	-18%		04/04/2017 10:10	0.44	0.52	0	100
05/02/2017 09:16	1	0.49	mg/L	51%		05/02/2017 09:16	1	0.49	0.51	75
06/06/2017 11:40	1.2	0.7	mg/L	42%		06/06/2017 11:40	1.2	0.7	0.416667	70
07/03/2017 06:52	1.2	0.76	mg/L	37%		07/03/2017 06:52	1.2	0.76	0.366667	65
08/01/2017 09:18	1.1	0.74	mg/L	33%		08/01/2017 09:18	1.1	0.74	0.327273	55
09/06/2017 08:10	1.3	0.93	mg/L	28%		09/06/2017 08:10	1.3	0.93	0.284615	55
10/10/2017 10:38	1.7	1.2	mg/L	29%		10/10/2017 10:38	1.7	1.2	0.294118	0
11/14/2017 10:41	4.1	0.92	mg/L	78%		11/14/2017 10:41	4.1	0.92	0.77561	0
min	<0.3	<0.13		-25%	0%					
max	4.1	2.1		91%						
average	1.15	0.63		43%			1.12	0.57		
median	1.1	0.535		37%			1.1	0.535		
		1.935						2.0175		

bold - set NDs equal to DLR

bold - NDs set equal to zero

avg alum	0.68	0.32
avg ach	1.49	0.78
median alum	0.72	0.37
median ach	1.35	0.76

Date	Plant Eff TOC	Units	QA	RAA
08/03/2015 15:10	0.65	mg/L		
08/04/2015 08:20	0.65	mg/L		
08/05/2015 08:52	0.75	mg/L		
08/06/2015 09:55	1.1	mg/L		
08/07/2015 09:05	0.82	mg/L		
09/16/2015 10:10	1.2	mg/L		
09/29/2015 10:15	1	mg/L	0.881429	
10/21/2015 10:38	0.97	mg/L		
10/27/2015 09:46	1	mg/L		
11/03/2015 10:22	1.1	mg/L		
11/10/2015 09:46	1	mg/L		
11/17/2015 11:16	1.1	mg/L		
11/24/2015 10:10	0.93	mg/L		
12/01/2015 11:30	0.85	mg/L		
12/08/2015 13:09	0.99	mg/L		
12/15/2015 09:45	0.97	mg/L		
12/22/2015 11:00	0.82	mg/L		
12/29/2015 09:35	0.9	mg/L	0.966364	
01/05/2016 10:07	0.82	mg/L		
01/12/2016 14:00	0.65	mg/L		
01/19/2016 11:00	0.6	mg/L		
01/25/2016 13:40	0.7	mg/L		
02/02/2016 10:41	0.74	mg/L		
02/09/2016 10:05	0.72	mg/L		
02/16/2016 15:03	0.71	mg/L		
02/23/2016 09:24	0.7	mg/L		
03/01/2016 10:03	0.7	mg/L		
03/08/2016 11:20	0.85	mg/L		
03/15/2016 09:32	0.82	mg/L		
03/23/2016 15:05	0.81	mg/L		
03/30/2016 15:02	0.7	mg/L	0.732308	
04/05/2016 08:38	0.79	mg/L		
04/12/2016 11:47	1.6	mg/L		
04/12/2016 12:40	1.2	mg/L		
04/13/2016 08:05	1.2	mg/L		
04/19/2016	1	mg/L		
04/26/2016 13:18	1.2	mg/L		
05/03/2016 10:30	1.4	mg/L		
05/03/2016 13:05	1.4	mg/L		
05/10/2016 10:02	2.7	mg/L		
05/17/2016 11:22	1.8	mg/L		
05/24/2016 09:04	2	mg/L		
06/02/2016 08:44	2.1	mg/L		
06/07/2016 09:02	2	mg/L		
06/14/2016 09:30	2	mg/L		
06/21/2016 09:30	2.2	mg/L		
06/28/2016 09:12	2.4	mg/L	1.686875	1.066744
07/06/2016 10:00	2.2	mg/L		
07/13/2016 11:44	2.1	mg/L		
07/19/2016 09:40	2.7	mg/L		
07/26/2016 09:30	2	mg/L		
08/02/2016 11:12	2.1	mg/L		
08/09/2016 14:15	2	mg/L		
08/16/2016 10:00	1.7	mg/L		

08/23/2016 11:01	1.5	mg/L		
08/30/2016 08:52	1.4	mg/L		
09/06/2016 10:05	1.7	mg/L		
09/14/2016 08:47	1.3	mg/L		
09/20/2016 10:42	1.2	mg/L		
09/27/2016 10:25	1.2	mg/L	1.776923	1.290617
10/04/2016 11:36	1.8	mg/L		
10/11/2016 09:34	1.1	mg/L		
10/18/2016 10:41	1.1	mg/L		
10/25/2016 11:03	1	mg/L		
11/01/2016 08:35	0.64	mg/L		
11/09/2016 14:15	0.65	mg/L		
11/15/2016 09:26	0.51	mg/L		
11/22/2016 09:35	0.68	mg/L		
11/29/2016 10:16	0.88	mg/L		
12/06/2016 13:11	0.69	mg/L		
12/13/2016 10:11	0.8	mg/L		
12/20/2016 09:30	1.2	mg/L		
12/28/2016 12:23	0.62	mg/L	0.897692	1.27345
01/03/2017 11:35	0.98	mg/L		
01/09/2017 09:07	0.5	mg/L		
01/17/2017 10:52	0.41	mg/L		
01/24/2017 10:10	0.46	mg/L		
02/01/2017 11:37	0.61	mg/L		
02/07/2017 15:09	0.31	mg/L		
02/15/2017 09:35	0.36	mg/L		
02/21/2017 09:10	0.41	mg/L		
03/01/2017 12:11	ND	mg/L		
03/07/2017 07:15	0.36	mg/L		
03/14/2017 09:31	0.37	mg/L		
03/21/2017 09:15	0.41	mg/L		
03/27/2017 12:17	0.54	mg/L	0.476667	1.209539
04/04/2017 11:10	1.7	mg/L		
04/12/2017 09:10	0.51	mg/L		
04/18/2017 09:20	0.35	mg/L		
04/24/2017 12:25	0.63	mg/L		
05/02/2017 11:10	0.86	mg/L		
05/10/2017 08:10	0.91	mg/L		
05/16/2017 08:45	1.1	mg/L		
05/23/2017 08:48	0.88	mg/L		
05/30/2017 08:55	2.1	mg/L		
06/06/2017 12:07	0.92	mg/L		
06/13/2017 10:01	0.92	mg/L		
06/20/2017 08:30	0.89	mg/L		
06/27/2017 09:25	1.1	mg/L	0.99	1.035321
07/03/2017 07:03	1	mg/L		
07/11/2017 06:30	1	mg/L		
07/18/2017 10:35	0.77	mg/L		
07/25/2017 11:00	0.95	mg/L		
08/01/2017 06:55	0.86	mg/L		
08/08/2017 08:50	0.86	mg/L		
08/15/2017 09:15	1	mg/L		
08/22/2017 08:34	1	mg/L		
08/29/2017 10:00	2.5	mg/L		
09/06/2017 09:52	1	mg/L		

09/12/2017 07:15	0.85		mg/L		
09/19/2017 09:15	0.86		mg/L		
09/27/2017 08:00	1.5		mg/L	1.088462	0.863205
10/03/2017 10:07	1.2		mg/L		
10/10/2017 10:21	1.4		mg/L		
10/17/2017 14:18	1.5		mg/L		
10/24/2017 10:25	1.6		mg/L		
10/31/2017 10:05	1.3		mg/L		
11/08/2017 09:00	1.4		mg/L		
11/14/2017 10:11	1.1		mg/L	1.357143	0.978068

min	0.31		0.48	0.86
max	2.7		1.78	1.29
average	1.10		1.09	1.10
median	0.985		0.98	1.07
	2			

All post July 2015, all ACH

Date	TTHM QA	HAA5 QA	%Lytle Creek QA	avg tthm	avg haa	avg %
1st Q 13	6.9	2.9	100.0	12.1	3.1	93.1
1st Q 14	5.0	2.5	100.0	6.6	2.3	100.0
1st Q 15	8.0	1.6	100.0	20.4	4.2	82.7
1st Q 16	22.4	4.8	65.3			
1st Q 17	18.4	3.6	100.0			
2nd Q 13	18.1	5.0	80.7	13.6	3.2	75.5
2nd Q 14	4.8	1.5	83.3	9.8	2.7	82.4
2nd Q 15	6.5	1.5	83.3	19.3	4.0	65.2
2nd Q 16	30.2	5.9	48.7			
2nd Q 17	8.4	2.2	81.7			
3rd Q 13	12.8	2.3	65.0	29.4	5.6	49.0
3rd Q 14	19.1	3.6	50.0	15.9	2.9	57.5
3rd Q 15	38.5	5.5	41.7	38.3	7.3	43.3
3rd Q 16	54.0	9.8	30.0			
3rd Q 17	22.5	6.7	58.3			
4th Q 13	3.1	2.1	93.3	22.1	4.5	58.9
4th Q 14	27.6	4.9	66.7	15.4	3.5	80.0
4th Q 15	30.4	4.8	50.0	26.6	5.2	44.8
4th Q 16	25.1	4.5	51.0			
4th Q 17	24.4	6.4	33.3			

State of California
Drinking Water Program

Department of Public Health

Stage 2 DBP - Quarterly TTHM Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: West Valley Water District System No.: 3610004 Year: 2017 Quarter: 2nd

	Year:	2013				2014				2015				2016				2017			
	Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
PS Code	Sample Date (month/date):	3/22	6/6	9/6	12/19	3/20	6/4	9/19	12/10	3/12	6/2	9/11	12/9	1/13	4/20	7/8	10/10	1/17	4/3	7/3	10/16
3610004-601	Site 1: 213 E. Walnut	0	0	0	0	0	0	7	1	3	2	1	3	3	2	17	2	4	8	4	0
3610004-602	Site 2: 3750 Lytle Creek Rd	22	32	30	8	12	12	25	41	23	18	96	63	50	44	87	65	62	18	34	49
3610004-603	Site 3: 15182 Crane	0	30	1	0	0	0	31	45	0	0	0	25	28	37	81	0	21	1	0	0
3610004-604	Site 4: White Ash Rd	12	27	24	7	9	11	21	44	12	13	59	50	42	43	79	57	17	9	38	50
3610004-605	Site 5: Reservoir 6-3 Discharge Line	6	24	24	4	8	6	36	42	11	9	71	54	29	59	78	34	17	10	53	38
3610004-606	Site 6: 18433 Bohnert	10	32	21	4	8	7	33	41	8	4	74	39	20	48	81	42	20	11	43	54
3610004-607	Site 7: Via Montana and Via Bonita	5	0	2	2	3	2	0	6	7	6	7	11	8	8	7	1	6	9	4	4
3610004-608	Site 8: Hall and Kinningham	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	0	1	4	0
Number of Samples Taken		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Site 1																				LRAA stats	
Running Annual Average	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	3.0	3.0	2.0	2.0	2.0	2.0	6.0	6.0	6.0	8.0	4.0	4.0	0.0	2.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	65.0	
Operation Evaluation Level (OEL)	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.3	3.5	2.0	1.8	2.1	2.2	2.5	9.7	5.7	6.9	5.3	4.9	2.9	18.5	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	14.0	

Site 2																				
Running Annual Average	22.0	27.0	28.0	23.0	21.0	16.0	14.0	23.0	25.0	27.0	45.0	50.0	57.0	63.0	61.0	62.0	65.0	58.0	45.0	41.0	34.5
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	11.0	21.5	28.5	19.5	15.5	11.0	18.5	29.8	28.0	25.0	58.3	60.1	64.8	50.3	67.2	65.3	69.1	40.9	36.9	37.5	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 3																				
Running Annual Average	0.0	15.0	10.0	8.0	8.0	0.0	8.0	19.0	19.0	19.0	11.0	6.0	13.0	22.0	43.0	37.0	35.0	26.0	6.0	6.0	12.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	0.0	15.0	8.0	7.8	0.3	0.0	15.5	30.3	19.0	11.3	0.0	12.4	20.1	31.8	56.7	29.6	30.8	5.9	5.6	0.3	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 4																				
Running Annual Average	12.0	20.0	21.0	18.0	17.0	13.0	12.0	21.0	22.0	23.0	32.0	33.0	41.0	48.0	53.0	55.0	49.0	41.0	30.0	29.0	26.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	6.0	16.5	21.8	16.3	12.3	9.5	15.5	30.0	22.3	20.5	35.8	42.8	48.3	44.5	60.7	59.2	42.4	23.2	25.6	36.9	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 5																				
Running Annual Average	6.0	15.0	18.0	15.0	15.0	11.0	14.0	23.0	24.0	25.0	33.0	36.0	41.0	53.0	55.0	50.0	47.0	35.0	28.0	29.0	26.5
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	3.0	13.5	19.5	14.0	11.0	6.0	21.5	31.5	25.0	17.8	40.5	47.1	45.7	50.0	60.7	51.1	36.6	17.8	33.2	34.7	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 6																					
Running Annual Average	10.0	21.0	21.0	17.0	16.0	10.0	13.0	22.0	22.0	22.0	32.0	31.0	34.0	45.0	47.0	48.0	48.0	38.0	29.0	32.0	25.5
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	5.0	18.5	21.0	15.3	10.3	6.5	20.3	30.5	22.5	14.3	40.0	38.9	38.4	39.0	57.6	53.0	40.7	20.9	29.1	40.4	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 7																					
Running Annual Average	5.0	3.0	2.0	2.0	2.0	2.0	2.0	3.0	4.0	5.0	7.0	8.0	8.0	8.0	8.0	6.0	5.0	6.0	5.0	6.0	5.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	2.5	1.3	2.3	1.5	2.5	2.3	1.3	3.5	5.0	6.3	6.8	8.5	8.2	8.4	7.1	4.2	4.7	6.0	5.7	5.3	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 8																					
Running Annual Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.3	0.0	0.0	0.0	0.0	1.3	0.7	0.7	0.5	2.3	1.3	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Comments: 3750 Lytle Creek Road was resampled on 9/17/15 on laboratory report 15I1617-01 Total THM results were 24.6 ug/L.

Robin Glenney

Signature

Date

Stage 2 DBP - Quarterly HAA5 Report for Disinfection Byproducts Compliance (in μg/L or ppb)

System Name: West Valley Water District System No.: 3610004 Year: 2017 Quarter: 2nd

	Year:	2013				2014				2015				2016				2017			
	Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
PS Code	Sample Date (month/date):	3/22	6/6	9/6	12/19	3/20	6/4	9/19	12/10	3/12	6/2	9/11	12/9	1/13	4/20	7/8	10/10	1/17	4/3	7/3	10/16
3610004-601	Site 1: 213 E. Walnut	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	2	0	0
3610004-602	Site 2: 3750 Lytle Creek Rd	10	9	3	7	7	5	1	4	9	8	11	11	14	11	8	9	13	6	11	17
3610004-603	Site 3: 15182 Crane	0	9	0	0	0	0	7	10	0	0	0	4	5	8	15	0	5	0	0	0
3610004-604	Site 4: White Ash Rd	5	7	5	4	5	5	6	8	3	3	10	9	10	9	19	11	4	3	15	11
3610004-605	Site 5: Reservoir 6-3 Discharge Line	3	7	6	3	4	1	7	9	1	1	11	8	7	10	17	8	4	3	15	9
3610004-606	Site 6: 18433 Bohnert	5	8	4	3	4	1	7	8	0	0	12	6	3	9	17	9	3	3	13	14
3610004-607	Site 7: Via Montana and Via Bonita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3610004-608	Site 8: Hall and Kinningham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Samples Taken		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Site 1																				LRAA stats	
Running Annual Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	12.0	
Operation Evaluation Level (OEL)	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.3	0.0	0.0	0.0	0.0	0.0	1.4	0.7	0.7	0.8	0.4	0.4	3.9
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	4.0

Site 2																				
Running Annual Average	10.0	10.0	7.0	7.0	7.0	6.0	5.0	4.0	5.0	6.0	8.0	10.0	11.0	12.0	11.0	10.0	10.0	9.0	10.0	12.0	9.5
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	5.0	7.0	6.3	6.5	6.0	6.0	3.5	3.5	5.8	7.3	9.8	10.1	12.2	11.7	10.3	9.2	10.8	8.6	10.5	12.9	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 3																				
Running Annual Average	0.0	5.0	3.0	2.0	2.0	0.0	2.0	4.0	4.0	4.0	3.0	1.0	2.0	4.0	8.0	7.0	7.0	5.0	1.0	1.0	3.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	0.0	4.5	2.3	2.3	0.0	0.0	3.5	6.8	4.3	2.5	0.0	2.1	3.5	6.4	10.7	5.7	6.0	1.2	1.2	0.0	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 4																				
Running Annual Average	5.0	6.0	6.0	5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0	8.0	9.0	12.0	12.0	11.0	9.0	8.0	8.0	6.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	2.5	4.8	5.5	5.0	4.8	4.8	5.5	6.8	5.0	4.3	6.5	7.8	9.8	9.2	14.1	12.2	9.3	5.2	9.2	10.0	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 5																				
Running Annual Average	3.0	5.0	5.0	5.0	5.0	4.0	4.0	5.0	5.0	5.0	6.0	5.0	7.0	9.0	10.0	10.0	10.0	8.0	7.0	8.0	5.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	1.5	4.3	5.5	4.8	4.3	2.3	4.8	6.5	4.5	3.0	6.0	7.2	8.3	8.7	12.6	10.5	8.2	4.3	9.1	8.9	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 6																					
Running Annual Average	5.0	7.0	6.0	5.0	5.0	3.0	4.0	5.0	4.0	4.0	5.0	5.0	5.0	8.0	9.0	10.0	10.0	8.0	7.0	8.0	5.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	2.5	5.3	5.3	4.5	3.8	2.3	4.8	6.0	3.8	2.0	6.0	6.2	6.2	7.0	11.8	10.9	8.0	4.4	7.9	11.0	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 7																					
Running Annual Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.3	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Site 8																					
Running Annual Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Meets MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Operation Evaluation Level (OEL)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
OEL ≤ MCL?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Comments: 3750 Lytle Creek Road was resampled on 9/17/15 on laboratory report 15I1617-01 Total HAA results were 10.1 ug/L.

Robin Glenney

Signature

Date