WisCALM 2022 – Chloride Assessment Parameter Documentation

EGAD # 3200-2020-29

A product of the State of Wisconsin Clean Water Act Water Quality Report to Congress

Red Cedar River, Wisconsin DNR

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Contents

Parameter Names and Numbers

10 Year Chloride Chronic Assessment Value	80418
10 Year Chloride Acute Assessment Value	80419

Description

The chloride standards are set to protect aquatic life from chronic (long-term) and acute (short-term) toxicity. The criterion for chronic toxicity is 395 mg/L and for acute toxicity it is 757 mg/L. These criteria also apply to FAL use of streams, rivers, lakes, reservoirs, and impoundments. Chloride levels may be assessed at any time during the year because the aquatic community may be detrimentally impacted regardless of season; however, levels tend to be highest after snow melts. A waterbody is considered impaired for chronic toxicity if a 4-day average of the daily maximum values taken from 4 consecutive days exceeds the chronic criterion more than once in a three-year period[1]. For acute toxicity, a waterbody is considered impaired if the daily maximum exceeds the acute criterion more than once in a three-year period (Table 15). These criteria also apply to FAL use of lakes, reservoirs, and impoundments. Chlorides have been assessed on a systematic statewide basis since the 2014 assessment cycle.

Data Sources & Storage

This parameter is collected by DNR staff, volunteers, and by members of other organizations. These data are collected in the field as per the protocols listed below and then analyzed at certified laboratories, typically the State Lab of Hygiene (SLOH). The results are then loaded from the labs into the SWIMS database.

Methods and procedures to document and store

- Long Term Trend Rivers Sampling Protocol; typically collected along with other parameters in 1 L bottles
- Lake Sampling Procedures – LTT Water Quality; typically collected along with other parameters in 1 L bottles

[1] A water can still be assessed for chronic toxicity if only a single value is available.

Data Entry

Chloride data analyzed by the SLOH are sent to SWIMS via the Lab Data Entry System. If connections are established with other laboratories, data can be sent to SWIMS via those connections. A spreadsheet batch upload process may be utilized to enter chloride data to SWIMS.

Presentation of Results

Presentation of Results in WATERS online report and Water Condition Viewer

How do the new parameters fit into the existing multi-part assessment categorization process?

- The parameters may be assessed independently from other parameters and may affect the waterbody assessment categorization for the FAL use use assessments.

View of WATERS online report for chlorides

Waterbody Chloride Assessment Report (WisCALM) **Includes data from 2007 to 2016** **Date Report Ran: 10/26/2017**

WBIC: 15000 **Official Name:** Milwaukee River **Segment #:** 1
AU #: 426339 **Local Name:** Milwaukee River **Mile:** 0 to 2.9
County: Milwaukee **Watershed:** Menomonee River,Milwaukee River South

Station ID	Name	Earliest	Latest Date	Min. Data Req. Met	# Samples Exceed Chronic	# Samples Exceed Acute	Impairment Flag Chronic	Impairment Flag Acute
413003	Milwaukee River - Near Mouth	02/14/2011	10/07/2011	Y	0	0	N	N

WBIC: 15000 **Official Name:** Milwaukee River **Segment #:** 2
AU #: 426381 **Local Name:** Milwaukee River **Mile:** 2.9 to 19.35
County: Ozaukee,Milwaukee **Watershed:** Milwaukee River South

Station ID	Name	Earliest	Latest Date	Min. Data Req. Met	# Samples Exceed Chronic	# Samples Exceed Acute	Impairment Flag Chronic	Impairment Flag Acute
413640	Milwaukee River at Estabrook Park At Milwaukee WI	02/28/2007	07/25/2016	Y	0	0	N	N
10012616	Milwaukee River - South Of Estabrook Park Dam	02/13/2011	10/19/2012	Y	0	0	N	N

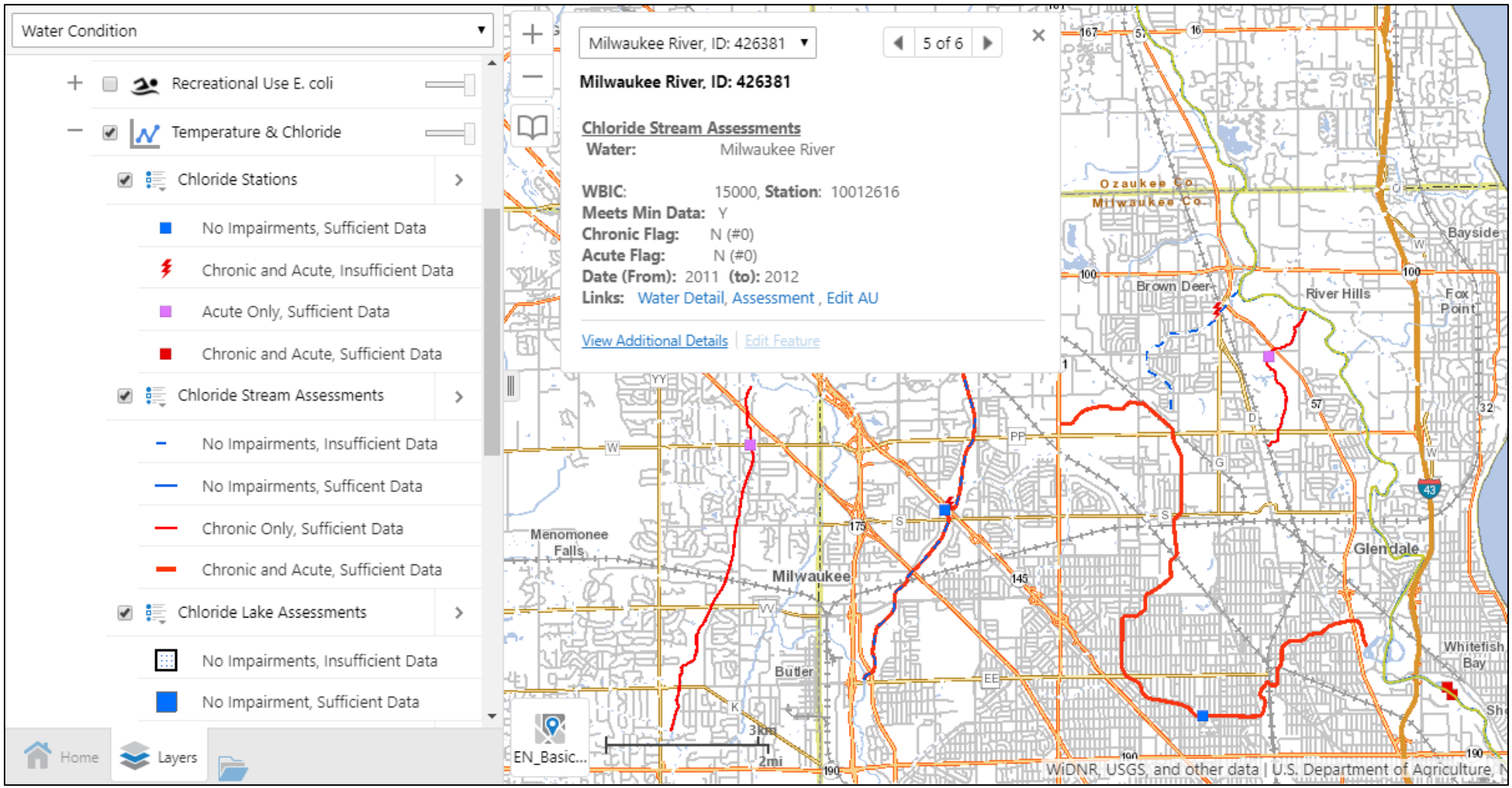
WBIC: 14500 **Official Name:** Oak Creek **Segment #:** -9
AU #: 9969 **Local Name:** Oak Creek **Mile:** 0 to 13.32
County: Milwaukee **Watershed:** Oak Creek

Station ID	Name	Earliest	Latest Date	Min. Data Req. Met	# Samples Exceed Chronic	# Samples Exceed Acute	Impairment Flag Chronic	Impairment Flag Acute
413672	Oak Creek at Oak Creek Parkway 3m(Bi)	09/24/2008	09/24/2008	N	0	0	N	N
413913	Oak Creek US of 15th Ave N of Beech St	02/12/2011	02/19/2016	Y	17	8	Y	Y

WBIC: 2900 **Official Name:** Root River **Segment #:** 2
AU #: 425682 **Local Name:** Root River **Mile:** 25.8 to 43.69
County: Waukesha,Milwaukee **Watershed:** Root River

Station ID	Name	Earliest	Latest Date	Min. Data Req. Met	# Samples Exceed Chronic	# Samples Exceed Acute	Impairment Flag Chronic	Impairment Flag Acute
413716	Root River at W Grange Avenue (HWY HH)	02/13/2011	01/29/2015	Y	8	7	Y	Y
413717	Root River at W Ryan Road (HWY 100)	02/13/2011	02/13/2011	N	1	0	N	N
10031473	Root River at Layton Ave. at Greenfield WI	02/13/2011	05/31/2012	Y	6	5	Y	Y

View of Water Condition Viewer report for chlorides



Assessment Package Logic

Chloride Assessment Tool Steps (Version 1)

Based on 2018 WisCALM assessment method for the assessment of chloride data

Prepared by: Ashley Beranek
August 18, 2016

Assessment Tool Steps

1. Select representative stations and sample results:
    a. Query database for stations that are STATION_TYPE = LAKE; RESERVOIR; RIVERINE IMPOUNDMENT; RIVER, STREAM. Should include any variation on these station types such as river boat landing or lake deepest spot. Should NOT include any facility, Great Lake, other, land, storm sewer, well, wetland, or canal stations.
    b. Select Chloride dataset using the DNR Parameter code 940 for the past 10 years (2018 cycle = 2007 – 2016).

2. Edit datasets that include replicates and blanks.
    a. Remove replicates and blanks.
        i. Multiple **samples collected from the same station on the same date** should be considered "replicate" samples. Replicate samples are collected for the purpose of measuring the amount of sampling error or sample variability, and **all but one replicate should be removed** from datasets to be assessed using this assessment tool. Select the replicate sample with the highest value.
        ii. Samples that are identified as "**blanks**," which are collected for the purpose of quality assurance, **should be removed** from the datasets to be assessed using this assessment tool.

3. Comparison to criteria
    a. To meet minimum data requirement a station needs to have at least two chloride values within a 3-year period. No station should be excluded because of not meeting minimum data requirements but should instead have a flag (Y/N) (Appendix 1).
    b. Compare against Chronic Criteria. Count the number of values exceeding the chronic criteria. To determine impairment for chronic criteria:
        i. If all values are less than or equal to the chronic criterion (≤395 mg/L), then the station is meeting chronic criterion. (Impaired = **N**)
        ii. If two or more values exceed the criteria (>395) but are not within a three year window then the station is meeting chronic criterion. The number of samples exceeding should be starred if this is the case (Appendix 1). (Impaired = **N**)
        iii. If two or more values exceed the criteria (>395) within a three year time period then the station is not meeting chronic criterion. (Impaired = **Y**)
    c. Compare against Acute Criteria. Count the number of values exceeding the acute criteria. To determine impairment for acute criteria:
        i. If all values are less than or equal to the acute criterion (≤757 mg/L), then the station is meeting acute criterion. (Impaired = **N**)

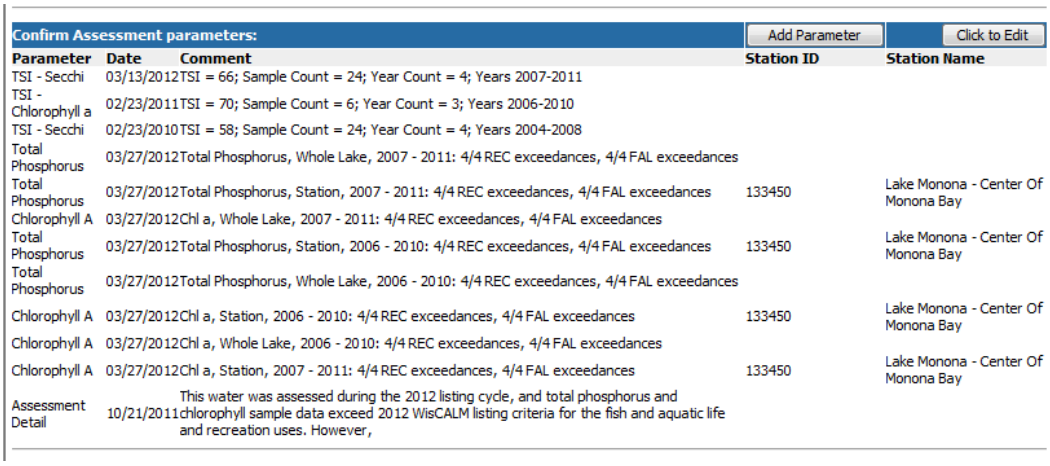
ii. If two or more values exceed the criteria (>757) but are not within a three year window then the station is meeting acute criterion. The number of samples exceeding should be starred if this is the case (Appendix 1). (Impaired = **N**)

iii. If two or more values exceed the criteria (>757) within a three year time period then the station is not meeting chronic criterion. (Impaired = **Y**)

4. Summary of assessment results by station.
   a. A summary of all assessed monitoring stations should be generated.

5. Documentation of results in WATERS database in Assessment Parameters area
   a. Append results of chloride assessment tool to the WATERS Assessment Parameter area as shown below:

Parameter	Date	Comment	Station ID	Station Name
Chloride	Date results were calculated	# Samples exceeding Chronic Criteria: 3; Impaired for Chronic =Y; # Samples exceeding Acute Criteria = 2*; Impaired for Acute = N	123456	Abby Road River



Confirm Assessment parameters: | Add Parameter | Click to Edit

Parameter	Date	Comment	Station ID	Station Name
TSI - Secchi	03/13/2012	TSI = 66; Sample Count = 24; Year Count = 4; Years 2007-2011		
TSI - Chlorophyll a	02/23/2011	TSI = 70; Sample Count = 6; Year Count = 3; Years 2006-2010		
TSI - Secchi	02/23/2010	TSI = 58; Sample Count = 24; Year Count = 4; Years 2004-2008		
Total Phosphorus	03/27/2012	Total Phosphorus, Whole Lake, 2007 - 2011: 4/4 REC exceedances, 4/4 FAL exceedances		
Total Phosphorus	03/27/2012	Total Phosphorus, Station, 2007 - 2011: 4/4 REC exceedances, 4/4 FAL exceedances	133450	Lake Monona - Center Of Monona Bay
Chlorophyll A	03/27/2012	Chl a, Whole Lake, 2007 - 2011: 4/4 REC exceedances, 4/4 FAL exceedances		
Total Phosphorus	03/27/2012	Total Phosphorus, Station, 2006 - 2010: 4/4 REC exceedances, 4/4 FAL exceedances	133450	Lake Monona - Center Of Monona Bay
Total Phosphorus	03/27/2012	Total Phosphorus, Whole Lake, 2006 - 2010: 4/4 REC exceedances, 4/4 FAL exceedances		
Chlorophyll A	03/27/2012	Chl a, Station, 2006 - 2010: 4/4 REC exceedances, 4/4 FAL exceedances	133450	Lake Monona - Center Of Monona Bay
Chlorophyll A	03/27/2012	Chl a, Whole Lake, 2006 - 2010: 4/4 REC exceedances, 4/4 FAL exceedances		
Chlorophyll A	03/27/2012	Chl a, Station, 2007 - 2011: 4/4 REC exceedances, 4/4 FAL exceedances	133450	Lake Monona - Center Of Monona Bay
Assessment Detail	10/21/2011	This water was assessed during the 2012 listing cycle, and total phosphorus and chlorophyll sample data exceed 2012 WisCALM listing criteria for the fish and aquatic life and recreation uses. However,		

Assessment Package Code

The first assessment package piece gathers the raw data that meets the assessment requirements: generate view: WT_SWIMS_CHLORIDE_RESULT_V.

```
/* Formatted on 9/10/2020 3:48:14 PM (QP5 v5.326) */
CREATE OR REPLACE FORCE VIEW W07510.WT_SWIMS_CHLORIDE_RESULT_V
(
   CHLORIDE_RESULT_SEQ_NO,
   MONIT_STATION_SEQ_NO,
   RESULT_DATE_TIME,
   DNR_PARAMETER_TYPE,
   DNR_PARAMETER_CODE,
   RESULT_VALUE_NO,
   RESULT_AMT,
```

```
   RESULT_UNITS_TEXT,
   RESULT_QUALIFIER_CODE,
   LOQ_AMT,
   LOD_AMT,
   CREATE_DATE,
   CREATE_USER_ID,
   LAST_UPDATE_DATE,
   LAST_UPDATE_USER_ID,
   STATION_ID,
   PRIMARY_STATION_NAME,
   STATION_TYPE_CODE,
   SECONDARY_STATION_TYPE
)
BEQUEATH DEFINER
AS
   SELECT CHLRDRES.CHLORIDE_RESULT_SEQ_NO     CHLORIDE_RESULT_SEQ_NO,
          CHLRDRES.MONIT_STATION_SEQ_NO       MONIT_STATION_SEQ_NO,
          CHLRDRES.RESULT_DATE_TIME           RESULT_DATE_TIME,
          CHLRDRES.DNR_PARAMETER_TYPE         DNR_PARAMETER_TYPE,
          CHLRDRES.DNR_PARAMETER_CODE         DNR_PARAMETER_CODE,
          CHLRDRES.RESULT_VALUE_NO            RESULT_VALUE_NO,
          CHLRDRES.RESULT_AMT                 RESULT_AMT,
          CHLRDRES.RESULT_UNITS_TEXT          RESULT_UNITS_TEXT,
          CHLRDRES.RESULT_QUALIFIER_CODE      RESULT_QUALIFIER_CODE,
          CHLRDRES.LOQ_AMT                    LOQ_AMT,
          CHLRDRES.LOD_AMT                    LOD_AMT,
          CHLRDRES.CREATE_DATE                CREATE_DATE,
          CHLRDRES.CREATE_USER_ID             CREATE_USER_ID,
          CHLRDRES.LAST_UPDATE_DATE           LAST_UPDATE_DATE,
          CHLRDRES.LAST_UPDATE_USER_ID        LAST_UPDATE_USER_ID,
          WSN.STATION_ID                      STATION_ID,
          WSN.PRIMARY_STATION_NAME            PRIMARY_STATION_NAME,
          WSN.STATION_TYPE_CODE               STATION_TYPE_CODE,
          WSN.SECONDARY_STATION_TYPE          SECONDARY_STATION_TYPE
     FROM WT_SWIMS_CHLORIDE_RESULT CHLRDRES, WT_SWIMS_MONIT_STATION WSN
    WHERE chlrdres.monit_station_seq_no = wsn.monit_station_seq_no;
```

The second assessment package piece calculates the number of samples at a station that exceed criteria: generate view: WT_SWIMS_CHLORIDE_SUMMARY_V.

```
/* Formatted on 9/10/2020 3:55:26 PM (QP5 v5.326) */
CREATE OR REPLACE FORCE VIEW W07510.WT_SWIMS_CHLORIDE_SUMMARY_V
(
   MONIT_STATION_SEQ_NO,
   RESULT_CNT,
   MEETS_MIN_DATA_REQ_FLAG,
   EXCEED_CHRONIC_CNT,
   MEETS_CHRONIC_FLAG,
   EXCEED_ACUTE_CNT,
   MEETS_ACUTE_FLAG,
   EARLIEST_DATE,
```

```
   LATEST_DATE,
   CREATE_DATE,
   CREATE_USER_ID,
   LAST_UPDATE_DATE,
   LAST_UPDATE_USER_ID,
   STATION_ID,
   PRIMARY_STATION_NAME,
   STATION_TYPE_CODE,
   SECONDARY_STATION_TYPE
)
BEQUEATH DEFINER
AS
   SELECT CHLSUMM.MONIT_STATION_SEQ_NO       MONIT_STATION_SEQ_NO,
          CHLSUMM.RESULT_CNT                 RESULT_CNT,
          CHLSUMM.MEETS_MIN_DATA_REQ_FLAG    MEETS_MIN_DATA_REQ_FLAG,
          CHLSUMM.EXCEED_CHRONIC_CNT         EXCEED_CHRONIC_CNT,
          CHLSUMM.MEETS_CHRONIC_FLAG         MEETS_CHRONIC_FLAG,
          CHLSUMM.EXCEED_ACUTE_CNT           EXCEED_ACUTE_CNT,
          CHLSUMM.MEETS_ACUTE_FLAG           MEETS_ACUTE_FLAG,
          CHLSUMM.EARLIEST_DATE              EARLIEST_DATE,
          CHLSUMM.LATEST_DATE                LATEST_DATE,
          CHLSUMM.CREATE_DATE                CREATE_DATE,
          CHLSUMM.CREATE_USER_ID             CREATE_USER_ID,
          CHLSUMM.LAST_UPDATE_DATE           LAST_UPDATE_DATE,
          CHLSUMM.LAST_UPDATE_USER_ID        LAST_UPDATE_USER_ID,
          WSN.STATION_ID                     STATION_ID,
          WSN.PRIMARY_STATION_NAME           PRIMARY_STATION_NAME,
          WSN.STATION_TYPE_CODE              STATION_TYPE_CODE,
          WSN.SECONDARY_STATION_TYPE         SECONDARY_STATION_TYPE
     FROM WT_SWIMS_CHLORIDE_SUMMARY CHLSUMM, WT_SWIMS_MONIT_STATION
WSN
    WHERE chlsumm.monit_station_seq_no = wsn.monit_station_seq_no;
```

The third assessment package piece summarizes the AU-level assessment: generate view: WT_CHLORIDE_AU_SUMMARY_V.

```
/* Formatted on 9/10/2020 3:58:55 PM (QP5 v5.326) */
CREATE OR REPLACE FORCE VIEW W23321.WT_CHLORIDE_AU_SUMMARY_V
(
   MONIT_STATION_SEQ_NO,
   STATION_ID,
   PRIMARY_STATION_NAME,
   WBIC,
   ASSESSMENT_UNIT_SEQ_NO,
   OFFICIAL_NAME,
   LOCAL_WATERBODY_NAME,
   SEGMENT_NO,
   START_MILE_NO,
   END_MILE_NO,
   JURISDICTION_CODE,
   EARLIEST_DATE,
```

```
   LATEST_DATE,
   MEETS_MIN_DATA_REQ_FLAG,
   EXCEED_CHRONIC_CNT,
   EXCEED_ACUTE_CNT,
   IMPAIRED_CHRONIC_FLAG,
   IMPAIRED_ACUTE_FLAG,
   USE_FOR_ASSESSMENT_FLAG,
   RECENT_DATA_FLAG
)
BEQUEATH DEFINER
AS
   SELECT summ.monit_station_seq_no,
          summ.station_id,
          summ.primary_station_name,
          au.wbic,
          au.assessment_unit_seq_no,
          rw.official_name,
          au.local_waterbody_name,
          au.segment_no,
          au.start_mile_no,
          au.end_mile_no,
          au.jurisdiction_code,
          TRUNC (summ.earliest_date)
             AS earliest_date,
          TRUNC (summ.latest_date)
             AS latest_date,
          summ.meets_min_data_req_flag,
          CASE
             WHEN     summ.exceed_chronic_cnt >= 2
                 AND summ.meets_chronic_flag = 'Y'
             THEN
                TO_CHAR (summ.exceed_chronic_cnt) || '*'
             ELSE
                TO_CHAR (summ.exceed_chronic_cnt)
          END
             AS exceed_chronic_cnt,
          CASE
             WHEN     summ.exceed_acute_cnt >= 2
                 AND summ.meets_acute_flag = 'Y'
             THEN
                TO_CHAR (summ.exceed_acute_cnt) || '*'
             ELSE
                TO_CHAR (summ.exceed_acute_cnt)
          END
             AS exceed_acute_cnt,
          CASE summ.meets_chronic_flag WHEN 'Y' THEN 'N' ELSE 'Y' END
             AS impaired_chronic_flag,
          CASE summ.meets_acute_flag WHEN 'Y' THEN 'N' ELSE 'Y' END
             AS impaired_acute_flag,
          /* this CASE is the "use_for_assessment_flag". At most one station per AU will have this flag
equal to "Y".
```

```
        So, we're going to use the row_number() function to find the first row where we're partitioning
        by the AU and ordering by stations with the most desirable criteria, which is:

        1) favor stations that meet the minimum data requirements
        2) then take the station with the "worst" result
        3) if we still have multiple stations, take the one with the most recent data
        4) the last tie-breaker is to take the station with the highest exceed_chronic_cnt

        If no station for the AU meets the minimum data requirements, then all stations will have the flag
set to "N" */
      CASE ROW_NUMBER ()
           OVER (
              PARTITION BY au.assessment_unit_seq_no
              ORDER BY
                 CASE summ.meets_min_data_req_flag
                    WHEN 'Y' THEN 1
                    ELSE 2
                 END,
                 CASE summ.meets_chronic_flag
                    WHEN 'N'
                    THEN                 /* impaired chronic */
                       CASE summ.meets_acute_flag
                          WHEN 'N' THEN 1   /* impaired acute */
                          ELSE 2       /* not impaired acute */
                       END
                    ELSE
                       3                 /* not impaired */
                 END,
                 TRUNC (summ.latest_date) DESC,
                 summ.exceed_chronic_cnt DESC,
                 summ.station_id)
         WHEN 1
         THEN
            CASE summ.meets_min_data_req_flag
               WHEN 'Y' THEN 'Y'
               ELSE 'N'
            END
         ELSE
            'N'
      END
         AS use_for_assessment_flag,
      CASE
         WHEN summ.latest_date >=
             (SELECT ADD_MONTHS (report_cycle_begin_date, -12)
                FROM wt_epa_assess_reporting_cycle
               WHERE epa_report_cycle_status_code = 'CURRENT')
         THEN
            'Y'
         ELSE
            'N'
      END
```

```
        AS recent_data_flag
 FROM wt_assessment_unit  au
     INNER JOIN wt_tp_monit_station tpms
        ON au.assessment_unit_seq_no = tpms.assessment_unit_seq_no
     INNER JOIN wt_swims_chloride_summary_v summ
        ON tpms.monit_station_seq_no = summ.monit_station_seq_no
     LEFT OUTER JOIN wl_row_wbic_official_name_mv rw
        ON au.wbic = rw.wbic
WHERE au.status_code = 'A' AND tpms.include_flag = 'Y';
```