Bay Area Water Taste Test
Restore Hetch Hetchy
July 2025

Overview

Restore Hetch Hetchy is committed to restoring the Hetch Hetchy Valley in Yosemite National Park while ensuring continued water and power reliability for all communities that rely on the Tuolumne River.

Some opponents and skeptics of restoration have asserted that the quality of San Francisco's water is exceptional, and that the City's residents and customers will be forced to drink inferior water when Hetch Hetchy Reservoir is relocated and Tuolumne River supplies are diverted from other locations.

Restore Hetch Hetchy agrees that San Francisco's water is high quality, and we maintain it will still be good when Hetch Hetchy Valley is restored. We believe residents will experience no noticeable difference in water quality.

To test this assumption, we conducted taste comparisons between San Francisco's water and other high-quality local supplies from the East Bay and Marin County. The results confirmed our expectations.
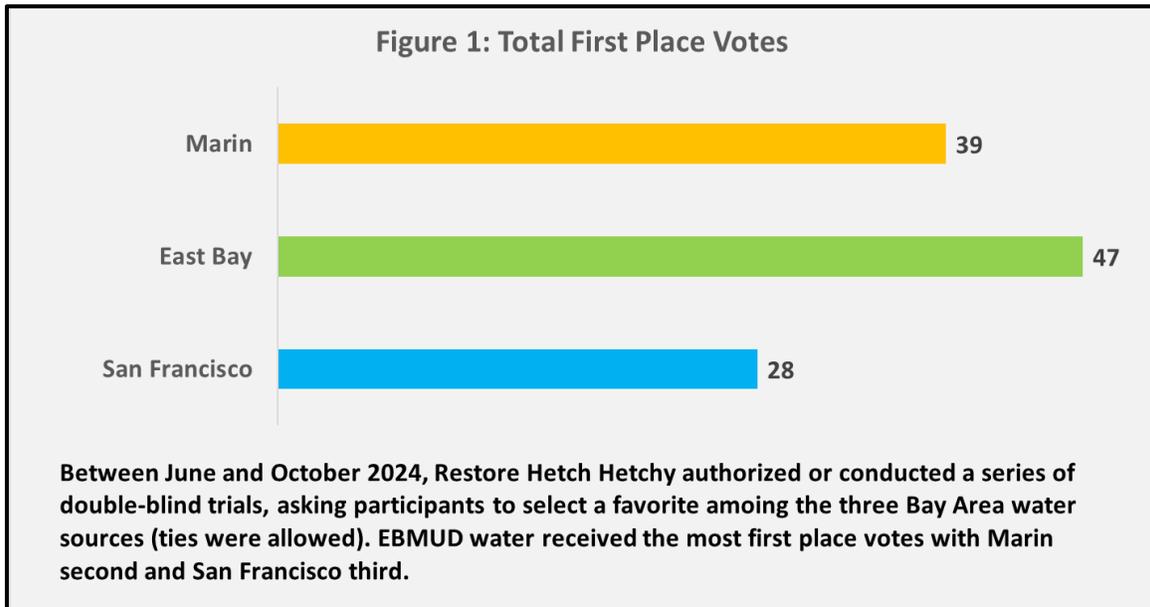
In a series of double blind taste tests, most respondents actually preferred East Bay and Marin water to San Francisco water. These findings indicate that water quality should not be a primary concern in debates over restoring the Hetch Hetchy Valley in Yosemite National Park.

Summary

In 2024, Restore Hetch Hetchy retained graduate students from the University of Colorado through its Capstone Program to design and initiate a double-blind water taste test to evaluate preferences of Bay Area residents.

In a series of trials conducted between June and October, the Capstone Team and Restore Hetch Hetchy asked participants to compare water supplies delivered by the San Francisco Public Utilities Commission (SFPUC, often colloquially called "Hetch Hetchy" water) with supplies delivered by the East Bay Municipal Utilities District (EBMUD) and the Marin Municipal Water District (MMWD). Participants ranked the taste of the three sources based on personal preference, with ties permitted.

A majority of participants preferred the taste of East Bay or Marin water to that of San Francisco. Out of 114 first place votes, 47 people (41%) selected East Bay water as best, 39 people (34%) selected Marin water as best, and 28 people (25%) selected San Francisco water as best. The results challenge the perception that 'Hetch Hetchy' water is superior. See Figure 1.

Figure 1: Total First Place Votes

Marin — 39
East Bay — 47
San Francisco — 28

Between June and October 2024, Restore Hetch Hetchy authorized or conducted a series of double-blind trials, asking participants to select a favorite amoing the three Bay Area water sources (ties were allowed). EBMUD water received the most first place votes with Marin second and San Francisco third.
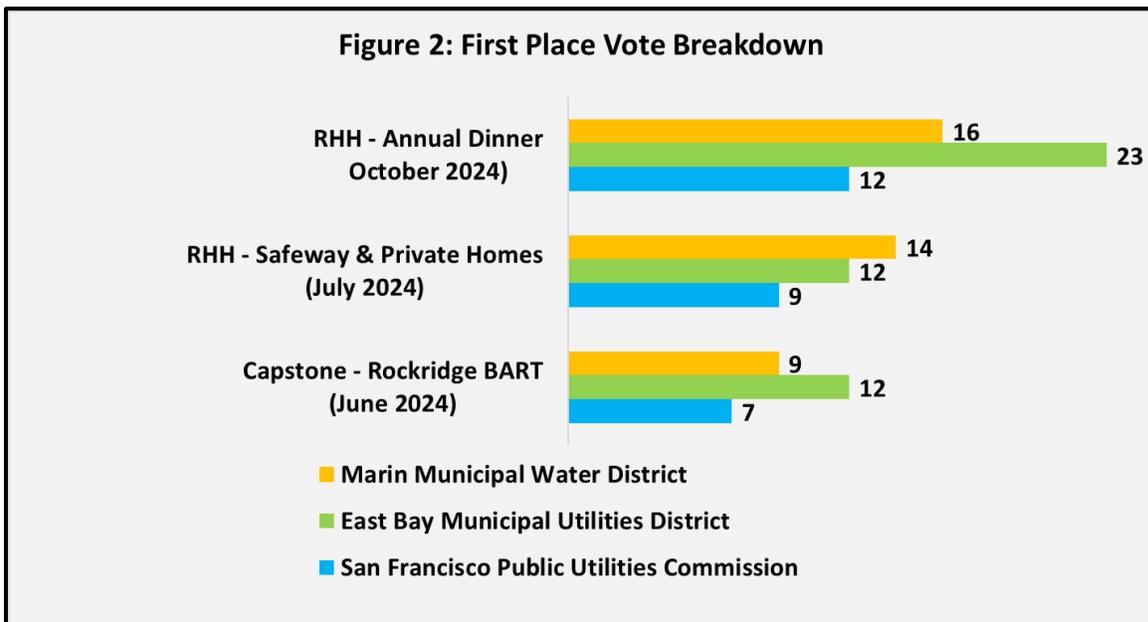
Methodology

The taste test took place in 3 phases:

1. In June, samples were collected at the SFPUC and EBMUD headquarters and from a Mexican restaurant in Larkspur (staff at the MMWD declined to provide samples for the test.). The University of Colorado Capstone Team, who designed the test, collected the opinions of passersby at the Rockridge BART station in Oakland. The Capstone Team's Findings and their Methodology and Recommendations are included as Appendices A and B.

2. In July, samples were collected from private homes in San Mateo County (90% SFPUC water), Oakland (EBMUD) and Fairfax (Marin). The samples were offered to passersby at Safeway in Oakland and in private homes. These samples were also sent to Tap Score, an independent lab, for detailed analysis (see Appendices C (SFPUC), D (EBMUD) & E (MMWD).

3. In October, samples were collected from the same private homes in San Mateo County, Oakland and Fairfax. The water was offered to people attending Restore Hetch Hetchy's Annual dinner on October 26 – as soon as they arrived and before they consumed any other food or beverage.

All testing followed a double-blind protocol: neither tasters nor test administrators knew which sample came from which source. Further, all taps were flushed before filling glass bottles, and all samples were kept at room temperature.

Testing and Results

A breakdown of the results from the separate trials reflecting the variability of responses is provided in Figure 2. Note that the exact mix of sources in any utility's supply varies over time and location.[1]

Figure 2: First Place Vote Breakdown

RHH - Annual Dinner October 2024)
- Marin Municipal Water District: 16
- East Bay Municipal Utilities District: 23
- San Francisco Public Utilities Commission: 12

RHH - Safeway & Private Homes (July 2024)
- Marin Municipal Water District: 14
- East Bay Municipal Utilities District: 12
- San Francisco Public Utilities Commission: 9

Capstone - Rockridge BART (June 2024)
- Marin Municipal Water District: 9
- East Bay Municipal Utilities District: 12
- San Francisco Public Utilities Commission: 7

- ■ Marin Municipal Water District
- ■ East Bay Municipal Utilities District
- ■ San Francisco Public Utilities Commission

Discussion

There are two fundamentally important aspects of water quality – health and taste. California's large cities are fortunate that professional water agency staff regularly test and treat supplies, ensuring that their water is safe to drink.[2]
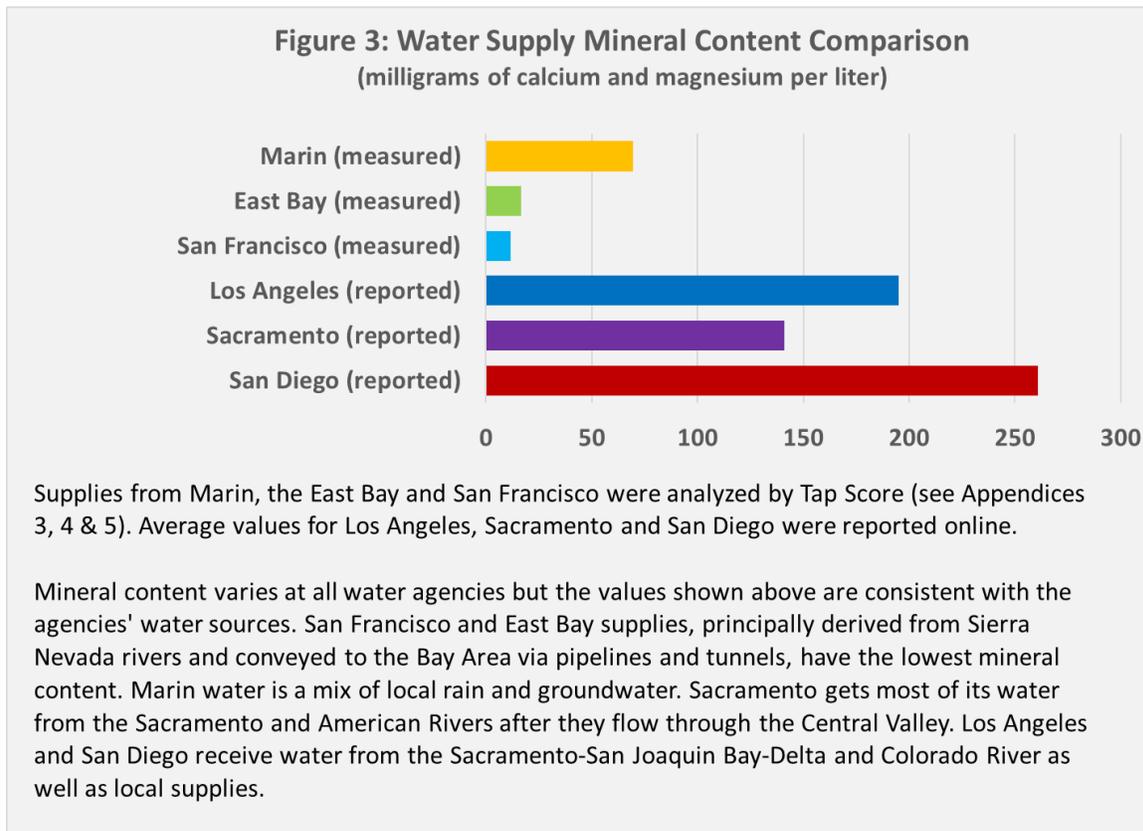
Water delivered in Marin, the East Bay and San Francisco is not only safe, but tastes good due to its modest mineral content. Water supplies in the East Bay and San Francisco primarily originate in the Sierra Nevada and are augmented by local rainfall and small amounts of groundwater.

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[1] On average, San Francisco derives 85% of its supply from the Tuolumne River. In recent years, however, the City has relied on local supplies and reservoirs in winter months so staff can do maintenance on the Mountain Tunnel – something customers rarely notice.

[2] Water in many small communities in California is not in fact safe to drink. See the **Community Water Center** for more information.

Water supplies in Marin come from local rainfall and groundwater, some of which is imported from Sonoma County.

Some water experts have indicated they prefer San Francisco's water for its "pure" taste. Others prefer water with a slight mineral taste (mostly calcium and magnesium), suggesting that San Francisco's water may be too neutral for their palate. Too much mineral content, as is the case with much of southern California's water, is generally disfavored. Figure 3, below, compares the mineral content of the samples used in the taste tests with values reported in water supplies for San Diego, Los Angeles and Sacramento.

Figure 3: Water Supply Mineral Content Comparison
(milligrams of calcium and magnesium per liter)

Supplies from Marin, the East Bay and San Francisco were analyzed by Tap Score (see Appendices 3, 4 & 5). Average values for Los Angeles, Sacramento and San Diego were reported online.

Mineral content varies at all water agencies but the values shown above are consistent with the agencies' water sources. San Francisco and East Bay supplies, principally derived from Sierra Nevada rivers and conveyed to the Bay Area via pipelines and tunnels, have the lowest mineral content. Marin water is a mix of local rain and groundwater. Sacramento gets most of its water from the Sacramento and American Rivers after they flow through the Central Valley. Los Angeles and San Diego receive water from the Sacramento-San Joaquin Bay-Delta and Colorado River as well as local supplies.

Conclusion

When Hetch Hetchy Valley is restored, San Francisco will still rely principally on the Tuolumne River for the majority of its supply. Water will be stored in and diverted from Cherry, Eleanor and/or Don Pedro Reservoirs – with mineral content perhaps similar to EBMUD's Pardee Reservoir. _Customers may like their water even better!_

Restore Hetch Hetchy believes the reputation of 'Hetch Hetchy' water is overstated. We welcome opportunities to collaborate with the San Francisco Public Utilities Commission or other interested parties on future independent testing.

Water Taste Test

Comparing Hetch Hetchy Water to Other Bay Area Sources

Bay Area Water Taste Test
Restore Hetch Hetchy

Appendix A

Prepared for Restore Hetch Hetchy, July 2024
Jazlyn Nie, Megan Franco, Katherine Halama

Water Taste Test Report: Comparing San Francisco Regional Water System Supplies to Other Bay Area Sources

Prepared for Restore Hetch Hetchy, July 2024

Jazlyn Nie, Megan Franco, Katherine Halama

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Abstract

City leaders, media and others in San Francisco have historically claimed that their drinking water has superior taste compared to other water suppliers. San Francisco blends its Tuolumne water supplies with local runoff and groundwater; collective civic pride often uses the phrase "Hetch Hetchy water" as a nickname for all supplies provided by the San Francisco Regional Water System (SFRWS).

To question these claims, we conducted a double-blind water taste test to determine whether Bay Area residents can distinguish the difference between San Francisco's water sourced from Hetch Hetchy and other regional water sources. The test involved tasting three successive water samples, sourced from Marin Municipal Water District (Marin), East Bay Municipal Utility District (EBMUD), and SFRWS. Participants were asked to complete a questionnaire rating the water samples as favorite, second favorite, and least favorite, and whether they would accept all three samples as their daily drinking water. Initial results indicated no clear preference among the three samples although, by small margins, Marin was rated the favorite, EBMUD second and San Francisco last (See Figure 1). It is essential to point out that both more data and a review of the study design are needed before reaching firm conclusions about the results. In this trial run of the taste test, our participant pool was limited and our experience suggested refinements in methodology should be considered before additional testing.

Overall, our study provided Restore Hetch Hetchy with a repeatable methodology so they can collect more data to better understand if Bay Area residents can distinguish between local water sources. We also provided several recommendations for how Restore Hetch Hetchy can conduct future taste testing.

Background

The San Francisco Public Utilities Commission (SFPUC), who supplies the San Francisco Bay Area with water, boasts on its website that its water, most of which is diverted from Hetch Hetchy Reservoir, is "among the purest water in the world." Most of the city's water comes from the Tuolumne River in the Sierra Nevada and is stored in Hetch Hetchy, Cherry, Eleanor, and Don Pedro Reservoirs more than 100 miles from the city. Water from the Tuolumne

is diverted from Hetch Hetchy Reservoir in Yosemite National Park, which was dammed in the early 20th century after the passing of the controversial Raker Act of 1913.[1] Supplies diverted directly from Hetch Hetchy are exempt from state and federal filtration requirements due to its "exceptional quality." However, SFPUC does filter runoff from local watersheds. Additionally, supplies diverted from Hetch Hetchy are temporarily stored in local reservoirs and account for about 30% of total system deliveries.[2] SFPUC treats all its water with ultraviolet light, pH adjustment, fluoridation, and chloramination (chlorine and ammonia).

Many locals claim they can taste the difference between "Hetch Hetchy" water and other tap water. We aimed to question this assertion by developing a double-blind water taste test, to determine if there is a clear taste difference between SFRWS water and other tap water sources in the Bay Area, including water from EBMUD and Marin. We conducted a double-blind taste test so neither the test team nor participants knew which water sample correlated with each location, providing us with the most objectivity and minimizing participant and researcher bias.

These three utilities, like most utilities, do not deliver water provided from a lone source. Rather, supplies are typically blended from different water sources. The exact blend changes from time to time and can differ within a utility's service territory.[3]

- SFRWS – 85% of San Francisco's water comes from the Tuolumne River in the Sierra Nevada. Most of this water is delivered directly to customers, but some is stored in Bay Area reservoirs. Water stored in Bay Area reservoirs is both filtered and treated before being delivered. San Francisco has also added slight amounts of groundwater to make its supplies stretch further. In recent years, San Francisco has shut down all deliveries from

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[1] "Water Quality," San Francisco Water Power Sewer, accessed June 5, 2024, https://sfpuc.org/accounts-services/water-quality.
[2] "Groundwater Supply Project."
[3] McDonald et al., "Water on an Urban Planet."

the Tuolumne (and Hetch Hetchy) for two months in the winter, so SFPUC can do critically important maintenance on its Mountain Tunnel. During this time San Francisco customers rely entirely on water from local watersheds and do not receive any "Hetch Hetchy" water.[4]

- EBMUD – East Bay cities including Berkley and Oakland rely on water imported from the Mokelumne River in the Sierra Nevada (near the Tuolumne River) for most of their supply. EBMUD also harvests runoff in local watersheds and, during dry years, brings in water from its Freeport project on the Sacramento River.[5]

- Marin - Marin gets no water from the Sierra's, and instead relies on rain to fill its reservoirs within the county. Other supplies are bought from Sonoma County Water Agency, who act as a water wholesaler, and local groundwater.[6]

Results

We recruited 22 participants in our first trial, which took place at the BART Rockridge Station in Oakland for three hours on June 14th, 2024. Spreck Rosekrans, Executive Director of Restore Hetch Hetchy, recruited an additional 6 participants after our initial trial, for a total of 28 participants and survey respondents.
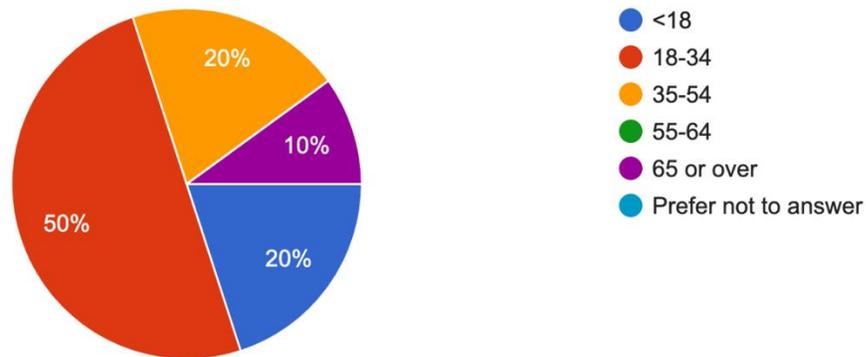
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[4] "Water Supply."
[5] "Water Supply: East Bay Municipal Utility District."
[6] "About Our Water System | Marin Water."

If you don't mind sharing, what is your age range?
10 responses

Legend:
- <18
- 18-34
- 35-54
- 55-64
- 65 or over
- Prefer not to answer

The survey question asking for a participant's age was not required (to see the survey questions, refer to the supplemental Methodology document), so we only received answers from 10 participants. As Figure 1 shows, 50% of respondents were between the ages of 18-34 and 10% were over the age of 65. The other 40% of respondents were between the ages of 35 and 64.

Participants could try each of the samples in any order. However, many (74.1%) of participants tried Sample A first, nearly all (81.5%) participants tried Sample B second, and many (77.8%) tried Sample C last.

For each sample, we asked participants to describe the sample using the following scale:

4	I would be happy to accept this water as my everyday drinking water.
3	I am sure that I could accept this water as my everyday drinking water.
2	I could accept this water as my everyday drinking water.
1	I could not accept this water as my everyday drinking water.

How would you describe this sample if it were your daily drinking water?
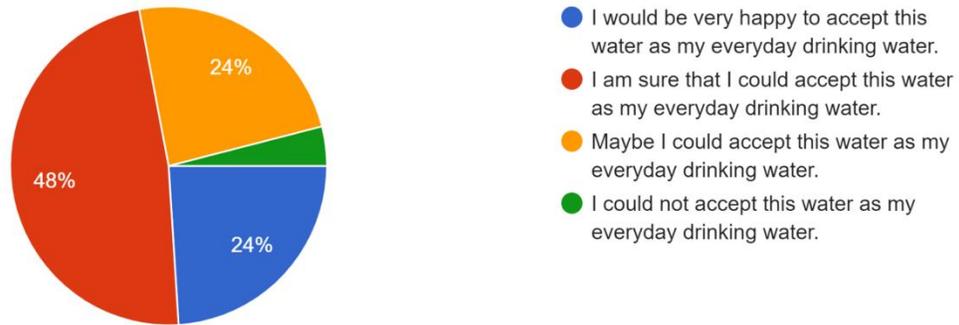26 responses
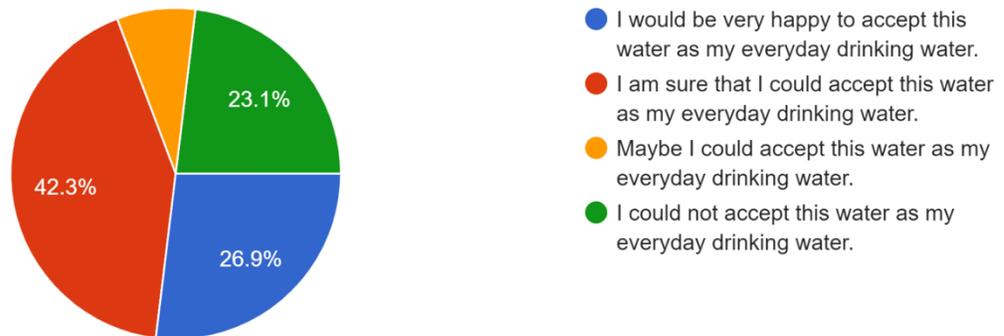
As Figure 2 shows, for Sample A, 26.9% of participants rated the sample a "4", or they "would be very happy to accept this water as [their] everyday drinking water," while 23.1% rated the sample A "1", or they "could not accept this water as [their] everyday drinking water."

Figure 3: Participants' Descriptions of Sample B

How would you describe this sample if it were your daily drinking water?
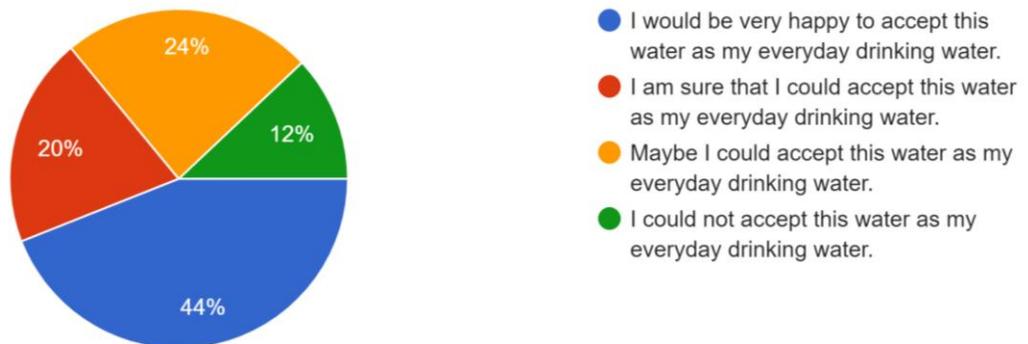25 responses

As Figure 3 shows, for Sample B, 24% of participants rated the sample a "4", or they "would be very happy to accept this water as [their] everyday drinking water," while 4% rated the sample a "1", or they "could not accept this water as [their] everyday drinking water."

Figure 4: Participants' descriptions of Sample C

How would you describe this sample if it were your daily drinking water?
25 responses

As Figure 4 shows, for Sample C, 44% of participants rated the sample a "4", or they "would be very happy to accept this water as [their] everyday drinking water," while 12% rated the sample a "1", or they "could not accept this water as [their] everyday drinking water."

When asked to rate the three samples, Sample A was ranked as "Favorite" by 12 participants, Sample B was ranked as "Favorite" by 9, and Sample C was ranked as "Favorite" by 8. Sample B was the most common "Second Favorite," with 13 participants choosing Sample B. Sample C was the most common "Least Favorite," with 11 participants choosing Sample C.

While this question asked the participants to rank each sample with the intention of only one sample being "Favorite," one being "Second Favorite," and one being "Least Favorite," a few participants said they could not distinguish a taste difference between samples and were unsure of how to rank the samples. In these instances, we permitted participants to rank more than one sample as the same. For example, one participant ranked all three samples as "Second Favorite," since he could not distinguish any taste differences between the samples.

After analyzing the test results, the test team was given the key to the water samples, correlating each sample with its location. Sample A was from Marin, Sample B was from EBMUD, and Sample C was from SFRWS.

To better interpret the results, we assigned numerical values to responses according to Table 1.

Table 1: The assigned values to each response

Response	Numerical Value
Favorite	3
Second favorite	2
Least favorite	1

Figure 5: Results of participants' ranked favorites for the three samples
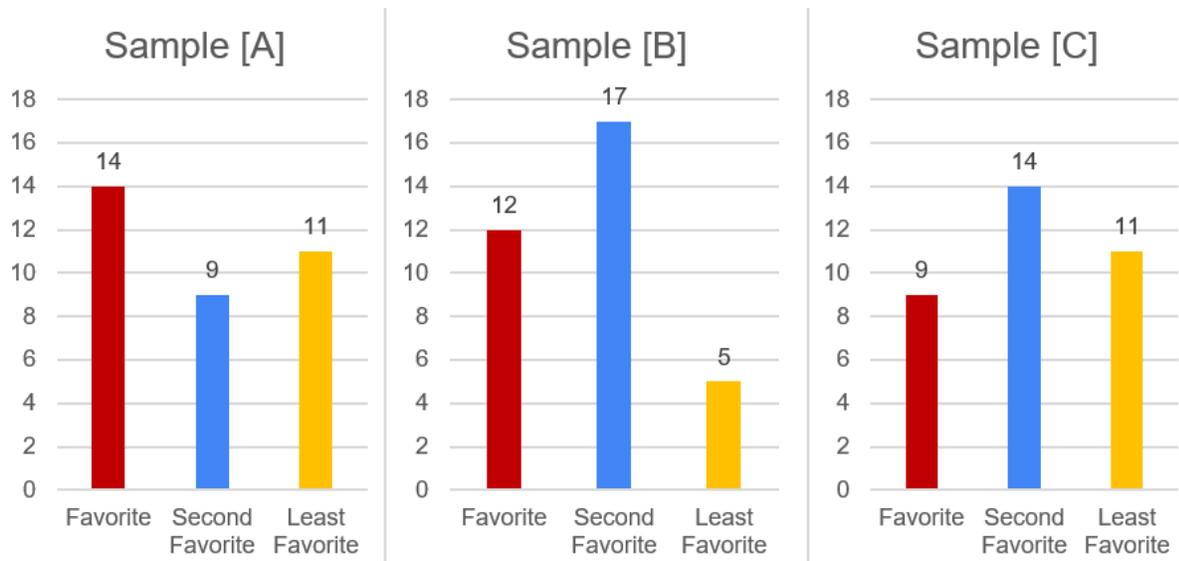
Then, we totaled the numerical values based on responses for each Sample to create a total number of points. As shown in Figure 5, 12 participants rated Sample A as "Favorite" (12 participants x 3), 9 participants rated Sample A as "Second Favorite" (9 participants x 2), and 7 participants rated Sample A as "Least Favorite" (7 participants x 1), which totaled 61 points for Sample A. Applying the same calculations for Samples B and C, results show in Table 2.

Table 2: Total points for each sample

Sample	Total Points
A	61
B	59
C	53

Sample A, or Marin, was the "Favorite" with 61 points, Sample B, or EBMUD, was the "second favorite" with 59 points, and Sample C, or SFRWS, was the "Least Favorite" with 53 points.

In addition to conducting the taste test with public participants, we also visited Anistacia Barrak-Barber, Colorado's only certified water sommelier, for a double-blind professional assessment of water smell and taste one day after the public test. With Anistacia's authorization, the tasting process was recorded. Anistacia tasted each of the samples and ranked Sample C as her favorite, Sample A second, and Sample B as her least favorite. For more details of the results of the water sommelier's findings, refer to the Appendix.

Discussion

We hoped to test 50-75 participants, but too few passersby were willing during the time available. For data to be to be statistically significant the participant pool must be over 100 responses.[7] We only recruited 22 participants and therefore could not produce statistically significant findings from our results. More participants and more data are needed to determine if people can distinguish between our water samples.

When considering future testing with at least 100 participants, we recommend analyzing the data with both the chi-square fit for goodness and the test for independence. Fit it for goodness would help us answer our first hypothesis to determine if people can differentiate between water samples. The test for independence would answer our second question and allow us to see if there is a correlation between taste and the location of the water sample. Chi-squared would determine if there is a meaningful relationship between taste and sample location. Due to

[7] Andrade C. Sample Size and its Importance in Research. Indian J Psychol Med. 2020 Jan 6;42(1):102-103. doi: 10.4103/IJPSYM.IJPSYM_504_19. PMID: 31997873; PMCID: PMC6970301.

our limited sample size, we were unable to conduct the chi-square tests. However, we analyzed our data on a smaller scale and were able to pull general trends from our test results.

We discovered that Sample A (Marin) was the preferred water sample, placing Sample C (SFRWS) as the least favored. However, our findings present a paradox: while 44% of participants were happy to accept Sample C for their everyday drinking water, only 26.9% would accept Sample A and 24% would accept Sample B as their daily drinking water source. We concluded that a larger participant pool is necessary to establish more definitive trends in our data.

Different variables have the potential to impact water quality and subsequently water taste. Contamination from pipes and other related infrastructure can potentially expose water samples to unwanted minerals. Water that encounters copper, iron, or galvanized pipes for extended periods of time may develop a metallic or bitter taste, becoming more noticeable when water is heated up. Plastic or rubber pipes can leech certain chemicals into water, giving it an unpleasant taste. Many pipes in the San Francisco Bay Area are made of cast iron and have the potential to influence the taste of tap water. To minimize the influence of contamination from pipes, the taps were flushed for longer than five minutes to avoid collecting water that has sat stagnant in the pipes. Additionally, water temperature can influence the flavor of the water. To maximize the flavor profile, water should be kept at room temperature; colder water numbs the taste buds which mask the taste of chlorine and fluoride, whereas warmer water can increase the taste of sodium and calcium.[8]

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[8] Burlingame, Gary A., Andrea M. Dietrich, and Andrew J. Whelton. "Understanding the Basics of Tap Water Taste." *Journal AWWA* 99, no. 5 (May 1, 2007): 100–111. https://doi.org/10.1002/j.1551-8833.2007.tb07930.x.

To gain deeper insight on the chemical composition of our water samples, each sample underwent analysis at SimpleLab, an independent laboratory specializing in drinking water testing. Samples A and B were ranked closely to each other, with many participants claiming that they tasted either similar or identical to one another. The chemical composition of both Samples A and B were found to be similar. Both Samples A and B and B showed similar characteristics, with nearly identical pH levels of 7.86 for Sample A and 7.98 for Sample B. In contrast, Sample C had a higher pH level of 8.23, indicating alkalinity.

Sample A registered the highest on the water hardness scale, with a rating of 69.44 mg/L. Hard water is characterized by elevated levels of dissolved minerals such as calcium and magnesium, which can give water a bitter and salty taste. Samples B and C rated lower on the water hardness scale, with Sample B at 16.61 mg/L and Sample C even lower at 11.68 mg/L, classifying them as soft waters. Soft water, like that delivered by EBMUD and SFRWS, has reduced calcium and magnesium content, typically offering a more neutral flavor profile. The laboratory analysis results are echoed in the sommelier's opinions of the water samples. For additional details of her findings and the discussion of the sommelier's interview, refer to the Appendix.

It is also important to note that the blend of water delivered by water agencies is not constant but varies over time and can vary within a service territory. For this taste test, SFRWS supplies were collected on the ground floor of the SFPUC headquarters. Likewise, EBMUD water was collected at its headquarters. Staff at the Marin headquarters declined to provide samples for testing, so the Marin water was collected at a nearby restaurant.

Conclusion & Areas for Future Research

This study aims to challenge San Francisco's claims that water from Hetch Hetchy reservoir is superior in its taste, by determining if participants can tell the difference between local water sources and by ranking three local water sources from "Favorite" to "Least Favorite." Our study contained several limitations but was a good start in developing a water taste test methodology and interpreting initial results.

The data we collected from our 28 participants in the initial test results show that participants favored Sample A (Marin) and Sample B (EBMUD) over Sample C (SFRWS). While Sample C was ranked as the "Least Favorite" sample most often, many of our participants said they would accept it as their drinking water. Further, most of our participants said they would accept all three samples as their daily drinking water. These results suggest that water taste is subjective and that residents may not be able to tell the difference between local water sources.

However, our study is inconclusive due to limitations in our test design and a lack of sufficient data for the results to be statistically significant. We identified several key barriers in our methodology and provided recommendations for future testing in Table 3 below.

Table 3: Study Limitations and Recommendations

Study Limitation	Recommendation for Future Research
Limited participants due to testing location – We conducted our test at the Rockridge BART station, a busy transit hub, in Oakland as requested by RHH (Restore Hetch Hetchy). During our test, we realized that	In future testing, we recommend RHH to conduct the taste test at a different location where people would be more willing to stop and participate in our test. Conducting the test at a college campus, such as the University of

people were quickly trying to get to a destination, leaving them little time to stop and participate in our water taste test. This made it difficult for us to collect enough data and produce statistically significant results.	California Berkeley campus during the academic year may be a better testing location, as there would be many willing college students who have time to stop and participate in our test. Changing the test location to an area with more willing participants would help RHH achieve statistically significant results.
Inherent participant bias – Before conducting the test, we recognized that taste is inherently subjective and our participants might bring their own unconscious bias to the taste test, potentially influencing results. Specifically, participants might have inadvertently preferred samples that tasted like their daily drinking water, ranked samples based on where they thought each sample was from, or for other unknown reasons.	We could not identify changes in our methodology or test design to reduce inherent participant bias. We recommend RHH closely follow our methodology and recommendations to standardize the test as much as possible. Additionally, RHH could consult water quality experts to improve the test methodology and find additional strategies that account for inherent participant bias.
Bias in sample preference from tasting order of each sample – When analyzing our results, we noticed that nearly all our participants sampled Sample A, then B, and then C. This may have influenced how participants ranked each sample. Specifically, if some participants were not able to distinguish a noticeable difference between samples, they may have ranked samples in order (with A as favorite, B as second favorite, and C as least favorite). Additionally, a water sample could	For future testing, we recommend RHH label the water samples using symbols that do not have an inherent sequencing. For example, sample labels could be "#," "%," and "&" instead of A, B, and C, which have an obvious sequence. RHH could also label the samples with "1", "2", and "3", and use a Research Randomizer, such as random.org, to randomly generate a sequence for each participant's sample testing. This would prevent participants from selecting their own

leave an aftertaste on the palette which may influence the taste of the following sample.	sequence, which may default to "1", "2", and "3" and introduce bias into the test.
Difficulty controlling water sample temperature – We identified temperature as a study limitation before our test and did our best to control the temperature of the water samples. Water quality experts recommended keeping our samples at room temperature, as this is known to be the ideal temperature to distinguish between water sources. Our samples were chilled in the fridge before the test, and then kept in a cooler while we were conducting our test outside. We believe this may have changed the temperature of our water samples throughout the test, and therefore may be influencing how our participants ranked each sample.	We recommend RHH to store water samples at room temperature before conducting future water taste tests, since experts recommend it as an ideal temperature for water testing. During the test, samples should be kept in a temperature-controlled cooler such as a Microyn Portable Refrigerator at room temperature. This will prevent any changes in temperature during the taste test, reduce any subsequent changes in sample taste or flavor, and standardize the temperature of each sample tried by every participant.
Change in sample flavor from sample container or storage time – Before our test, we identified the sample container and storage time as factors that could change the water samples' taste. To control this, we collected and stored each of our samples in glass containers to reduce taste impacts from plastic or other materials, as recommended by water quality experts. However, our samples were collected the day before conducting the taste test, which may have allowed time for the samples to change from their initial flavor.	We recommend that RHH continue to use the same glass containers to collect and store all water samples in future testing. Additionally, we recommend the collection of new samples for each test on the same day. We recommend against using the same water samples for testing that spans multiple days, as water can change flavor over time. To reduce this influence on sample taste as much as possible, RHH should collect the new water samples for each test and conduct the test on the same day.

<u>Impact of water system infrastructure on taste</u> – We identified the influence of water system infrastructure on water sample taste before conducting our test. Our water samples can pass through hundreds of miles of pipes, aqueducts, canals, several reservoirs, and treatment plants before reaching a tap, which may change the flavor of any water sample. To control this, water quality experts recommended "flushing" the tap, or allowing the water to freely pass through the tap, before collecting the sample.	In our test, we instructed RHH to flush the tap for five minutes before collecting each sample to prevent the collection of water that has been stagnant in pipes and may have changed taste. While the materials used in a water system's infrastructure will inherently affect water taste on any sample, we believe flushing the tap is sufficient in limiting the influence of the system's materials on our water samples taste. Therefore, we recommend that RHH continue to do so in future testing.
<u>Water sample taste may be influenced by mineral content, pH, total dissolved solids, and other factors</u> – Findings from our background research clearly stated that water components such as mineral content, pH, and total dissolved solids, among others, contribute significantly to water taste. Prior to conducting our test, we advised RHH to send our water samples to a testing lab to measure a few of these components. While the lab provided us with the chemical composition, pH, and mineral content of each sample, more research is needed to understand how these components contribute to each water sample's taste.	We recommend RHH conduct further research and review existing literature exploring how water components influence water taste. RHH should also continue to send water samples collected in future tests to testing labs to measure various water components. This may provide explanations for why participants preferred the taste of some water samples over others, information which RHH could use in future advocacy work challenging claims that San Francisco's water has superior taste.

In conclusion, our water taste test was a good first step in developing a detailed methodology and considering variables that may affect results. RHH should conduct more water

taste testing to increase the sample size and consider our recommendations to improve the method. Then, RHH may have more statistically significant results that show whether San Francisco Bay residents can distinguish between local water sources.

Appendix A: Water Sommelier

To further explore the differences between these water supplies in terms of smell and taste, and to understand the professional process and metrics used to taste water, our team visited Anistacia Barrak-Barber, Colorado's only water sommelier, and conducted the same double-blind taste test. (For the purposes of this visit, the questions for Anistacia were more specific and detailed than those for the public taste test, but the experimenter tasted the same samples used in the test on June 14th. At the time of the interviews with Anistacia, neither the experimenter nor the subjects knew which water source any of the samples came from).

With Anistacia's authorization, the tasting process was recorded. Below is a brief description of the testing process and her comments on the three samples in terms of smell and taste:

- *"With Sample A you can capture a pretty strong smell of Chlorine…Sample B smells kind of sweet …C has like minimal to no odor…"*

- "A, you can actually taste the Chlorine, and it leaves your mouth a drying-out feeling…B has something that makes it taste like tainted, a sweet, perfumy taste…C doesn't have outstanding taste, just like from melted ice, leaves your mouth a cooling and moisture feeling…"

In addition to the description itself, the sommelier also gave her conjectures on which sample belongs to which location. She assumed that Sample A was from EBMUD; Sample B was from Marin, and Sample C was from SFRWS. According to our records, the sommelier's guesses for A & B were inaccurate, while her guess for C was correct, and her description of the flavor is consistent with the lower levels of minerals found in the water from the SFRWS.

The sommelier's tasting results differed from those of the public. The sommelier ranked Sample C (SFRWS) first, Sample A (Marin) second and Sample B (EBMUD) last. The public ranked Sample A (Marin) first, Sample B (EBMUD) second, and Sample C (SFRWS) last. She favors Sample C (SFRWS) while it was ranked last by the public. We hypothesize that the lower mineral levels in the SFRWS sample may make it taste bland to the general public's palate.

These intriguing results challenge San Francisco's claims of the 'fineness' of their water's taste. If only an expert can discern the superior taste, the claim's credibility should be reconsidered. It is the residents of San Francisco and other neighboring cities who drink the water daily.

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Water Taste Test

A Methodology for Comparing Hetch Hetchy Water to Other Bay Area Sources

Bay Area Water Taste Test
Restore Hetch Hetchy
Appendix B

Prepared for Restore Hetch Hetchy, July 2024
Jazlyn Nie, Megan Franco, Katherine Halama

<u>Water Taste Test Methodology: Comparing San Francisco Regional Water System</u>

<u>Supplies Water to Other Bay Area Sources</u>

Prepared for Restore Hetch Hetchy, July 2024

Jazlyn Nie, Megan Franco, Katherine Halama

This supplemental document provides Restore Hetch Hetchy with detailed information on how we conducted our water taste test and documentation of our study limitations and survey. Our Water Taste Test Report contains our results, discussion, conclusion, and recommendations to Restore Hetch Hetchy. For questions regarding the taste test methodology and initial results, contact the Restore Hetch Hetchy capstone team:

Jazlyn Nie - jazlyn.nie@colorado.edu

Megan Franco- megan.franco@colorado.edu

Katherine Halama - katherine.halama@colorado.edu

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Research Questions & Hypotheses

Our study will attempt to answer two research questions:

1. Can residents of the San Francisco Bay Area identify a difference in taste between different local water sources without knowing the source of each sample?

2. Do residents consistently rank three unidentified water sources (with one being from the San Francisco Regional Water System or Hetch Hetchy Reservoir) in the same way?

    <u>Hypothesis 1: If participants try three different water samples without knowing each sample's source, they will not be able to distinguish taste differences between local water sources.</u>

    <u>Hypothesis 2:</u> If we ask participants to rank three water samples without knowing where each sample came from (with one of the water samples from the San Francisco Regional Water System or Hetch Hetchy Reservoir), they will not consistently rank the sources in the same way.

Materials

Our study will require the following materials:

- Table
- 3 chairs
- Water taste test flier or sign
- Paper copies of survey with test questions
- QR code with link to survey (printed or on phone)
- 300 paper 3-ounce cups (100 are extras)
- 3 sharpie markers
- Masking tape
- Glass containers for samples
- Three gallons of water (one from each water source)
- Cooler
- Thermometer

- Extra paper
- Extra pens
- RHH (Restore Hetch Hetchy) flyers, information, cards, and other outreach materials

Procedure

Day Before Taste Test

1. First, Restore Hetch Hetchy's Executive Director, Spreck Rosenkrans, collected three water samples. The samples were sourced from the San Francisco Regional Water System, East Bay Municipal Utility District (East Bay MUD), and Marin Municipal Water District. Spreck collected one gallon of water from each location at the same time in large glass containers.

2. When collecting the samples, Spreck "flushed the tap," or allowed water to flow freely through the tap for five minutes, allowing the tap water temperature and flavor to normalize. Water samples were stored in a refrigerator until the test.

3. A person not involved in the taste test labeled the containers with "A," "B," and "C," so only they knew which samples correlated to each sample location. The samples' corresponding locations were withheld from Spreck and the test team until the taste test was completed, following double-blind methodology.

Arrival and Set-Up

4. On the day of the taste test, Spreck provided the test team with the three water samples labeled "A," "B," and "C."

5. The test team arrived at the Rockridge BART Station in Oakland, California, and set up the table and test materials. Rockridge Station was chosen because it is a busy transit station with many visitors and there are often other tables set up for various promotional

activities and information. RHH worked with BART staff to obtain permission to use the

site beforehand.

6. Flyers, signs, and other promotional materials were placed on the table to attract

 participants. The team recruited people walking by to participate in our study by asking if

 they wanted to sample local water sources.

Test Procedure

7. Once a participant was recruited, approximately 1.5 ounces of Water Sample A was

 poured into a 3-ounce paper cup. The test team poured water up to a line on the paper cup

 to ensure the proper amount of each water sample was provided to participants.

8. The previous step was repeated for Samples B and C.

9. The test team asked the participant to use their phone to scan a QR code with a link to our

 survey to answer test questions or fill out a provided paper copy of the survey.

10. Participants read the introduction to the survey and answered the first question asking for

 the participant's age (answering this question was not required).

11. The participant sampled Samples A, B, and C in any order.

12. The participants noted what order they tried the samples on the survey.

13. For each sample, the participant ranked the sample according to the following scale:

4	I would be happy to accept this water as my everyday drinking water.
3	I am sure that I could accept this water as my everyday drinking water.
2	I could accept this water as my everyday drinking water.
1	I could not accept this water as my everyday drinking water.

14. The participant ranked each of the three samples as: "Favorite," "Second Favorite," and "Least Favorite."

15. Finally, the participants provided their email address if they wanted to be informed of the survey results. This was optional.

16. Steps 7-15 will be repeated for 3 hours for as many participants as possible.

Data Analysis

17. After the test, the team entered all paper versions of the survey into the Google Form.

18. The test team analyzed the data to exclude any incomplete answers or other discrepancies.

19. The team used the Google Form to produce several charts and graphics visualizing the data and noted any interesting or relevant findings.

20. The person who labeled the water samples sent the key identifying the corresponding location of each water sample to the test team.

Taste Test Survey

Water Taste Test - June 14th, 2024

You'll taste three different water samples from:
1. San Francisco Regional Water System
2. East Bay Municipal Utility District
3. Marin Municipal Water District

You will be told the label (A, B, or C) of the sample you are currently tasting, which corresponds to one of the sources above. To ensure the objectivity of the experiment, we as the experimenters do not know which sample comes from which source. Please take your time and answer the questions below:

kaha4475@colorado.edu Switch account

Not shared

* Indicates required question

Contact us:
Jazlyn.Nie@colorado.edu
Katherine.Halama@colorado.edu
Megan.Franco@colorado.edu

CU | MENV MASTERS OF THE ENVIRONMENT GRADUATE PROGRAM
University of Colorado Boulder

If you don't mind sharing, what is your age range?

○ <18

○ 18-34

○ 35-54

○ 55-64

○ 65 or over

○ Prefer not to answer

Which sample are you trying first?

○ A

○ B

○ C

Which sample are you trying second?

○ A

○ B

○ C

Which sample are you trying last?

○ A

○ B

○ C

How would you describe **Sample A** if it were your daily drinking water?

○ I would be very happy to accept this water as my everyday drinking water.

○ I am sure that I could accept this water as my everyday drinking water.

○ Maybe I could accept this water as my everyday drinking water.

○ I could not accept this water as my everyday drinking water.

How would you describe **Sample B** if it were your daily drinking water?

○ I would be very happy to accept this water as my everyday drinking water.

○ I am sure that I could accept this water as my everyday drinking water.

○ Maybe I could accept this water as my everyday drinking water.

○ I could not accept this water as my everyday drinking water.

How would you describe **Sample C** if it were your daily drinking water?

○ I would be very happy to accept this water as my everyday drinking water.

○ I am sure that I could accept this water as my everyday drinking water.

○ Maybe I could accept this water as my everyday drinking water.

○ I could not accept this water as my everyday drinking water.

Please rate the three samples. *

	Favorite	Second Favorite	Least Favorite
A	○	○	○
B	○	○	○
C	○	○	○

We appreciate your interest in our project! If you would like to receive updates and the results of our study, please provide your email address below.

Your answer

Submit   Clear form

MEZ86D

simplelab

**Bay Area Water Taste Test
Restore Hetch Hetchy
July 2025
Appendix C - SFPUC**

hello@gosimplelab.com

CLIENT INFORMATION

Client: Spreck Rosekrans
Requested On: Jun 27, 2024
Phone: 5103934593
Email: spreck@hetchhetchy.org

TESTING PERFORMED

Testing Requested: Advanced City Water Test
Matrix: Drinking Water
Testing / Report ID: MEZ86D

SAMPLE INFORMATION

Collection Date: Jun 30, 2024
Collected By: Spreck Rosekrans
Received Date: Jul 3, 2024
Reported On: Jul 11, 2024
Sample Location: Bottle C
Sample Address: 232 Garcia Avenue, Half Moon Bay, CA
94019, United States

TESTING NOTES

There were no problems with analytical events associated with this report unless noted. Quality control data is within laboratory defined or method specified acceptance limits except where noted. If you have any questions regarding these test results, please contact hello@gosimplelab.com

SUMMARY ANALYSIS

ANALYTE	UNIT	RESULT	METHOD	EVALUATION
pH	pH	**8.23**	EPA 150.1	OK
Total Dissolved Solids	mg/L	**32.9**	SM 2510 B	
Conductivity	umhos/cm	**51.4**	SM 2510 B	
Hardness (Ca,Mg)	mg/L	**11.53**		
Hardness (Total)	mg/L	**11.68**		
Grains per gallon	Grains	**0.69**		
Alkalinity (as CaCO3)	mg/L	**11.76**	SM 2320 B	
Langelier Saturation Index		**-1.36**		
Sodium Adsorption Ratio		**0.61**		
Total THMs	µg/L	**52.3**		

TEST RESULTS

ANALYTE	UNIT	RESULT	MDL	METHOD	EVALUATION
1,1,1,2 Tetrachloroethane	µg/L	NOT DETECTED	0.089	EPA 524.4	
1,1,1 Trichloroethane	µg/L	NOT DETECTED	0.099	EPA 524.4	
1,1,2,2 Tetrachloroethane	µg/L	NOT DETECTED	0.045	EPA 524.4	
1,1,2 Trichloroethane	µg/L	NOT DETECTED	0.065	EPA 524.4	

1,1 Dichloroethane	µg/L	NOT DETECTED	0.112	EPA 524.4	
1,1 Dichloroethylene	µg/L	NOT DETECTED	0.119	EPA 524.4	
1,1 Dichloropropene	µg/L	NOT DETECTED	0.108	EPA 524.4	
1,2,3 Trichlorobenzene	µg/L	NOT DETECTED	0.075	EPA 524.4	
1,2,3 Trichloropropane	µg/L	NOT DETECTED	0.067	EPA 524.4	
1,2,4 Trichlorobenzene	µg/L	NOT DETECTED	0.082	EPA 524.4	
1,2,4 Trimethylbenzene	µg/L	NOT DETECTED	0.106	EPA 524.4	
1,2 Dichlorobenzene	µg/L	NOT DETECTED	0.089	EPA 524.4	
1,2 Dichloroethane	µg/L	NOT DETECTED	0.077	EPA 524.4	
1,2 Dichloropropane	µg/L	NOT DETECTED	0.085	EPA 524.4	
1,3,5 Trimethylbenzene	µg/L	NOT DETECTED	0.119	EPA 524.4	
1,3 Dichlorobenzene	µg/L	NOT DETECTED	0.091	EPA 524.4	
1,3 Dichloropropane	µg/L	NOT DETECTED	0.08	EPA 524.4	
1,4 Dichlorobenzene	µg/L	NOT DETECTED	0.091	EPA 524.4	
2,2 Dichloropropane	µg/L	NOT DETECTED	0.091	EPA 524.4	
Aluminum	mg/L	**0.00974**	0.00974	EPA 200.7	< HGL
Antimony	mg/L	NOT DETECTED	0.00014	EPA 200.8	
Arsenic	mg/L	**0.0003361**	5.0E-5	EPA 200.8	> HGL (0)
Barium	mg/L	**0.00491**	9.0E-5	EPA 200.7	< HGL
Benzene	µg/L	NOT DETECTED	0.105	EPA 524.4	
Beryllium	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Boron	mg/L	**0.01542**	0.00348	EPA 200.7	< HGL
Bromobenzene	µg/L	NOT DETECTED	0.087	EPA 524.4	
Bromochloromethane	µg/L	NOT DETECTED	0.122	EPA 524.4	
Bromodichloromethane	µg/L	**0.67**	0.08	EPA 524.4	> HGL (0)
Bromoform	µg/L	NOT DETECTED	0.072	EPA 524.4	
Bromomethane	µg/L	NOT DETECTED	0.187	EPA 524.4	
Cadmium	mg/L	NOT DETECTED	0	EPA 200.8	
Calcium	mg/L	**4.03327**	0.00319	EPA 200.7	
Carbon Tetrachloride	µg/L	NOT DETECTED	0.091	EPA 524.4	
Chloride	mg/L	**4.756**	0.007	EPA 300.1	
Chlorobenzene	µg/L	NOT DETECTED	0.116	EPA 524.4	
Chloroethane	µg/L	NOT DETECTED	0.157	EPA 524.4	
Chloroform	µg/L	**51.54**	0.106	EPA 524.4	> HGL (0.22)
Chloromethane	µg/L	NOT DETECTED	0.185	EPA 524.4	
Chlorotoluene 2	µg/L	NOT DETECTED	0.091	EPA 524.4	
Chlorotoluene 4	µg/L	NOT DETECTED	0.085	EPA 524.4	
Chromium (Total)	mg/L	**0.000185**	0.00019	EPA 200.8	< HGL
cis 1,2 Dichloroethylene	µg/L	NOT DETECTED	0.089	EPA 524.4	
cis 1,3 Dichloropropene	µg/L	NOT DETECTED	0.064	EPA 524.4	

Cobalt	mg/L	**4.0E-6**	0	EPA 200.8	< HGL
Copper	mg/L	**0.01485**	0.00039	EPA 200.7	< HGL
Dibromochloromethane	µg/L	**0.09**	0.068	EPA 524.4	< HGL
Dibromochloropropane	µg/L	NOT DETECTED	0.069	EPA 524.4	
Dibromomethane	µg/L	NOT DETECTED	0.074	EPA 524.4	
Dichlorodifluoromethane	µg/L	NOT DETECTED	0.094	EPA 524.4	
Dichloromethane	µg/L	NOT DETECTED	0.142	EPA 524.4	
Ethylbenzene	µg/L	NOT DETECTED	0.11	EPA 524.4	
Ethylene dibromide	µg/L	NOT DETECTED	0.072	EPA 524.4	
Fluoride	mg/L	**0.717**	0.004	EPA 300.1	< HGL
Hexachlorobutadiene	µg/L	NOT DETECTED	0.122	EPA 524.4	
Iron	mg/L	**0.02543**	0.00072	EPA 200.7	< HGL
Isopropylbenzene	µg/L	NOT DETECTED	0.104	EPA 524.4	
Lead	mg/L	**0.0001128**	2.0E-5	EPA 200.8	> HGL (0)
Lithium	mg/L	**0.00153**	0.00017	EPA 200.7	< HGL
Magnesium	mg/L	**0.35482**	0.00037	EPA 200.7	
Manganese	mg/L	**0.00121**	7.0E-5	EPA 200.7	< HGL
Mercury	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Methyl Tertiary Butyl Ether	µg/L	NOT DETECTED	0.074	EPA 524.4	
Molybdenum	mg/L	**0.0003439**	1.0E-5	EPA 200.8	< HGL
m,p Xylene	µg/L	NOT DETECTED	0.233	EPA 524.4	
Naphthalene	µg/L	NOT DETECTED	0.066	EPA 524.4	
n Butylbenzene	µg/L	NOT DETECTED	0.096	EPA 524.4	
Nickel	mg/L	NOT DETECTED	0.0001	EPA 200.8	
Nitrate (as N)	mg/L	**0.006**	0.006	EPA 300.1	< HGL
Nitrite (as N)	mg/L	**0.006**	0.006	EPA 300.1	< HGL
n Propylbenzene	µg/L	NOT DETECTED	0.095	EPA 524.4	
o Xylene	µg/L	NOT DETECTED	0.114	EPA 524.4	
Phosphorus	mg/L	NOT DETECTED	0.00587	EPA 200.7	
p Isopropyltoluene	µg/L	NOT DETECTED	0.109	EPA 524.4	
Potassium	mg/L	**0.25947**	0.00068	EPA 200.7	
sec Butylbenzene	µg/L	NOT DETECTED	0.103	EPA 524.4	
Selenium	mg/L	NOT DETECTED	0.00041	EPA 200.8	
Silver	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Sodium	mg/L	**4.77071**	0.00017	EPA 200.7	
Strontium	mg/L	**0.02789**	4.0E-5	EPA 200.7	< HGL
Styrene	µg/L	NOT DETECTED	0.087	EPA 524.4	
Sulfate	mg/L	**1.23**	0.009	EPA 300.1	< HGL
tert Butylbenzene	µg/L	NOT DETECTED	0.106	EPA 524.4	
Tetrachloroethylene	µg/L	NOT DETECTED	0.106	EPA 524.4	

Thallium	mg/L	NOT DETECTED	0	EPA 200.8	
Tin	mg/L	NOT DETECTED	0.0034	EPA 200.7	
Titanium	mg/L	NOT DETECTED	0.00028	EPA 200.7	
Toluene	µg/L	NOT DETECTED	0.031	EPA 524.4	
trans 1,3 Dichloropropene	µg/L	NOT DETECTED	0.091	EPA 524.4	
Trichloroethylene	µg/L	NOT DETECTED	0.125	EPA 524.4	
Trichlorofluoromethane	µg/L	NOT DETECTED	0.123	EPA 524.4	
Uranium	mg/L	0.0005036	3.0E-5	EPA 200.8	> HGL (0)
Vanadium	mg/L	NOT DETECTED	0.00017	EPA 200.8	
Vinyl Chloride	µg/L	NOT DETECTED	0.156	EPA 524.4	
Zinc	mg/L	0.00173	0.00044	EPA 200.7	< HGL

How To Read Your SimpleLab PDF Report

Your results are being evaluated with the Health Guidance Level.
This is a health protective, non-enforceable drinking water benchmark. HGL is based on the most protective human health benchmark used among public health agencies for a contaminant. Drinking water at or near the HGL over the course of your lifetime is thought to be safe.

MDL: Method Detection Limit. MDL is the lowest concentration of an analyte which testing instrumentation and the analysis team is configured to measure.

Did you know?

This Tap Score report is easier to understand when viewed online.
Access in-depth information about every detection, including health
risks and treatment solutions.

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RQKGSV

simplelab

CLIENT INFORMATION

Client: Spreck Rosekrans
Requested On: Jun 27, 2024
Phone: 5103934593
Email: spreck@hetchhetchy.org

hello@gosimplelab.com

EPA LAB ID: CA01652
8312 Miramar Mall
San Diego, California 92121

TESTING PERFORMED

Testing Requested: Advanced City Water Test
Matrix: Drinking Water
Testing / Report ID: RQKGSV

SAMPLE INFORMATION

Collection Date: Jun 30, 2024
Collected By: Spreck Rosekrans
Received Date: Jul 3, 2024
Reported On: Jul 11, 2024
Sample Location: Bottle B
Sample Address: 232 Garcia Avenue, Half Moon Bay, CA
94019, United States

TESTING NOTES

There were no problems with analytical events associated with this report unless noted. Quality control data is within laboratory defined or method specified acceptance limits except where noted. If you have any questions regarding these test results, please contact hello@gosimplelab.com

SUMMARY ANALYSIS

ANALYTE	UNIT	RESULT	METHOD	EVALUATION
pH	pH	**7.98**	EPA 150.1	OK
Total Dissolved Solids	mg/L	**45.4**	SM 2510 B	
Conductivity	umhos/cm	**71.1**	SM 2510 B	
Hardness (Ca,Mg)	mg/L	**16.54**		
Hardness (Total)	mg/L	**16.61**		
Grains per gallon	Grains	**0.97**		
Alkalinity (as CaCO3)	mg/L	**22.82**	SM 2320 B	
Langelier Saturation Index		**-1.27**		
Sodium Adsorption Ratio		**0.69**		
Total THMs	µg/L	**51.63**		

TEST RESULTS

ANALYTE	UNIT	RESULT	MDL	METHOD	EVALUATION
1,1,1,2 Tetrachloroethane	µg/L	NOT DETECTED	0.089	EPA 524.4	
1,1,1 Trichloroethane	µg/L	NOT DETECTED	0.099	EPA 524.4	
1,1,2,2 Tetrachloroethane	µg/L	NOT DETECTED	0.045	EPA 524.4	
1,1,2 Trichloroethane	µg/L	NOT DETECTED	0.065	EPA 524.4	

1,1 Dichloroethane	µg/L	NOT DETECTED	0.112	EPA 524.4	
1,1 Dichloroethylene	µg/L	NOT DETECTED	0.119	EPA 524.4	
1,1 Dichloropropene	µg/L	NOT DETECTED	0.108	EPA 524.4	
1,2,3 Trichlorobenzene	µg/L	NOT DETECTED	0.075	EPA 524.4	
1,2,3 Trichloropropane	µg/L	NOT DETECTED	0.067	EPA 524.4	
1,2,4 Trichlorobenzene	µg/L	NOT DETECTED	0.082	EPA 524.4	
1,2,4 Trimethylbenzene	µg/L	NOT DETECTED	0.106	EPA 524.4	
1,2 Dichlorobenzene	µg/L	NOT DETECTED	0.089	EPA 524.4	
1,2 Dichloroethane	µg/L	NOT DETECTED	0.077	EPA 524.4	
1,2 Dichloropropane	µg/L	NOT DETECTED	0.085	EPA 524.4	
1,3,5 Trimethylbenzene	µg/L	NOT DETECTED	0.119	EPA 524.4	
1,3 Dichlorobenzene	µg/L	NOT DETECTED	0.091	EPA 524.4	
1,3 Dichloropropane	µg/L	NOT DETECTED	0.08	EPA 524.4	
1,4 Dichlorobenzene	µg/L	NOT DETECTED	0.091	EPA 524.4	
2,2 Dichloropropane	µg/L	NOT DETECTED	0.091	EPA 524.4	
Aluminum	mg/L	NOT DETECTED	0.00974	EPA 200.7	
Antimony	mg/L	NOT DETECTED	0.00014	EPA 200.8	
Arsenic	mg/L	**0.0002556**	5.0E-5	EPA 200.8	> HGL (0)
Barium	mg/L	**0.00948**	9.0E-5	EPA 200.7	< HGL
Benzene	µg/L	NOT DETECTED	0.105	EPA 524.4	
Beryllium	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Boron	mg/L	NOT DETECTED	0.00348	EPA 200.7	
Bromobenzene	µg/L	NOT DETECTED	0.087	EPA 524.4	
Bromochloromethane	µg/L	NOT DETECTED	0.122	EPA 524.4	
Bromodichloromethane	µg/L	**1.06**	0.08	EPA 524.4	> HGL (0)
Bromoform	µg/L	NOT DETECTED	0.072	EPA 524.4	
Bromomethane	µg/L	NOT DETECTED	0.187	EPA 524.4	
Cadmium	mg/L	NOT DETECTED	0	EPA 200.8	
Calcium	mg/L	**4.941**	0.00319	EPA 200.7	
Carbon Tetrachloride	µg/L	NOT DETECTED	0.091	EPA 524.4	
Chloride	mg/L	**5.667**	0.007	EPA 300.1	
Chlorobenzene	µg/L	NOT DETECTED	0.116	EPA 524.4	
Chloroethane	µg/L	NOT DETECTED	0.157	EPA 524.4	
Chloroform	µg/L	**50.57**	0.106	EPA 524.4	> HGL (0.22)
Chloromethane	µg/L	NOT DETECTED	0.185	EPA 524.4	
Chlorotoluene 2	µg/L	NOT DETECTED	0.091	EPA 524.4	
Chlorotoluene 4	µg/L	NOT DETECTED	0.085	EPA 524.4	
Chromium (Total)	mg/L	NOT DETECTED	0.00019	EPA 200.8	
cis 1,2 Dichloroethylene	µg/L	NOT DETECTED	0.089	EPA 524.4	
cis 1,3 Dichloropropene	µg/L	NOT DETECTED	0.064	EPA 524.4	

Cobalt	mg/L	**4.0E-6**	0	EPA 200.8	< HGL
Copper	mg/L	**0.00675**	0.00039	EPA 200.7	< HGL
Dibromochloromethane	µg/L	NOT DETECTED	0.068	EPA 524.4	
Dibromochloropropane	µg/L	NOT DETECTED	0.069	EPA 524.4	
Dibromomethane	µg/L	NOT DETECTED	0.074	EPA 524.4	
Dichlorodifluoromethane	µg/L	NOT DETECTED	0.094	EPA 524.4	
Dichloromethane	µg/L	NOT DETECTED	0.142	EPA 524.4	
Ethylbenzene	µg/L	NOT DETECTED	0.11	EPA 524.4	
Ethylene dibromide	µg/L	NOT DETECTED	0.072	EPA 524.4	
Fluoride	mg/L	**0.721**	0.004	EPA 300.1	< HGL
Hexachlorobutadiene	µg/L	NOT DETECTED	0.122	EPA 524.4	
Iron	mg/L	**0.00395**	0.00072	EPA 200.7	< HGL
Isopropylbenzene	µg/L	NOT DETECTED	0.104	EPA 524.4	
Lead	mg/L	**2.0E-5**	2.0E-5	EPA 200.8	> HGL (0)
Lithium	mg/L	**0.00189**	0.00017	EPA 200.7	< HGL
Magnesium	mg/L	**1.02033**	0.00037	EPA 200.7	
Manganese	mg/L	NOT DETECTED	7.0E-5	EPA 200.7	
Mercury	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Methyl Tertiary Butyl Ether	µg/L	NOT DETECTED	0.074	EPA 524.4	
Molybdenum	mg/L	**0.0001797**	1.0E-5	EPA 200.8	< HGL
m,p Xylene	µg/L	NOT DETECTED	0.233	EPA 524.4	
Naphthalene	µg/L	NOT DETECTED	0.066	EPA 524.4	
n Butylbenzene	µg/L	NOT DETECTED	0.096	EPA 524.4	
Nickel	mg/L	NOT DETECTED	0.0001	EPA 200.8	
Nitrate (as N)	mg/L	**0.006**	0.006	EPA 300.1	< HGL
Nitrite (as N)	mg/L	**0.006**	0.006	EPA 300.1	< HGL
n Propylbenzene	µg/L	NOT DETECTED	0.095	EPA 524.4	
o Xylene	µg/L	NOT DETECTED	0.114	EPA 524.4	
Phosphorus	mg/L	NOT DETECTED	0.00587	EPA 200.7	
p Isopropyltoluene	µg/L	NOT DETECTED	0.109	EPA 524.4	
Potassium	mg/L	**0.52277**	0.00068	EPA 200.7	
sec Butylbenzene	µg/L	NOT DETECTED	0.103	EPA 524.4	
Selenium	mg/L	NOT DETECTED	0.00041	EPA 200.8	
Silver	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Sodium	mg/L	**6.41184**	0.00017	EPA 200.7	
Strontium	mg/L	**0.04058**	4.0E-5	EPA 200.7	< HGL
Styrene	µg/L	NOT DETECTED	0.087	EPA 524.4	
Sulfate	mg/L	**1.719**	0.009	EPA 300.1	< HGL
tert Butylbenzene	µg/L	NOT DETECTED	0.106	EPA 524.4	
Tetrachloroethylene	µg/L	NOT DETECTED	0.106	EPA 524.4	

Thallium	mg/L	NOT DETECTED	0	EPA 200.8	
Tin	mg/L	NOT DETECTED	0.0034	EPA 200.7	
Titanium	mg/L	NOT DETECTED	0.00028	EPA 200.7	
Toluene	µg/L	NOT DETECTED	0.031	EPA 524.4	
trans 1,3 Dichloropropene	µg/L	NOT DETECTED	0.091	EPA 524.4	
Trichloroethylene	µg/L	NOT DETECTED	0.125	EPA 524.4	
Trichlorofluoromethane	µg/L	NOT DETECTED	0.123	EPA 524.4	
Uranium	mg/L	**2.6E-5**	3.0E-5	EPA 200.8	> HGL (0)
Vanadium	mg/L	**0.000166**	0.00017	EPA 200.8	< HGL
Vinyl Chloride	µg/L	NOT DETECTED	0.156	EPA 524.4	
Zinc	mg/L	**0.00044**	0.00044	EPA 200.7	< HGL

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Your results are being evaluated with the Health Guidance Level.
This is a health protective, non-enforceable drinking water benchmark. HGL is based on the most protective human health benchmark used among public health agencies for a contaminant. Drinking water at or near the HGL over the course of your lifetime is thought to be safe.

MDL: Method Detection Limit. MDL is the lowest concentration of an analyte which testing instrumentation and the analysis team is configured to measure.

Did you know?

This Tap Score report is easier to understand when viewed online.
Access in-depth information about every detection, including health
risks and treatment solutions.

gosimplelab.com/signin

6C6MK7

simplelab

CLIENT INFORMATION

Client: Spreck Rosekrans
Requested On: Jun 27, 2024
Phone: 5103934593
Email: spreck@hetchhetchy.org

Bay Area Water Taste Test
Restore Hetch Hetchy
July 2025
Appendix E - MMWD

hello@gosimplelab.com

TESTING PERFORMED

Testing Requested: Advanced City Water Test
Matrix: Drinking Water
Testing / Report ID: 6C6MK7

SAMPLE INFORMATION

Collection Date: Jun 30, 2024
Collected By: Spreck
Received Date: Jul 3, 2024
Reported On: Jul 11, 2024
Sample Location: Bottle A
Sample Address: 232 Garcia Avenue, Half Moon Bay, CA 94019, United States

TESTING NOTES

There were no problems with analytical events associated with this report unless noted. Quality control data is within laboratory defined or method specified acceptance limits except where noted. If you have any questions regarding these test results, please contact hello@gosimplelab.com

SUMMARY ANALYSIS

ANALYTE	UNIT	RESULT	METHOD	EVALUATION
pH	pH	7.86	EPA 150.1	OK
Total Dissolved Solids	mg/L	173.8	SM 2510 B	
Conductivity	umhos/cm	271.5	SM 2510 B	
Hardness (Ca,Mg)	mg/L	68.97		
Hardness (Total)	mg/L	69.44		
Grains per gallon	Grains	4.06		
Alkalinity (as CaCO3)	mg/L	65.96	SM 2320 B	
Langelier Saturation Index		-0.57		
Sodium Adsorption Ratio		1.16		
Total THMs	µg/L	55.31		

TEST RESULTS

ANALYTE	UNIT	RESULT	MDL	METHOD	EVALUATION
1,1,1,2 Tetrachloroethane	µg/L	NOT DETECTED	0.089	EPA 524.4	
1,1,1 Trichloroethane	µg/L	NOT DETECTED	0.099	EPA 524.4	
1,1,2,2 Tetrachloroethane	µg/L	NOT DETECTED	0.045	EPA 524.4	
1,1,2 Trichloroethane	µg/L	NOT DETECTED	0.065	EPA 524.4	

1,1 Dichloroethane	µg/L	NOT DETECTED	0.112	EPA 524.4	
1,1 Dichloroethylene	µg/L	NOT DETECTED	0.119	EPA 524.4	
1,1 Dichloropropene	µg/L	NOT DETECTED	0.108	EPA 524.4	
1,2,3 Trichlorobenzene	µg/L	NOT DETECTED	0.075	EPA 524.4	
1,2,3 Trichloropropane	µg/L	NOT DETECTED	0.067	EPA 524.4	
1,2,4 Trichlorobenzene	µg/L	NOT DETECTED	0.082	EPA 524.4	
1,2,4 Trimethylbenzene	µg/L	NOT DETECTED	0.106	EPA 524.4	
1,2 Dichlorobenzene	µg/L	NOT DETECTED	0.089	EPA 524.4	
1,2 Dichloroethane	µg/L	NOT DETECTED	0.077	EPA 524.4	
1,2 Dichloropropane	µg/L	NOT DETECTED	0.085	EPA 524.4	
1,3,5 Trimethylbenzene	µg/L	NOT DETECTED	0.119	EPA 524.4	
1,3 Dichlorobenzene	µg/L	NOT DETECTED	0.091	EPA 524.4	
1,3 Dichloropropane	µg/L	NOT DETECTED	0.08	EPA 524.4	
1,4 Dichlorobenzene	µg/L	NOT DETECTED	0.091	EPA 524.4	
2,2 Dichloropropane	µg/L	NOT DETECTED	0.091	EPA 524.4	
Aluminum	mg/L	NOT DETECTED	0.00974	EPA 200.7	
Antimony	mg/L	NOT DETECTED	0.00014	EPA 200.8	
Arsenic	mg/L	**0.000197**	5.0E-5	EPA 200.8	> HGL (0)
Barium	mg/L	**0.0395**	9.0E-5	EPA 200.7	< HGL
Benzene	µg/L	NOT DETECTED	0.105	EPA 524.4	
Beryllium	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Boron	mg/L	**0.03046**	0.00348	EPA 200.7	< HGL
Bromobenzene	µg/L	NOT DETECTED	0.087	EPA 524.4	
Bromochloromethane	µg/L	**0.28**	0.122	EPA 524.4	< HGL
Bromodichloromethane	µg/L	**12.28**	0.08	EPA 524.4	> HGL (0)
Bromoform	µg/L	**0.1**	0.072	EPA 524.4	> HGL (0)
Bromomethane	µg/L	NOT DETECTED	0.187	EPA 524.4	
Cadmium	mg/L	NOT DETECTED	0	EPA 200.8	
Calcium	mg/L	**13.24517**	0.00319	EPA 200.7	
Carbon Tetrachloride	µg/L	NOT DETECTED	0.091	EPA 524.4	
Chloride	mg/L	**16.609**	0.007	EPA 300.1	
Chlorobenzene	µg/L	NOT DETECTED	0.116	EPA 524.4	
Chloroethane	µg/L	NOT DETECTED	0.157	EPA 524.4	
Chloroform	µg/L	**40.9**	0.106	EPA 524.4	> HGL (0.22)
Chloromethane	µg/L	NOT DETECTED	0.185	EPA 524.4	
Chlorotoluene 2	µg/L	NOT DETECTED	0.091	EPA 524.4	
Chlorotoluene 4	µg/L	NOT DETECTED	0.085	EPA 524.4	
Chromium (Total)	mg/L	NOT DETECTED	0.00019	EPA 200.8	
cis 1,2 Dichloroethylene	µg/L	NOT DETECTED	0.089	EPA 524.4	
cis 1,3 Dichloropropene	µg/L	NOT DETECTED	0.064	EPA 524.4	

Cobalt	mg/L	**4.0E-6**	0	EPA 200.8	< HGL
Copper	mg/L	**0.02063**	0.00039	EPA 200.7	< HGL
Dibromochloromethane	µg/L	2.03	0.068	EPA 524.4	> HGL (0.1)
Dibromochloropropane	µg/L	NOT DETECTED	0.069	EPA 524.4	
Dibromomethane	µg/L	NOT DETECTED	0.074	EPA 524.4	
Dichlorodifluoromethane	µg/L	NOT DETECTED	0.094	EPA 524.4	
Dichloromethane	µg/L	NOT DETECTED	0.142	EPA 524.4	
Ethylbenzene	µg/L	NOT DETECTED	0.11	EPA 524.4	
Ethylene dibromide	µg/L	NOT DETECTED	0.072	EPA 524.4	
Fluoride	mg/L	**0.74**	0.004	EPA 300.1	< HGL
Hexachlorobutadiene	µg/L	NOT DETECTED	0.122	EPA 524.4	
Iron	mg/L	**0.00249**	0.00072	EPA 200.7	< HGL
Isopropylbenzene	µg/L	NOT DETECTED	0.104	EPA 524.4	
Lead	mg/L	2.0E-5	2.0E-5	EPA 200.8	> HGL (0)
Lithium	mg/L	**0.00109**	0.00017	EPA 200.7	< HGL
Magnesium	mg/L	**8.71617**	0.00037	EPA 200.7	
Manganese	mg/L	**7.0E-5**	7.0E-5	EPA 200.7	< HGL
Mercury	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Methyl Tertiary Butyl Ether	µg/L	NOT DETECTED	0.074	EPA 524.4	
Molybdenum	mg/L	**0.0003582**	1.0E-5	EPA 200.8	< HGL
m,p Xylene	µg/L	NOT DETECTED	0.233	EPA 524.4	
Naphthalene	µg/L	NOT DETECTED	0.066	EPA 524.4	
n Butylbenzene	µg/L	NOT DETECTED	0.096	EPA 524.4	
Nickel	mg/L	**0.0019095**	0.0001	EPA 200.8	< HGL
Nitrate (as N)	mg/L	**0.214**	0.006	EPA 300.1	< HGL
Nitrite (as N)	mg/L	NOT DETECTED	0.006	EPA 300.1	
n Propylbenzene	µg/L	NOT DETECTED	0.095	EPA 524.4	
o Xylene	µg/L	NOT DETECTED	0.114	EPA 524.4	
Phosphorus	mg/L	**0.31169**	0.00587	EPA 200.7	
p Isopropyltoluene	µg/L	NOT DETECTED	0.109	EPA 524.4	
Potassium	mg/L	**2.65621**	0.00068	EPA 200.7	
sec Butylbenzene	µg/L	NOT DETECTED	0.103	EPA 524.4	
Selenium	mg/L	NOT DETECTED	0.00041	EPA 200.8	
Silver	mg/L	NOT DETECTED	1.0E-5	EPA 200.8	
Sodium	mg/L	**22.24835**	0.00017	EPA 200.7	
Strontium	mg/L	**0.12398**	4.0E-5	EPA 200.7	< HGL
Styrene	µg/L	NOT DETECTED	0.087	EPA 524.4	
Sulfate	mg/L	**38.92**	0.009	EPA 300.1	< HGL
tert Butylbenzene	µg/L	NOT DETECTED	0.106	EPA 524.4	
Tetrachloroethylene	µg/L	NOT DETECTED	0.106	EPA 524.4	

Thallium	mg/L	NOT DETECTED	0	EPA 200.8	
Tin	mg/L	NOT DETECTED	0.0034	EPA 200.7	
Titanium	mg/L	NOT DETECTED	0.00028	EPA 200.7	
Toluene	µg/L	NOT DETECTED	0.031	EPA 524.4	
trans 1,3 Dichloropropene	µg/L	NOT DETECTED	0.091	EPA 524.4	
Trichloroethylene	µg/L	NOT DETECTED	0.125	EPA 524.4	
Trichlorofluoromethane	µg/L	NOT DETECTED	0.123	EPA 524.4	
Uranium	mg/L	NOT DETECTED	3.0E-5	EPA 200.8	
Vanadium	mg/L	NOT DETECTED	0.00017	EPA 200.8	
Vinyl Chloride	µg/L	NOT DETECTED	0.156	EPA 524.4	
Zinc	mg/L	**0.17168**	0.00044	EPA 200.7	< HGL

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