

QA/QC Suggested Review Guidelines

Overall suggestion: Activating data filters in Excel is very helpful to quickly analyze data results from each Module. Excel does not filter cells containing formulas reliably though, as it is trying to sort on the formulas themselves rather than the results, therefore the QA/QC process contains steps to copy and paste results as values only before analysis. All suggested review actions below assume review of the value only versions of Module results, which should be compiled into the QAQC_Working_File spreadsheet.

Additionally, Electronic Water Rights Information Management System (eWRIMS) is only as accurate as the data inputted into it, and unfortunately the data entry process has passed through different versions of operating procedures, including entries that were bulk uploaded from the previous version called the Water Rights Information Management System (WRIMS) in 2006/2007. There are record inconsistencies that you will see when looking at records entered in the 1990s vs the 2000s or even the 2010s that reflect changing use of various fields in the database. This can make it difficult to rely on certain fields as they may only have actual values for a certain date range of entries, so it is important to be aware of these inconsistencies as you review the data.

Priority Date Module

The Priority Date Module is designed to establish a clear list of what the priority for each water right it for use in water allocation modeling. The Module assigns a single priority date for post-1914 appropriative water rights using current eWRIMS data; assign date code '10000000' to riparian water rights; assign a date code of January 1 and the year the diversion commenced (i.e. YYYY0101) for pre-1914 water rights; assign date code '11111111' for any pre-1914 water right in which the priority date is unknown.

After the Priority Date Module has been run, it is helpful to activate data filters to check that the results make sense.

WATER_RIGHT_TYPE	APPLICATION_ACCEPTANCE_DATE	SUB_TYPE	YEAR_DIVERSION_COMMENCED	ASSIGNED_PRIORITY_DATE
Statement of Div and Use	7/19/2012	PRE1914,	2002	20020101
Statement of Div and Use	3/23/2005	PRE1914,	1974	19740101
Statement of Div and Use	1/3/1967	PRE1914,	1914	19140101
Statement of Div and Use	1/3/1967	PRE1914,	1914	19140101
Statement of Div and Use	2/20/2004	PRE1914,	1914	19140101
Statement of Div and Use	2/19/2004	PRE1914,	1914	19140101
Statement of Div and Use	4/26/2012	PRE1914,	1914	19140101

- Figure 1. Example of a post-1914 assigned priority date on pre-1914 water rights.
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- For example, filtering to review only Statements of Diversion and Use and check that all assigned priority dates are either “10000000” (the riparian default value) or are less than “19140101” which is the largest pre-1914 date

that should be assigned. A reverse way to look at this is to sort by assigned priority date, if “10000000” or dates prior to “19150101” are assigned to anything besides Statements, then manual adjustments may be needed.

This is not necessarily a check to make sure the Module is working but rather to check for anomalies in eWRIMS. For example, Small Irrigation Registrations or “H” water rights make use of the eWRIMS field “Year Diversion Commenced”, which is not usually used by appropriate water rights, only Statements. Because the Priority Date Module relies on the “Year Diversion Commenced” field for pre-1914 date assignment, this can cause confusion in “H” records. The Module already accounts for this, but it is an example of an anomaly that is worth recognizing in case dates assignments are not making sense.

- Another anomaly to be aware of is the “Sub-Type” field that is associated with Statements. You should notice that there are inconsistencies with the “Year Diversion Commenced” value and the “Sub-Type”, especially when there is a pre-1914 date in the “Year Diversion Commenced” but the “Sub-Type” only lists “Riparian” as a value as shown below:

C	E	F	G	H
WATER_RIGHT_TYPE	APPLICATION_RE	APPLICATION	SUB_TYPE	YEAR_DIVERSION
Statement of Div and Use	9/13/2012	7/26/2013	RIPERIAN,	1895
Statement of Div and Use	3/3/2016	4/1/2016	RIPERIAN,PRE1914,	1860
Statement of Div and Use		1/1/1974	RIPERIAN,	1910
Statement of Div and Use	11/18/1998	11/18/1998	RIPERIAN,	1905
Statement of Div and Use	7/2/2001	7/2/2001	RIPERIAN,	1903
Statement of Div and Use	7/2/2001	7/2/2001	RIPERIAN,	1903
Statement of Div and Use	8/16/2002	8/16/2002	RIPERIAN,	1850
Statement of Div and Use	5/25/2005	5/25/2005	RIPERIAN,	1900
Statement of Div and Use	7/1/2010	5/4/2012	RIPERIAN,	1872
Statement of Div and Use	7/1/2010	4/19/2012	RIPERIAN,	1872
Statement of Div and Use	7/6/2010	6/22/2012	RIPERIAN,	1905
Statement of Div and Use	7/6/2010	6/27/2012	RIPERIAN,	1905
Statement of Div and Use	7/6/2010	1/10/2012	RIPERIAN,	1905

Figure 2. Example of statements that have pre-1914 diversion years, yet pre-1914 subtype is not listed as a Sub-Type.

Understand that when Initial Statements are recorded into eWRIMS, the “Sub-Type” field is taken from a list of checked boxes that the diverter selects, it is not assigned by State Water Resources Control Board Division of Water Rights (Division) technical staff. If the diverter does not understand the different options, they may select the wrong one, or as often happens they select both riparian and pre-1914, and this automatically gets recorded into eWRIMS. Whether the diverter intends the Statement to represent a pre-1914 right or a riparian right is not clear without contacting them directly. E They also

might not be aware of the different way riparian and pre-1914 rights are assessed in our water allocation process, thus they may not realize the consequences of selecting one over the other.

Realize that in many watersheds, when an enforcement sweep or other Division action occurred in the past, many diverters were told they needed to file Statements even if they had an unpermitted diversion that needed a post-1914 water right. They filled a Statement to avoid penalties, but they might not have fully understood the water rights law behind what they filed or what options they selected in their Initial Statement.

There should not be many manual overrides needed in the Priority Date Module, but staff should be conscious of both the anomalies listed above, and of the larger water rights in the area they are reviewing, as the likelihood of special Division Orders or other associated license or permit terms that may affect priority date goes up with the size of the water right.

Missing Report Management System (RMS) Records Module

The Missing RMS Records Module is intended to highlight within each water right which years in the electronic record are missing annual water use reports. Note that reliable electronic records are assumed to be from 2014 to present, but actual electronic records may be available for earlier years. The Module Identifies water rights that have missing annual RMS reports and calculates the number of missing annual RMS reports based on the number of expected reports.

ARRAY FORMULA - INDEX	FINAL RESULTS - MISSING RMS REPORTS		
DO NOT MODIFY FORMULA - DO NOT FILL DOWN	FILL DOWN FORMULA - DO NOT MODIFY FORMULA - USE THESE RESULTS FOR QAQC - REFER TO E		
UNIQUE_APPL_ID	ANNUAL_REPORTS_SUBMITTED	EXPECTED_REPORTS	NO_OF_MISSING_ANNUAL_REPORTS
A002723	4	7	3
A002928	4	7	3
A003421	4	7	3
A003565	4	7	3

Figure 3. Example of applications missing multiple annual reports.

This Module does not have anything to manually adjust, it is intended to be a binary presence/absence counter for annual water use reports for each water right in the QA/QC project area. While it may not appear to have much use, it is worth discussing the potential decisions that can be made using this Module.

One of the main goals of the QA/QC effort in a specific area is to develop an estimated set of water demands to represent each water right in that area, which can then be used in a water allocation model to predict water availability in different supply scenarios. Specifically, this approach has been used to issue curtailments during drought based on the recent average reported use of water under different water rights in a watershed. A

question that was discussed during that process was whether artificial water use reports should be created for water rights that were missing records during the years analyzed. One use of this Module would be to quantify both how many reports are missing for the years focused on, and how many water rights are missing one or more (or all) reports in those years. This may drive any decisions on creating artificial reports to fill in missing reports.

In the Russian River QA/QC analysis of 2021, water use reports were reviewed from 2017, 2018, and 2019, with the average of those three years being used to represent average demand for each water right. In that case, the decision was made not to create artificial reports to fill in missing reports. This decision was based on two main factors: 1) Filing annual water use reports is a legal obligation for all water right holders, thus failure to file should not be rewarded with an assumed demand for water availability, and 2) Creating artificial reports requires making many other big assumptions, not least of which is the fact that most water rights that do report usage do not report full use compared to their “face value”, therefore creating artificial reports that simply divides face value among allowed months of diversion would also artificially inflate the overall demand in the project area.

While it should not be considered “the” method for handling missing reports, for informational purposes here is how missing reports were handled in the Russian River. For water rights that had only one or two reports present in the record reviewed, the average demand was calculated based on the reports present, thus if only one report was present then that was used to represent demand (as opposed to considering the missing years as zero and averaging one year of use against two years of zero-use, which would diminish the average demand). Water rights that had no water use reports in the period analyzed were given a demand of zero for all months.

Primary Beneficial Use Module

The Primary Beneficial Use Module is intended to assign one dominant beneficial use (or a hybrid dominant use in the case of larger municipalities or water agencies) to water rights where multiple uses are listed. These could be used in water allocation modeling in two distinct ways: 1) For assigning return flow values or identifying non-consumptive uses based on type of use and 2) For associating health and safety values to uses that rely on the water diverted for human consumption.

Review of the Primary Beneficial Use Module involves a few key fields from eWRIMS and an understanding of the basic assumptions of the Module. The “Primary Owner” and “Primary Owner Type” fields are extremely helpful for quickly checking if the water right belongs to the larger types of groups that would affect demand numbers, such as water agencies, municipalities, and agricultural businesses, which can affect how you want the Primary Beneficial Use to be categorized.

- The basic assumptions to understand in the Module are that the beneficial uses are ranked with irrigation having the highest priority, and “minor” uses such as dust control or recreation having lower priority.

USE_CODE	USE_RANKING
Irrigation	1
Municipal	2
Domestic	3
Power	4
Stockwatering	5
Industrial	6
Frost Protection	7
Heat Control	8
Recreational	9
Dust Control	10
Mining	11
Fire Protection	12
Aquaculture	13
Fish and Wildlife Preservation and	14
Incidental Power	15
Milling	16
Snow Making	17
Water Quality	18
Aesthetic	19
Other	20

Figure 4. Water use codes and their priority ranking.

- The Module assigns the highest-ranking use as the water right’s primary beneficial use. As shown below:

ACTION:	PASTE NEW INPUT DATA FROM [NAME OF SCRIPT] SCRIPT HERE - DELETE SAMPLE				FILL DOWN FORMULA - DO NOT MC	
APPLICATION	USE_CODE	WATER_RIGHT_TYPE	WATER_RIGHT	PRIMARY_OWNER	USE_CODE_RANK	HIGHEST_RANK
C000222	Stockwatering	Stockpond	Certified	Individual	5	5
C000223	Stockwatering	Stockpond	Certified	Individual	5	5
C002935	Stockwatering	Stockpond	Certified	Corporation	5	5
C002936	Stockwatering	Stockpond	Certified	Corporation	5	5
C005161	Stockwatering	Stockpond	Certified	Corporation	5	5
C005162	Stockwatering	Stockpond	Certified	Corporation	5	5
C005163	Stockwatering	Stockpond	Certified	Corporation	5	5
C005164	Stockwatering	Stockpond	Certified	Corporation	5	5
C005165	Stockwatering	Stockpond	Certified	Corporation	5	5
C005166	Stockwatering	Stockpond	Certified	Corporation	5	5
C005343	Stockwatering	Stockpond	Certified	Corporation	5	5
C005521	Stockwatering	Stockpond	Certified	Individual	5	5
C005522	Stockwatering	Stockpond	Certified	Individual	5	5
C005624	Stockwatering	Stockpond	Certified	Corporation	5	5
C005834	Stockwatering	Stockpond	Certified	Individual	5	5
C006052	Stockwatering	Stockpond	Certified	Individual	5	5
S000114	Stockwatering	Statement of Div and	Claimed	Corporation	5	1
S000114	Irrigation	Statement of Div and	Claimed	Corporation	1	1
S000114	Domestic	Statement of Div and	Claimed	Corporation	3	1

Figure 5. Example of an application being ranked according to its highest ranking use code.

The exception is for the owner type “government/municipal” which causes the Module to create a hybrid beneficial use of irrigation/municipal or irrigation/domestic depending on which uses are relevant. The hybrid use is intended to allow the water allocation modeling to treat these differently, as the water usage patterns for these types of entities can be complicated and usually represent the largest water users in a watershed.

Another anomaly of eWRIMS that staff should be aware of is that the “Primary Owner Type” field does not always logically match the owner. For example, there are owners who are listed as being government/municipal, but the name of the owner is a home building company or an LLC in general, which doesn’t make sense except in the loosest sense of municipal in that the water right may serve multiple residences in the future. This is where it is up to staff reviewing the Module to look deeper into the record and decide if the water right should retain a hybrid designation. The question of why that owner was associated with that ownership type is harder to answer, Division records date back over 100 years and reasonings for classifying something a certain way has changed over time. The other general possibility is that it was just entered wrong in the first place and was never updated.

Other manual changes may depend on the watershed being examined or the specific task for the QA/QC process. For example, many water rights, both appropriative and riparian, list a large number of beneficial uses, perhaps with the thinking that listing every possible future use will enhance the water right. When reviewing the actual water use reports, most water rights only show use in one or two main beneficial uses, but this isn’t captured in the eWRIMS records. Depending on the size of the area being QA/QC’d, it may not be time feasible to review all of the actual water use reports, so cross checking the amount of water used may help in deciding which records are worth diving deeper into (e.g., cross check the larger water rights first and smaller water rights as time allows).

An example of a general decision that could be made for a watershed would be with small domestic water rights. Many of these rights list irrigation as a beneficial use, as it is an approved co-use for the small domestic registration. The Module will select irrigation as being the “highest” use for these, however staff may want to default all small domestic registrations to having domestic as the primary use, as that is the intention of the registration. This will be driven by the project’s focus, is it more important to capture all irrigation use in a watershed or will there be a health and safety assessment where domestic use should be highlighted.

A counter-example that highlights another eWRIMS anomaly is where a registration, say a small irrigation registration, does not have irrigation listed as a beneficial use. It seems illogical but in previous efforts there have been found both small domestic and small irrigation registration records in eWRIMS that don’t have the expected beneficial use listed in the water right title under their beneficial use record. This is where staff

would need to pick an assumption to apply to the project, and make manual corrections as needed.

The last anomaly that has been found is with water rights that have no associated beneficial use. These are usually found by performing a comparison of the unique water rights expected in the project with the unique water right list produced in the Beneficial Use Module. These water rights would need to both have their record manually added to the Module results, and staff would need to try and deduce and manually assign the primary beneficial use from the eWRIMS record.

Diversion Out of Season Module

The Diversion Out of Season Module is intended to highlight where annual water use reports for an individual water right show use outside of the approved diversion season(s).

This Module is very complicated to produce based on the eWRIMS records, but is intended to highlight a simple concept, where an appropriate water right is recording water use outside of its approved diversion season(s). The simplest manual correction is to zero out demand in months where the diversion is not approved, so that demand is not reflected in the final demand data set for the project area.

This Module is broken into two parts:

Part A analyzes all authorized start and end dates for direct diversion and diversion to storage from the "USE_SEASON" Flat File. This resulting table shows which months are included in the season of diversion for each water right.

1	INFO:	INPUT DATA FOR SPREADSHEET - FROM PART_A											
2	ACTION:	PASTE AS DATA NEW INPUT DATA FROM PART_A DIRECT SEASON HERE - DELETE SAMPLE DATA BELOW											
3	APPL_ID_UNIQUE	JAN_DIRECT	FEB_DIRECT	MAR_DIRECT	APR_DIRECT	MAY_DIRECT	JUN_DIRECT	JUL_DIRECT	AUG_DIRECT	SEP_DIRECT	OCT_DIRECT	NOV_DIRECT	DEC_DIRECT
4	A001029					IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON		
5	A001205					IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON		
6	A001983	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON
7	A002723					IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON			
8	A002928					IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON		
9	A003421						IN_SEASON	IN_SEASON	IN_SEASON	IN_SEASON			
10	A003601						IN_SEASON	IN_SEASON	IN_SEASON				

Figure 6. Example of each application's season of diversion by month.

Part B incorporates the diversion seasons from part A and cross references all diversion reports submitted for each water right. Any records of diversion occurring outside the authorized season of diversion as well as a count of these records are calculated in the “DIVERSION_OUT_OF_SEASON” excel tab.

1	INPUT DATA FOR SPREADSHEET - FROM WATER_USE_REPORT FLAT FILES					RESULT - OUT OF	RESULT - NO OF	OUT OF SEASON DIVERSIONS BY APPLICATIO	
2	PASTE NEW INPUT DATA FROM [NAME OF SCRIPT] SCRIPT HERE - DELETE SAMPLE DATA BELOW					FILL DOWN FORM	ARRAY - DO NOT	FILL DOWN	
3	YEAR	MONTH	AMOUNT	DIVERSION_TYPE	OUT_OF_SEASON_DIRECT	OUT_OF_SEASON_STOR	DIVERSION_OUT	UNIQUE_RMS_A	NUMBER OF OUT OF SEASON RECORDS
73	2018	4	0	DIRECT			0	A013270	0
74	2018	6	0	STORAGE			0	A013277	0
75	2019	4	0	STORAGE			0	A013281A01	0
76	2020	11	1.04	DIRECT	OUT_OF_SEASON_DIRECT		1	A013281A02	6
77	2014	12	0	STORAGE			0	A013281B	0
78	2017	3	0	STORAGE			0	A013287	0
79	2015	4	0	DIRECT			0	A013288	0
80	2017	12	0	DIRECT			0	A013289	0
81	2019	8	3.59	DIRECT			0	A013301	7
82	2017	11	0	STORAGE			0	A013317	0
83	2017	11	0.3	DIRECT	OUT_OF_SEASON_DIRECT		1	A013330	0
84	2019	9	3.04	DIRECT			0	A013331	12
85	2019	3	0	DIRECT			0	A013359	0

Figure 7. Example of applications with number and type of out of season diversions.

In practice very few instances of diversions out of season were found, therefore it is worth taking a closer look at any water rights that are flagged and verifying in eWRIMS that the diversions really are out of season before zeroing those months, as some water rights have extremely complicated permitted seasons of use.

Please note that Statements and Federal Claims are excluded from this analysis as they are recorded claims rather than permitted rights, meaning that there is not an approved season of use.

Identify Duplicate reporting (Duplicate Values – Months and Years Module and Duplicate Diversion for Multiple Water Rights Module)

Duplicative reports lead to erroneous and inflated water demand estimates. Reporters will sometimes submit identical water use values for identical Points of Diversions (POD) that serve multiple water rights (e.g., report total demand for all associated water rights served by a POD under each water right instead of splitting up demand proportionately for each water right). A script was generated to identify these scenarios for correction. Initially, POD measuring less than 500 meters apart are flagged as potential duplicate pairs. These pairs are then further screen for similarities in reported water use values, primary owner names, status, and use type. If these indicators are positive and the reported diversion is confirmed as a duplicate, it should be removed from the demand dataset.

Statistics, Diversion Exceeds Face Value, and Unit Conversion Module

The Statistics, Diversion Exceeds Face Value, and Unit Conversion Module is intended to highlight where annual reports deviate significantly from what is either allowed (for appropriate rights) or what was initially reported (for riparian claims).

This Module identifies potential data errors that represent the majority of the QA/QC workload. The most obvious “bad” data is found when the total reported annual use is compared to the “face value”, which is either the permitted annual amount allowed in appropriative water rights or the initial reported annual use for riparian claims. The easiest way to analyze the results of this Module is to sort by diversion using percentage of “face value” with the largest percentage values on top. The amount of water (in acre-feet) reported over “face value” is also included and can be used for prioritizing review. You will commonly find that the largest percentage values will show reported use far above the associated face value or initial diversion. The value of sorting by percentage of “face value” is that most watersheds or study areas will have enough water rights that reviewing every individual water use report is infeasible, however sorting can give focus to the smaller subset of records that are most likely to have errors that will have the most significant effect on the demand dataset.

AnnualTotalDiversion	Annual_Use	FaceValue	Initial_Reported_Diversion	Units_IniDiv	IniDiv_Converted_to_AF	Diversion_as_Percent_of_FV	Amount_over_FV
100	0	95.5	0		0	1.047120419	4.5
100	0	95.5	0		0	1.047120419	4.5
100	0	95.5	0		0	1.047120419	4.5
100	0	95.5	0		0	1.047120419	4.5
100	0	95.5	0		0	1.047120419	4.5
75	0	95.5	0		0	0.785340314	0
56	0	95.5	0		0	0.586387435	0
4	0	95.5	0		0	0.041884817	0
34	0	95.5	0		0	0.356020942	0
34	0	95.5	0		0	0.356020942	0
34	0	95.5	0		0	0.356020942	0
2	0	95.5	0		0	0.020942408	0
4	0	95.5	0		0	0.041884817	0
345	0	95.5	0		0	3.612565445	249.5
6.77	0	95.5	0		0	0.070890052	0

Figure 8. Example of reported use of 345 acre feet which exceeds the face value by over 249 acre feet and 361%.

An important aspect to consider however when evaluating the “face value” results is the water right type, as appropriative rights and riparian rights have very different regulatory processes. Appropriative rights have a maximum amount they can divert based on the terms of their permit or license. Riparian rights are more nebulous in that 1) They must share and share alike both in times of plentiful water and water scarcity, meaning there is not a firm limit to their usage over the general state law that prohibits waste of water, and 2) The “face value” of a Statement is really the initial reported diversion amount, which is only a recordation with us and not a limit on what they can divert. If a property using a riparian right changes owner, the new owner may put more water to use in future years than was previously reported, causing yearly reports to exceed the “face value”, however this doesn’t amount to any violation since it is not a permit or license. Reported diversions under Statements should still be reviewed for reasonableness, however the “face value” should be used as a guide rather than as a hard limit.

What makes this section particularly hard to QA/QC is that an understanding of both trends in how diverters make errors in reporting and of the changes in the reporting form itself over the years is required. A common error is diverters recording the same value for “Direct Diversions” and “Diversions to Storage”, effectively doubling the reported amount. There is a pre-calculated field that will identify this specific potential type of duplicate reporting in the Module.

3	APPL_ID	WATER_RIGHT_ID	YEAR	MONTH	AMOUNT	DIVERSION_TYPE
122	A001029	147	2016	8	1.23	DIRECT
123	A001029	147	2014	4	0	DIRECT
124	A001029	147	2014	3	0	STORAGE
125	A001029	147	2014	5	1.232961264	DIRECT
126	A001029	147	2019	8	0	STORAGE
127	A001029	147	2020	4	0	DIRECT
128	A001029	147	2016	7	0	STORAGE
129	A001029	147	2016	8	0	STORAGE
130	A001029	147	2014	6	1.232961264	DIRECT
131	A001029	147	2014	5	1.232961264	STORAGE
132	A001029	147	2018	3	0	DIRECT

Figure 9. Example of reporting identical values for both direct diversions and diversion to storage for the same month and year.

The total may still be far below their face value, however it is still an incorrect representation of water usage, especially when there is not a storage component on their water right. This reflects an essential misunderstanding of what the Division is requesting when asking diverters to submit annual reports of water usage. To add to this, prior to 2014 the Division had a combined “Diversion” field where the total of both direct and storage diversions was reported, which makes diagnosing errors in reporting harder (and perhaps leading to the later trend of reporters putting the same number in multiple fields when water use reports changed).

Below are suggested reviews based on the percentage face value field. In all cases clear documentation of what changes were made and why should be recorded for transparency and so that public questions on the final dataset can be easily answered. Also note that while this only flags values above face value, values far below face value may also be caused by the same conversion-type error, they just don’t affect the overall demand dataset as significantly because they are too small rather than too big. While not as easy to pin down, sorting by the smallest percentage of “face value” tends to flag errors typically associated with inaccurate face value or initial reported diversion values in eWRIMS, or potential unit conversion issues. Pre-calculated fields are included in the Module to provide reference calculations for common unit conversion mistakes, showing what the reported value would have been in the other units, which can guide the user into identifying and correcting erroneous reported values.

Far Above Face Value (>200% face value)

Many reports that show use far above face value are indicative of major errors in the reports. The two most common errors are reporting gallons as acre-feet, and reporting rates of diversion as acre-feet. It is not always obvious which is the cause, but staff should be able to test out some conversions using the pre-calculated unit conversion fields, and review the actual water use reports for each flagged water right to figure out what is the likely error. There are some differences in approach between appropriative rights and Statements, as noted above. The overall amount being diverted should be taken into account for Statements that exceed face value, a change from 200 gallons to 800 gallons a year represents a 400% increase and may be reasonable since it does not constitute as big of a difference as compared to 200 acre-feet and 800 acre-feet. This is where use of the “amount over face value” field can become particularly useful.

The biggest QA/QC action here is deciding how to correct these records. Leaving demand values from this group unaltered could significantly increase the final demand dataset. Gallons to acre-feet conversion errors are easy to correct, the rate of diversion error is more difficult in absence of contacting the diverter for more information, which is not considered as part of the QA/QC process at this time. The best approach for rate of diversion errors is to decide on a uniform correction to apply that can be documented for the QA/QC process. The major decision point here is what length of time to apply to the rate to transform it into a monthly amount, without having to make too many assumptions about use and assuming there won't be sufficient time/resources/regulatory ability to contact the water right holder for more information. It is not uncommon for monthly diversion volumes to inadvertently be reported as diversion rates. Particularly when the user does not understand the difference between direct diversion, diversion to storage, and use. It can be common to see a diversion rate being reported under “direct diversion”, while the diversion volume associated with that rate is reported under “use”, or similar mix-up.

Close to Face Value (100%-200% face value)

This category covers tougher decision points for modifying water rights data. An appropriate right should not exceed its face value, however there is always the chance that the specific terms of a permit or license may allow more water to be taken in certain circumstances. Similarly, many appropriative water rights have seasons of diversion associated with the water year (October 1 – September 30) and not the calendar year, which can result in a total calendar annual report exceeding face value, but the diverted amount is within the face value limits permitted within the water year. This is where the total amount matters as much as the percentage over, as shown in the Statement example above. By further sorting the water rights flagged in this category by the total face value amount, staff can choose to focus on the largest diversions first. Additionally, many larger diverters that have multiple water rights have been found to report the total diversions of all their collective water rights in each individual water use

report, which may cause both an exceedance of face value on individual rights and an overall multiplication of water use reporting.

When reviewing Statements in this range, note the earlier discussion of what “face value” means for riparian rights, as there may be a valid reason these reports have increased.

Calculation of diversion data for final master demand table.

The “Statistics, Diversion Exceeds Face Value, and Unit Conversion Module” calculates monthly average diversion data based on the diversion and use data reported to RMS by the water right holders. Use the Data Processing Module Tabs of the QAQC Working File to identify errors or other changes that need to be made. Use these QAQC Suggested Review Guidelines for considerations to make when evaluating the results of the Data Processing Modules. If it’s determined that any changes need to be made, overwrite the corresponding data field in the Intermediate Diversion and Use tab within the QA/QC Working File and update the three QA/QC action columns to document whether a change was made, what the specific change was, and the reason for the change. This will be used to generate a final QAQC’d demand dataset that will go into the final master demand table in the QAQC Working File spreadsheet. This will aid in transparency by providing a clear record of which individual reported values were modified to generate the QAQC’d demand dataset.