Supplemental Appendix D.1
Potential Water Quality Risk Indicator Evaluations

October 7, 2020

Table of Contents

Waterborne Illness: Historical Customer Complaints

Regulated water systems are required by the State Water Board to self-report customer complaints regarding potential waterborne illness occurring as a result of contamination in the system's drinking water provision. These complaints are in turn often investigated by the systems by conducting additional laboratory tests to either verify or dismiss the presence of contaminants associated with the complaint. In some cases, complaints are not investigated via laboratory testing but through field tests.

Step 1: Applicability: Good
This risk indicator was utilized in Risk Assessment 1.0 and identified as an applicable risk indicator through a stakeholder-driven process in 2019. A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- No. of Complaints Reported by Customers; eAR (annual, not required)
- No. of Complaints Investigated; eAR (annual, not required)
- No. of Complaints reported to the Division of Drinking Water or Local County Staff; eAR (annual, not mandatory)
- Brief Description of Cause and Corrective Action taken, eAR (annual, not required)

Risk Indicator Methodology:

The total number of reported customer complaints of waterborne illness per customer in the past two years either confirmed by the system or with no test results refuting the responsibility of the water system.

The data collected through the eAR does not allow the State Water Board to:

1. Distinguish the number of complaints by customer. The data collected only illustrates the total number of complaints which may include multiple complaints by one customer.
2. The only way to determine if a test result confirmed or refuted the complaint would be to review the written notes provided.

Data Coverage: Poor
The following analysis was completed using the average response rate between the 2017 and 2018 eAR reporting years for public water systems with 3,300 service connections or less. It is important to highlight that there is no specific regulatory language that requires submittal of waterborne disease information to the State Water Board and therefore this is not a mandatory section of the eAR.

- No. of Complaints Reported by Customers: **Poor**
  - 50% coverage
- No. of Complaints Investigated: **Poor**
  - 38% coverage
- No. of Complaints reported to the Division of Drinking Water or Local County Staff**: Poor**
  - 38% coverage.
- Brief Description of Cause and Corrective Action taken: **Poor**
  - 12% coverage

Data Availability: **Poor**

All three data points are collected annually through the eAR and discussed during sanitary surveys, but they are not required for reporting. Voluntary data reporting can result in data coverage issues. Therefore, risk indicators that rely on voluntary data reporting downgrades the data availability score by one criteria level. Also, determining if a test result confirmed or refuted the complaint requires data mining of the "Notes" field, which is time consuming and may be difficult to interpret. Therefore, the Accessibility criteria was downgraded to "Poor."

Data Accuracy/Quality: Poor

Reporting to the State Water Board is dependent upon water systems themselves reporting such information. Considering the self-reported nature of the data, and that some customer complaints are not verified by subsequent laboratory testing, State Water Board staff and UCLA suggest a data accuracy/quality score of "Poor."

Step 3: Combined Evaluation: Future

Combined evaluation suggests that the State Water Board should consider Waterborne Illness: Historical customer complaints as a risk indicator in the Future.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
  - Coverage: **Poor**
  - Availability: **Poor**
  - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Waterborne Illness: Current Customer Complaints

The total number of reported customer complaints of waterborne illness per customer in the most recent reporting year confirmed by sampling. The State Water Board district staff typically collaborates with public health officers and water system on these issues due the immediate health impacts. However, there is not comprehensive dataset

available recording these efforts to-date. Therefore, the only available data is available through the eAR.

Step 1: Applicability: Good
This risk indicator was utilized in Risk Assessment 1.0 and identified as an applicable risk indicator through a stakeholder-driven process in 2019. A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- No. of Complaints Reported by Customers; eAR (annual, not required)
- No. of Complaints Investigated; eAR (annual, not required)
- No. of Complaints reported to the Division of Drinking Water or Local County Staff, eAR (annual, not required)
- Brief Description of Cause and Corrective Action taken, eAR (annual, not required)

Risk Indicator Methodology:

The total number of reported customer complaints of waterborne illness per customer in the most recent reporting year either confirmed by sampling.

The data collected through the eAR does not allow the State Water Board to:

1. Distinguish the number of complaints by customer. The data collected only illustrates the total number of complaints which may include multiple complaints by one customer.
2. The only way to determine if a test result confirmed or refuted the complaint would be to review the written "Notes" provided.

Data Coverage: **Poor**
The following analysis was completed using the average response rate between the 2017 and 2018 eAR reporting years for public water systems with 3,300 service connections or less:

- No. of Complaints Reported by Customers: **Poor**
  - 50% coverage.
- No. of Complaints Investigated: **Poor**
  - 38% coverage.
- No. of Complaints reported to the Division of Drinking Water or Local County Staff**: Poor**
  - 38% coverage.

- Brief Description of Cause and Corrective Action taken: **Poor**
  - 12% coverage**.**

Data Availability: **Poor**
All data points are collected annually through the eAR, but they are not required for reporting. Voluntary data reporting can result in data coverage issues. Therefore, risk indicators that rely on voluntary data reporting downgrades the data availability score by one criteria level. Also, determining if a test result confirmed or refuted the complaint requires data mining of the "Notes" field, which is time consuming and may be difficult to interpret. Therefore, the Accessibility criteria was downgraded to "Poor."

Data Accuracy/Quality: Poor
Reporting to the State Water Board is dependent upon water systems themselves reporting such information. Considering the self-reported nature of the data, and that many customer complaints are not verified by subsequent testing, State Water Board staff and UCLA suggest a data accuracy/quality score of "Poor."

Step 3: Combined Evaluation: Future
Combined evaluation suggests that the State Water Board should consider Waterborne Illness: Current customer complaints as a risk indicator in the Future.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
  - Coverage: **Poor**
  - Availability: **Poor**
  - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Frequency of Bacteriological Violations (Total Coliform)

Frequency of total coliform bacteriological violations that have incurred in the past three years.

Step 1: Applicability: Good
Bacteriological contaminants in drinking water can cause gastrointestinal diseases, infections, or more severe health impacts. Bacteriological testing in drinking water typically is based on two types of testing in California, the presence of total coliform or the presence of E. coli. The presence of these contaminants could also suggest that water treatment is inadequate, interrupted, or intermittent. Total coliform and E. coli were merged to represent a single metric in Risk Assessment 1.0 and identified as an applicable risk indicator through a stakeholder-driven process in 2019. However, in Risk Assessment 2.0 total coliform violations and E. coli are separated out into two separate potential risk indicators because it has been recognized that the significance of their

applicability may be different. A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- MCL violations Total Coliform Rule (TCR): SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDWW) and in SDWIS, required reporting)

Data Coverage: **Good**
- The data is required reporting, the overall coverage score is considered good.

Data Availability: Good
All water systems are required to report results of coliform monitoring[1] monthly by the 10th day of the following month. In general, the routine monitoring frequencies[2] for public water systems is proportional to the population served and/or number of service connections.

Data Accuracy/Quality: Good
The bacteriological analyses are run through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification. However, It is important to note that bacteriological data is not currently submitted to the State Water Board via a database input, as is done with chemical laboratory data, but violations are typically entered into SDWIS on a monthly basis.

Step 3: Combined Evaluation: Yes
Total Coliform metric meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
  - Coverage: **Good**
  - Availability: **Good**
  - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

E. coli Presence

Evidence of E. coli or E. coli violation in the past two years.

---

[1] Revised Total Coliform Rule: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/rtcr.html

[2] Total Coliform Rule: A Quick Reference Guide: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=3000663W.txt

Step 1: Applicability: Excellent
Bacteriological contaminants in drinking water can cause gastrointestinal diseases, infections, or more severe health impacts. Bacteriological testing in drinking water typically is based on two types of testing in California, the presence of total coliform or the presence of E. coli. E. coli is a subset of the coliform bacteria that is typically considered to be of higher concern in drinking water systems. The presence of E. coli in drinking water suggests that the supply has fecal contamination, and in turn, that other pathogens could be present. The presence of these contaminants could also suggest that water treatment is inadequate, interrupted, or intermittent.

E. coli was merged with total coliform to represent a single metric in Risk Assessment 1.0 and identified as an applicable risk indicator through a stakeholder-driven process in 2019. However, for consideration in Risk Assessment 2.0 total coliform violations and E. coli were separated out into two separate potential risk indicators because it has been recognized that their significance may be different.

A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Source:

- MCL violations Total Coliform Rule (TCR): SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDWW) and in SDWIS, required reporting)

Data Coverage: Good
The data is required reporting and the overall coverage score is considered good.

Data Availability: Good
All water systems with a surface water source are required to report monitoring results monthly, whereas water systems with ground water sources are typically required to report monthly only if they had a positive total coliform. Some water systems may have other frequencies required by their permit based on specific hazards associated with their water system.

Data Accuracy/Quality: Good
The bacteriological analyses are run through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification. However, it is important to note that bacteriological data is not currently submitted to the State Water Board via a database input, as is done with chemical laboratory data, but violations are typically entered into SDWIS on a monthly basis.

Step 3: Combined Evaluation: Yes
E.coli meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Excellent**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Treatment Technique Violations

According to U.S. EPA and State Water Board regulations, systems must carry out specified treatment when there is no reliable or feasible method to measure the concentration of a contaminant to determine if there is a public health concern. A treatment technique is an enforceable procedure or level of technological performance, which public water systems must follow to ensure control of a contaminant. The treatment technique rules also list the best available technology for meeting the standard, and the compliance technologies available and affordable for small systems. Some examples of treatment technique rules are the:

- Surface Water Treatment Rule[3] (disinfection and filtration)
- Ground Water Rule[4]
- Lead and Copper Rule (optimized corrosion control)
- Acrylamide and Epichlorohydrin Rules (purity of treatment chemicals)

This type of violation (which is distinct from more commonly-known MCL or monitoring and reporting violations) is incurred when a water system does not follow required treatment techniques to reduce the risk from contaminants, e.g. exceeding the maximum allowable flow rate of a surface water treatment plant.

Step 1: Applicability: Good
This risk indicator was utilized in Risk Assessment 1.0 and identified as an applicable risk indicator through a stakeholder-driven process in 2019. An internal survey of State Water Board District Engineers in July 2020 indicated there is a strong relationship between treatment technique violations and their ability to provide adequate and safe drinking water.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point(s) & Source(s):

---

[3] SWTR: https://www.govinfo.gov/content/pkg/FR-1998-12-16/html/98-32888.htm

[4] GWR: https://www.govinfo.gov/content/pkg/FR-2006-11-08/html/06-8763.htm

- Treatment technique violations: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDWW) and in SDWIS, required reporting)

Data Coverage: **Good**
Overall, the coverage of most treatment technique violations is "Good" in SDWIS.

Data Availability: **Good**
State Water Board staff constantly review laboratory or water system reports which indicates whether a treatment technique violation has occurred. The data is also entered and maintained by State Water Board staff frequently in SDWIS.

The overwhelming majority of State Water Board District engineer survey respondents indicated data availability was good. However, the treatment technique violations that are entered in SDWIS less often may not be as complete. Certain treatment technique violations may not be required to be entered in SDWIS.

Data Accuracy/Quality: Good
The State Water Board has guidance for district engineers on how to assign violation types as the occur. However, some state water staff may apply violations types code inconsistently across districts due to differences in interpretations and recordkeeping processes. While this is an issue we are working on, the board feels that the major of the treatment techniques violations entered in to SDIWS are accurate and complete.

Step 3: Combined Evaluation: Yes
Treatment technique violations meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
  - Coverage: **Good**
  - Availability: **Good**
  - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Lead and Copper

Exceedance of lead or copper Action Level (lead: 0.015 mg/L, copper 1.3 mg/L)

Step 1: Applicability: Good

Due to their toxic health effects at elevated levels, especially for vulnerable populations, the 1991 Lead & Copper (LCR) Rule[5] requires water systems to monitor lead and copper levels at a sample of consumers' taps. However, due to cost and technical obstacles, testing only occurs at the taps of a small fraction of the overall customer population. However, those sampling locations are designed to represent the highest risk sampling locations. The LCR rule is important because it set an "Action Level" for water systems that exceed 0.015 mg/L for lead and 1.3 mg/L for copper which remains in place today. If Action Levels for lead or copper are exceeded, installation or modifications to corrosion control treatment along with public notification.

For the purposes of Risk Assessment 1.0, a system was classified as in violation if it exceeded an Action Level between September 2018 and September 2019. A total of 49 water systems were identified as having exceeded Action Levels for lead or copper.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Source:

- Lead and Copper results in SDWIS (required reporting)
  - Monitored every 6 months; or
  - If a system has 90th percentile levels that do not exceed 0.005 mg/L for lead and 0.65 mg/L for copper for two consecutive periods, it may reduce the sampling to once every three years at the reduced number of sites; or
  - For systems that do not meet the criteria above, after two consecutive periods with no action level exceedance, the monitoring frequency may be reduced to annually at a reduced number of sites, if the system receives written approval from the State Water Board based on its review of the system's data. After sampling for three years (including the initial sampling year) with no action level exceedance, the frequency may be reduced to once every three years at the reduced number of sites, if the system receives written approval from the State Water Board.

Data Coverage: **Good**
The coverage for lead and copper exceedances relies on the Federal Water System Type classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category**: Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above**: Good**

---

[5] A proposal for a federal revision of the LCR was released in 2019, but not finalized.

Therefore, the overall score for coverage is good, excluding TNCs.

Data Availability: Good
After initial monitoring is complete, systems monitor from either six months to one year to three years depending on the concentration of the result. The systems with results approaching or exceeding the action limit will be monitored at a more frequent rate. While the data availability may vary based on the frequency of required sampling, drinking water regulations have been designed and deemed appropriate of public health through the legislative process. Therefore, the data availability is "Good."

Data Accuracy/Quality: Fair
The accuracy/quality of lead and cooper results are dependent on various factors including the selection of homes to monitor (self-selected by water systems with State Water Board review), sampling protocol (sampling proper taps at an appropriate stagnation time), homeowners correctly understanding sampling procedures, etc. All of these factors led State Water Board staff that participated in survey on July 2020 to be potentially less accurate than other types of chemical monitoring. Therefore, the data accuracy was determined to be "Fair."

Step 3: Combined Evaluation: Maybe
The Lead and Copper meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Maybe**

Number of High Potential Exposure (HPE) Contaminants

The number of contaminants with *annual average concentrations* that exceed the drinking water standard (MCL or Action Level – for lead) at least once during a system's 9-year compliance cycle.

Step 1: Applicability: Good
Number of HPE Contaminants is utilized by OEHHA in their HR2W Tool and is considered applicable. While HPE serves as a good proxy for average exposure at the tap, one DDW survey respondent noted when comparing multiple contaminants for exposure, the MCL relative to the public health goal (PHG) for each contaminant should be considered and weighted across the various contaminants.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Water Quality Monitoring database (WQM)*:* Water quality sampling data for the list of chemicals below, housed in WQIr chemical table, *(*Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting)
- MCL violations Total Coliform Rule (TCR): SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)
- Lead Sampling Analyte results: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)

Analyte Name	Analyte Number (in WQIr)
Arsenic	01002
Barium	01007
Benzene	34030
Cadmium	01027
Carbon Tetrachloride	32102
Mercury	71900
Methyl Tertiary Butyl Ether (MTBE)	46491 (A-030)
Nitrate as Nitrogen	00618
1,2,3-trichloropropane (1,2,3-TCP)	77443/7744x
Perchloroethylene PCE	34475
Perchlorate	A-031
Trichloroethylene (TCE)	39180
Toluene	34010
Xylene	81551
Dibromochloropropane (DBCP)	38761
Total trihalomethanes (TTHM)	82080
Uranium	28012

Risk Indicator Methodology:

Calculate average concentrations of contaminants from individual sources.
- Calculate time-weighted averages for each contaminant by calendar year.
- Take the mean of the yearly time-weighted averages to derive a source concentration:
  - If no test for a contaminant was reported in a given year, that year did not contribute to the multi-year average.

- o   If only a single test was reported for a contaminant in a given year, that concentration was used to represent the entire year.
- All source concentrations within a water system were averaged to calculate one concentration value for each chemical in each system:
  - o   When no treated or untreated samples are available for a specific contaminant, raw samples were used.
  - o   For systems with wholesaler water purchases, the average was adjusted based on the known or default fractions of the water that the wholesaler supplies that system.

To determine HPE for each water system, OEHHA:[6]
- Estimated the average annual concentration of delivered water for each contaminant (except for Total Coliform)
- Assessed whether the concentration was greater than the MCL (or the Action Level for lead) at least once in the time period for each contaminant.
- Counted the number of contaminants whose average annual concentration was greater than its MCL (or Action Level for lead)
- Added a count if the system exceeded the TCR MCL at least once during the study period.

To determine HPE for each water system, OEHHA:[7]
- Estimated the average annual concentration of delivered water for each contaminant (except for Total Coliform)
- Assessed whether the concentration was greater than the MCL (or the Action Level for lead) at least once in the time period for each contaminant.
- Counted the number of contaminants whose average annual concentration was greater than its MCL (or Action Level for lead)
- Added a count if the system exceeded the TCR MCL at least once during the study period.

OEHHA's reason[8] for considering whether a system had "at least one" such high exposure instead of counting the exact number of high potential exposures is to account for variation in the amount of water quality monitoring data available by year. Some

---

[6] OEHHA, *Achieving the Human Right to Water in California: An Assessment of the State's Community Water Systems*, August 2019: https://oehha.ca.gov/media/downloads/water/report/achievinghr2w08192019.pdf

OEHHA, *A Framework and Tool for Evaluating California's Progress in Achieving the Human Right to Water*, January 2019: https://oehha.ca.gov/media/downloads/water/report/hr2wframeworkpublicreviewdraft010319.pdf

[7] OEHHA, *Achieving the Human Right to Water in California: An Assessment of the State's Community Water Systems*, August 2019: https://oehha.ca.gov/media/downloads/water/report/achievinghr2w08192019.pdf

OEHHA, *A Framework and Tool for Evaluating California's Progress in Achieving the Human Right to Water*, January 2019: https://oehha.ca.gov/media/downloads/water/report/hr2wframeworkpublicreviewdraft010319.pdf

[8] From Page 15 in OEHHA's *Achieving the Human Right to Water in California: An Assessment of the State's Community Water Systems*,

systems sample more or less frequently based on their monitoring requirements but would ideally have data for at least one year during the 9-year time period. Counting "at least one" high exposure in the 9-year time period accounts for monitoring or reporting bias in which some systems may have fewer years of data (and therefore fewer high potential exposures) due to lack of reporting or monitoring, not because of their prescribed monitoring schedule.

Data Coverage: **Good**
The coverage across all contaminants is good, but TTHMs is fair, because some Districts and Local Primacy Agencies don't receive this data via WQIr. The contaminants a water system is required to sample for is dependent upon their Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good excluding TNCs.

Data Availability: Good
Most water systems have monitoring frequencies of 3 years or greater. However, waivers for some contaminants are applied upon request by the water system when monitoring data reflects water quality well below the MCL per regulatory language. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- MCL violations Total Coliform Rule (TCR) **(Good)**
- Lead Sampling Analyte results **(Fair)**
- WQIr chemical table: **Good**

The overall score is Good.

All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders. However, lead results are dependent on various factors including the selection of homes to monitor (self-selected by water systems), sampling protocol (sampling proper taps at adequate stagnation time), homeowners correctly understanding sampling procedures, etc.

Step 3: Combined Evaluation: Yes
HPE metric meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Presence of High Potential Exposure (HPE) Acute Contaminants

The total number of a water system's high potential exposure (HPE) contaminants[9] that are acute or semi-acute contaminants (nitrate, nitrite, or total nitrate and nitrite, perchlorate, and E. coli/fecal coliform), per California Public Notification Rule (California Code of Regulation § 64463.1, sub d. (a)). Acute contaminants refer to those that pose an acute health risk, (i.e., death or illness) as a result of a single short period of exposure measured in seconds, minutes, hours, or days (Health and Safety Code section 64400).

Step 1: Applicability: Good
Presence of Acute Contaminants: High Potential Exposure is utilized by OEHHA in their HR2W Tool. Additionally, a survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Water Quality Monitoring database (WQM) between 2008 and 2016*:* Water quality sampling data for the list of chemicals below housed in WQIr chemical table (Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting)
- Acute TCR MCL violations: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)

Analyte Name	Analyte Number (in WQIr)
Nitrate/Nitrite	A-029
Perchlorate	A-031

---

[9] The number of contaminants with *annual average concentrations* that exceed the drinking water standard (MCL or Action Level – for lead) at least once during a system's 9-year compliance cycle.

Risk Indicator Methodology:

To create the indicator OEHHA:[10]

- Determined whether there was a high potential exposure (HPE) for any of the aforementioned contaminants.
- For each system, OEHHA summed the total number of acute contaminants that had a high potential exposure (sum can equal 0, 1, 2 or 3). This approach does not measure an acute exposure event, but rather identifies whether the high potential exposure was for an acute contaminant.
- Only 'acute' TCR MCL violations are considered for this indicator (i.e., E. coli/fecal coliform), as opposed to all TCR MCL violations in the high potential exposure indicator.

Data Coverage: **Good**
The coverage for Presence of High Potential Exposure (HPE)Acute Contaminants, is dependent upon Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good excluding TNCs.

Data Availability: Good
Most water systems have monitoring frequencies of 3 years or greater. However, waivers for some contaminants are applied upon request by the water system when monitoring data reflects water quality well below the MCL per regulatory language. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- Acute TCR MCL violations: **Good**

---

[10] From Page 18 in OEHHA's *Achieving the Human Right to Water in California: An Assessment of the State's Community Water Systems*,

- WQIr chemical table: **Good**

All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders.

Step 3: Combined Evaluation: Yes
Presence of High Potential Exposure (HPE) Acute Contaminants: MCL Violation meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
  - Coverage: **Good**
  - Availability: **Good**
  - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Maximum Duration of High Potential Exposure (HPE)

This indicator measures the maximum duration of high potential exposure (HPE)[11] for 19 selected contaminants by summing the number of years for which each contaminant had high potential exposure during the nine-year study period (2008-2016).

Step 1: Applicability: Good
Maximum Duration of High Potential Exposure is utilized by OEHHA in their HR2W Tool. In contrast to the "Number of High Potential Exposure (HPE) Contaminants" risk indicator, which captures if a system has had any high-contaminant concentrations, this indicator focuses on the recurring nature of contamination. Accordingly, it highlights systems that show an ongoing contamination problem. Capturing this recurring exposure may be important, especially when such exposure involves contaminants whose health effects are associated with chronic exposure. A long duration of high potential exposure can also signal that a system may need additional resources or support to remedy contamination.

Internal DDW stakeholders expressed concerns that while this would be a good measure for exposure it may not be the best for determining risk level for a public water system. Additionally, it was noted in comparing multiple contaminants for exposure that the MCL relative to the public health goal (PHG) for each contaminant should be considered and weighted across the various contaminants.

---

[11] The number of contaminants with *annual average concentrations* that exceed the drinking water standard (MCL or Action Level – for lead) at least once during a system's 9-year compliance cycle.

Step 2: Data Fitness **(For public water systems with 3,300 connections or less)**

Required Risk Indicator Data Points & Sources:

- Water Quality Monitoring database (WQM) between 2008 and 2016*:* Water quality sampling data for the list of chemicals below housed in WQIr chemical table. (Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting)
- MCL violations Total Coliform Rule (TCR): SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)
- Lead Sampling Analyte results: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)

Analyte Name	Analyte Number (in WQIr)
Arsenic	01002
Barium	01007
Benzene	34030
Cadmium	01027
Carbon Tetrachloride	32102
Mercury	71900
Methyl Tertiary Butyl Ether (MTBE)	46491 (A-030)
1,2,3-trichloropropane (1,2,3-TCP)	77443/7744x
Nitrate as Nitrogen	00618
Perchloroethylene PCE	34475
Perchlorate	A-031
Trichloroethylene (TCE)	39180
Toluene	34010
Xylene	81551
Dibromochloropropane (DBCP)	38761
Total trihalomethanes (TTHM)	82080
Uranium	28012

Risk Indicator Methodology:

To create the indicator OEHHA:[12]

---

[12] From Page 21 in OEHHA's *Achieving the Human Right to Water in California: An Assessment of the State's Community Water Systems*,

- Estimated average annual concentration for each contaminant (except for TCR)
- Summed the number of years (within 9-year compliance cycle) for which any contaminant's annual average concentrations was greater than the MCL (or Action Level for lead) for each contaminant and summed the total years of TCR MCL violations.
- Select the maximum duration across the 19 contaminants.

Data Coverage: **Good**

The coverage across all contaminants is good, but TTHMs is fair, because some Districts and Local Primacy Agencies don't receive this data via WQIr. The contaminants a water system is required to sample for is dependent upon their Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category. **(Poor)**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above. **(Good)**

The overall score for coverage is good excluding TNCs.

Data Availability: Good

Most water systems have monitoring frequencies of 3 years or greater. However, waivers for some contaminants are applied upon request by the water system when monitoring data reflects water quality well below the MCL per regulatory language. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- MCL violations Total Coliform Rule (TCR) **(Good)**
- Lead Sampling Analyte results **(Fair)**
- WQIr chemical table: **Good**

The overall score is Good.

All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders. However, lead results are dependent on various factors including the selection of homes to monitor (self-selected by water systems), sampling protocol (sampling proper taps at adequate stagnation time), homeowners correctly understanding sampling procedures, etc. Also, bacteriological data is currently submitted in a non-electronic format from the

laboratories to the district offices and LPAs. However, violations are typically input monthly.

Step 3: Combined Evaluation: Yes
Maximum Duration of HPE meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Presence of Acute Contaminants: Past MCL Violation

This non-compliance indicator assesses which, if any, of the non-compliance events have involved acute contaminants, namely nitrate, nitrite, or nitrate plus nitrite, perchlorate, and E. coli/fecal coliform violations.

Acute contaminants refer to those that pose an acute health risk, (i.e., death or illness) as a result of a single short period of exposure measured in seconds, minutes, hours, or days (Health and Safety Code section 64400).

Step 1: Applicability: Good
Presence of Acute Contaminants: MCL Violation is utilized by OEHHA in their HR2W Tool. Additionally, a survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

It is worth to mention that, for systems with more than one MCL violation, this indicator does not consider whether the MCL violations occurred at the same time. Thus, this indicator assesses the extent to which an acute MCL event happened between 2008 and 2016, not the timing of multiple MCL violations.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Violation Maintenance List: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDWW) and in SDWIS, required reporting)
- MCL violations Total Coliform Rule (TCR): SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)
- WQIr chemical table: (Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting)

Analyte Name	Analyte Number (in WQIr)
Nitrate/Nitrite	A-029
Perchlorate	A-031

Risk Indicator Methodology:

- Determined whether an acute MCL violation for nitrate, perchlorate or E. coli/fecal coliform has occurred at any point during a water system's 9-year compliance cycle.
  - If a system in currently out of compliance and on the HR2W list, it will not be analyzed within the Risk Assessment.
- For each system, sum the total number of acute contaminants in violation.

Data Coverage: **Good**
The coverage for Presence of Acute Contaminants: MCL violation, is dependent upon Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good, excluding TNCs.

Data Availability: Good
Most water systems have monitoring frequencies of 3 years or greater. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- Violation Maintenance List: **Good**
- MCL violations Total Coliform Rule (TCR) **Good**
- WQIr chemical table: **Good**

All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders. However, bacteriological data is currently submitted in a non-electronic format from the laboratories to the district offices and LPAs. However, violations are typically input monthly.

Step 3: Combined Evaluation: Yes
Presence of Acute Contaminants: MCL Violation meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Non-Compliance with Primary Drinking Water Standards

This indicator evaluates the number of contaminants that have been in non-compliance with the MCL for one 9-year compliance cycle at source level for 17 contaminants* of interest, see table below.

*It's important to note that there are more 17 contaminants with MCLs.

Step 1: Applicability: Poor
Non-compliance indicator captures regulatory non-compliance with primary drinking water standards that can be associated with occasional increases in contaminant concentrations at the source or distribution level. Non-compliance with primary drinking water standards is utilized by OEHHA in their HR2W Tool.

This indicator accounts for systems with ongoing MCL violations and are currently on HR2W List. Systems currently out of compliance will not be analyzed within the Risk Assessment.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Violation Maintenance List: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)
- MCL violations Total Coliform Rule (TCR): SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)
- WQIr chemical table: Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting)

Analyte Name	Analyte Number (in WQIr)
Arsenic	01002
Barium	01007

Analyte Name	Analyte Number (in WQIr)
Benzene	34030
Cadmium	01027
Carbon Tetrachloride	32102
Mercury	71900
Methyl Tertiary Butyl Ether (MTBE)	46491 (A-030)
Nitrate as Nitrogen	00618
Perchloroethylene PCE	34475
Perchlorate	A-031
Trichloroethylene (TCE)	39180
Toluene	34010
Xylene	81551
Dibromochloropropane (DBCP)	38761
Total trihalomethanes (TTHM)	82080
Uranium	28012

Risk Indicator Methodology:

Total number of contaminants that have at least one MCL violation during the study period.

Data Coverage: **Good**
The coverage Non-Compliance with Primary Drinking Water Standards relies on monitoring and reporting violations for these 17 contaminants, in which the monitoring frequency is dependent upon their Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good, excluding TNCs.

Data Availability: Good
Most water systems have monitoring frequencies of 3 years or greater. However, as previously mentioned waivers can be applied per the regulations under some conditions. The water systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may

score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- Violation Maintenance List: **Good**
- MCL violations Total Coliform Rule (TCR) **Good**
- WQIr chemical table: **Good**

All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders. However, bacteriological data is currently submitted in a non-electronic format from the laboratories to the district offices and LPAs. However, violations are typically input monthly.

Step 3: Combined Evaluation: No
Non-Compliance with Primary Drinking Water Standards does not meet the combined criteria and should not be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Poor**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **No**

Maximum Duration of Non-Compliance

Assessment of the maximum duration of non-compliance across all contaminants (i.e., select the highest value among the total number of years with at least one MCL violation for each contaminant) approximates the amount of time a water system's customers may be exposed to un-safe drinking water.

Step 1: Applicability: Good
A survey of State Water Board engineers in July 2020 gave a good score for the applicability of this indicator. Maximum Duration of Non-Compliance is also used as a risk indicator by the OEHHA HR2W Tool.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Violation Maintenance List; SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)
    - 01- MCL, SINGLE SAMPLE
        - MCL violation based on a single sample or an organic analyte that is 10x the MCL
    - 02-MCL, NUMERIC AVERAGE OF SAMPLES TAKEN
    - MCL violation for an inorganic, organic, or radiological constituent where compliance is based on a running annual average or monitoring period average.
    - 02-MCL, LOCATIONAL RUNNING ANNUAL AVERAGE (LRAA) FOR STAGE 2 DBP RULE
    - MCL violation for exceedance of TTMH or HAA5 where compliance is based on a locational running annual average
- WQIr Table with the following contaminants (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting):

Analyte Name	Analyte Number (in WQIr)
Arsenic	01002
Barium	01007
Benzene	34030
Cadmium	01027
Carbon Tetrachloride	32102
Mercury	71900
Methyl Tertiary Butyl Ether (MTBE)	46491 (A-030)
Nitrate as Nitrogen	00618
Perchloroethylene PCE	34475
Perchlorate	A-031
Trichloroethylene (TCE)	39180
Toluene	34010
Xylene	81551
Dibromochloropropane (DBCP)	38761
Total Coliform	99906
Total trihalomethanes (TTHM)	82080
Uranium	28012

Risk Indicator Methodology:

To create the indicator OEHHA:[13]
- Determines whether a system had at least one MCL violation in a given year (excluding lead and 1,2,3-TCP).
- For each contaminant, summed the number of years with at least one MCL violation.
- Select the contaminant with the maximum duration of non-compliance across all contaminants, and record the durations as the "maximum durations of non-compliance."

Data Coverage: **Good**

The coverage of Maximum Duration of Non-compliance relies on monitoring and reporting violations for these 17 contaminants, in which the monitoring frequency is dependent upon their Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good excluding TNCs.

Data Availability: **Good**

Most water systems have monitoring frequencies of 3 years or greater. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- Violation Maintenance List: **Good**
- WQIr chemical table: **Good**
  - All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders
- Violation Start Date and end Dates: **Good**

---

[13] From Page 21 in OEHHA's *Achieving the Human Right to Water in California: An Assessment of the State's Community Water Systems*,

o   Return to compliance Enforcement action dates are assumed to be accurate.

Step 3: Combined Evaluation: Yes
Maximum Duration of Non-compliance meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Increasing Presence of Water Quality Trends Toward MCL

Increasing concentration of one or more regulated contaminants, that are detected at or greater than 80% of MCL within the past decade. Rising concentrations of a chemical contaminant indicates that heightened risk exists and that may be appropriate to initiation preventative steps to ensure that violations do not occur.

Step 1: Applicability: Good
If a water system's water quality is deteriorating over time that is cause for concern. A survey of State Water Board engineers in July 2020 indicated an applicability score of "Good."

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- WQIr chemical table: Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting).
    - OEHHA's Tool analyzes the following contaminants. The State Water Board may utilize a broader list for the Risk Assessment.

Analyte Name	Analyte Number (in WQIr)
Arsenic	01002
Barium	01007
Benzene	34030
Cadmium	01027
Carbon Tetrachloride	32102
Mercury	71900

Methyl Tertiary Butyl Ether (MTBE)	46491 (A-030)
Nitrate as Nitrogen	00618
Perchloroethylene PCE	34475
Perchlorate	A-031
Trichloroethylene (TCE)	39180
Toluene	34010
Xylene	81551
Dibromochloropropane (DBCP)	38761
Total Coliform	99906
Total trihalomethanes (TTHM)	82080
Uranium	28012

Risk Indicator Methodology:

- For each water system, determine if the contaminants in the above table have the minimum number of samples required to conduct the trend analysis over a certain time interval, to be determined.
- Identify contaminants that are at or greater than 80% of the MCL and are experiencing an upward trend towards the MCL.

Data Coverage: **Good**
This indicator relies on contaminant monitoring data. The monitoring frequency is dependent upon each system's Federal water system classification in SDWIS. The types of classifications a water system can include the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good excluding TNCs.

Data Availability: Good
Most water systems have monitoring frequencies of 3 years or greater. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders.

Step 3: Combined Evaluation: Yes
The Presence of Water Quality Trends Toward MCL meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Frequency of Water Quality Near MCL

Frequency of when regulated contaminant(s) are detected at or greater than 80% of MCL in the Water Board's SDWIS database over the past decade.

Step 1: Applicability: Fair
The purpose of this risk indicator is to count the number of water quality results at or greater than 80% of the MCL. A survey taken July 2020 revealed that the applicability of this indicator is "Fair" since sometimes it was observed that contaminants often peaked and then later diminished potentially due to natural attenuation.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- WQIr chemical table which contains analyte results: Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting).
    - OEHHA's Tool analyzes the following contaminants. The State Water Board may utilize a broader list for the Risk Assessment.

Analyte Name	Analyte Number (in WQIr)
Arsenic	01002
Barium	01007
Benzene	34030
Cadmium	01027

Analyte Name	Analyte Number (in WQIr)
Carbon Tetrachloride	32102
Mercury	71900
Methyl Tertiary Butyl Ether (MTBE)	46491 (A-030)
Nitrate as Nitrogen	00618
Perchloroethylene PCE	34475
Perchlorate	A-031
Trichloroethylene (TCE)	39180
Toluene	34010
Xylene	81551
Dibromochloropropane (DBCP)	38761
Total Coliform	99906
Total trihalomethanes (TTHM)	82080
Uranium	28012

Risk Indicator Methodology:

For each result of a specific analyte, give a count for the number results at or greater than 80% of the MCL over the past decade.

Data Coverage: **Good**
This indicator relies on contaminant monitoring data. The monitoring frequency is dependent upon each system's Federal water system classification in SDWIS. The types of classifications a water system can include the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good excluding TNCs.

Data Availability: Good
Most water systems have monitoring frequencies of 3 years or greater. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders.

Step 3: Combined Evaluation: No
Frequency of Water Quality Near MCL does not meet the combined criteria and will not be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **No**

Current Water Quality Greater than 50% for Acute Contaminants

The drinking water contains greater than 50% of MCL for any acute contaminant

Step 1: Applicability: Fair
While Current Water Quality Greater than 50% for Acute Contaminants serves as a good proxy for measuring exposure for acute contaminants, also a good a trigger for additional monitoring for certain constituents, but most respondents from the survey of State Water Board engineers in July 2020 had concerns regarding this metric's applicability due to the issues listed below:

- Applying 50% MCL on E. coli
- Nitrate levels for some water systems have stayed the same for many years at over 1/2 the MCL.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Water Quality Monitoring database (WQM)*:* Water quality sampling data for the list of chemicals below housed in WQIr chemical table. (Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting)
- Acute TCR MCL violations: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting).

Analyte Name	Analyte Number (in WQIr)
Nitrate/Nitrite	A-029
Perchlorate	A-031

Data Coverage: **Good**

The coverage for Current Water Quality Greater than 50% for Acute Contaminants cannot be calculated for E. coli. Also, it is dependent upon Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good excluding TNCs.

Data Availability: Good

Most acute contaminants have at least annual monitoring frequencies and waivers are not typically applied. The systems with results approaching or exceeding the MCL are be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- Acute TCR MCL violations: **Good**
- WQIr chemical table: **Good**

All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders. However, bacteriological data is currently submitted in a non-electronic format from the laboratories to the district offices and LPAs. However, violations are typically input monthly.

Step 3: Combined Evaluation: No

Current Water Quality Greater than 50% for Acute did not meet the combined criteria and should not be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
  - Coverage: **Good**
  - Availability: **Good**

- ○ Quality: **Good**
- STEP 3: COMBINED EVALUATION: **No**

Past Presence on the HR2W List

The Human Right to Water (HR2W) List includes systems that are in violation of a primary and/or secondary MCL and have an enforcement action. A system is removed from the HR2W list after required enforcement actions have been taken and the water system has returned to compliance. This indicator reflects past presence on the HR2W list within the last 3 years. In some cases, permanent infrastructure changes have been made to return to compliance.

Step 1: Applicability: Good
A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator. It was noted that in some cases, permanent infrastructure changes have been made to return to compliance. However, in other cases operational or interim changes may been made to return to compliance. Operational or interim changes have a higher probability of returning to violation in the future. Therefore, previous inclusion on the HR2W List indicates that system has a history of violations and has a higher risk of being in violation in the future. Future refinements of this metric in later iterations may include removing those systems with installed and properly operating permanent solutions.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Enforcement Action Data (Return to Compliance for primary and/or secondary MCL violations); SDWIS (ongoing, required).

Data Coverage: Good
Enforcement actions are issued when appropriate to water systems for primary and/or secondary MCL violations.

Data Availability: Good
Enforcement actions are entered into SDWIS on an ongoing basis.

Data Accuracy/Quality: Good
Enforcement action dates are assumed to be accurate.

Step 3: Combined Evaluation: Yes
Past Presence on the HR2W List meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
  - ○ Coverage: **Good**
  - ○ Availability: **Good**
  - ○ Quality: **Good**

- STEP 3: COMBINED EVALUATION: **Yes**

Average Duration on the HR2W List

The Human Right to Water (HR2W) List includes systems that are in violation of a primary and/or secondary MCL and have an enforcement action. A system is removed from the HR2W list after required enforcement actions have been taken and the water system has returned to compliance. This indicator reflects average duration the water system spent on the HR2W list (out of compliance) over the past 3 years. The length of time a water system is out-of-compliance reflects, at least in part, the capacity of the water system to respond to violations and therefore future risk.

Step 1: Applicability: Good
A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator. It was noted that duration may be impacted by funding cycles and construction periods in addition to the water system's ability to respond to the violation.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Enforcement Action Data; SDWIS (ongoing, required).
    - Enforcement Action Date for primary and/or secondary MCL violations
    - Return to Compliance Date for primary and/or secondary MCL violations

Data Coverage: Good
Enforcement actions are issued when appropriate to water systems for primary and/or secondary MCL violations.

Data Availability: Good
Enforcement actions are entered into SDWIS on an ongoing basis.

Data Accuracy/Quality: Good
Enforcement action dates are assumed to be accurate.

Step 3: Combined Evaluation: Yes
Average Duration on the HR2W List meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Proximity of Public Water System's Source Water to Septic System

This proposed indicator assesses the potential risk to source water quality caused by impaired water (i.e., possible nitrate/nitrite and/or microbial contamination) from a nearby septic system. The proposed indicator determines whether the required minimum distance from the public water system source water to a nearby septic system is met.

Onsite wastewater treatment systems (OWTS), commonly known as septic systems, primarily treat domestic wastewater and employ subsurface disposal. Septic systems can impact local drinking water wells or surface water bodies. The U.S. EPA and Department of Housing and Urban Development (HUD) recommend at least 50-ft separation from a drinking water well. In California, the Department of Water Resources provides appropriate guidelines on well setbacks from OWTS in their Well Construction Standards. State Water Board and Regional Water Quality Control Boards also oversee OWTS policy[14] and Local Agencies (e.g., county or city departments and independent districts) can implement addition OWTS policies if they have Local Agency Management Plans approved by the applicable Regional Water Quality Control Board (Regional Board). Every new or replacement septic system requires a permit, either through local jurisdiction or from the Regional Boards. Some counties have their own separation distance requirements (setbacks) from septic system to public well, private well and surface water intake.

Step 1: Applicability: Good
A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator. It was noted that the severity of risk posed by nearby septic systems may also depend on the source depth and construction features (if the source is a well).

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Separation distance from septic system to public water system source water derived from septic system locational data (latitude and longitude); Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required); and/or
- Regional Board or County OWTS Installation and Use permit record compared to well log location.

Data Coverage: Fair
The Sanitary Survey conducted by State Water Board DDW staff is a possible data source for the Separation Distance from septic system (e.g., manually determined through an on-site interview, review of maps, etc.). Coverage of this data across public

---

[14] California State Onsite wastewater treatment systems (OWTS) policy;
https://www.waterboards.ca.gov/water_issues/programs/owts/docs/owts_policy.pdf

water systems with 3,300 service connections or less can vary because (1) Sanitary Surveys may not include the same survey questions for all water systems or water systems types state-wide and (2) locations of septic systems may not be known by the water system.

Another potential data source is OWTS installation and use permit application record through either Local Agencies, such as County or City Environmental Health Department, or the Regional Boards. Unfortunately, this data is not universally available for all septic systems state-wide because historically Counties began collecting this data at different times (when they began implementing their permit programs), which can lead to data coverage gaps for septic systems installed before these permit programs were in place.

Data Availability: Poor
The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Although locational data for a septic system (latitude and longitude) is required to be submitted as part of a septic system permit application, similar to Sanitary Survey data, Regional Board and County's permit records are not state-wide machine-readable or readily extractable.

Data Accuracy/Quality: Poor
A survey of State Water Board District Engineers in July 2020 indicated that the quality/accuracy of this data might not be reliable since it is often determined by staff through the interpretation of multiple hand-drawn maps of varying levels of quality.

Step 3: Combined Evaluation: Future
Proximity of Public Water System's Source Water to Septic System does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and accuracy/quality can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Fair**
    - Availability: **Poor**
    - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Proximity of Untreated Public Water System's Source to Nearby Surface Water

The distance to a nearby surface water may affect bacteriological quality of the public water system's drinking water source during certain periods or events. Groundwater under the direct influence of surface water (GWUDI) means the groundwater source that is located close enough to nearby surface water, such as a river, stream, or lake, to receive direct surface water recharge. Since a portion of the groundwater source's recharge is from surface water, the groundwater source is considered at risk of contamination from pathogens such as *Giardia lamblia, Cryptosporidium,* and viruses, which are not normally found in true groundwaters. This proposed indicator determines the distance from the nearby surface water to the public water system's drinking water source to determine if groundwater source is susceptible to direct influence of surface water.

Step 1: Applicability: Fair
A survey of State Water Board District Engineers in July 2020 identified an applicability score of "Fair" for this indicator. It was noted that improper geological condition, source depth, and source construction feature (if the source is a well) represent more criticality on source water quality rather than proximity of an untreated source to surface water (e.g., a well is near a creek with no confining layer would have a higher risk than a well near a creek that has a confining layer). It was also noted that determination of groundwater under direct influence of surface water (GWUDI) is often subject to professional judgement and may not consistently correlated with the proximity of the source water to nearby surface water.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Distance from the nearby surface water; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Fair
The Sanitary Survey conducted by State Water Board DDW staff is a possible data source for Distance from the nearby surface water. Coverage of this data across public water systems with 3,300 service connections or less can vary because (1) Sanitary Surveys may not include the same survey questions for all water systems or water systems types state-wide and (2) Survey questions may not be consistently asked to each system from one Sanitary Survey to the next, thus coverage for individual data points for one system over time can vary.

Data Availability: Poor
The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water

systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair
A survey of State Water Board District Engineers in July 2020 indicated that data quality/accuracy associated with the proposed data point is "Fair." Access to reliable data may make this difficult for staff to assess while conducting a Sanitary Survey.

Step 3: Combined Evaluation: No
Proximity of Untreated Public Water System's Source to Nearby Surface Water does not meet the combined criteria and should not be considered for inclusion in Risk assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
    - Coverage: **Fair**
    - Availability: **Poor**
    - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **No**

Compliance with Well Construction Standards

Each new public water supply well is required to comply with the well construction standards as provided in California Waterworks standards (California Code of Regulations [CCR] §64560(c)). These standards include, as a minimum, requirements in California Department of Water Resources (DWR) Bulletins 74-81/74-90 and American Water Works Association (AWWA) Standard A100-06 (Water Wells). This proposed indicator assesses the potential risk to source water quality caused by improperly constructed source water well by evaluating compliance with California Waterworks well construction standards.

Step 1: Applicability: Good
A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator with the recognition that there may be alterative mitigation measures in place to account for construction deficiencies.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Compliance status with the well construction requirements specified in California Waterworks standards; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required).

Data Coverage: Poor

The Sanitary Survey conducted by State Water Board DDW staff is a possible data source for compliance status with the new well construction standards. Coverage of this data across public water systems with 3,300 service connections or less can vary because not all wells have the necessary well construction logs. Additionally, waterworks standards and well standards in general have changed over time. Thus, the historical compliance data cannot be consistently reviewed and recorded across all public water systems with 3,300 service connections or less depending on the time of the well's construction.

Data Availability: Poor

The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair

A survey of State Water Board engineers in July 2020 indicated that data quality/accuracy associated with the proposed data point is "Fair" due to the locational inaccuracies that may exist because older data do not have GPS coordinates and instead are based on historic addresses or maps not drawn to scale.

Step 3: Combined Evaluation: Future

Compliance with Well Construction Standards does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and accuracy/quality can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
  - Coverage: **Poor**
  - Availability: **Poor**
  - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Emerging Contaminants

Presence of emerging contaminants with an established public health goal.

Step 1: Applicability: Fair
Every five years the U.S. EPA is required to issue a new list of up to 30 unregulated contaminants and decides which public water system must monitor for it. The purpose of this is to determine what the occurrence of the contaminant is in order to inform decisions about future regulations.

While these lists can help to determine occurrence of a specific unregulated contaminants, additional health information may be needed to determine if a contaminant poses a significant health risk. Since the science for these contaminants may not be completed and thus may not end up being a regulated contaminant, DDW staff felt this was only a "Fair" risk indicator.

Step 2: Data Fitness **(For public water systems with 3,300 connections or less)**

Required Risk Indicator Data Points & Source:

Analyte Results for the following list of contaminants in the WQIr:

- Hexavalent Chromium (monitored monthly to quarterly; required reporting for select systems)
- 1,4-dioxane ((monitored monthly to quarterly; required reporting for select systems)
- PFOA/PFOS (monitored monthly to quarterly; required reporting for select systems)
- Microplastics (monitored monthly to quarterly; required reporting for select systems)
- NDMA (monitored monthly to quarterly; required reporting for select systems)

Data Coverage: **Good**
Typically, a subset of water systems is required to monitor for certain emerging contaminants and therefore the coverage may be limited for systems under 3,300 service connections statewide. Additionally, the area of interest that the contaminant falls within may also limit the number water systems required to monitor.

Data Availability: **Good**
When the U.S. EPA issues compliance orders to water systems to monitor for contaminants on their list, the typical monitoring frequency ranges from monthly to quarterly. Additionally, monitoring of emerging contaminants can be required through permits and may increase or decrease the typical monitoring frequency. Furthermore, the State Water Board may have limited authority to continue monitoring for these emerging contaminants which can further limit data when the compliance order ends.

Data Accuracy/Quality: Fair
Since emerging contaminants are relatively new, the detection limit of the test may be relatively high. This high detection limit could result in a false negative. However, detection limits often improve as testing methods evolve over time. The water quality monitoring data received from the water systems must be certified by the Environmental

Laboratory Accreditation Program (ELAP). The data is then stored in WQIr and maintained by DDW Staff.

Step 3: Combined Evaluation: No
Emerging Contaminants does not meet the combined criteria and will not be considered for future risk assessments.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
    - Coverage: **Good**
    - Availability: **Good**
    - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **No**

Potential Contamination Hazards

This indicator assesses if there are nearby sources of potential contamination or active releases that can be potential threats to drinking water sources.

Step 1: Applicability: Fair
A survey of State Water Board engineers in July 2020 indicated an applicability score of "Fair." Respondents noted that, historically, identifying nearby potential contamination hazards is not as critical as determining contamination of actual drinking water sources (ground water and surface water). This indicator may be more useful for siting new wells rather than determining risk for existing wells (if the source is a well). Respondents also noted that the applicability of this indicator may vary based on the hazard remediation status, treatment presently implemented, direction (i.e., upstream, or downstream), and type of the potential contamination source.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Possible Contaminating Activities (PCAs) Inventory (risk ranking and proximity); DWSAP Program[15] (since 1997 completed, required in response to federal SDWA (1996))
- Water System Boundaries; SABL (updated as needed, not required).
- Environmental and Compliance data for the waste discharges to land, or unauthorized releases of hazardous substances from underground storage tanks; GeoTracker (determination of exact reporting frequency and whether

---

[15] Drinking Water Source Assessment and Protection (DWSAP) Program:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/DWSAP.html

required reporting on whole was not available because GeoTracker consists of a variety of datasets retrieved from multiple State Water Board programs and other agencies, majority datasets are not required).

Risk Indicator Methodology:

SABL - Water system boundaries are overlaid with the contamination site data.

Data Coverage: Good
- PCAs Inventory: **Good**
  - 94% of public water systems statewide completed their source assessment as of September 30, 2003.
- Water System Boundaries – SABL: **Good**
  - There is no required reporting of water system service areas, however; current data coverage is 96.78%.
- Environmental and Compliance data for the waste discharges to land, or unauthorized releases of hazardous substances from underground storage tanks – GeoTracker: **Fair**
  - Coverage analysis was not possible because GeoTracker consists of a variety of datasets retrieved from multiple State Water Board programs and other agencies.

Data Availability: Fair
- PCAs Inventory: **Poor**
  - This dataset was developed under the DWSAP program created in response to federal SDWA (1996). Staring in 1997, DWSAP had completed source assessments for nearly all the public drinking water sources across the state, however, this dataset has not been updated in many years.
- Water System Boundaries – SABL: **Good**
  - The State Water Board updates water service area boundaries on an ongoing basis.
- Environmental and Compliance data for the waste discharges to land, or unauthorized releases of hazardous substances from underground storage tanks – GeoTracker: **Fair**
  - Determination of exact reporting frequency at an individual dataset level is not available because GeoTracker consists of a variety of datasets retrieved from multiple State Water Board programs and other agencies. There also are some one-off studies.

Data Accuracy/Quality: Fair
- PCAs Inventory: **Fair**
  - A survey of State Water Board engineers in July 2020 indicated an accuracy/quality score of "Fair" with a respondent's note recognizing that the PCA check list is fairly accurate.
- Water System Boundaries – SABL: **Fair**

- o Water system boundaries in SABL often do not reflect the water system's "water service area," instead it sometimes reflects the water system's jurisdictional area. The State Water Board is working with water systems to verify their water system boundaries and is building a new tool to allow water systems to edit their boundaries in real time.
- Environmental and Compliance data for the waste discharges to land, or unauthorized releases of hazardous substances from underground storage tanks – GeoTracker: **Fair** (for public water systems, Good for domestic wells)
  - o The datasets as in the Electronic Deliverable Format (EDF), which currently exist in GeoTracker Portal,[16] are only required reporting and meet regulatory requirements within entire data hosted on Geotracker GAMA/GAMA GIS. Considering nature of data reported directly from laboratories, the data in GeoTracker Portal may tend to be accurate, however, the data are generally from very shallow wells clustered around sites with known water quality issues, which may not represent drinking water sources except for the data from irrigated lands regulatory program.

Step 3: Combined Evaluation: No
Potential Contamination Hazards does not meet the combined criteria and should not be considered for inclusion in Risk assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
  - o Coverage: **Good**
  - o Availability: **Fair**
  - o Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **No**

Source Water Protection Zones

To receive a new or amended domestic water supply permit for a proposed well, California Waterworks standards require the water system to provide the documentation demonstrating that a well site control zone with a 50-foot radius around the site can be established for protecting the source from vandalism, tampering, or other threats at the site (CCR §64560(a)(2)). This proposed indicator determines if the source water well meets the documentation requirement for demonstrating 50-foot radius protection zone in the technical report as part of the water supply permit application and compliance status with that requirement.

---

[16] GeoTracker Portal: https://geotracker.waterboards.ca.gov/

Step 1: Applicability: Fair

A survey of State Water Board District Engineers in July 2020 indicated an applicability score of "Fair" for this indicator. It was noted that maintaining 50-foot radius around the well site is often challenging for the public water system due to local zoning, property ownership issues, etc. Furthermore, it appeared that maintaining 50-foot radius around the well site is beneficial, other factors such as local hazards and well construction are interconnected. It was noted that the potential adverse effects from non-compliance with this standard can be mitigated by alternative source construction and other DDW-approved alternatives, which result in the equivalent level of public health protection (e.g., improved security, existing treatment, etc.).

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Documentation in the domestic water supply permit demonstrating 50-foot radius protection zone around the well site and compliance status with this requirement; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Poor

The Sanitary Survey conducted by State Water Board DDW staff is a possible data source to confirm the compliance status of the water system with the 50-foot radius well protection zone requirement. However, demonstration of the 50-foot radius control zone is a newly added requirement to the Waterworks standards 2008 revision and thus the old wells constructed prior to 2008 were not regulated by the same the standards as current, leading to the significant coverage gap for compliance status data with this requirement.

Data Availability: Poor

The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair

A survey of State Water Board District Engineers in July 2020 indicated an accuracy/quality score of "Fair". It may be difficult to determine compliance during a sanitary survey.

Step 3: Combined Evaluation: No

Source Water Protection Zones does not meet the combined criteria and should not be considered for inclusion in Risk assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
  - Coverage: **Poor**
  - Availability: **Poor**
  - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **No**

Level 2 Assessment under rTCR

DDW performs a Level 2 Assessment when a water exceeds a Level 2 coliform treatment technique trigger in the rTCR. This assessment requires water systems to correct possible causes identified by DDW for an E. Coli MCL violation or repeated Level 1 coliform treatment techniques triggers in a 12-month period. The Level 2 assessment must be completed within 30 days of exceeding the trigger.

Step 1: Applicability: Good
The improvement of the Total Coliform Rule in 1989 to the Revised Total Coliform Rule in 2013 requires a Level 1 or Level 2 Assessment after a specific coliform treatment technique trigger is exceeded. Specifically, a Level 2 Assessment is triggered after the presence of E coli is detected in a water system's drinking water, the water system does not monitor for the required samples of E. coli, or the water system has two Level 1 trigger exceedances in a 12-month period and the cause of the first exceedance has not been corrected. Presence of E. coli is a serious health concern and may suggest that water treatment is inadequate, interrupted, or intermittent.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Level 2 Assessment Spreadsheet (Updated Quarterly and required reporting)
  - Level 2 Assessments are currently being tracked and managed by the DDW's Program Liaison Unit manually outside of SDIWS.

Data Coverage: Fair
The coverage is assumed to be "Fair." Not all Districts and LPAs are providing Level 1 and Level 2 activity information through the Form submitted to Headquarters in a timely manner or when required.

Data Availability: Good
Level 2 Assessments are tracked manually and reported quarterly to U.S. EPA. The data is available in a machine-readable format (i.e. csv file format).

Data Accuracy/Quality: Good

When Level 2 Assessments are submitted to State Water Board Headquarters, they are assumed to be complete and accurate.

Step 3: Combined Evaluation: Yes
The Level 2 Assessment Under rTCR meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Fair**
    - Availability: **Good**
    - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Maybe**

Percentage of Sources Exceeding an MCL

Percent of the number of sources that exceed any MCL. The number includes water systems sources with an exceedance of any primary chemical contaminant within the past 3 years.

Step 1: Applicability: Good
Water system's with impaired water sources make it more difficult to provide safe, drinking water, particularly in the event of a drought. This problem is compounded when a water system has multiple impaired water sources.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Water source facility type: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting).
    - CC - Consecutive Connection[1]
    - IG - Infiltration Gallery
    - IN – Intake
    - NN - Non-Piped, Non-Purchased
    - NP - Non-Piped, Purchased
    - RS – Reservoir
    - RC - Roof Catchment
    - SP – Spring
    - WL – Well
- WQIr chemical table: Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting).

Analyte Name	Analyte Number (in WQIr)
Arsenic	01002
Barium	01007
Benzene	34030
Cadmium	01027
Carbon Tetrachloride	32102
Mercury	71900
Methyl Tertiary Butyl Ether (MTBE)	46491 (A-030)
Nitrate as Nitrogen	00618
Perchloroethylene PCE	34475
Perchlorate	A-031
Trichloroethylene (TCE)	39180
Toluene	34010
Xylene	81551
Dibromochloropropane (DBCP)	38761
Total Coliform	99906
Total trihalomethanes (TTHM)	82080
Uranium	28012

Risk Indicator Methodology:

- Determine the number of total sources.
- Determine the number of total sources with chemical exceedances.
- Calculate the percentage of impaired sources by dividing the total number of sources with exceedances by the total number of sources and then multiplying that number by 100.

Data Coverage: **Good**
- SDWIS: **Good**
    - Water source facility type is considered a physical infrastructure / inventory that is housed and queried in SDWIS database and reviewed frequency by State Water Board staff through SDWIS and mDWW. The data is required reporting and the overall coverage score is considered good.
    - Several DDW staff indicated that active interties or consecutive connections (as it is known in SDWIS) that run all year round would be captured in SDWIS because they are permitted and counted as a source for the system. However, interties that are considered emergency or seasonal may not be entered in SDWIS. Additionally, other DDW staff indicated that historic instructions may not have been clear on policies to

enter interties in SDWIS and this may have impacted the total number of interties currently entered into SDIWS.
- WQIr: **Good**
    - o The coverage for specific water quality analyte results for a water system is dependent upon the Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).
        - ▪ TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
        - ▪ TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good excluding TNCs.

Data Availability: Good
- SDWIS: **Good**
    - o Water source facility type is maintained and updated frequently by State Water Board staff through mDWW and SDWIS.
- WQIr: **Good**
    - o Most water systems have monitoring frequencies of 3 years or greater. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- SDWIS:
    - o Water source facility type is submitted by water systems and reviewed and maintained frequently by DDW staff. The vast majority of "water source facility type" inventory is accurate.
- WQIr: **Good**
    - o All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders.

Step 3: Combined Evaluation: Yes
Percentage of Sources Exceeding an MCL meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - o Coverage: **Good**

- o Availability: **Good**
- o Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Percentage of Total Capacity Exceeding or Approaching MCL

Percentage of total well supply capacity that exceeds or approaches an MCL.

Step 1: Applicability: Good
This indicator was proposed through DDW internal advisory workgroup; potentially in lieu of the Percentage of Sources Exceeding an MCL. The internal advisory group noted that the number of water sources does not necessarily reflect the importance of each source relative to the capacity.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- WQIr: Water quality sampling (Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting).
- Source Capacity; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required).

Risk Indicator Methodology:

- Sum up total source capacity for the water system.
- Extract analyte results for the sources that is exceeding or approaching a contaminants MCL.
- Divide the capacity for the source exceeding or approaching MCL by the total capacity for the water system.
- Determine the percentage of the contaminated well source as a part of total capacity.

Data Coverage: Fair
- Source Capacity: **Fair**
  - o Source capacity is typically discussed in a Sanitary Survey. However, coverage of this data may vary because the pump capacity may not reflect the actual well capacity.
- WQIr Chemical Table: **Good**
  - o The contaminants a water system is required to sample for is dependent upon their Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**
- TNTCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is Fair.

Data Availability: Fair
- Source Capacity: **Poor**
  - The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.
- WQIr Chemical Table: **Good**
  - Most water systems have monitoring frequencies of 3 years or greater. However, waivers for some contaminants are applied upon request by the water system when monitoring data reflects water quality well below the MCL per regulatory language. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant's monitoring data may score "Fair" in availability given the monitoring frequency, a "Good" criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good
- Source Capacity: **Good**
  - Source capacity can be confirmed during a Sanitary Survey by reviewing the engineering report that was submitted as a requirement of public water system's domestic water supply permit. However, older well sources may have lost capacity over time and/or only maximum pump capacity data may only be available.
- WQIr chemical table: **Good**
  - All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders.

Step 3: Combined Evaluation: Future
Percentage of Total Capacity Exceeding or Approaching MCL does not meet the combined criteria, but it is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage and availability can be improved.

- STEP 1 APPLICABILITY: **Good**

- STEP 2: DATA FITNESS
  - Coverage: **Fair**
  - Availability: **Fair**
  - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Future**

Proximity to a Contaminated Well

This indicator determines the distance of the public water system's drinking water source to a nearby contaminated well. Pollution from agricultural, industrial, and routine human activity can penetrate into groundwater and contaminate wells. These contaminated wells may potentially impact nearby public water systems using the same aquifer as their drinking water source.

Step 1: Applicability: Fair
An applicability score of "Fair" was assigned for this proposed indicator, considering the applicability may vary based on the remediation status of contamination or measures implemented to mitigate potential impacts from the contaminated well. It also may be difficult to prove or quantify the direct impact from the contaminated well on the water quality of the drinking water source.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Distance from the nearby contaminated wells; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Fair
The Sanitary Survey conducted by State Water Board DDW staff is a possible data source for Distance from the nearby contaminated wells. Coverage of this data across public water systems with 3,300 service connections or less can vary because (1) Sanitary Surveys may not include the same survey questions for all water systems or water systems types state-wide and (2) Survey questions may not be consistently asked to each system from one Sanitary Survey to the next, thus coverage for individual data points for one system over time can vary.

Data Availability: Poor
The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the

fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Poor
This information can perhaps be accessed through reviewing water system's technical report regarding source assessment during the Sanitary Survey, otherwise it would be determined through any risk map (if available) of nearby contaminated well(s), which would likely be very challenging to obtain accurate information.

Step 3: Combined Evaluation
Proximity to a Contaminated Well does not meet the combined criteria and should not be considered for inclusion in Risk assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
    - Coverage: **Fair**
    - Availability: **Poor**
    - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **No**

Age of Well Sources

This proposed indicator determines whether the age of source water wells exceed the typical useful life of 35 years.

Step 1: Applicability: Good
Life expectancy of a well sources is an important factor when determining reliability and risk. As wells age, they become more susceptible to failure, increasing the water quality or water quantity risk. A DDW internal workgroup confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Age of wells; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required).

Data Coverage: Fair
The age of well sources is typically discussed in a Sanitary Survey while evaluating a water system's source water. However, coverage of this data across public water systems with 3,300 service connections or less can vary because data availability of well age data may not be consistent across all systems and counties, as well log requirements have changed over time.

Data Availability: Poor

The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair

Age of well sources may be difficult for DDW staff to confirm during a Sanitary Surveys, particularly if well logs are not available. Staff may need to rely on other sources/information such as engineering reports and/or other technical reports to confirm the accuracy of this information.

Step 3: Combined Evaluation

Age of Well Sources does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and accuracy/quality can be improved.

- STEP 1: APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
    - Coverage: **Fair**
    - Availability: **Poor**
    - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**