Credible Data: Data Quality Grade Level Assignments

Dataset: Utah DWQ (internally-collected data) and Non-DWQ Cooperators.
Summary: Data quality can be improved upon, but most results meet the Data Validation Criteria from the Credible Data Quality Matrix for data submission and can move forward to IR-specific QC checks to determine if they can used for all assessment purposes. Overall Grade: A-

Data Type	Data Validation Criterion from Credible Data Quality Matrix	Grade Level Assigned	Justification	Areas for Future Improvement
Field Data	Quality Assurance Project Plan (QAPP)	A	DWQ's QAPP approved by DEQ Quality Assurance Council (May 2014).	Implement all components of DWQ's QAPP.
	Sampling & Analysis Plan (SAP)	B	Multiple planning documents that constitute key SAP components were approved informally for targeted runs. Some projects such as UCASE have formal SAPs.	Formalize SAP documentation and approval process and make sure all required SAP components (listed in QAPP) are completed. Lakes SAP needs to be updated.
	Calibration Documentation	A	Calibration documentation available for most field records but recalibration information typically not recorded. Individual results may be flagged or rejected if calibration documentation cannot be found.	Maintain documentation of recalibration; make sure recalibration is occurring according to SOP. Make calibration documentation more accessible and tied to results.
	Field Documentation	A	Field notes, if collected, are scanned into file and available for review.	Few field notes are being collected; find solution to simplify/automate recording field notes, especially when they apply to representativeness of sampling conditions, and make sure they get transferred into AWQMS.
	Flow Data	A	Flow data is routinely collected and final value is stored in file and available for review.	Perform second flow measurement at replicate sites. Record cross-sectional measurements, depths, velocity readings, equipment used, and any other notes related to flow measurement on a form.

	Water Temperature Methods	B	Accuracy and resolution of thermistor acceptable. However the traceable, certified thermistors have not been rechecked against NIST reference thermometer annually.	Purchase a new NIST reference thermometer and perform check of all thermistors against NIST reference thermometer annually, as required by QAPP and SOP.
	pH Methods	A	Probe is calibrated according to SOP and manufacturer's instructions. Accuracy and resolution of probe acceptable.	Perform and record recalibration when needed as required by SOP.
	Dissolved Oxygen – Percent Saturation for Calibrated Meter	A	Probe is calibrated according to SOP and manufacturer's instructions. Accuracy and resolution of probe acceptable.	Perform check of all barometers against NIST reference barometer annually, as required by QAPP and SOP. Any new equipment should have a built-in barometer.
	Dissolved Oxygen – Concentration Methods for Calibrated Meter	A	Probe is calibrated according to SOP and manufacturer's instructions. Accuracy and resolution of probe acceptable.	Perform check of all barometers against NIST reference barometer annually, as required by QAPP and SOP. Any new equipment should have a built-in barometer.
Data Type	**Data Validation Criterion from Credible Data Quality Matrix**	**Grade Level Assigned**	**Justification**	**Areas for Future Improvement**
Water Chemistry Data	Quality Assurance Project Plan (QAPP)	A	DWQ's QAPP approved by DEQ Quality Assurance Council (May 2014). All analyzing laboratories have approved QAPPs.	Implement all components of DWQ's QAPP.
	Sampling & Analysis Plan (SAP)	B	Multiple planning documents that constitute key SAP components were approved informally for targeted runs. Some projects such as UCASE have formal SAPs.	Formalize SAP documentation and approval process and make sure all required SAP components (listed in QAPP) are completed. Lakes SAP needs to be updated.
	Laboratory Method	A	All methods approved by DWQ and/or Utah Public Health Laboratory.	Obtain and review copies of method SOPs from all methods from analyzing laboratories.

	Detection Limits	B	Detection limits are approved and submitted by some labs. State Lab detection limits are approved and available but not routinely submitted (only reporting limits are submitted with all non-detect results).	Require State Lab to submit a reporting and detection limit with every result value. Work with State Lab to achieve greater sensitivity for IR analytes for which detection limit > numeric criteria.
	Lab Certification	B	State Lab is certified by EPA. Other analyzing labs are certified by Utah Public Health Laboratory or NELAC.	State Lab plans to be certified by NELAC in 2016.
	QC Samples	A	QC sample results are available for DWQ review.	Build QC sample performance review into project SAPs. Perform occasional assessment of laboratory internal/batch QC sample performance.
	Laboratory Comments	A	Analyzing laboratories submit comments with individual results when applicable. Individual results are flagged or rejected if comment indicates data quality issue. Laboratories are available for follow-up explanation on comments.	Require State Lab to provide more detail in comments, for example if comment indicates recovery limits for MS/MSD are out of range, the actual recovery percentage should be included in the comment.
	Field Documentation	A	All field documentation associated with samples submitted to laboratory is stored in file and available for review.	Few field notes are being collected; find solution to simplify/automate recording field notes, especially when they apply to representativeness of sampling conditions, and make sure they get transferred into AWQMS.
	Metals	A	Results for assessed metals are submitted with hardness values (or Ca and Mg values) as requested by sampler.	Add into SOPs/SAPs a check to make sure these conditions are including in project planning process (i.e. when a field value or important lab parameter such as hardness must accompany an analyte result for assessment).
	Organics	A	Results for pentachlorophenol are routinely submitted with field pH; individual results are flagged or rejected if this is not the case.	Add into SOPs/SAPs a check to make sure these conditions are including in project planning process (i.e. when a field value or important lab parameter must accompany an analyte result for assessment).

	Inorganics	B	Results for fluoride are not routinely collected and may not be submitted with air temperature. Results for Total Ammonia as N are routinely submitted with field pH and water temperature. When these requirements are not met, individual results are flagged or rejected.	Add into SOPs/SAPs a check to make sure these conditions are including in project planning process (i.e. when a field value or important lab parameter must accompany an analyte result for assessment).
Data Type	**Data Validation Criterion from Credible Data Quality Matrix**	**Grade Level Assigned**	**Justification**	**Areas for Future Improvement**
E. coli Data	Quality Assurance Project Plan (QAPP)	A	DWQ's QAPP approved by DEQ Quality Assurance Council (May 2014).	Implement all components of DWQ's QAPP.
	Sampling Analysis Plan (SAP)	B	Multiple planning documents that constitute key SAP components were approved informally for targeted runs. Some projects such as UCASE have formal SAPs.	Formalize SAP documentation and approval process and make sure all required SAP components (listed in QAPP) are completed. Lakes SAP needs to be updated.
	Standard Operating Procedures (SOPs)	A	Samplers follow DWQ's SOPs for E. coli Sample Collection & Analysis.	SOPs need to be revisited and possibly updated/revised.
	EPA Approved Method	A	IDEXX Colilert (USEPA-approved) used for all samples.	
	Demonstration of Capability (Annual)	A	DOC or SOP training/review signatures available and stored in file.	
	Data	A	All data submitted in template on time.	
	Field Documentation	B	All bench sheets stored in file met but QA info about materials often not recorded.	Make sure all samplers are filling out bench sheet for materials QA info.
	QA/QC	B	Holding times and incubation period routinely met but QA info about materials often not recorded.	
	Geo Information	A	Geo information is provided in form of MLID associated with each sample.	

	NIST Thermometer for Incubator	B	NIST certification has expired for the majority of traceable, certified incubator thermometers.	Purchase a new NIST reference thermometer and perform check of all incubator thermometers against NIST reference thermometer annually, as required by QAPP and SOP.
Data Type	**Data Validation Criterion from Credible Data Quality Matrix**	**Grade Level Assigned**	**Justification**	**Areas for Future Improvement**
Biological Data	Quality Assurance Project Plan (QAPP)	A	DWQ's QAPP approved by DEQ Quality Assurance Council (May 2014).	Implement all components of DWQ's QAPP.
	Sampling Analysis Plan (SAP)	A	UCASE Field Manual constitutes approved SAP.	
	Standard Operating Procedures (SOPs)	A	Samplers follow SOPs included in UCASE Field Manual.	
	Field Documentation	A	All field documentation is scanned into file and available for review.	
	DWQ approved taxonomy lab	A	All samples analyzed by approved taxonomy lab.	

Dataset: USGS

Summary: Data quality is good, results meet the Data Validation Criteria from the Credible Data Quality Matrix for data submission and can move forward to IR-specific QC checks to determine if they can used for all assessment purposes. Overall Grade: A

Data Type	Data Validation Criterion from Credible Data Quality Matrix	Grade Level Assigned	Justification
Field Data	Quality Assurance Project Plan (QAPP)	A	USGS Utah Water Science Center maintains a general QAPP. In additional an approved QAPP and SAP is required for each study as described in the USGS National Field Manual for the Collection of Water-Quality Data. The USGS National Water Quality Laboratory and other national USGS labs maintain their own QAPPs.
	Sampling & Analysis Plan (SAP)	A	
	Calibration Documentation	A	Calibration documentation is maintained and available for review as required in the USGS National Field Manual for the Collection of Water-Quality Data.

	Field Documentation	A	Calibration documentation is maintained and available for review as required in the USGS National Field Manual for the Collection of Water-Quality Data.
	Flow Data	A	Flow data is routinely collected with water samples and is accessible online in real-time and in Annual Reports.
	Water Temperature Methods	A	Accuracy and resolution of thermistor acceptable. Thermistors checked against NIST reference thermometer every 6 to 12 months, depending on the manufacturer's recommendation and as required by USGS National Field Manual for the Collection of Water-Quality Data.
	pH Methods	A	Probe is calibrated according to USGS National Field Manual for the Collection of Water-Quality Data and manufacturer's instructions. Accuracy and resolution of probe acceptable.
	Dissolved Oxygen – Percent Saturation for Calibrated Meter	A	
	Dissolved Oxygen – Concentration Methods for Calibrated Meter	A	
Data Type	**Data Validation Criterion from Credible Data Quality Matrix**	**Grade Level Assigned**	**Justification**
Water Chemistry Data	Quality Assurance Project Plan (QAPP)	A	USGS Utah Water Science Center maintains a general QAPP. In additional an approved QAPP and SAP is required for each study as described in the USGS National Field Manual for the Collection of Water-Quality Data. The USGS National Water Quality Laboratory and other national USGS labs maintain their own QAPPs.
	Sampling & Analysis Plan (SAP)	A	
	Laboratory Method	A	Most methods approved by DWQ; research methods used in some USGS studies may be flagged during IR QC checks.
	Detection Limits	A	Detection limits are approved by DWQ and submitted with results.
	Lab Certification	A	USGS National Water Quality Laboratory maintains accreditation through NELAC.
	QC Samples	A	QC sample results are available for DWQ review.
	Laboratory Comments	A	Lab comments submitted with individual results when applicable. Individual results are flagged or rejected during IR QC checks if comment indicates data quality issue.

	Field Documentation	A	Field documentation is available for DWQ review.
	Metals	A	Results for assessed metals are submitted with hardness values (or Ca and Mg values).
	Organics	A	Results for pentachlorophenol are routinely submitted with field pH; individual results are flagged or rejected if this is not the case.
	Inorganics	A	If fluoride collected, air temperature is typically also collected. Results for Total Ammonia as N are routinely submitted with field pH and water temperature. When these requirements are not met, individual results are flagged or rejected.

Dataset: Western Watersheds

Summary: Data quality can be improved upon, but most results meet the Data Validation Criteria from the Credible Data Quality Matrix for data submission and can move forward to IR-specific QC checks to determine if they can used for all assessment purposes. Overall Grade: B

Data Type	Data Validation Criterion from Credible Data Quality Matrix	Grade Level Assigned	Justification	Areas for Future Improvement
Field Data	Quality Assurance Project Plan (QAPP)	B	QAPP/SAP approved by WY DEQ (May 2010). Utah informally accepted this plan but for future submittal years.	For future submission years, DWQ would prefer WW to submit a Utah-specific QAPP/SAP. Or if WW is to have DWQ "Cooperator" status, they must submit a SAP for DWQ approval and operate under DWQ's QAPP requirements.
	Sampling & Analysis Plan (SAP)	B		
	Calibration Documentation	B	Calibration documentation available for review according to SAP.	DWQ SOPs require daily calibration of Dissolved Oxygen probes. If WW is to have DWQ "Cooperator" status, calibration documentation must be submitted quarterly with field data.
	Field Documentation	A	Field notes submitted with data.	
	Flow Data	n/a	Not submitted; not collected according to SAP.	

	Water Temperature Methods	B	Accuracy and resolution of thermistor acceptable. SAP does not indicate whether the traceable, certified thermistors have been checked against NIST reference thermometer annually.	For "A" grade, a more accurate probe must be used and traceable, certified thermistors must be rechecked against NIST reference thermometer annually, and recalibrated, if needed.
	pH Methods	B	Probe is calibrated daily according to SAP and manufacturer's instructions. Accuracy and resolution of probe acceptable.	For "A" grade, a more accurate probe must be used.
	Dissolved Oxygen – Percent Saturation for Calibrated Meter	n/a	Not submitted; not collected according to SAP.	
	Dissolved Oxygen – Concentration Methods for Calibrated Meter	B	Probe is factory-calibrated according to SAP and manufacturer's instructions. Accuracy and resolution of probe acceptable.	DWQ SOPs require daily calibration of dissolved oxygen probes used for instantaneous measurements. If WW is to have DWQ "Cooperator" status, calibration documentation must be submitted quarterly with field data.
Data Type	**Data Validation Criterion from Credible Data Quality Matrix**	**Grade Level Assigned**	**Justification**	
E. coli Data	Quality Assurance Project Plan (QAPP)	B	QAPP/SAP approved by WY DEQ (May 2010). Utah informally accepted this plan.	For future submission years, DWQ would prefer WW to submit a Utah-specific QAPP/SAP. Or if WW is to have DWQ "Cooperator" status, they must submit a SAP for DWQ approval and operate under DWQ's QAPP requirements.
	Sampling Analysis Plan (SAP)	B		
	Standard Operating Procedures (SOPs)	B	Sampler follows WY-approved E. coli-related SOPs. These have been initially determined to be equivalent to DWQ SOPs for E. coli sample collection and analysis.	For future submission years, and if WW is to have DWQ "Cooperator" status, WW should be trained on and sign they have read and follow DWQ's E. coli Program SOPs, and pass an annual DOC. This should be included in a Utah-specific SAP.
	Demonstration of Capability (Annual)	B	Sampler acknowledges review of DWQ's E. coli-related SOPs (via email confirmation) and follows WY-equivalent SOP and IDEXX instructions.	
	EPA Approved Method	A	IDEXX Colilert (USEPA-approved) used for all samples.	

	Data	B	Data submitted in template; extension provided for submission following deadline.	If WW is to have DWQ "Cooperator" status, they must submit data quarterly. This will ensure that data is provided to IR Assessment staff in a timely manner and in the proper format.
	Field Documentation	A	Bench sheet information and field notes provided with data submission.	
	QA/QC	B	SAP indicates that holding times and incubation conditions will be met and the reagents will be used before expiration.	For "A" grade, these items should be included in a filled out bench sheet and provided to DWQ with data submission.
	Geo Information	A	Provided with data submission.	If WW is to have DWQ "Cooperator" status, they must include sampling sites in approved SAP and MLIDs will be assigned prior to data collection.
	NIST Thermometer for Incubator	B	SAP indicates that incubator temperature will be checked for accuracy but does not specify if a NIST-traceable incubator thermometer will be used.	For "A" grade, DWQ SOP requires a certified internal incubator thermometer in additional to the digital display from the built-in incubator thermistor.

Dataset: DOGM

Summary: Data quality is difficult to assess because DWQ did not review actual QAPPs or SAPs, but DWQ assumes most results meet the Data Validation Criteria from the Credible Data Quality Matrix for data submission and can move forward to IR-specific QC checks to determine if they can used for all assessment purposes. In-depth IR-specific QC checks will thoroughly evaluate the quality of each result. Overall Grade: B

Data Type	Data Validation Criterion from Credible Data Quality Matrix	Grade Level Assigned	Justification
Field Data	Quality Assurance Project Plan (QAPP)	B	DWQ assumes data collected under a QAPP and SAP as R645-301-723 requires monitoring follow "Standard Methods" which outlines Quality Assurance Plan requirements in Chapter 1020. Permit application also requires a monitoring plan (SAP). Further sampling and analysis requirements outlined in DOGM Technical Directives.
	Sampling & Analysis Plan (SAP)	B	

	Calibration Documentation	B	Calibration documentation available for DWQ's review if needed as per email communication with DOGM officials (calibration documentation and demonstration of capability required during facility inspections).
	Field Documentation	B	DWQ assumes field notes are available for DWQ review, if needed, as per typical SAP requirements.
	Flow Data	B	DWQ assumes flow data is available for DWQ review, if needed, as the rule requires it be collected.
	Water Temperature Methods	B	DWQ assumes monitoring conducted according to 40 CFR Part 136 and/or "Standard Methods for the Examination of Water and Wastewater", which ensures acceptable accuracy and resolution of thermistors.
	pH Methods	B	DWQ assumes monitoring conducted according to 40 CFR Part 136 and/or "Standard Methods for the Examination of Water and Wastewater", which ensures calibration and acceptable accuracy and resolution of pH probes.
	Dissolved Oxygen – Percent Saturation for Calibrated Meter	B	DWQ assumes monitoring conducted according to 40 CFR Part 136 and/or "Standard Methods for the Examination of Water and Wastewater", which ensures calibration and acceptable accuracy and resolution of dissolved oxygen probes.
	Dissolved Oxygen – Concentration Methods for Calibrated Meter	n/a	Not submitted or collected.
Data Type	**Data Validation Criterion from Credible Data Quality Matrix**	**Grade Level Assigned**	**Justification**
Water Chemistry Data	Quality Assurance Project Plan (QAPP)	B	DWQ assumes data collected under a QAPP and SAP as R645-301-723 requires monitoring follow "Standard Methods" which outlines Quality Assurance Plan requirements (including laboratory QAPPs) in Chapter 1020. Permit application also requires a monitoring plan (SAP). Further sampling and analysis requirements outlined in DOGM Technical Directives.
	Sampling & Analysis Plan (SAP)	B	
	Laboratory Method	A	All methods approved by DWQ and/or Utah Public Health Laboratory; any results collected with unapproved methods will be flagged/rejected during IR QC Checks.
	Detection Limits	B	Detection limits are approved by DWQ and submitted with results.

	Lab Certification	A	Analyzing labs are certified by Utah Public Health Laboratory or NELAC; any results from unapproved labs will be flagged/rejected during IR QC Checks.
	QC Samples	B	Unknown whether field QC samples are collected. Laboratory QC samples are available for DWQ review if needed.
	Laboratory Comments	B	Laboratory comments available for DWQ review, if needed, as per policy of any certified laboratory.
	Field Documentation	B	DWQ assumes field notes are available for DWQ review, if needed, as per typical SAP requirements.
	Metals	A	Results for assessed metals are submitted with hardness values or Ca and Mg values.
	Organics	n/a	Organics data not submitted.
	Inorganics	n/a	Fluoride and Total Ammonia data not submitted.