DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

QAPP Amendment Form

PROGRAM:	Delta Regional Monitoring Program (DRMP)
PROJECT:	Constituents of Emerging Concern (CEC)
QAPP VERSION:	Version 2.0
PREPARED BY:	MLJ Environmental
DATE SUBMITTED:	November 22, 2021

Title: Amendment to the Data Management Procedures for Laboratory Blank Contamination

Section of QAPP affected:

Appendix A. Surface Water Data Management Standard Operating Procedures (version 2.1).

Reason for Changes:

The data management procedures for the Delta RMP CEC Project are being updated to incorporate the use of the QACode FI – analyte in field sample and associated blank (Standard Operating Procedures for Surface Water Data Management version 2.1). Previous data flagging business rules dictated that when laboratory blank contamination occurred, the only QACodes applied to the batch were those applied to the blank sample in which the contamination was observed. The data managers for the CV RDC are updating these procedures to include the application of "FI" to associated environmental samples with measurable detections of the target analyte in accordance with SWAMP flagging procedures. This has been discussed and confirmed with the Delta RMP Program QA Officer, Project Manager, Regional Board QA Representative, and State Board QA Officer.

This form is to document the updated data verification and flagging procedures to include the application of the QACode "FI" to environmental samples where laboratory blank contamination is observed (does not meet the Measurement Quality Objective of <MDL).

Detail of Changes:

Changes have been made to Section VII.E.7, Table 7, and Attachment B of the attached Data Management Standard Operating Procedures (SOP); updated version is 2.1. The following language has been added to each section.

1. Section VII.E.7. Verify Laboratory Data Quality Control, page 37:
   a) "When laboratory blank results do not meet MQOs, any associated environmental samples with detectable results (> MDL) should also be flagged as "FI" indicating the analyte was present in both the environmental sample and its associated blank."
2. Table 7. Common quality assurance codes and flagging rules for chemistry data, page 37:

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Table 7. Common quality assurance codes and flagging rules for chemistry data.

SAMPLE TYPE		QA CODE	CODE DESCRIPTION	FLAGGING BUSINESS RULES
Environmental Samples	Blank Contamination	FI	Analyte in field sample and associated blank	Apply to environmental results with detections that are associated with a laboratory blank result that was above the acceptable limit. LabBlank is flagged with "IP" ; LabBlank and environmental results are given a compliance code of QUAL.

3. Attachment A. MLJ Environmental Chemistry Analysis Review Checklist, Section 4.4, page 56
   a) "Project Specific: Where there is an exceedance of the MQO in the Lab Blank, verify the QACode "FI" is applied to all associated environmental samples with detectable results (> MDL)."

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Approval:

The amendment(s) detailed within this document shall be effective upon signature completion of all parties listed below. By signing this amendment, all parties listed below acknowledge and accept these changes. A copy of this document shall be distributed to all parties within the QAPP distribution list and shall be included and/or attached to all distributed copies of the original QAPP.

CEC Program Manager:	DocuSigned by: Melissa Turner 9796DD915C44446... Melissa Turner	Date: 12/27/2021
CEC Quality Assurance Officer:	DocuSigned by: Will Hagan A1D771E8E56040F... Will Hagan	Date: 12/23/2021
CEC Data Manager:	DocuSigned by: 2801D2DF64FB454... Cassandra Lamerdin	Date: 12/22/2021
Quality Assurance Representative, CVRWQCB:	DocuSigned by: Selina Cole F3102A0E248746B... Selina Cole	Date: 1/3/2022
Quality Assurance Officer, SWRCB:	DocuSigned by: Andrew Hamilton 7CBAC1C276074C6... Andrew Hamilton	Date: 12/23/2021

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Appendix A. Surface Water Data Management Standard Operating Procedures (version 2.1)

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

STANDARD OPERATING PROCEDURES FOR SURFACE WATER DATA MANAGEMENT

FOR DATA GENERATED UNDER THE DELTA REGIONAL MONITORING PROGRAM

REVISION 2.1

NOVEMBER 22, 2021

Prepared by:

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

SOP for Surface Water Data Management revision history.

Revision No.	Revision Date	Person Responsible	Revision Description	Section(s) Affected
2.0	09/01/2021	L. McCrink	Update to MLJ Data Management Procedures to include updated checklists and tissue; addition of MIS procedures.	All
2.1	11/22/2021	L. McCrink	Updates regarding data Quality Assurance flagging rules when blank contamination is observed.	VII.E.7, Table 7, Attachment A

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

TABLE OF CONTENTS

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

LIST OF ACRONYMS

CEDEN	California Environmental Data Exchange Network
CV RDC	Central Valley Regional Data Center
COC	Chain of Custody
EDD	Electronic Data Deliverable
eDERs	Environmental Data Entry and Reporting System
eQAPP	Electronic Quality Assurance Project Plan
IRLP	Irrigated Lands Regulatory Program
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
LIMS	Laboratory Information Management System
MDL	Minimum Detection Limit
MLJ DMT	Michael L Johnson Data Management Team
MLML-MPSL	Moss Landing Marine Laboratories Marine Pollution Studies Laboratory
MQO	Measurement Quality Objective
MIS	Management Information System
MS SQL	Microsoft SQL Server
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PR	Percent Recovery
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SOP	Standard Operating Procedures
SWAMP	Surface Water Ambient Monitoring Program
TIE	Toxicity Evaluation Identification
WQTL	Water Quality Trigger Limits
WY	Water Year

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

I. INTRODUCTION

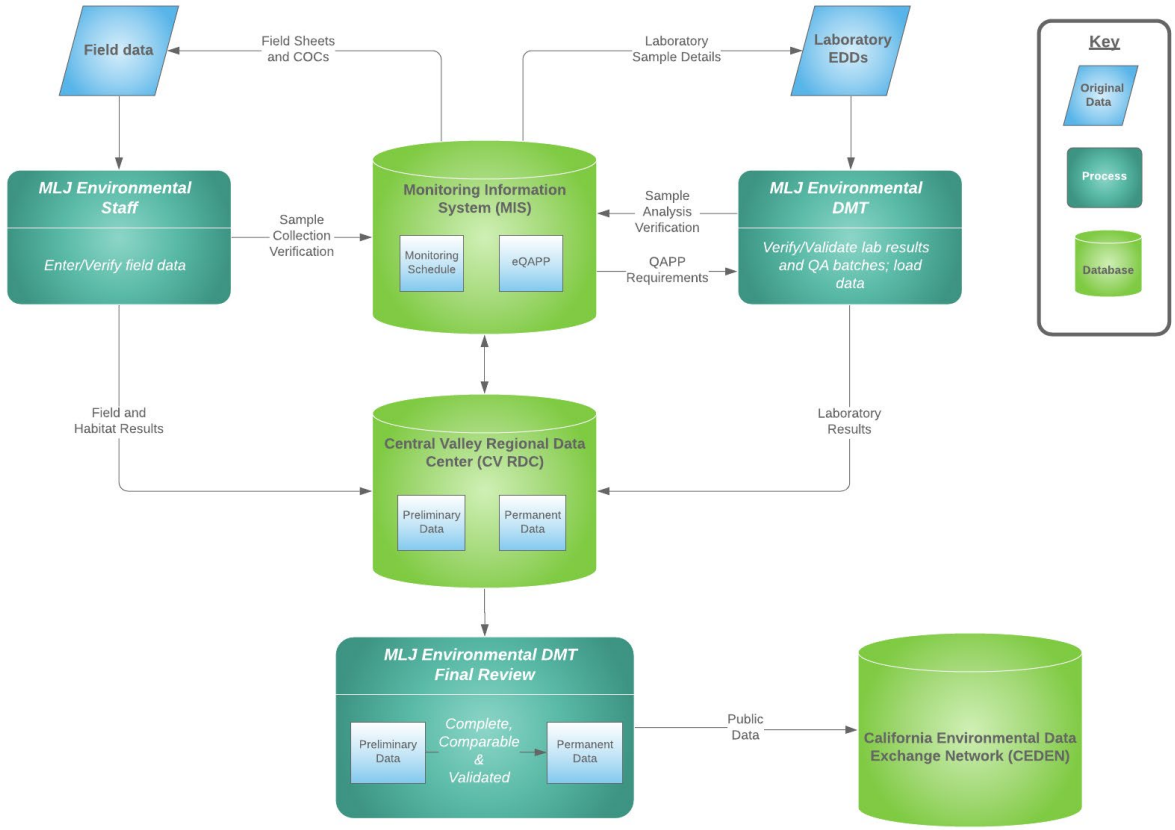
The MLJ Environmental (MLJ) Standard Operating Procedures (SOPs) for Surface Water and Sediment Data Management describes the preparation, verification, quality control (QC), and processing of surface water, sediment, and tissue data completed by MLJ staff. Procedures outlined in this SOP apply to both chemistry and toxicity data.

A. PURPOSE

The following SOP outlines the procedures for the management of environmental quality data by MLJ Environmental. This document describes the general processes, minimum information requirements, and data verification procedures for field measurements and laboratory results, and the storage and management of those results in the Central Valley Regional Data Center (CV RDC) database. **Figure 1** is an illustration of the data flow from the receipt of data, through verification and quality control checks and finally uploaded and stored in relational databases managed by MLJ. Finalized data are transferred to the State Water Resources Control Board's (State Water Board) California Environmental Data Exchange Network (CEDEN) database when approved by the data provider.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Figure 1. Data flow diagram for water quality data (including sediment and tissue) managed in the CV RDC database and migrated to CEDEN.



B. DATABASES

There are three primary databases which are used throughout the data management process:

- ***Monitoring Information System (MIS Database)***. The MIS Database is an internal data management system managed and maintained by MLJ staff. The primary function of the MIS Database is to store and maintain programmatic information needed to manage and complete monitoring for various projects. Where necessary, data in the MIS are maintained in a format that is comparable to the CV RDC, allowing for monitoring data to be queried across both database systems for reporting purposes. There are two main elements of the MIS database that are used in different capacities throughout the data review and management process:
    - *Monitoring Schedule Database*: This element of the database stores scheduled sampling event details by project. The monitoring schedule is used to track samples collected and results received. Reports generated from this system are used to communicate the number of samples planned to be collected based on method and analyte to the laboratories and create field sampling materials including field sheets and chains of custody (COCs). It also stores information regarding the status and

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

completion of specific milestones for the processes outlined in this SOP such as completion dates for field data entry, laboratory deliverable receipt, and results loading into the CV RDC.

- *eQAPP Database*: This element of the database stores Measurement Quality Objectives (MQOs) and quality assurance requirements for each project. The term "eQAPP" refers to an electronic Quality Assurance Project Plan (QAPP). This part of the database serves as the official repository for current QAPP requirements by project.

- ***Central Valley Regional Data Center Database (CV RDC).*** The CV RDC is one of three Regional Data Centers in California that can migrate data to CEDEN which is managed by the State Water Board. The relational design of the CV RDC was developed with the intent to ensure that data submitted through this process are CEDEN comparable and meet CEDEN minimum requirements and business rules. The CV RDC is synced with CEDEN weekly to ensure comparability of lookup lists. Data within the CV RDC are not publicly available through CEDEN until they are verified and marked as public.
- ***California Environmental Data Exchange Network (CEDEN).*** This statewide water quality database is the repository for the public results of most surface water monitoring occurring in the State of California. It is maintained and managed by State Water Board staff; data in it are publicly available through http://ceden.org.

C. PERMISSIONS AND SECURITY

The MIS is a MS SQL database that is hosted on Amazon Web Services (AWS). Permissions to the MIS occur at the project level for specific clients upon request as well as to MLJ staff, as necessary.

The CV RDC database is a Microsoft (MS) SQL database which can be accessed online by using the Environmental Data Entry and Reporting System (eDERS) hosted by Moss Landing Marine Laboratories (MLML) or internally by MLJ Data Management Team (DMT) staff using MS SQL Management Studio or MS Access interfaces. All users are assigned a username and password for access to data. Permissions are unique to individual staff logins and are granted on the individual result record level (Row Level Security or RLS) based on RowSecurityIDs applied to every table and record in the database. Permissions are assigned by MLJ DMT staff when new projects or user logins are created in the database.

The CV RDC database is hosted on the MLML server, along with the MLML RDC; both databases are maintained as separate environments by the respective data management staff and do not share data or permissions. MLML staff cannot assign permissions to data within the CV RDC and cannot access CV RDC data unless permissions are assigned to them for specific results by MLJ DMT staff as needed for various projects (e.g. Delta RMP data review).

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

II. PROJECT DEFINITION

Certain elements of a monitoring project must be defined in the CV RDC Database before any results can be loaded or stored. High-level information associated with the project (Program Code, Parent Project Code, Project Code) and the sampling locations (Station Code, Target Latitude, Longitude, and datum) are required to be associated with any monitoring data in the CV RDC Database. Likewise, if elements of the monitoring program are managed by MLJ staff in the MIS Database, the same high-level project information stored in the CV RDC Database must also be within the MIS. Project definition information are stored in a comparable format between the MIS and the CV RDC such that data can easily be moved and queried between the two systems.

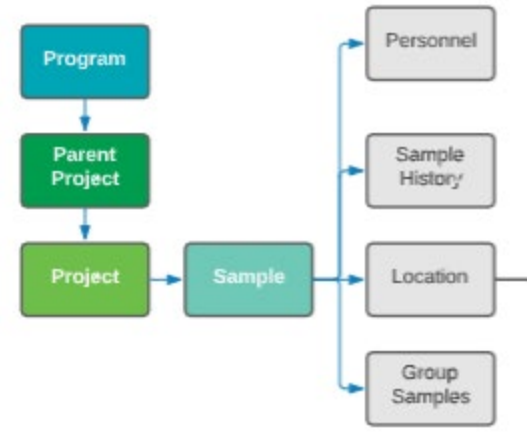
Data that are only being loaded directly to the CV RDC do not need to be defined in the MIS; however, at a minimum, the following fields must be populated in at least the CV RDC Database prior to loading any field or laboratory results.

- *Program Code.* The Program Code is the top tier of project definition information that can capture the requirements for initiating the project in the broadest sense, such as the regulatory program under which the project is required (e.g., Irrigated Lands Regulatory Program/ILRP).
- *Parent Project Code.* The Parent Project Code is the second tier of project definition information, further identifying the specific projects that operate within the defined program (e.g., specific coalitions under the ILRP, such as ILRP East San Joaquin Water Quality Coalition). For long term monitoring programs, the Parent Project Code should remain static as long as the monitoring is being conducted.
- *Project Code:* The Project Code associates surface water results with a higher-level Parent Project and Program Code. Project Codes can be used at the discretion of the Project Manager to logically combine samples in spatial or temporal groupings to meet programmatic needs. The Project Code also connects the station information and associated sampling results to the original workplan and monitoring schedules. When creating a Project Code, it is important to keep in mind that all data for a specific project code will be transferred at one time; therefore, Project Codes for long term projects often capture a specific time period that will be transferred in a single effort, such a quarter or a year.
- *Station Code*: The Station Code must be unique and reflects the station name; station codes can be no more than 25 characters. Whenever possible, station codes associated with data managed by the MLJ DMT should start with the 3-digit hydrologic unit code followed by six characters representing the station location e.g., 541MER520; this format is consistent with SWAMP station code formatting.
- *Target Latitude and Longitude*: Target latitude and longitude is used to positively identify the Station Code location during sampling and reporting.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

The hierarchical groupings of Program, Parent Project, and Project Codes are outlined in **Figure 2**. This hierarchy allows managers the ability to group Project Codes into logical temporal time frames like water (WY) or calendar year focused on time frames for loading data to CEDEN.

Figure 2. Relationship of Program, Parent Project, and Project Codes to Sample Table in CV RDC Database.



Project data submitted to the CV RDC must meet minimum reporting requirements for the data to be made public via CEDEN when applicable; not all data submitted to the CV RDC are transferred to CEDEN based on client needs. These specific requirements are described in the CV RDC Entry Manuals on the MLJ Environmental website.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

III. MANAGEMENT INFORMATION SYSTEM (MIS)

The MIS Database is an internal data management tool to help facilitate reporting of monitoring requirements for various projects managed by MLJ staff. Depending on the needs of each individual project, elements of the MIS may or may not need to be populated. The sections below describe the general design elements and their intended use. The overall design of the database is purposefully flexible to allow the data management in the MIS to be tailored to specific client and/or project needs.

A. MONITORING SCHEDULE

The monitoring schedule tables within the MIS Database are comprised of data necessary for developing monitoring schedules including where samples will be collected and what analytes will be measured. This monitoring schedule tables are used for the organization, planning, tracking and management of sample collection and analysis completion for each individual project.

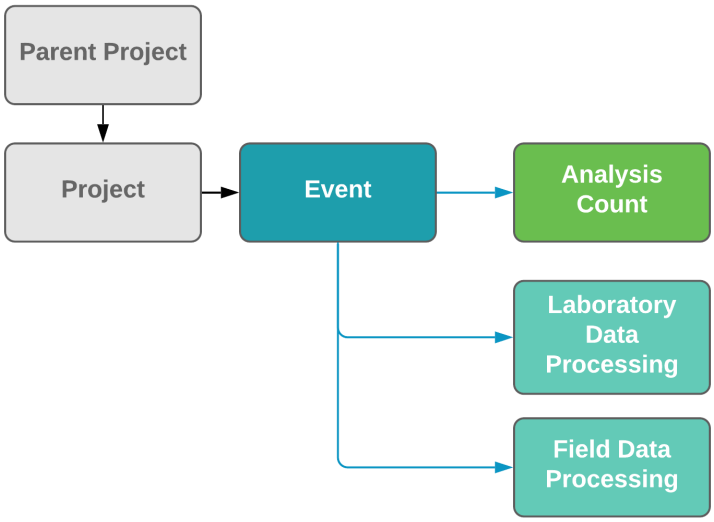
Monitoring schedules are stored on two different levels: the sample event level and the individual analysis level (**Figure 3**).

Sample event data are associated with the Project Code defined in the MIS and the CV RDC. Each event is assigned an anticipated sampling date. Depending on the needs of the project, events can be assigned season codes and/or Event ID's which help categorize or qualify the sampling events as needed. Season codes are maintained in the MIS and are created based on project specifications (e.g., "Storm" event code for events triggered by rainfall in the area).

Individual samples are defined on the Analysis Count table and must be assigned to a sampling event. The locations (station codes) and constituents to be monitored for each sampling event are defined on this table. Sample replicates and additional quality control samples requiring additional volume are defined as individual records. Station Codes and constituents (defined by the analyte name, analytical method, matrix, fraction, and reporting units) must be comparable to lookup lists in the CV RDC. Monitoring scheduling information is captured on the individual sample level using the Monitoring Type Code on the Analysis Count table. Monitoring type codes describe how individual samples meet the requirements of the individual monitoring program requirements (e.g., an ILRP Management Plan Monitoring constituent would be coded "MPM").

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Figure 3. Relationship of monitoring schedule tables in the MIS Database.



B. POPULATING THE MONITORING SCHEDULE IN THE MIS

1. Load Monitoring Schedule into the MIS Database

Data management staff work with the Project Manager to finalize and upload a complete monitoring schedule for each project. Monitoring schedules are exported directly from the MIS and can be used as part of regulatory compliance; any changes to the schedule must be updated within the database to allow for correct assessment of completion, cost estimates, and creation of field sheets and chain of custody forms.

The monitoring schedule tables (**Table 1**) include specific details necessary to achieve each project's specific data management and data usability goals; at a minimum this must include:

- Project information; comparable with the CV RDC
- Expected sample dates
- Sample event information
- Sample stations/locations; comparable with the CV RDC
- Sample type codes; comparable with the CV RDC
- Analysis information, including analyte, analytical method, matrix, fraction, and reporting units; comparable with the CV RDC
- Monitoring requirement type codes
- Sample qualifier codes

The monitoring schedule is then formatted for uploading and imported into the MIS for the tracking and reporting of completeness as monitoring occurs; this process is outlined in the SOP for Monitoring Schedule Updates and Loading into the MIS. All project, site location, and

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

analytical information associated with results that will be stored in the CV RDC will be maintained as comparable to the CV RDC lookup lists and codes. This ensures that data stored in the MIS Database can be linked to analytical results in the CV RDC allowing for completeness assessment and status updates during the data receipt, review and loading process.

Table 1. Monitoring schedule tables in the MIS Database.

Only the primary columns used by most projects are defined below. Ancillary fields are not included in this table; these fields can be used to manage data or further qualify project requirements where necessary.

TABLE NAME	FIELD NAME	FIELD DESCRIPTION	CV RDC COMPARABLE
Event	ParentProjectCode	High-level project definition code.	Yes
	ProjectCode	Project definition code, often specific to a designated time period in which sample collection occurs.	Yes
	ScheduledSampleDate	Anticipated date on which the sampling event will occur.	--
	SampleDate_Beginning	Actual date on which sampling began.	--
	SampleDate_End	Actual date on which sampling ended; this is the same as the beginning date if the sampling event was completed in one day.	--
	Season	Description of sampling periods, variable by to project.	--
Analysis Count	StationCode	Station at which sample is collected.	Yes
	SampleTypeCode	Code describing the type of sample to be collected (e.g., Grab, FieldBlank, etc.)	Yes
	Replicate	Sample replicate number.	Yes
	Constituent ID	Unique identifier that defines the specific constituent being sampled by analyte (or organism) name, matrix, method, fraction, and reporting units.	No[1]
	SampleCount	Number of samples associated with each record.	--
	MonitoringType	Code describing the monitoring requirements for the specific sample.	--
	SampleQualifierCode	Code describing if and by whom the sample is intended to be collected.	--
	SampleFailureCode	Code describing the reason why a sample was not collected or analyzed by the laboratory.	No
	SampleComplete	True/false field indicating whether a scheduled sample was collected; to be completed by staff during **Sample Collection Verification** outlined below.	--
	AnalysisComplete	True/false field indicating whether results were received for a collected sample; to be completed by staff during Verify **Sample Analysis** steps outlined below.	--

[1]Constituent IDs are managed separately by MLJ in both the MIS and the CV RDC. Constituent IDs in the MIS do not always directly compare to the CV RDC; however, each of the individual elements of a constituent code (analyte, matrix, method, fraction, and units) must be comparable to the CV RDC.

2. Monitoring Schedule Verification

Once the final monitoring schedule is imported into the MIS Database, the monitoring schedule is then exported and verified by the DMT, Project QA Officer, and Project Manager prior to being submitted for finalization and/or approval by a regulatory entity. This review, at a minimum, includes specific sample requirements (e.g., ensuring all dissolved metals samples are

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

associated with an analysis for hardness at the same site), database business rules (e.g., the correct application of data codes), and CV RDC data comparability (e.g., lookup lists). Project Managers are responsible for reviewing exported monitoring schedules for accuracy and project requirements. The Project QA Officer is responsible for reviewing this schedule to ensure all QAPP requirements (e.g., quality control sample frequency) are met. Any errors or changes found in the export are made in the database and the schedule is re-exported.

3. Analysis Count Reports for Laboratories

Finalized sample schedules are exported as reports and sent to the appropriate analytical laboratories. Laboratories can use the schedule to determine which analyses will be requested for how many samples prior to each sampling event. The Field Sampling Coordinator or Project Manager is responsible for providing these reports to laboratories when monitoring schedules are finalized in addition to coordinating with laboratory staff regarding updates to the monitoring schedule and sample bottle shipments prior to events.

C. POST-SAMPLING UPDATES TO MONITORING SCHEDULE

1. Tracking of Samples Collected

Once the sampling events scheduled in the database have occurred, MLJ staff update the MIS with specific information regarding what samples were collected during the event; this information is then compared to what was expected. These steps are discussed in the **Sample Collection Verification** section below.

2. Informing Laboratories of Sample Details

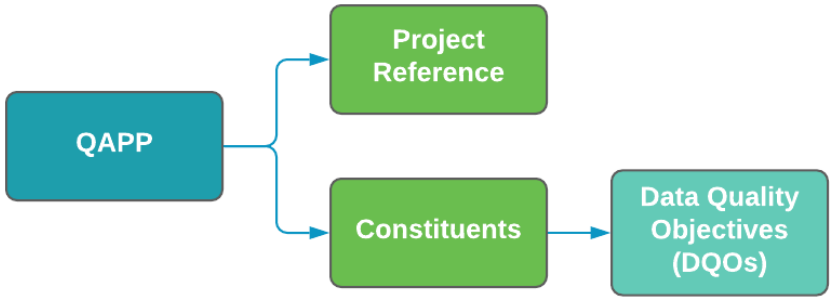
For each event in which samples are submitted to a laboratory for analysis, specific reports (Laboratory Sample Details) are exported and sent to the analytical laboratories. These Laboratory Sample Details files provide the laboratories with the data that are required for generating CV RDC/CEDEN comparable electronic data deliverables (EDDs). The Laboratory Sample Details export process is outlined below in the **Laboratory Sample Details** section.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

IV. ELECTRONIC QAPP (EQAPP) DATABASE

The electronic QAPP (eQAPP) is a relational database that stores quality assurance requirements and data quality objectives (DQOs) for each project and analyte, as defined by the project's QAPP, as shown in **Figure 4**. The eQAPP Database is the internal repository for all up-to-date quality assurance requirements for projects in which data are managed by MLJ staff. The eQAPP Database is updated when amendments to QAPPs are approved. Data exported from the eQAPP Database can be used to ensure document submittals match the most up to date quality assurance requirements stored in the database. The Project QA Officer is responsible for ensuring the eQAPP Database reflects current quality assurance requirements of each project.

Figure 4. Relationship of eQAPP tables in the MIS Database.



The MLJ DMT uses the data stored in the eQAPP Database to process EDDs received from laboratories and verify that the data reported in the EDDs meet the project requirements and associated measurement quality objects (MQOs). The eQAPP compiles quality assurance requirements in a format comparable to the CV RDC to ensure efficiency and accuracy when processing laboratory EDDs. A description of the specific fields which can be populated in the eQAPP Database are outlined in **Table 2**. Though specific requirements may vary by project, the eQAPP should include the following information to assess laboratory results:

- Original QAPP document reference and submittal information;
- Constituent information such as analyte name, matrix, method, fraction and unit, comparable with CV RDC/CEDEN;
- Preparation and digest extract methods, comparable with CV RDC/CEDEN;
- Expected MDL and RL values (not accounting for adjustments made when dilutions are performed);
- Required measurement quality objects (e.g., LCS percent recovery control limits);
- Batch completeness requirements.

Each of these elements must be defined in the database and verified by the Project QA Officer prior to the MLJ DMT processing any EDDs received for a project. Data are uploaded to and managed in the eQAPP according to the SOP, Procedures for eQAPP SQL Data Management.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Table 2. eQAPP tables in the MIS Database.

Only the primary columns used by most projects are defined below. Ancillary fields are not included in this table; these fields can be used to manage data or further qualify project requirements where necessary.

TABLE NAME	FIELD NAME	FIELD DESCRIPTION	CV RDC COMPARABLE
QAPP	QAPPCode	A code representing the QAPP under which monitoring is being conducted.	--
	QAPPName	Title of the QAPP.	--
	QAPPDescription	Narrative description of the project defined by the QAPP.	--
	QAPPStartDate	Project start date.	--
	QAPPEndDate	Project end date.	--
Project Reference	ParentProjectCode	Parent Project Code associated with data generated under the QAPP.	Yes
Constituent	Laboratory	Laboratory contracted to analyze the constituent.	No
	Constituent ID	Unique identifier that defines the specific constituent being sampled by analyte (or organism) name, matrix, method, fraction, and reporting units.	No[1]
	PrepPreservationName	Preservative or sample preparation associated with the constituent (if applicable).	Yes
	DigestExtractMethod	Digestion or extraction methods used by the laboratory (if applicable).	Yes
	MDL	Constituent detection limit.	Yes
	RL	Constituent reporting limit.	Yes
	ConstituentStatus	Indicates whether the consituent definition is active or inactive	--
	Constituent AmendmentCode	Indicates the version of the QAPP in which the constituent information was approved.	--
	Constituent StartDate	Date on which the constituent information was approved.	--
	Constituent EndDate	Date on which the constituent information was removed from the QAPP or replace by more accurate information.	--
DQOs	DQOParameter	Specific data parameter being evaluated, e.g., field duplicate RPD, matrix spike percent recovery.	--
	DQOType	Reference to the specific data quality element being assessed (e.g., “PR” for percent recovery, “RefTox” for toxicity accuracy evaluation).	--
	DQOCriterion	Assessment criteria (e.g., less than a specific value)	--
	DQOValue	The specific value or threshold used for the assessment (e.g., a maximum RPD threshold of 25)	--
	DQOCriterion Second	Any secondary criteria that should also be considered when evaluating against the primary.	--
	DQOStatus	Indicates whether the specific objective is active or inactive.	--
	DQO AmendmentCode	Indicates the version of the QAPP in which the objective was approved.	--

[1]Constituent IDs are managed separately by MLJ in both the MIS and the CV RDC. Constituent IDs in the MIS do not always directly compare to the CV RDC; however, each of the individual elements of a constituent code (analyte, matrix, method, fraction, and units) must be comparable to the CV RDC.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

V. PRE- AND POST-SAMPLING DATA MANAGEMENT

For projects in which MLJ is responsible for collecting samples and submitting them to laboratories, the monitoring schedule defined in the MIS Database is used to generate sampling materials and track the status of the samples required to be monitored. The following steps can be completed for projects for which MLJ staff are responsible for all components of the monitoring completion. Each step may or may not be necessary for all projects, depending on the level of participation of MLJ staff in the sample collection process and/or specific client needs.

A. SAMPLE PREPARATION FOR MLJ MANAGED PROJECTS

The MIS can be used to prepare field sheets, sample labels and COCs. This step occurs for projects with a sampling component managed by MLJ and is not required for other projects. MLJ Sampling Staff use the MIS to prepare for an upcoming sample collection event to confirm bottle counts and additional checks of sampling materials against the MIS sampling schedule information.

1. Bottle Counts

Prior to a sampling event, MLJ field crews assess the amount of sample containers required for the event. Bottle count reports are exported using sample collection requirements stored in the MIS Database. Counts of the required containers are used to submit bottle requests to laboratories and/or order containers directly from suppliers ahead of a sampling event to ensure the required sampling materials are in house prior to the event. Bottle count reports are also used to pack coolers and allocate materials to sampling teams in preparation for sampling events. The Field Sampling Coordinator is responsible for ensuring timely requests for sample bottles from laboratories and ensuring that all supplies are obtained prior to sampling.

2. Field Sheets, Sample Labels, and COCs

Field sheets and sample bottle labels are exported directly from the database using reports designed to pull formatted information from the MIS Database. Field sheets and labels are populated with as much information as possible prior to the event to streamline tasks in the field as well as avoid erroneous sample records or analysis requests. Chain of Custody forms, which must accompany all samples once they are collected, are generated in Excel using information from the MIS sampling schedule to ensure minimal manual updates to sample event information.

Sample collection contingency plans are also generated to account for in-field changes to the sampling schedule (such as sites that may not be able to be sampled) given future monitoring events and annual analyte counts. The Field Sampling Coordinator is responsible for ensuring all sample materials are verified against the original sample schedule in the MIS Database prior to the field sampling event.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

B. SAMPLE EFFORT

Samples should be collected according to the sampling SOPs included in the associated project's QAPP to ensure the collection of field data are performed in a scientifically sound and repeatable manner. Many pre- and post-sampling details not directly replate to data management are detailed in the associate Sampling SOP and are not discussed in this document.

C. POST SAMPLING PROCESSES

1. Electronic Filing of Field Documentation

For projects managed by MLJ, field sheets, COCs, and sampling photos are stored electronically on a secure server which is backed up nightly. All hard copies are physically filed where they can be accessed by MLJ staff and the Project QA Officer if needed. Electronic documents must be retained for a minimum of 10 years.

2. Sampling Summary Report

For all projects in which monitoring was completed by MLJ field crews, a Sampling Summary Report is typed up after each sampling event which includes a short narrative of all stations that were sampled, sample failures, and any remarkable or anomalous events or observations made by field crews. The summary is distributed to the Project Managers and the DMT and is used to communicate the status of the sampling event including any anomalies encountered. The Field Sampling Coordinator is responsible for ensuring the Sample Summary Reports are complete and are distributed to appropriate staff.

3. Sample Collection Verification

Sample collection information is verified against the MIS schedule for each sampling event. After each sampling event, the MIS Database is updated to reflect which samples were collected based on the completed field sheets and COCs. At a minimum, the following items should be verified or updated once sampling is complete:

- **Sample Date**. The MIS Database is populated with expected sample dates when the initial monitoring schedule is loaded. These dates need to be verified or updated to the day or range of days on which the sampling event occurred.
- **Sample Complete**. Each sample that was scheduled should be marked as true/false for sample completed. All samples and analytes planned to be collected must be accounted for in the monitoring schedule in the MIS Database (**Table 1**). If a scheduled sample was not collected, the record in the database should be flagged with the correct failure code to qualify why the sample is missing. The acceptable failure codes currently listed in the database are provided in **Table 3**.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Table 3. Acceptable sample failure codes to be used in the MIS database.

Where possible, failure codes are similar to those defined in CEDEN; however, not all failure codes stored in the MIS Database are CEDEN comparable, some have been added for internal tracking.

SAMPLE FAILURE CODE	SAMPLE FAILURE	DESCRIPTION
BRK	Sample bottle broken	Sample bottle broken.
CMIS	Collection Missed	Sample failed to be collected due to oversite on COC/fieldsheet.
DIS	Discontinued	Sample was originally scheduled to be sample but was then discontinued. No sample was collected because it was no longer required.
DRY	Dry	Dry (No water)
FLD	Flooded	Flooded
HAB	Hard Bottom	Hard Bottom (no sediment)
INF	Instrument Failure	Instrument failure
ISP	Isolated Pool	Isolated pool not connected to moving water source, no flow.
LMIS	Laboratory Missed. Did Not Analyze	Sample was not analyzed by the lab due to lab error.
None	None	No failure, sample was collected.
TEMPLAB	Sample stored at improper temperature by Lab.	Sample stored at improper temperature by Lab. Not storing or utilizing results.
TOS	Too Shallow	Too shallow to collect water samples.

4. QC Sample Verification and Assessment

If there is a situation where a site is scheduled for QC sample collection and the samples could not be collected, the QC samples will need to be collected at a different site. The determination of the back-up site at which the QC samples are collected is usually made in the field based on sample collection contingency plans established prior to sampling. Wherever this occurs, the sample schedule in the MIS must be updated after the sampling event to include the field QC samples that were actually collected. In addition, field QC sample frequency requirements must be reassessed after every sampling event to ensure any changes in the field do not reduce the total amount of QC samples required for the project. The QC frequency percentages are recalculated following each event to ensure the minimum requirements for each analyte are still met. Any field QC that could not be collected during the event must be rescheduled for future events to ensure that QC frequency requirements are met. The Field Sampling Coordinator should notify the Project QA Officer if there are no future events in which the analyte(s) in question are scheduled and the QC frequency requirements required by the QAPP will not be met.

D. EXPECTED SAMPLE RESULTS TRACKING

The sample tracking component of the MIS Database is used to ensure that requirements are met for each sample from the beginning of the process (sample collection) to end (finalized results loaded in the CV RDC). Once a sample has been collected and verified against the

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

monitoring schedule, a record must be created to track all future expected reporting deliverables. Reporting deliverables will be project specific and may include preliminary laboratory results, laboratory reports, EDDs, and laboratory invoices.

Field result process and deliverables are tracked on the Field Data Processing table in the MIS Database (**Figure 3**). A record must be created on this table to track each of the steps outlined below for the **Field Data Processing** requirements. The specific fields on this table are outlined in **Table 4**.

Table 4. Field data processing steps tracked in the MIS Database.

TABLE NAME	FIELD NAME	FIELD DESCRIPTION	REFERENCE
Field Data Processing	FieldEntryCompleteDate	Date on which field data entry was completed.	**Field Data Entry**
	FieldEntryPerformedBy	Staff who completed field data entry	
	FieldVerificationCompleteDate	Date on which field data verification was completed.	**Field Result Quality Assurance**
	FieldVerificationPerformedBy	Staff who completed field data verification.	
	FieldEntryVerificationComments	Details regarding field data verification.	
	SampleDetailsSentDate	Date on which the sample details file was sent to the laboratory.	**Laboratory Sample Details**
	SampleDetailsSentBy	Staff who sent the sample details file to the laboratory.	
	SampleDetailComments	Details regarding sample details communications with laboratories.	
	FieldExceedanceReportRequired	Indication of additional project action requirements triggered by the field results.	--

In the Laboratory Data Processing table (**Figure 3**), a separate record needs to be created for each laboratory and report type combination that is expected to be received given what was collected and submitted for analysis. These records will be used for tracking expected reports from laboratories and paying laboratory invoices once all deliverables have been received, as outlined in **Table 5**.

The sample completion counts and expected report records are used by MLJ DMT staff in charge of receiving laboratory results to track timely receipt of deliverables from laboratories and to verify the completeness of the results received. Accurate sample counts are crucial to the analytical data verification steps outlined below (see **Laboratory Data Processing**). Sample collection verification activities are overseen by the Project QA Officer.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Table 5. Laboratory data processing steps tracked in the MIS Database.

TABLE NAME	FIELD NAME	FIELD DESCRIPTION	REFERENCE
Laboratory Data Processing	Laboratory	Analyzing laboratory form which a report is expected.	--
	ReportType	Description of expected report.	--
	ReportNumber	Report identifier provided by the laboratory.	--
	PrelimLabReportReceivedDate	Date on which preliminary results were received by the laboratory.	**Receipt and Filing of Laboratory Results**
	LabReportReceivedDate	Date on which the PDF report was received by the laboratory.	
	EDDReceivedDate	Date on which electronic data were received by the laboratory.	
	LabReportEDDReceivedComments	Details regarding the receipt of laboratory deliverables.	
	LabReportReviewedDate	Date on which the PDF report was reviewed by MLJ staff.	**Initial Laboratory PDF Review**
	LabReportReviewedBy	Staff who completed the report review.	
	LabReportReviewComments	Details regarding the review of the report.	
	LabExceedanceReportRequired	Indication of additional project action requirements triggered by the results.	
	EDDReviewedDate	Date on which the electronic data were reviewed by MLJ DMT.	**Processing of Chemistry EDDs, Processing of Toxicity EDDs, Processing of Tissue EDDs**
	EDDReviewedBy	Staff who completed the electronic data review.	
	EDDDoubleCheck	Staff who verified the electronic data processing.	**Loading Laboratory Results into CV RDC Database**
	EDDReadyToLoad	A true/false field indicating if an EDD is in the queue for loading to the CV RDC.	
	EDDLoadedDate	Date on which a processed EDD was loaded to the CV RDC.	
	EDDLoadedBy	Staff who loaded the data to the CV RDC.	
	EDDComments	Details regarding the processing and loading of the EDD.	
	InvoiceNumber	Identifier of the invoice for the analyses completed and data received.	--
	InvoiceDate	Date on which the invoice was received.	
	InvoiceComments	Details regarding the invoicing process.	

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

VI. FIELD DATA PROCESSING

A. FIELD DATA ENTRY

Field data must be entered into the CV RDC database after each sampling event is complete using information recorded on the field sheets. There are two options for field data entry into the CV RDC: 1) direct field data entry using the Environmental Data Entry and Reporting System (eDERS) hosted by MLML, or 2) upload of field results using the CEDEN Field Template.

1. Option 1 – Field Data Entry via eDERS

Data are entered directly into the CV RDC using the eDERS online webforms. Field data are entered according to the Field Data Entry SOP. The eDERS field data entry forms were developed based on SWAMP field sheets and include drop down lists from the valid lookup list tables to ensure CEDEN comparability.

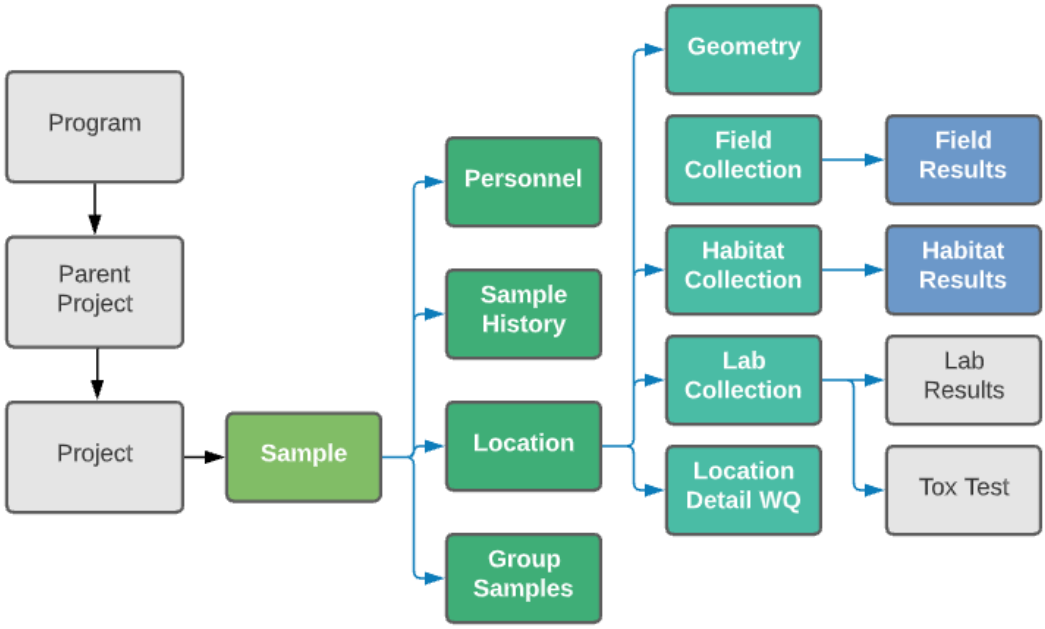
2. Option 2 – Field Data Entry via CEDEN Field Template

If data are formatted in the Field Template, then MLJ DMT staff can load them directly into the CV RDC as a single file, rather than entering results by hand. Data are loaded using a series of queries to add the results to the CV RDC relational database design. Automated checks are performed on the data during the loading process to ensure that results are unique, assigned to the correct project and site information, formatted correctly, contain the correct valid values, and that all required fields are populated. Result table counts are tracked prior to loading and compared to counts after loading to ensure all intended results were uploaded. After the Field Template is loaded, specific verification steps are performed to ensure the correct results have been added into the CV RDC database.

The conceptual relational table design in the CV RDC storing field data is shown in **Figure 5;** the CV RDC design matches the design in CEDEN to ensure comparability and ability to transfer data directly to CEDEN.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Figure 5. Sample through Field and Habitat Result tables the CV RDC Database.



The field data that are usually entered into the CV RDC by MLJ staff are listed in **Table 6**. Fields listed as "required" in **Table 6** must be entered into the database for each sample collected.

Table 6. Field and habitat result tables in the CV RDC.

Only primary fields are included; ancillary fields for each table referenced are not included but can be found in CV RDC documentation available online. All columns described below are preferred to be populated to best describe the project data; however, not all columns are required (are nullable) in the CV RDC database. Fields required to be populated are indicated with a "Yes" in the CV RDC Required column. In some cases, default values may be added by MLJ staff when information is not available from the data submitter.

TABLE NAME	FIELD NAME	FIELD DESCRIPTION	CV RDC REQUIRED
Sample	EventCode	Represents the primary reason for the sampling event at a particular station and date, e.g., water quality, tissue or bioassessment.	Yes
	ProjectCode	References the project that originated the sample.	Yes
	StationCode	A 9-digit assigned code that uniquely identifies the monitoring location within the CV RDC database.	Yes
	SampleDate	The date the sample was collected in the field, expressed as dd/mmm/yyyy.	Yes
	AgencyCode	The acronym for the agency that collected/created the sample.	Yes

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

TABLE NAME	FIELD NAME	FIELD DESCRIPTION	CV RDC REQUIRED
	ProtocolCode	A code representing the sampling protocols and methods used during the sampling event.	Yes
	SampleComments	The comments field should be used for any notes or comments specifically related to the sample collection.	
Sample History	SamplePurposeCode	A code representing the reason samples were collected from a specific station on a specific date to collect (e.g., habitat, water chemistry).	Yes
	PurposeFailureName	A code used to identify if there were any issues with collecting any of the intended samples/information at a site, (e.g., dry site).	Yes
Personnel	PersonnelCode	A code representing the personnel collecting the sample.	Yes
Group Sample	Group Code	Allows programs to group samples together to meet individual program needs, such as by Season.	Yes
Geometry	Latitude	Latitude from which sample was taken in decimal degrees with 5 decimal places.	Yes
	Longitude	Longitude from which sample was taken in decimal degrees with 5 decimal places.	Yes
	GPSDevice	A code identifying the GPS device used to collect the GPS measurements.	Yes
	Datum	The Datum field records the datum that was used on the GPSDevice to record the GPS measurements.	
	GPSAccuracy	The accuracy of the GPS device used to collect the GPS measurements.	
Location Detail	OccupationMethod	Method of station occupation for sample collection (e.g. "Walk In", "From Bridge", or report research vessel name).	
	Starting Bank	Bank where distances are measured from; left or right bank (when looking downstream).	
	Stream Width	Stream Width at the station where sample was taken.	
	Unit Stream Width	Units in which the stream width is measured.	

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

TABLE NAME	FIELD NAME	FIELD DESCRIPTION	CV RDC REQUIRED
	Station Water Depth	The average of the water depth measurements when taking discharge.	
	Unit Station Water Depth	Unit in which Station Water Depth was measured.	
	Hydromodification	Any hydromodification at sample site (e.g., Bridge, ConcreteChannel, Pipes).	
	Hydromodification Loc	Location of hydromodification relative to sample – upstream, downstream, not applicable, or not recorded	
	Location Detail WQ Comments	The comments field should be used for any notes or comments specifically related to location details. Put additional hydromodifications here.	
Lab Collection	Collection Method	The general method of collection (e.g., "Water_Grab", "Sed_Grab", "Autosampler24h")	Yes
	Sample Type	The type of sample collected or analyzed (e.g., "Grab", "Fieldblank", "LCS")	Yes
	Collection Time	The time when the first sample was collected at that site in the field, expressed as hh:mm. (24 hour clock).	Yes
	Replicate	A number that identifies replicates created in the field.	Yes
	Collection Device	The specific device used to collect samples.	Yes
	Position in Water Column	Position in water column where sample was taken.	
	Collection Depth	The depth at which the sample was collected.	Yes
	Unit Collection Depth	The units associated with the above "CollectionDepth" value.	Yes
Habitat Collection	CollectionMethodCode	A code referring to the general method of collection. Default for habitat is "Not Applicable".	Yes
	Collection Time	The time when the first sample was collected at that site in the field, expressed as hh:mm. (24 hour clock).	Yes
Habitat Result	Constituent	A combination of the analyte, matrix, method, fraction, and unit being collected.	Yes
	Variable Result	Non numerical or qualitative result collected as field observations.	
	ResQualCode	A code that qualifies the result for the sample, if necessary. The Default value is "=" for Habitat.	Yes

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

TABLE NAME	FIELD NAME	FIELD DESCRIPTION	CV RDC REQUIRED
	QACode	A code that describes any special conditions, situations or outliers that occurred during or prior to the observation to achieve the result.	Yes
	Collection Device	The specific device used to collect sample.	Yes
	Habitat Result Comments	The comments field should be used for any notes or comments specifically related to the habitat result. Put additional variable results here if needed.	
Field Collection	Collection Method	Refers to the general method of collection. Default value is "Field".	Yes
	Collection Time	The time when the first sample was collected at that site in the field, expressed as hh:mm. (24 hour clock).	Yes
	Collection Depth	The depth at which the sample was collected.	Yes
	Unit Collection Depth	The units associated with the "CollectionDepth" value. The default values should be "m" (meters) for water samples or "cm" (centimeters) for sediment samples.	Yes
	Position Water Column	The position in the water column where the sample was taken.	
Field Results	Constituent	A combination of the analyte, matrix, method, fraction, and unit being collected.	Yes
	Result	The result of the field measurement.	
	ResQualCode	Qualifies the result for the sample, if necessary. The Default value is "=".	Yes
	QACode	A code that describes any special conditions, situations or outliers that occurred during or prior to the observation to achieve the result.	Yes
	Collection Device	A code that refers to the refers to the specific device used in the collection of the sample.	Yes
	Calibration Date	Date on which the field collection device was calibrated.	Yes
	Field Result Comments	The comments field should be used for any notes or comments specifically related to the field result. If any failures or issues occurred put explanation here.	

For all samples collected by MLJ sampling staff, a combination of qualitative habitat results and quantitative field measurements are taken whenever a site is visited.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

The habitat observations that are usually collected by MLJ sampling staff and entered into the CV RDC include:

- Color (specific to either the sediment or water being collected),
- Composition (specific to sediment),
- Dominant substrate,
- Observed flow,
- Odor (of the overall site and the water and/or sediment)
- Other presence,
- Precipitation,
- Precipitation in the last 24 hours,
- Sky code (clear, cloudy, etc.),
- Wadeability of the waterbody,
- Water clarity,
- Wind direction,
- Wind speed.

In addition, MLJ staff take photos of site conditions when visiting a sample location; codes referencing the photo documentation taken by sampling staff are stored in the CV RDC database with habitat parameters.

Quantitative measurements are taken in the field by MLJ staff whenever site conditions allow. Field measurements are taken using multiparameter meters and flow meters according to the Sample Collection SOPs followed by sampling staff. Specific field measurements may vary according to individual project requirements; however, in most cases MLJ staff collect the following measurements that are recorded in the CV RDC during field data entry:

- Air temperature in °C,
- Discharge in cfs,
- Dissolved oxygen in mg/L,
- Specific conductivity in uS/cm,
- pH,
- Water temperature in °C

Once complete, data entry should be tracked by adding the data entry staff name (formatted as last name and first initial) and date of entry in the Field Data Processing table in the MIS Database (**Table 4**).

B. FIELD RESULT QUALITY ASSURANCE

Once field data are entered into the CV RDC database, all electronic field data should be double checked against the original field collection records. Depending on the project this may be all records.

For field results entered directly into eDERs, the final field data are exported and copied into an Excel workbook to review for accuracy using the following steps.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

1. Export Field Data from eDERS

Each of the following items should be exported into a single Excel sheet for the sampling event using the queries provided:

- Sample, Personnel, Group, Purpose, Location, Geometry, and Location Detail information
- Field Results
- Habitat Results
- Lab Collection

2. Compare the Electronic Field Data to the Field Sheets

Each Excel spreadsheet is verified against the field sheets from the sampling event. Data entry QC is completed by a staff member who did not complete the data entry. The Excel files and field sheets should be reviewed for both completeness and accuracy of entry. All sample failures (such as dry sites or sites to which sampling crews could not gain access) should be noted on the field sheets and recorded in the CV RDC and MIS Databases to account for any deviations from the planned monitoring schedule.

Once complete, field result verification should be tracked by adding the data entry staff name (formatted as last name and first initial) and date of verification in the Field Data Processing table in the MIS Database (**Table 4**).

Once field results are entered into the database and verification is complete, MLJ staff will compare the collection information to field QC requirements outlined in the QAPP to ensure that all required QC samples were collected (see **QC Sample Verification and Assessment**). Failure to meet minimum field QC sample requirements during a sampling event must be reported to the Project QA Officer and Project Manager.

C. LABORATORY SAMPLE DETAILS

Once field data are entered into the CV RDC, the laboratory sample detail information is exported and submitted to the laboratories in an Excel file referred to as Sample Details. The laboratories use the Sample Details file to populate the sample collection information required in the CEDEN comparable EDD. The Sample Details includes the CEDEN analyte names of the constituents associated with samples submitted for analysis. Sample Details should be sent to the laboratory as soon as possible after the event is completed and field data are verified. The following information should be queried from the CV RDC to create Sample Details for each sampling event:

- Sample ID (generally a combination of the Station Code and the sample type information)
- Station Code
- Sample Date
- Project Code
- Event Code
- Protocol Code
- Agency Code
- Sample Comments

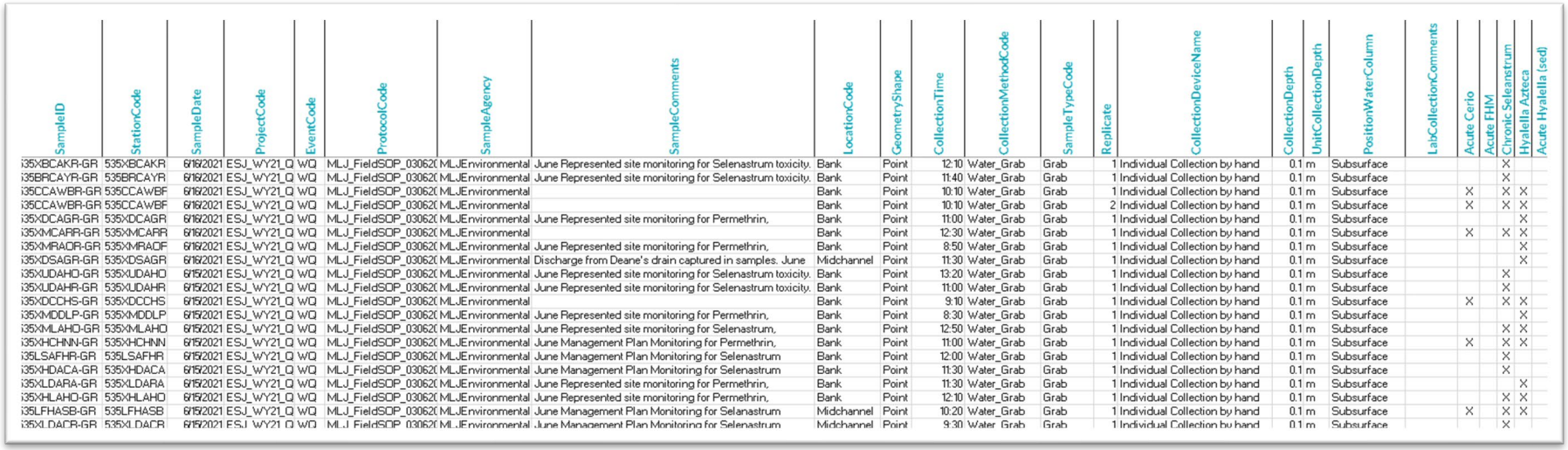
DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

- Location Code
- Geometry Shape
- Collection Time
- Collection Method Code
- Sample Type Code
- Replicate
- Collection Device Name
- Collection Depth
- Unit Collection Depth
- Position Water Column
- Lab Collection Comments

Once submitted to the laboratory, the sample details should be tracked by adding the staff name (formatted as last name and first initial) and date on which the file was sent in the Field Data Processing table in the MIS Database (**Table 4**). An example of a final laboratory Sample Details report is shown in **Figure 6**.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Figure 6. Example sample details sent to a laboratory to assist in completing and formatting EDDs.



SampleID	StationCode	SampleDate	ProjectCode	EventCode	ProtocolCode	SampleAgency	SampleComments	LocationCode	GeometryShape	CollectionTime	CollectionMethodCode	SampleTypeCode	Replicate	CollectionDeviceName	CollectionDepth	UnitCollectionDepth	PositionWaterColumn	LabCollectionComments	Acute Cerio	Acute FHM	Chronic Selenastrum	Hyalella Azteca	Acute Hyalella (sed)
i35XBCAKR-GR	535XBCAKR	6/16/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Selenastrum toxicity.	Bank	Point	12:10	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X		
i35BRCAYR-GR	535BRCAYR	6/16/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Selenastrum toxicity.	Bank	Point	11:40	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X		
i35CCAWBR-GR	535CCAWBF	6/16/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental		Bank	Point	10:10	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface		X		X	X	
i35CCAWBR-GR	535CCAWBF	6/16/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental		Bank	Point	10:10	Water_Grab	Grab	2	Individual Collection by hand	0.1	m	Subsurface		X		X	X	
i35XDCAGR-GR	535XDCAGR	6/16/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Permethrin,	Bank	Point	11:00	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface					X	
i35XMCARR-GR	535XMCARR	6/16/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental		Bank	Point	12:30	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface		X		X	X	
i35XMRAOR-GR	535XMRAOF	6/16/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Permethrin,	Bank	Point	8:50	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface					X	
i35XDSAGR-GR	535XDSAGR	6/16/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	Discharge from Deane's drain captured in samples. June	Midchannel	Point	11:30	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface					X	
i35XUDAHO-GR	535XUDAHO	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Selenastrum toxicity.	Bank	Point	13:20	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X		
i35XUDAHR-GR	535XUDAHR	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Selenastrum toxicity.	Bank	Point	11:00	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X		
i35XDCCHS-GR	535XDCCHS	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental		Bank	Point	9:10	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface		X		X	X	
i35XMDDLP-GR	535XMDDLP	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Permethrin,	Bank	Point	8:30	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface					X	
i35XMLAHO-GR	535XMLAHO	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Selenastrum,	Bank	Point	12:50	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X	X	
i35XHCHNN-GR	535XHCHNN	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Management Plan Monitoring for Permethrin,	Bank	Point	11:00	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface		X		X	X	
i35LSAFHR-GR	535LSAFHR	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Management Plan Monitoring for Selenastrum	Bank	Point	12:00	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X		
i35XHDACA-GR	535XHDACA	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Management Plan Monitoring for Selenastrum	Bank	Point	11:30	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X		
i35XLDARA-GR	535XLDARA	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Permethrin,	Bank	Point	11:30	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface					X	
i35XHLAHO-GR	535XHLAHO	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Represented site monitoring for Permethrin,	Bank	Point	12:10	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X	X	
i35LFHASB-GR	535LFHASB	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Management Plan Monitoring for Selanastrum	Midchannel	Point	10:20	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface		X		X	X	
i35XLDACR-GR	535XLDACR	6/15/2021	ESJ_WY21_Q	WQ	MLJ_FieldSOP_03062(	MLJEnvironmental	June Management Plan Monitoring for Selenastrum	Midchannel	Point	9:30	Water_Grab	Grab	1	Individual Collection by hand	0.1	m	Subsurface				X		

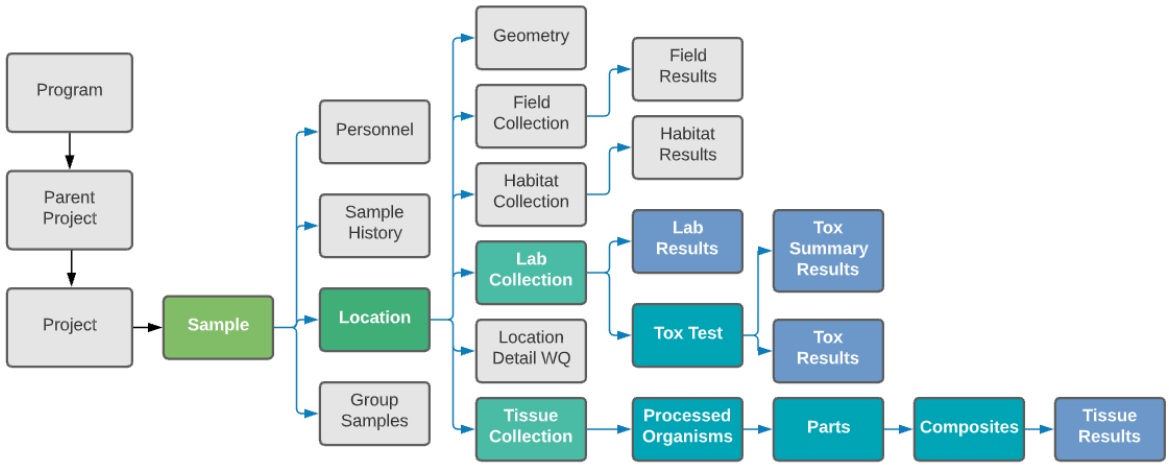
DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

VII. LABORATORY DATA PROCESSING

A. LABORATORY DATA TABLES AND STRUCTURE

Laboratory data are submitted to the MLJ DMT using a CEDEN comparable EDD template. Data are reviewed and loaded into the CV RDC Database through data loading tools that are maintained by the MLJ DMT staff (**Figure 1**). The relational table design in which laboratory data are stored in the CV RDC Database is shown in **Figure 7**.

Figure 7. Sample through Laboratory and Toxicity Result tables within the CV RDC database.



B. MINMUM REQUIREMENTS FOR DATA FORMATTING AND SUBMISSION

Reporting laboratories follow the CV RDC data submission steps can be found on the MLJ website. MLJ DMT staff are available to assist with questions about the processes outlined on the website. Data submission steps are as follows:

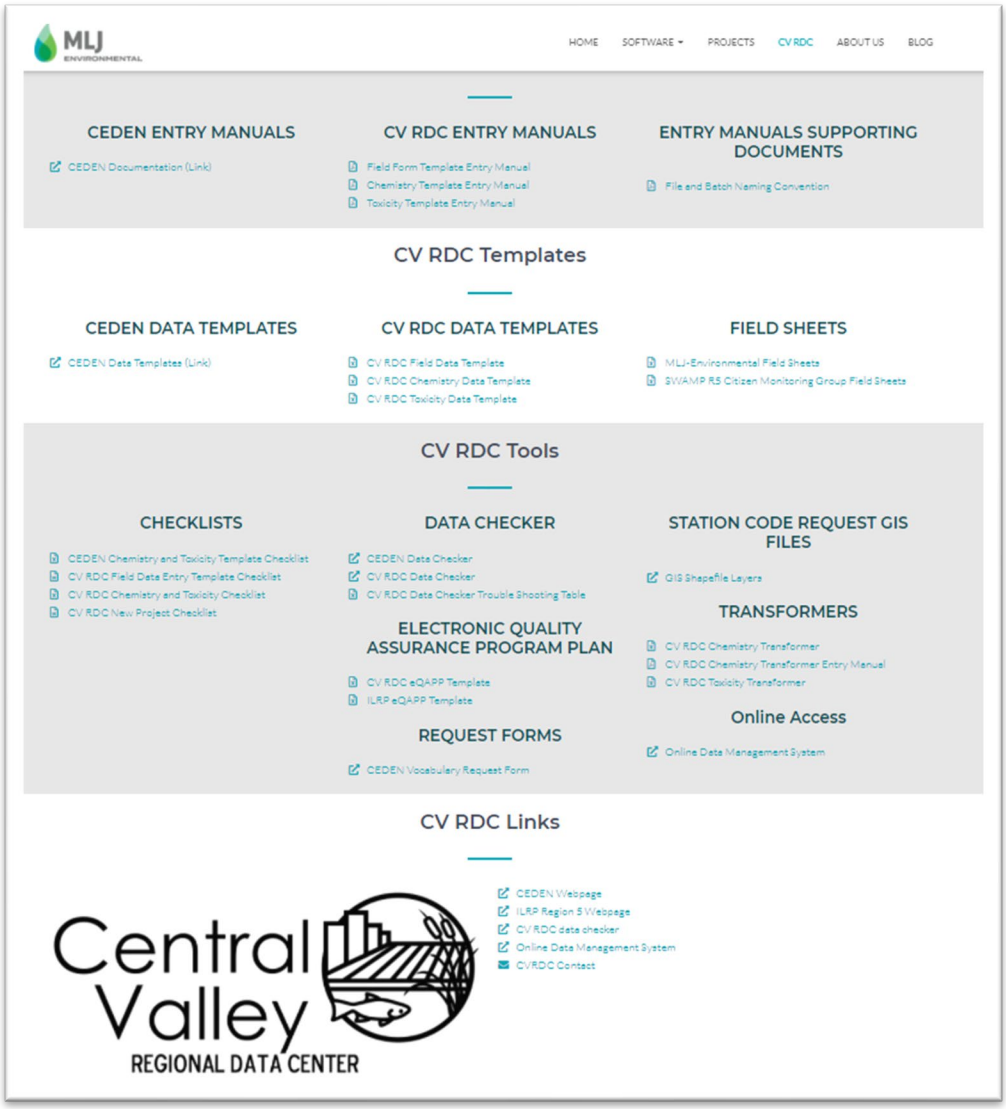
- Step 1: Review of required data elements,
- Step 2: Determine comparability and register project (see **Project Definition**),
- Step 3: Entry into appropriate templates,
- Step 4: Verification that data are correct and comparable,
- Step 5; Submission of data to CV RDC,
- Step 6: Coordination (if appropriate) whether data should be exported to CEDEN.

MLJ works in partnership with laboratories to assist with data reporting. MLJ staff generate **Laboratory Sample Details** for the laboratories to ensure the correct sample collection information is included in the EDD. MLJ ensures all necessary reporting templates and documentation are available online, including online data checkers to facilitate data submission

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

(**Figure 8**). These checkers allow the submitting agencies to double check the EDDs they have generated against common CV RDC/CEDEN business rules and lookup list values.

Figure 8. Online resources for data submissions available on the MLJ website.



C. RECEIPT AND FILING OF LABORATORY RESULTS

Laboratory results are typically received in two formats: a PDF report in the laboratory's standard output format and an EDD in CV RDC/CEDEN template formats. Once received, both the PDF and the original EDD are electronically filed on secure servers and marked as received by MLJ DMT staff in the Laboratory Data Processing table in the MIS Database (**Table 5**). All documents must be retained for a minimum of 10 years.

Laboratory reports and EDD files are received by email from the individual project and/or data managers for each laboratory. Results should be received according to the schedule as outlined

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

in individual laboratory contracts and the QAPP. Though turnaround times may vary, laboratories are generally expected to provide the PDF report within 30 days of sample submission and the EDD within 45 days; preliminary results from toxicity testing are generally expected within two weeks. Occasionally, unforeseen delays can occur for receiving laboratory information (such as re-analyses due to QC failure). When laboratory deliverables are not received within the specified timeframe, MLJ staff will follow up with laboratory staff and request an estimated date for the deliverable. Deliverables that are excessively late must be discussed with the Project QA Officer.

Laboratory deliverables must be entered in the MIS Database with a receipt date that reflects the business day on which the laboratory submitted them to MLJ. Any deliverables received before 4 PM on a business day should be recorded with that received date; any deliverables received on a weekend, holiday, or after 4 PM on a business day should be marked as received on the next business day.

D. INITIAL LABORATORY PDF REVIEW

Laboratory results are usually provided in the PDF report prior to receiving the EDDs. Results received in the PDF should be reviewed for completeness and high-level QC concerns immediately upon receiving the report from the laboratory. This initial review allows the opportunity to resolve questions or concerns with the laboratory before the results are provided in the EDD. Furthermore, for some projects, results exceeding thresholds or trigger limits are assessed and reported within a specific time frame according to their program requirements. Trigger limit assessments are completed during this review to ensure program deadlines are met.

Review of the laboratory report is only an initial review; the same checks are repeated during the more in-depth EDD review outlined below. At a minimum, the initial checks of the PDF report should include:

- **Initial sample completeness.** Ensure all analytes requested are reported.
- **Initial blank sample assessment.** Ensure there are no detections above the allowable limit in laboratory and field blanks.
- **Initial positive control sample assessment.** Check the recoveries reported for MS and LCS samples. For projects where the QAPP states that all MS samples with zero percent recovery are reanalyzed, MLJ DMT staff will ensure reanalysis did occur. Reports with multiple positive control failures should be reviewed by the Project QA Officer.
- **Case narrative review.** Any anomalous or concerning issues identified in the report case narrative should be communicated to and reviewed by the QA Officer.

Any reporting discrepancies should be communicated back to the laboratory for clarification and/or a revised report. Significant QC issues noted by MLJ DMT staff during the initial review should be further reviewed by the Project QA Officer to ensure the project requirements are met and determine whether corrective actions need to be taken by the laboratory or MLJ staff. Communications with the laboratory or the QA Officer should occur as soon as possible to ensure project timeline requirements (such as trigger limit exceedance reporting deadlines) are met.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

E. PROCESSING OF CHEMISTRY EDDS

Prior to loading an EDD into the CV RDC database, each EDD is reviewed following a checklist that has been customized for the specific reporting laboratory, data type, and project (when applicable). The fundamental checklist items are described below; the detailed checklist used to process chemistry EDDs is provided in **Attachment A**.

EDD reviews require three items: the EDD, the accompanying PDF laboratory report, and eQAPP information.

1. Verify Sample Analysis

All laboratory results should be verified against the sample collection records and COCs upon receipt from the laboratory. Each record in the original monitoring schedule in the MIS that was marked as sampled should now be marked as completed for the analysis. Any missing or mis-reported analyses must be communicated back to the laboratory. Expected analyses that were not completed must be marked as incomplete and qualified with the correct Sample Failure Code on the Analysis Count table in the MIS Database (**Table 3**).

The Project QA Officer is responsible for overseeing laboratory result verification and ensuring that revised reports and data deliverables are received, as necessary. The Project QA Officer may delegate some of this work including communication with the laboratory, follow ups regarding revised report and tracking of QC anomalies.

Any re-analyses should be reviewed by the Project QA Officer for proper reporting procedures. The Project QA Officer or their delegate should communicate with the laboratory to decide which data are acceptable and ensure they are properly flagged and qualified. Only one set of results for any analysis will be loaded into the CV RDC Database (reanalysis results can be referenced in result comments).

2. Remove Extra Non-Project QC Data

Analytical batches processed in the laboratory often contain samples from multiple projects; when laboratories provide all QC results associated with a batch, they may include matrix spike results performed on samples from a different project. At the discretion of the QA Officer, MLJ DMT staff will remove any extra non-project or non-direct data that is not needed to qualify results. Occasionally non-project data are needed to fulfill batch QC requirements; when this occurs, data are assessed against the same QAPP requirements used for project-generated samples (see **Verify Laboratory Data Quality Control**).

3. Verify Results

Electronic data deliverables should be verified against the PDF reports to ensure reporting consistency between report formats. When laboratories generate EDDs directly from their Laboratory Information Management System (LIMS), a minimum of 10% of the data must be verified against the PDF report. When EDDs are hand entered by the laboratory, 100% of the results provided must be checked against the report.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

If discrepancies are found during the 10% data verification, additional verification is needed to ensure the laboratory export is correct and matches the PDF laboratory report. Issues are communicated back to the laboratory and, if needed, a new export will be requested.

4. Verify Processing and Analysis Information

All analytical sample processing and analysis information should be verified against the project-specific requirements outlined in the eQAPP and against the business rules of the CV RDC (e.g., correct formatting of the LabBatch identifier). Any discrepancies between the processing and analysis information and the expected requirements in the project eQAPP should be communicated back to the contract laboratory and the report amended if applicable. At a minimum, results will be checked for:

- Expected LabBatch formatting utilizing CV RDC batch naming conventions.
- Expected batch grouping – ensure that the LabBatch is grouped by method.
- Expected batch completion times – ensure the analysis dates and digest/extract dates (where applicable) in a batch are within 24 hours of each other.
- Expected analyte/calculation reporting.
- Expected preparation or digest methods.
- Expected minimum detection limits (MDLs) and reporting limits (RLs) - ensure detection and reporting limits match those specified in the eQAPP. Diluted samples are reported with elevated detection and reporting limits, so only results with a dilution factor of 1 would be expected to match the QAPP.
- Expected reporting units.

5. Verify Formatting

Fields that are not controlled by valid values (e.g., comment fields) need to be reviewed to ensure consistency and usability. According to CV RDC business rules and the original SWAMP formatting, the Lab Result Comments field is used to capture percent recovery (PR) and relative percent difference (RPD) values for accuracy and precision control samples. The laboratory result comment field should be formatted as follows for all MS, LCS, laboratory duplicate, or field duplicate samples:

1. Indicate PR or RPD, followed by the calculated value: PR XX or RPD XX. (e.g, PR 99)
    - When in combination, separate the two values with a comma: PR XX, RPD XX (e.g. PR 99, RPD 5).
    - Some programs indicate FD RPD XX for field duplicates.

Any non-detect results should be blank and coded “ND” for the result qualifier code. Results below the MDL are considered non-detect.

6. Calculating Field Duplicate Precision

Field duplicate RPD (or applicable precision evaluation) calculations are not normally provided by the laboratory; these values must be calculated according to requirements outlined in the QAPP and added to the Lab Result Comments of the EDD for evaluating field duplicate acceptability.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

When a field duplicate or parent sample result is non-detect the RPD cannot be calculated and the RPD is indicated as “RPD NA” in the Lab Result Comments field.

7. Verify Laboratory Data Quality Control

All laboratory analysis results will be verified against the current MQOs stored in the eQAPP Database. Any data that do not meet the project acceptability criteria must be flagged with an approved quality assurance flag defined in the CV RDC/CEDEN QACode LookUp lists. Common quality assurance flags are listed in **Table 7** as well as business rules for how the codes are applied for most projects in which data are processed by MLJ staff. All acceptable, unflagged data are assigned a QACode of None to indicate there were no anomalies for which a QACode is required. No records with an unpopulated QACode field can be loaded to the database.

If necessary, MLJ DMT staff will update QACodes applied by the laboratory to match the project QA requirements. Any updates will be highlighted and provided to the laboratory to ensure the correct QACode is applied in future EDDs.

Any quality assurance concerns that require an additional code not yet approved for use in a specific project must be reviewed by the project QA Officer. All approved codes are reviewed for CV RDC/CEDEN comparability and for consistency of QA failure classification by the Project QA Officer. Qualified data are still considered useable as multiple factors are considered when determining usability; refer to specific QAPPs for information regarding the determination of useable data.

At a minimum, the following QC checks must be performed prior to loading analytical data into the database:

- **Hold time compliance.** Samples are evaluated to ensure they were performed within the designated hold time outlined within the eQAPP.
- **QC sample frequency evaluation.** Depending on the specific requirements outlined in the QAPP, most batches should be analyzed with the following QC samples:
  - Laboratory blank,
  - Laboratory control spike (LCS),
  - Matrix spike (MS), and
  - Laboratory duplicate.

  When sample frequency requirements are not met, the LabSubmissionCode is updated to “QI” to indicate incomplete QC; otherwise, the LabSubmissionCode is populated according to the **LabBatch Information Updates** conventions. A Lab Batch Comment is always required to indicate why batch QC frequency was not met.
- **Field QC sample evaluation.** All applicable field QC should be evaluated according to the requirements in the eQAPP. This usually includes (but is not limited to):
  - Field blank detections – any field blank detections should be below the acceptable limit outlined in the eQAPP.
  - Field duplicate acceptability – field duplicate RPDs must be below the acceptable limit outlined in the eQAPP.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

- **Laboratory QC sample evaluation.** All applicable Laboratory QC should be evaluated according to the requirements in the eQAPP. This usually includes (but is not limited to):
  - Laboratory blank detections – any laboratory blank detections should be below the acceptable limit outlined in the eQAPP.
    - When laboratory blank results do not meet MQOs, any associated environmental samples with detectable results (> MDL) should also be flagged as "FI" indicating the analyte was present in both the environmental sample and its associated blank.
  - Laboratory control spike (LCS) recoveries – PR values for LCS samples should be within the acceptable limits outlined in the eQAPP.
  - Matrix spike recoveries – PR values for MS samples should be within the acceptable limits outlined in the eQAPP.
  - Laboratory replicate acceptability – laboratory replicate RPDs must be below the acceptable limit outlined in the eQAPP.
  - Surrogate recoveries - PR values for surrogate samples should be within the acceptable limits outlined in the eQAPP.

Table 7. Common quality assurance codes and flagging rules for chemistry data.

Sample Type		QA Code	Code Description	Flagging Business Rules
Environmental Samples	Holding Time	H	A holding time violation has occurred	Apply to each result with the holding time exceeded. Apply to matrix spikes with parent environmental samples. Do not apply to LABQA.
	Dilutions performed	D	EPA Flag - Analytes analyzed at a secondary dilution	Apply to results with a dilution factor greater than 1.
	Blank Contamination	FI	Analyte in field sample and associated blank	Apply to environmental results with detections that are associated with a laboratory blank result that was above the acceptable limit. LabBlank is flagged with "IP"; LabBlank and environmental results are given a compliance code of QUAL.
Field QC Samples	Field Blanks	IP/IP5[1]	Analyte detected in method, trip, or equipment blank	Apply to field blank results with a detection above the acceptable limit.
	Field Duplicates	FDP	Field duplicate RPD outside of established limits	Apply to results for both replicates with an RPD above the acceptable limit.
Laboratory QC Samples	LabBlank	IP	Analyte detected in method, trip, or equipment blank	Apply to lab blank result with a detection above the acceptable limit.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Sample Type		QA Code	Code Description	Flagging Business Rules
	MS/MSD	GB	Matrix spike recovery not within control limits	Apply to MS or MSD result with a percent recovery outside of project QC limits.
	LCS	EUM	LCS recovery is outside of control limits.	Apply to LCS results with a percent recovery outside of project QC limits.
	CRM	GBC	CRM analyte recovery is outside of control limits.	Apply to CRM results with a percent recovery outside of project QC limits.
	Laboratory Dup/MSD	IL	Duplicate analysis not within control limits.	Apply to results for both replicates with an RPD above the acceptable limit.
	000NONPJ samples	QAX	When the native sample for the MS/MSD or DUP is not included in the batch reported	Apply to 000NONPJ samples when the native sample is not included in the batch reported.
Surrogates		GN	Surrogate recovery is outside of control limits	Apply to both the surrogate that did not meet QC limits and to the analytes/sample associated to that surrogate. If there are two surrogates performed for a sample and one is outside project QC limits and one is inside QC limits, GN is applied to all analytes for that sample except the surrogate that was inside QC limits.
Rejecting Batches		R	Data rejected - EPA Flag	Apply to all samples within a rejected batch (environmental and QC) that are outside project QC limits and the program QA officer determines to be rejected. (See Rejected Chemistry Results section for details)

[1]The use of the specific "IP" code may vary by project according to the FB evaluation requirements outlined in the QAPP; the determination of the correct code to use is at the discretion of the Project QA Officer.

8. LabBatch Information Updates

The CV RDC business rules applied to most projects when reviewing and updating the LabBatch worksheet within the CEDEN template are as follows:

- **LabSubmissionCode updates**. For data processed by MLJ DMT staff, the Lab Submission Code is updated anytime a QACode other than None is used in a batch. Batches where all results have a QACode of "None" have a LabSubmissionCode of "A" for acceptable. If the batch has any QACode other than "None", "A,MD" is applied indicating acceptable with minor deviations .

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

- **BatchVerificationCode updates.** Unless otherwise specified, all data processed by MLJ staff according to the steps outlined in this SOP are given a batch verification code of "VAC" indicating a cursory verification was completed.

9. Unique Row Verification

Unique records are verified by completing two checks:

- Ensure that there is only one analyte and fraction for each station, sample date, and sample type for environmental samples, and
- Ensure all required CV RDC fields are unique in the EDD.

10. Chemistry Data Checker

Once the EDD review is complete, the processed EDD is uploaded into a CV RDC/CEDEN online data checker for a verification of business rules and valid values by the MLJ DMT. A data checker is an online tool into which a data provider can upload a populated template to run the data set through a series of automated checks. The data checker provides a report to the data provider via email identifying errors that need to be resolved and issues that need to be reviewed in the submitted EDD. In most cases, errors identified by the data checker are database requirements and must be resolved for the data to be uploaded into the CV RDC database. Other items identified as potential issues with the EDD are warnings which may be project specific or not applicable to the data set. All potential issues identified by the data checker are evaluated and addressed, when applicable, by the MLJ DMT in coordination with the data provider and/or laboratory (as needed) prior to finalizing the EDD and loading it into the CV RDC database (see **Loading Laboratory Results into CV RDC Database**). Processed EDDs may be uploaded to the data checker more than once to ensure all applicable errors and warnings have been successfully corrected. Links to data checkers used for CV RDC data can be found on the MLJ Environmental website; the specific data checker that should be used for an EDD is dependent on the project and the CEDEN template being submitted.

11. Rejected Chemistry Results

Results that do not meet project acceptance criteria must be assessed through the corrective action process (see Corrective Action/Resolution). When corrective actions are assessed and no resolution can be reached the rejection of results that do not meet QC requirements as outlined by the QAPP are left to the discretion of the Project QA Officer. The Project QA Officer works in coordination with data users and any project-specific authorities or regulators to assess the QC failures according to project goals and determine whether results should be rejected.

Results that are rejected by the QA Officer, and are therefore considered unusable for the project goals, are processed and flagged with a QACode of "R" for rejected. Individual rejected results should be formatted as follows:

- The result is removed from the Result column (cell is null) and the ResQualCode updated to "NR".
- The Lab Result Comments are updated to indicate the original result of the failed sample,
  - Example: "Original result 0.02 ug/L. Batch rejected. See batch comments."

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

- An applicable Lab Batch Comment is applied to indicate why the batch and/or result was rejected.
- Appropriate QACode flags, indicating that QC limits that were not met, are applied in addition to the rejected QACode.

If the whole batch is rejected, the following updates are made to the batch-level information:

- The Lab Submission Code is updated with an "R,QC" indicating that the batch is rejected;
- The batch verification code is updated to "VR"; and
- The compliance code is also updated to "Rej" to indicate that the data are rejected and unusable for intended purposes.

12. Chemistry EDD Review MIS Tracking

Once complete, the EDD review should be tracked by adding the staff name (formatted as last name and first initial) and date on which the review was completed in the Laboratory Data Processing table in the MIS Database (**Table 5**).

F. PROCESSING OF TOXICITY EDDS

Like the chemistry EDDs, MLJ DMT staff process individual toxicity EDDs prior to loading them into the CV RDC Database. Each EDD is reviewed following a checklist that has been customized for the specific reporting laboratory, data type, and project when applicable. The fundamental checklist items are described below; a detailed checklist used to process toxicity EDDs is provided in **Attachment B**.

EDD reviews require three items: the EDD, the accompanying PDF laboratory report, and the eQAPP project information.

1. Verify Sample Analysis

Toxicity results should be verified against the sample collection records and the MIS Database according to the same steps outlined above for chemistry results (**Verify Sample Analysis**).

2. Verify Results

Toxicity results should be verified against the final laboratory PDF report according to the same steps outlined above for chemistry results (**Verify Results**).

3. Verify Processing and Analysis Information

All toxicity sample processing and analysis information should be verified against the project-specific requirements outlined in the eQAPP and against the business rules of the CV RDC Database (e.g., correct formatting of the LabBatch identifier**)**. Any discrepancies between the processing and analysis information and the expected requirements in the project eQAPP should be communicated back to the contract laboratory; if applicable, the report should be amended by the laboratory and resubmitted. At a minimum, toxicity results will be checked for:

- Expected ToxBatch formatting utilizing CV RDC batch naming conventions.
- Expected batch grouping – ensure that the ToxBatch is grouped by method and organism.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

- Expected test and method information.
- Expected statistical information.
- Expected organisms and endpoints.

4. Calculating Field Duplicate Precision

Field duplicate RPD (or applicable precision evaluation) calculations are not normally provided by the laboratory; these values must be calculated according to the requirements outlined in the QAPP and added to the ToxPointSummaryComments field of the EDD for evaluating field duplicate acceptability. According to CV RDC business rules, the RPD calculation in the ToxPointSummaryComments field should be formatted as "RPD XX" or, for some projects, as "FD RPD XX" for field duplicates.

5. Verify Laboratory Data Quality Control

Toxicity results should be verified against the current MQOs stored in the eQAPP Database. Like chemistry data, any data that do not meet the project acceptability criteria must be flagged with an approved quality assurance flag defined on the CV RDC/CEDEN QA Code LookUp lists. Common quality assurance flags are listed in **Table 8**. All acceptable, unflagged data are assigned a QACode of None to indicate there were no anomalies for which a QACode is required. All records must have QACode field in order to be loaded to the database.

At a minimum, the following QC checks must be performed prior to toxicity data being loaded into the database:

- **Hold time compliance.** Samples are evaluated to ensure they were performed within the designated hold time outlined within the eQAPP.
- **QC sample frequency evaluation.** Depending on the specific requirements outlined in the eQAPP, toxicity batches should be analyzed with at least one negative control (CNEG) sample.
  When QC sample frequency requirements are not met, the LabSubmissionCode is updated to "QI" to indicate incomplete QC. A ToxBatchComments is required to indicate why batch QC frequency was not met.
- **Field QC sample evaluation.** All applicable field QC should be evaluated according to the frequency requirements in the eQAPP. This usually includes (but is not limited to):
  - Field duplicate acceptability – field duplicate RPDs must be below the acceptable limit outlined in the eQAPP.

Table 8. Common quality assurance codes and flagging rules for toxicity data.

Sample Type		QA Code	Code Description	Flagging Business Rules for ToxSummary TestQACode
Environmental Samples	Holding Time	H	A holding time violation has occurred	Apply to each result with the holding time exceeded. Do not apply to LABQA.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Sample Type		QA Code	Code Description	Flagging Business Rules for ToxSummary TestQACode
	Dilutions performed	D	EPA Flag - Analytes analyzed at a secondary dilution	Apply to results with a dilution other than 100.
Field QC Samples	Field Duplicates	FDP	Field duplicate RPD outside of established limits	Apply to results for both replicates with an RPD above the acceptable limit.
Laboratory Control Samples	CNEG	TAC	Alternative control used in toxicity statistical analysis	Apply to CNEG that was not utilized in statistical analysis
	CNSL/ CNpH[1]	TCF	Alternative control does not meet test acceptability criteria	Apply to alternative control result that is outside of TAC limits.
Samples with Water Quality Parameter Issues		TCI	Conductivity insufficient for test species	Apply to applicable sample only
		TCT	Conductivity tolerance exceeded for test species	Apply to applicable sample only
		TR	Test conditions not acceptable (temp, light)	Apply to applicable sample only
		TW	Water quality parameters outside recommended test method ranges	Apply to applicable sample only
		TWN	Required water quality parameters not measured	Apply to applicable sample only
		TA	Ammonia precision or accuracy exceeds laboratory control limit	Apply to applicable sample only
Sample with Organism or Survival Issues		PRM	Low survival in toxicity test resulted from test interference due to pathogen-related mortality	Apply to applicable sample only
		TOQ	Number of organisms in a toxicity test do not meet the minimum quantity per replicate at test initiation or an unequal quantity of organisms per replicate is used	Apply to applicable sample only. Ensure OrganismPerRep is correct.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Sample Type	QA Code	Code Description	Flagging Business Rules for ToxSummary TestQACode
	TAE	Organism exceeds age limit	Apply to applicable sample only
Replicate Issues	RLST	Replicate lost or destroyed	Apply to applicable sample only. Ensure RepCount is adjusted accordingly.
Rejecting Batches	R	Data rejected - EPA Flag	Apply to all samples within a rejected batch (environmental and QC) that are outside project QC limits and the program QA officer determines to be rejected. (See **Rejected Toxicity Results** section for details)

6. ToxBatch Information Updates

ToxBatch information should be populated according to CV RDC business rules as outlined in the chemistry section; see **LabBatch Information Updates** section above.

7. Toxicity Unique Row Verification

Unique records are verified by completing two checks:

- Ensure that there is only one organism and endpoint for each station, sample date and sample type for environmental samples, and
- Ensure all required CV RDC fields are unique in the EDD.

8. Toxicity Data Checker

Once the EDD review is complete, toxicity results should be uploaded to the CV RDC/CEDEN data checkers according to the same steps outlined for chemistry data above (**Chemistry Data Checker**).

9. Rejected Toxicity Results

Results that do not meet project acceptance criteria must be assessed through the corrective action process (see Corrective Action/Resolution). When corrective actions are assessed and no resolution can be reached the rejection of results that do not meet QC requirements as outlined by the QAPP are left to the discretion of the Project QA Officer. The Project QA Officer works in coordination with data users and any project-specific authorities or regulators to assess the QC failures according to project goals and determine whether results should be rejected.

Results that are rejected by the QA Officer are considered unusable for the project goals and are processed with other results and flagged with a QACode of “R” for rejected. Individual rejected toxicity results should be formatted as follows:

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

- PercentEffect is removed (cell is null),
- SigEffect updated to “NA”
- TestQACode updated to “R”
- ComplianceCode as “REJ”
- The mean is left as is with the mean populated
- The tox point summary comments are updated to indicate why the samples were rejected
  - Example: “Control did not meet test acceptability criteria. Rejected data.”
- An applicable tox batch comment is applied to indicate why the batch or sample was rejected.
- Appropriate QACode flags, indicating that QC limits that were not met, are applied in addition to the rejected QACode.

If the whole batch is rejected, the following updates are made to the batch-level information:

- The LabSubmissionCode is updated with an “R,QC” indicating that the batch is rejected,
- The BatchVerificationCode is updated to “VAC,VCN” (Cursory Verification, Tox Control Failure, Flagged by QAO),
- The ComplianceCode is updated to “Rej” to indicate that the data is rejected and unusable for all intended purposes.

10. Toxicity EDD Review MIS Tracking

Once complete, the EDD review should be tracked by adding the staff name (formatted as last name and first initial) and date on which the review was completed in the Laboratory Data Processing table in the MIS Database (**Table 5**).

G. PROCESSING OF TISSUE EDDS

Prior to loading a tissue EDD into the CV RDC database, each EDD is reviewed following a checklist that has been customized for the specific reporting laboratory, data type, and project (when applicable). The fundamental checklist items are described below; the detailed checklist used to process chemistry EDDs is provided in **Attachment C**.

EDD reviews require three items: the EDD, the accompanying PDF laboratory report and eQAPP project information.

Tissue EDD processing follows the same steps outlined above in the **Processing of Chemistry EDDs** section; the major exception is the review of the sample composite information outlined below. The composite review steps are completed first, then the steps for chemistry EDDs can be followed to compete the process.

1. Fish Composite

For fish tissue samples the below items on the tissue template fish composite worksheet must be reviewed for accuracy, consistency and adherence to CV RDC business rules:

- Ensure sample and collection information matches field data entry (Columns A -N).
- Ensure TisSource is “NA”.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

- Ensure Organism IDs follow a recognizable, consistent convention for the program.
- If fork and total length are recorded, ensure the total length is larger than fork length.
- If the project is a human health study, ensure that the smallest fish total length is no more than 20% difference compared to the largest fish total length (if applicable according to the QAPP).
- Review for extreme or erroneous values for fork length, total length, and weight of fish.
- Ensure TissueID's follow a recognizable, consistent convention for the program.
- Ensure TissueName and PartsPrepPreservationName matches tissue processing procedures in QAPP.
- Review the tissue weight against the weight of fish to ensure the tissue weights are lower (or similar where the whole fish was used).
- Ensure CompositeIDs follow a recognizable, consistent convention for the program. Often CompositeIDs should include the StationCode, sample date, and organism reference. If the program has individual vs composite samples typically "I" or "C" are referenced in the CompositeID.
- Ensure that the CompositeWeight, CompositeType, CompositeReplicate, UnitCompositeWeight, HomogDate, OrganismGroup, ComAgencyCode are the same for each CompositeID.
- Review the individual organism weights against the CompositeWeights and ensure there are no extreme or erroneous values.

2. Bivalve Composite

For bivalve tissue samples the below items on the tissue template bivalve composite worksheet must be reviewed for accuracy, consistency, and adherence to business rules:

- Ensure sample and collection information matches field data entry (Columns A -N).
- Ensure TisSource is "Resident" or "Transplant".
- Ensure OrganismID's follow a recognizable, consistent convention for the program.
- Ensure ShellLength, ShellWidth and LengthWidthType are consistent; check for extreme or erroneous values.
- Ensure individual bivalve measurements are provided. If the program is not reporting individual bivalve measurements, ensure QAPP allows for averaging measurements.
- Ensure TissueID's follow a recognizable, consistent convention for the program.
- Ensure TissueName and PartsPrepPreservationName match tissue processing procedures in QAPP.
- Review for erroneous values for tissue weight compared to organism weight (if reported).
- Ensure the CompositeIDs follow a recognizable, consistent convention for the program. CompositeIDs should include StationCode, sample date, and organism reference. If the program has individual vs composite samples typically "I" or "C" are referenced in the CompositeID.
- Ensure that the CompositeWeight, CompositeType, CompositeReplicate, UnitCompositeWeight, HomogDate, OrganismGroup, ComAgencyCode are the same for each CompositeID.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

- Review the individual organism weights against the CompositeWeights and ensure there are no extreme or erroneous values.

3. Super Composite

For super composite samples the below items on the tissue template super composite worksheet must be reviewed for ensure accuracy, consistency, and adherence to business rules:

- Ensure CompositeSourceID matches ID from original composite worksheet.
- Ensure CompositeType, CompositeReplicate, CompositeWeight and UnitCompositeWeight are the same for each SuperCompositeID.
- Ensure SuperCompositeIDs follow a recognizable, consistent convention for the program.
- Ensure CompositeType equals “super”.

4. Verify Tissue Result

When verifying tissue chemistry results follow the steps outlined in the **Verify Results** section above for processing chemistry EDDs. In addition to those steps, tissue results must also be checked for the following:

- Ensure SampleTypeCode equals “Composite”.
- Ensure the CompositeID matches between results worksheet and corresponding composite worksheet.
- Ensure OrganismGroup is applicable to the corresponding type of composite.

5. Verify Processing and Analysis Information

Processing and analysis information should be verified according to the **Verify Processing and Analysis Information** steps outlined for chemistry EDDs.

6. Verify Formatting

Formatting should be verified according to the **Verify Formatting** steps outlined for chemistry EDDs.

7. Verify Laboratory Data Quality Control

Laboratory data quality control samples are verified according to the **Verify Laboratory Data Quality Control** steps outlined for chemistry EDDs.

8. LabBatch Information Updates

Laboratory batch information should be process according to the **LabBatch Information Updates** steps outlined for chemistry EDDs.

9. Unique Row Verification

Unique row checks for tissue data are run according to the **Unique Row Verification** steps outlined for chemistry EDDs.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

10. Tissue Chemistry Data Checker

Tissue data are run through data checkers according to the **Chemistry Data Checker** steps outlined for chemistry EDDs.

11. Rejected Tissue Chemistry Results

Results that do not meet project acceptance criteria must be assessed through the corrective action process (see Corrective Action/Resolution). When corrective actions are assessed and no resolution can be reached the rejection of results that do not meet QC requirements as outlined by the QAPP are left to the discretion of the Project QA Officer. The Project QA Officer works in coordination with data users and any project-specific authorities or regulators to assess the QC failures according to project goals and determine whether results should be rejected.

Tissue chemistry data are rejected and coded according to the **Rejected Chemistry Results** steps outlined for chemistry EDDs.

12. Chemistry EDD Review MIS Tracking

Once complete, the EDD review should be tracked by adding the staff name (formatted as last name and first initial) and date on which the review was completed in the Laboratory Data Processing table in the MIS Database (**Table 5**).

H. CORRECTIVE ACTION/RESOLUTION

Results that fail to meet project acceptance criteria due to errors in the field or lab trigger the initiation of the corrective action process. While the specific process may vary by project, there are four general steps that should be followed to complete this process:

1. Identification of the error or deviation,
2. Documentation and tracking,
3. Investigation of the root cause, and
4. Review/follow up to assess if the error has been successfully corrected.

As the MLJ DMT staff are the first reviewers of data received from laboratories, they are primarily involved in the identification and documentation of errors and deviations.

When errors are found in either the PDF report or the EDD file which prevent the data from being processed and/or loaded into the database, the following actions should be performed:

- The appropriate laboratory will be contacted regarding the issue(s) requiring resolution and sent a copy of the data file to use as a reference if needed.
- If the issue requires a resubmission, a revised data file and/or hardcopy report will be requested from the laboratory.

All minor issues will be revised by the MLJ DMT staff in the EDD file; the laboratory must be notified of any changes to the final data file prior to loading.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Similarly, for field deviations/errors identified during the data review process, the field crew and project manager will be notified, and any additional actions discussed for correcting the data and preventing similar issues in the future.

Any laboratory errors that cannot be resolved by an updated report or data file must be reviewed by the QA Officer and assessed for the necessity of further investigation or resolution. The QA Officer works with the labs to establish proper documentation and corrective actions for laboratory errors.

For most projects, follow up reviews of implemented corrective actions occur on two levels:

1. Summaries and reviews of corrective actions are provided to data users and regulators through annual QA assessment reports, and
2. Reviews with laboratory staff occur through annual meetings conducted by the QA Officer and data managers assessing performance and data needs.

The associated QAPP provides additional guidance regarding project-specific corrective actions and should be referenced when determining the level to which step 3 and 4 should be implemented.

I. PROVIDING CHEMISTRY RESULTS FOR TOXIC TOXICITY RESULTS (PHASE III TIE)

For certain projects, toxicity samples in which the organisms exhibit a certain amount of toxic effect may require further investigation as to the source of the toxicity in the samples. Toxicity Identification Evaluations (TIEs) may be performed and, as part of a Phase III TIE, chemistry results can be used to evaluate the toxic effect of specific analytes detected in the sample. When a TIE is triggered (according to limits defined by the program requirements), MLJ DMT staff provide relevant chemistry data associated with the sample that is determined to be toxic to one or more organisms, back to the toxicity laboratory so that a Phase III TIE can be completed.

If there are relevant chemistry results available to send back to the laboratory, MLJ DMT staff export these results into a Phase III TIE chemistry data template once the originally reported results have been verified and loaded into the database. The Laboratory Data Processing table in the MIS Database is updated to reflect that chemistry results were sent to the laboratory. The laboratory uses the data provided to calculate the toxic units of any detected analytes for the TIE investigation summary in the final laboratory report.

J. LOADING LABORATORY RESULTS INTO CV RDC DATABASE

Once an EDD is processed and verified (the checklist is completed and any remaining laboratory questions are answered and updated), the EDD is placed in a queue for loading into the CV RDC Database. Prior to loading, EDDs should be double-check by one additional staff member to ensure the data processing steps have been completed as outlined above. MLJ DMT staff follow internal SOPs specific to loading chemistry, toxicity, and tissue EDDs into the CV RDC database.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Completion of each of these steps are tracked in the Laboratory Data Processing table of the MIS Database.

Data are loaded using a series of queries to add the results to the CV RDC relational database design. Automated checks are performed on the data prior to loading to ensure that results are unique, assigned to the correct sample collection information, formatted correctly, contain the correct valid values, and that all required fields are populated. Result table counts are tracked prior to loading and compared to counts after loading to ensure all intended results were uploaded. After the EDD is loaded, specific verification steps are performed to ensure the correct results have been added into the CV RDC database. Basic data queries are run after all results are loaded to verify the correct permissions and usability codes are on the results.

Any discrepancies will be noted and communicated back to the Project Manager and Project QA Officer to be reconciled. The loaded EDD is filed in the appropriate internal system as described above (**Receipt and Filing of Laboratory Results**); loaded copies of EDDs containing any updates that occurred during data processing are saved with the end of the file name updated to indicate it was loaded and the date it was uploaded (e.g., "_LOADED_071821").

Once complete, the loaded EDD should be tracked by adding the staff name (formatted as last name and first initial) and date on which loading was completed in the Laboratory Data Processing table in the MIS Database (**Table 5**).

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

VIII. DATA FINALIZATION AND PUBLICATION

A. INTERNAL DATA REVIEW

Prior to project deliverables and reporting of the project data set, the data in the CV RDC database is compared to information in the MIS to check for completeness, ensure specific business rules are applied, verify WQTL exceedances reported for applicable projects, and ensure data output for Project Managers and reports are exporting correctly. The main checks include:

- Ensure Analysis Count table in the MIS Database is marked correctly for sample collection and analysis completion (**Table 1**).
- Ensure completeness assessments in the MIS Database agree with the data loaded into the CV RDC.
- Ensure exceedances identified during the **Initial Laboratory PDF Review** section match the final results in the CV RDC.
- Verify that field results are within the expected range; results are queried against the general limits (depending on the project and/or region) to determine if they are outside of the range expected for the measurement.
    - If a field result is outside the specified limits, verify the value against the original fieldsheet to ensure it is not the result of a transcription error.
    - Any results identified as unlikely based on the specified limits and verified with the field sheet should be discussed with the Project Manager and QA Officer to determine if the result is usable.
        - It may be the case that the result is determined to be legitimately outside of the normal range based on further site-specific information or anomalous sampling conditions. If the result is determined to be useable, no further data qualifiers are required, though a note should be added to the comment field specifying that the result is useable.
        - Values determined to be suspect should be updated to a null value with a ResQualCode of "NR", a QA code of “FIF” for Instrument Failure, and a specific comment including the original suspect result that was removed (e.g., "Value recorded as 45mg/L, suspected instrument failure").
- Ensure business rules for field entry have been correctly applied such as ResQualCodes and QACodes.

B. UPDATE CV RDC DATA FROM PRELIMINARY TO PERMANENT

Every result table in the CV RDC Database has a status column that indicates if the record is preliminary or permanent data. Permanent data have been fully reviewed and finalized; in most cases the finalization of the data is associated with the completion of an associated data report. If the data are to be made publicly available, permanent data are ready to be transferred to

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

CEDEN. Some data may be kept internal depending on the project and are not transferred to CEDEN; these data are qualified with an appropriate status as outlined in **Table 9**.

Preliminary data are working data that have not been fully reviewed and/or finalized. Preliminary data must undergo a final review and be approved for finalization before being considered permanent. The specific valid values used to indicate these statuses are outlined in **Table 9**.

Each data set that is ready to be finalized will undergo a series of global query checks which ensure that the data submitted follow the documented CV RDC business rules. If any discrepancy is found during a review, MLJ DMT staff will discuss the discrepancy with the appropriate person. Discussion will cover whether the information collected is accurate, what the cause(s) leading to the deviation may be, how the deviation might impact data quality, and what corrective actions might be considered.

Once all the global query checks have been performed and documented, MLJ DMT staff will update the status of each record to indicate it is permanent data and notify the Project Manager.

Table 9. Status field valid values used in the CV RDC.

STATUS VALID VALUE	TRANSFER TO CEDEN	STATUS DESCRIPTION
CEDEN_Entry_CVRDC	No	Used for preliminary CV RDC data to be eventually exported to CEDEN, transfer to CEDEN cannot occur until the data are updated to permanent.
CEDEN_Perm_CVRDC	Yes	Used for permanent CV RDC data to be exported to CEDEN.
CVRDC_Entry	No	Used for internal preliminary CV RDC data not to be exported.
CVRDC_Perm	No	Used for internal permanent CV RDC data not to be exported.

C. TRANSFER DATA FROM THE CV RDC TO CEDEN

Data cannot be transferred to CEDEN until the status is marked as permanent, indicating it has undergone global query checks, and that it is intended to be published in CEDEN (**Table 9**). When data are finalized and ready for transfer, the MLJ DMT will receive final approval from the Project Manager. The Project Manager will receive an Excel file that summarizes the data to be transferred and provides result counts. All data transfers to CEDEN will be recorded and documented. Once the transfer is complete, the Project Managers will be notified.

Data should be transferred to CEDEN once any final reports including an assessment and interpretation of the associated results have been submitted to regulators and/or data users (unless specified otherwise by the project requirements). For most projects, this occurs on an annual basis. The MLJ DMT generally publish finalized data to CEDEN within 1-2 months of report submittal. Excessive delays are generally not expected seeing as finalized, permanent data in the CV RDC do not need to undergo further data checks or verification steps prior to being transferred to CEDEN. If delays past this time period are to be expected, the reasons for the delay along with an expected timeline for publication should be provided to the data users.

In addition to updating the status of each record to “CEDEN_Perm_CVRDC”, several other fields in the CV RDC must be updated for any data that are data intended for CEDEN to ultimately be

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

transferred. The following fields must be updated appropriately for the final CEDEN transfer to occur:

- Status,
- DataToBeExported,
- CollectionComplete, and
- Public.

Once datasets are appropriately updated in the CV RDC Database, the data will automatically be uploaded to CEDEN during the weekly synchronization that occurs every Saturday morning. This process is performed using automated run statements managed by MLML-MPSL.

In addition to the correct data coding in the CV RDC, MLJ DMT staff must also notify the CEDEN DMT to update the project lookup list to indicate the project is public; this step allows the data to be visible on any CEDEN export tool.

Any updates to CV RDC data that have already been transferred to CEDEN are synchronized with CEDEN on a weekly basis. Any significant changes to data in the CV RDC that affect results or the interpretation of results (e.g., sample location) are communicated to CEDEN staff and the agency associated with the project through the use of the CEDEN Data Modification Request Form (http://ceden.org/procedures.shtml). The Request Form serves as official notification to CEDEN staff that the change will occur; the changes will be implemented during the database synchronization unless concerns are raised during the notification process. Minor changes (e.g., spelling or formatting changes to comment fields) do not require that CEDEN be notified. All changes to data that have already been published, both significant and insignificant, are reviewed by the Project QA Officer and documented internally by the MLJ DMT.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

ATTACHMENT A. MLJ ENVIRONMENTALCHEMISTRY ANALYSIS REVIEW CHECKLIST

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

MLJ Water Chemistry Analysis Checklist

Item No.			Component Name	Verified (No Fixes Needed)	Verified	Fixes Needed	Not Applicable	Comments
1			**Results Check**					
	1.1		Verify Results with the PDF					
		1.1.1	Check 10% of the results. Filter on the sample information to ensure that the sample information lines up with the results. If the 10% check is all correct, then proceed with processing the EDD. If errors are found, check all results against the PDF.					
		1.1.2	Check the case narrative in each PDF for important information about reanalysis, hold time violations, or anything that appears out of the ordinary that could affect specific samples or the entire batch. Paste snips of pertinent information into the LaboratoryQuestions tab, and update LabResultsComments if necessary.					
2			Sample Information					
	2.1		Coalition Samples (Grab, field duplicates, field blanks, matrix spikes)					
		2.1.1	Lab Sample Details: Compare sample collection information from the database to the EDD to verify they are the same.					
3			Processing and Analysis Information					
	3.1		Lab Batches					
		3.1.1	Batch names should conform to the CV RDC batch naming guidelines, stored here: X:\P_CV_RDC\Management_Documentation\2_Documentation_EntryManuals\File-BatchName (or online at CV RDC batch naming conventions).					
		3.1.2	Batches are defined by Method. Each batch should have same Units (excluding surrogates) and Analysis Date. Analysis Dates in a batch should be within 24 hours of each other; if there is a Digest Date then digests/extractions should all be within 24 hours.					
	3.2		Matrix Name					
		3.2.1	When an MS is performed off blankwater, add the following comment to the CollectionComments. Include the period: “MS performed on FieldBlank.”					
	3.3		Method Name, Analyte Name, Fraction Name, Unit, MDL and RL					
		3.3.1	Each method, analyte, fraction and unit should have the correct Preparation & Digestion methods reported. Review the eQAPP to verify.					
	3.5		ExpectedValue					
		3.5.1	All MS, LCS, CRM or Surrogate samples should have an expected value.					
	3.6		LabSampleComments					
		3.6.1	LabReplicates of 2 should have an RPD (Relative Percent Difference) recorded (excluding surrogate samples).					
		3.6.2	All LCS and MS samples should have a PR (Percent Recovery) recorded.					
		3.6.3	Check the correct format for PR and RPD was applied: use “PR XX” or “RPD XX”; when in combination (such as for an MSD), use “PR XX, RPD XX” (e.g., PR 99, RPD 5)					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

ITEM NO.			COMPONENT NAME	VERIFIED (NO VERIFIED	FIXES NEEDED	NOT APPLICABLE	COMMENTS
		3.6.4	Calculate Field Duplicate RPDs: Calculate RPD for FieldDup (replicate of 2) and its associated environmental sample: Round results to TWO sig figs (unless 3 digits: i.e., 24, 2.5 163). See QAPP for calculation; example ABS((X-Y)/(X+Y))*100 (where X = env sample result and Y = fielddup result). FD RPD calculations do NOT apply to surrogates (unit=%). For ND results, enter "FD RPD NA" (if either the environmental sample or the field duplicate is ND) If RPD values equal zero (both replicates have the same positive value), use "FD RPD 0" (Project Specific: label only FD sample with "FD RPD XX")					
		3.6.5	Flag FD RPD (If Applicable): If the calculated RPD is outside limits, flag the FieldDup AND environmental sample with a QACode of "FDP". See eQAPP for project specific limits.					
		3.6.6	If the EDD includes bacteria results (E. coli) Calculate Field Duplicate/LabRep Rlog: W:\P_ILRP\2.3_DataMgmt\6_ReviewEDDs\EDDChecking\Rlog_calcs\2018 WY. If one sample is ND then enter "Rlog NA". If one sample is >2419.6 enter "Rlog NA". Remove FD RPD that is calculated by the lab and replace with Rlog you calculated as per eQAPP.					
	3.7		Submitting Agency					
		3.7.1	Submitting Agency is MLJ Environmental					
	3.8		BatchVerificationCode					
		3.8.1	Populate BatchVerificationCode column with VAC if all checks within this checklist are performed.					
4			QA Checks					
	4.1		Batch Amount Check: Verify laboratory batches have the correct amount of QC required by the QAPP; if QC is missing batch is appropriately flagged with a LabSubmissionCode of QI and a lab batch comment is included. (Verify with lab first as to why it is missing)					
	4.2		Hold Time Check: Check extraction/analysis occurred within the appropriate holding times; if holding times were not met the batch is appropriately flagged and a lab batch comment is included.					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Item No.			Component Name	Verified (No Verified Fixes Needed	Not Applicable	Comments
	4.3		FieldBlank Check: (or any project blank samples) If a field blank flag is required notify QA Officer. Potentially need to reanalyze samples. If lab reanalyzed samples to confirm ensure LabResultComments indicates so. Project Specific: 1) Check that FieldBlanks meet eQAPP limits 2) If equal to or >RL, check if FB results is <1/5 env sample 3) If <1/5 env sample, leave QACode as None and add LabResultComments "<1/5 env sample, env sample=XX" 4) If >1/5 env sample, change QACode to IP5 and add LabResultComments ">1/5 env sample, env sample=XX" 5) For flagged samples, add LabBatchComm "Analyte detected in fieldblank (">1/5 env sample, env sample=XX)."					
	4.4		Laboratory QC Check: Laboratory QC (MS, LCS, MSD, Lab Blank, Lab Duplicates) Verify samples are within the eQAPP requirements; if QC is outside of requirements the batch is appropriately flagged and a lab batch comment is included. Verify LabBlanks, Matrix Spikes, Lab duplicates and LCS's and any other specific MQO's according to eQAPP. Project Specific: Where there is an exceedance of the MQO in the Lab Blank, verify the QACode "FI" is applied to all associated environmental samples with detectable results (> MDL).					
	4.5		LabBatch Comments Check: Once all QACodes are applied use a pivot table to verify that LabBatch comments reflect all QACodes in the Results tab. (Make sure to refresh pivot table before check and use the Standardized LabBatchComments.) Check that all QC issues explained at beginning of report are recorded in EDD with either a QACode or in the batch comment. Standardized LabBatchComments excel file is located here: W:\P_ILRP\2.3_DataMgmt\6_ReviewEDDs\EDDChecking					
	4.6		Project Specific: Look at LabReplicates: similar to Field Duplicates, if either lab results are ND, the RPD values should be NA. Change the value the lab has calculated to RPD NA if either rep 1 or rep 2 has a result of ND.					
	4.7		LabSubmissionCode Check: If the batch has any QACode other than "None", labbatch CANNOT be "A"; should be "A,MD" with a batch comment explaining the code; note that there is NO space between the "A," and "MD".					
	4.8		Lab Report qualifiers: double the check PDF lab report and make sure any appropriate qualifiers are added to either the result or batch comments.					
5			Unique Row Check					
	5.1		Unique Row: Verify that each row is unique. Sample and database unique.					
6			Data Checker					
	6.1		Data Checker: Run file through data checker and resolve any issues. http://checker.cv.mpsl.mlml.calstate.edu/CVRDC/CVRDCUpload.php. When errors are found run through data checker again until all applicable items are resolved. For CEDEN template use: http://ceden.org/CEDEN_checker/Checker/CEDENUpload.php					
	6.2		LabBatch naming convention changed. Verify less than 50 characters (max for the database). The data checker will show an error for anything over 35 characters, which is ok. No action necessary to change if under 50 characters.					
7			Tracking					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Item No.			Component Name	Verified (No Verified	Fixes Needed	Not Applicable	Comments
	7.1		Counts: Refresh pivot table for counting analytes for each environmental sample. Update analysis count in MIS ensure all analytes expected were received.				
	7.2		Tracking: Update MIS, LaboratoryDataProcessing group, qry2_ReportEDDProcessing with date EDD is complete and your name.				

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

ATTACHMENT B. MLJ ENVIRONMENTAL TOXICITY ANALYSIS REVIEW CHECKLIST

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

MLJ Toxicity Analysis Checklist

Delta RMP Version 1.0, Last updated on September 1, 2021

Item No.		Component Name	Verified (No	Verified	Fixes Needed	Not-Applicable	Comments
1		Summary and Replicate Results Check					
	1.1	Verify Summary Results with the PDF					
	1.1.1	Check the Mean					
	1.1.2	Check the Percent Control					
	1.1.3	Check the SigEffect: The field cannot be empty- for LABQAs it is "NA" NSG= not significant, greater than threshold SG= significant, greater than threshold NSL=not significant, less than threshold SL= significant, less than threshold					
	1.1.4	For information about TIEs reference the report to correctly format the comment. Project Specific: TIENarrative: Any sample that is SL with a PctControl less then (<) 50% should have a TIE run (excluding not applicable Field duplicate samples see comment below for this situation). To check if chemistry has been done on our end, check: W:\2.3_DataMgmt\2.1_ResultDetails_PhaseIII_TIE. The comment should include any TIE comments/conclusions if a TIE was run: "A TIE was conducted on XX/XX/XX and it was concluded that X was the cause of toxicity." "No TIE was conducted due to…" (Do not apply this comment to samples with a percent effect greater than 50%) "No TIE was conducted on field duplicate due to the TIE being performed on environmental sample."					
	1.2	Verify WQ Replicate Results with pdf					
	1.2.1	Double Check WQ Results using the P_WQResults: 1) Check WQ Results against the PDF (Copy the P_WQResults into new Workbook) 2) Check high low results: Check the high/low values are correct. Use the formulas contained in the TOXEDD_WQMeasurement_HighLowCheck excel file (newer EDDs may have hi/low tab in EDD) located in the checklist folder: W:\2.3_DataMgmt\6_ReviewEDDs\EDDChecking\EDDChecklists (Notes for Sediment: Conductivity, DO, Temp and pH can be checked using the individual water quality measurement data sheets, and Ammonia is found on a separate sheet (Total Ammonia Analysis, check Day0 and Day10 ammonia values).					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

ITEM NO.			COMPONENT NAME	VERIFIED (NO	VERIFIED	FIXES NEEDED	NOT- APPLICABLE	COMMENTS
		1.2.2	ResQualCode: "=" (default); "ND" (non-detect); or "NR" for results that were not recorded (due to replicate loss; not required by the program; or by negligence). "NSI" (no surviving individuals) ResQualCode to be applied if a chronic endpoint could not be recorded due to 100% mortality in a replicate and the values should be added to the datasheet if they are missing.					
	1.3		Samples (Grab, field duplicates, field blanks)					
		1.3.1	Lab Sample Details: Compare sample collection information from the database to EDD to verify elements are the same.					
	1.4		Laboratory Quality Assurance Samples (Control Samples)					
		1.4.1	Check the AgencyCode is in the AgencyCodeLookup list and is the Laboratory that created the sample.					
		1.4.2	Project Specific: Check TAccC (Test Acceptibility Criteria) are met (see Section 9 of this checklist for DRMP specific TAccC criteria).					
		1.4.2	UnitCollectionDepth = m (for water) or cm (for sediment).					
2			Processing and Analysis Information (For Summary and Results Tab)					
	2.1		Collection Information					
		2.1.1	Project Specific: Check Protocol Code is correct for individual project.					
		2.1.2	Project Specific: Agency Code = Sampling Agency for environmental samples and Lab Agency for LABQA samples.					
		2.1.3	Check the GeometryShape = "Point" for env. samples or is left blank for LABQA samples					
		2.1.4	Project Specific: Check the CollectionDeviceName = “Individual bottle by hand” or "Individual bottle by USGS-PFRG weighted sampler"; or "None" for LABQA.					
		2.1.5	PositionWaterColumn = "Subsurface" (water) or "Not Applicable" (LABQA or Sediment)					
	2.2		Toxicity Batch					
		2.2.1	Batch names should conform to the CV RDC batch naming guidelines, stored here: X:\P_CV_RDC\Management_Documentation\2_Documentation_EntryManuals\File-BatchName (or online at CV RDC batch naming conventions).					
		2.2.2	Batches are grouped by OrganismName and Method; and include supporting QA samples.					
	2.3		MatrixName, Method Name, Test Duration, Organism Name, Test Exposure Type, QA Control ID, Treatment, Concentration, Unit Treatment, Analyte Name, Unit Analyte, QA Code, Compliance Code					
		2.3.1	Matrix Name: "samplewater" (env. Sample) or "labwater" (LABQA sample)					
		2.3.2	Check the MethodName matches the requirements for the specific organism in the QAPP.					
		2.3.3	TestDuration: Check test duration matches the requirements of the method used.					
		2.3.4	Check the OrganismName matches the lookup list					
		2.3.5	Project Specific: TestExposureType = Chronic or Acute. Check Test Exposure Type reported is appropriate for the method used per the QAPP.					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Item No.			Component Name	Verified (No	Verified	Fixes Needed	Not- Applicable	Comments
		2.3.6	QA Control ID = LabSampleID of Control used for statistical analysis. Use "Control" if left blank by laboratory.					
		2.3.7	Project Specific: Treatment = “None” if no Treatment is applied. Otherwise, check if Treatment reported is appropriate per the QAPP.					
		2.3.8	Project Specific: Concentration = “0” if no Treatment is reported. If a Treatment is applied, check that the Concentration is appropriate per the QAPP.					
		2.3.9	Project Specific: UnitTreatment = “None” if no Treatment is applied. Otherwise, check if TreatmentUnit reported is appropriate per the QAPP.					
		2.3.10	Dilution = 100					
		2.3.11	Project Specific: AnalyteName = Check Analyte Name matches desired endpoints per the QAPP.					
		2.3.12	Project Specific: UnitAnalyte = Check Unit of Analyte matches desired units for endpoints per the QAPP.					
		2.3.13	QACode = "None" unless there was a deviation from expected test parameters. Refer to CEDEN lookup lists to verify any QACodes reported by the lab other than "None".					
		2.3.14	Project Specific: Compliance code = COM or PEND, depending on chain of review for the individual project					
3			Processing and Analysis Information - Summary Worksheet Only					
	3.1		Analysis Check					
		3.1.1	WQSource = Not Applicable (default)					
		3.1.2	ToxPointMethod = None (default)					
		3.1.3	Project Specific: AnalyteName = Check Analyte Name matches desired endpoints per the QAPP.					
		3.1.4	Fraction = None (default)					
		3.1.5	Project Specific: UnitAnalyte = Check Unit of Analyte matches desired units for endpoints per the QAPP.					
		3.1.6	Project Specific: Time Point = Check Time Points required per QAPP					
		3.1.7	Project Specific: Replicate Count = Replicate Count required per QAPP					
		3.1.8	Statistical Method =T-test or Mann-U (when applicable) or Fisher (when applicable)					
		3.1.9	Percent of Control and Effect values are calculated for all environmental samples. Compare to those listed in Lab Report.					
		3.1.10	Sig Effect is found in the SigEffectLookup (NA = LABQA)					
	3.2		ToxPointSummaryComments					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Item No.			Component Name	Verified (No	Verified	Fixes Needed	Not- Applicable	Comments
		3.2.1	Calculate Field Duplicate Relative Percent Difference (RPD) for field duplicates (Grab rep 2) and its associate environmental sample: See QAPP for calculation; example ABS((X-Y)/(X+Y))*100 (where X = env sample result and Y = field dup result). If RPD values equal zero (both replicates have the same positive value), use “RPD 0”. (Project Specific: label only FD sample as "FD RPD XX"					
		3.2.2	Flag FD RPD (If Applicable): If the calculated FD RPD is outside limits, flag the FieldDup AND environmental sample with a QACode of “FDP”. See eQAPP for project specific limits.					
4			QA Checks					
	4.1		Laboratory batches have the correct amount of QC required by the QAPP. Each batch must have a control with it.					
	4.2		Hold Time Check: Check that all analyses were run within the appropriate holding times. If holding times were not met a QA Code of "H" is to be entered in TestQACode field in SUMMARY TAB ONLY (not Replicate tab).					
5			Toxicity Batch Worksheet					
	5.1		Submitting Agency					
		5.1.1	Project Specific: Submitting Agency is “MLJ Environmental” unless specified otherwise by the project manager.					
	5.2		LabSubmissionCode					
		5.2.1	If batch has a QACode other than “None”, lab batch CANNOT be “A”; should be “A,MD” with a batch comment explaining the code; note that there is NO space between the A, and MD.					
	5.3		ToxBatchComments					
		5.3.1	Include lab batch comment explaining any QACode associated with the batch. If no code, leave blank.					
		5.3.2	Project Specific: Depending on chain of review for individual projects, populate BatchVerificationCode column with “NR”; the final verification will be done by MLM who will apply “VAC” after their final review.					
6			Unique Row Check					
	6.1		Unique Row: Verify that each row is unique for the Summary tab.					
	6.2		Unique Row: Verify that each row is unique for the Results tab.					
7			Data Checker					
	7.1		Data Checker: Run file through data checker and resolve any issues. http://checker.cv.mpsl.mlml.calstate.edu/CVRDC/CVRDCUpload.php.					
8			Tracking					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Item No.			Component Name	Verified (No	Verified	Fixes Needed	Not- Applicable	Comments
	8.1		Counts: Compare counts in EDD to those in the MIS to ensure all organisms and endpoints are accounted for.					
	8.2		Tracking: Update MIS for count verification and review completion.					
9			Test Acceptability Criteria (TAccC) (DRMP Specific)					
	9.1		Check for TAccC					
		9.1.1	*H. azteca* (96 hr): ≥ 90% mean survival in controls					
		9.1.2	*H. azteca* (10 day): ≥ 80% mean survival in controls and measurable growth					
		9.1.3	*C. dilutes* (10 day): ≥ 80% mean survival in controls and an average of ≥ 0.60 mg ash-free dry weight for surviving individuals					
		9.1.4	*P. promelas* (7 day): ≥80% mean survival in controls and an average of ≥ 0.25 mg ash-free dry weight for surviving individuals					
		9.1.5	*C. dubia* (6-8 day): ≥80% control survival and 60% of the surviving control females must produce 3 broods with an average of 15 or more young per surviving female					
		9.1.6	*S. capricornutum* (96-hour): (without EDTA) mean cell density of at least $2x10^5$ cells/mL in controls and variability (CV%) among control replicates ≤20%					
10			Salinity (DRMP specific)					
	10.1		For *C. dubia*: if there is an environmental sample that has a conductivity of ≤ 130 µS/cm make sure that a low conductivity tolerance control is run (CNSL).					
	10.2		If a low conductivity tolerance control is run (CNSL), but it does not meet TAC, the sample is compared to the regular CNEG and the following comment applied: "Tolerance control based on sample conductivity did not meet test acceptability criteria; percent effect based on comparison with standard control. Effects may include response to low EC in sample." QACode: TW (Water quality parameters outside recommended test method ranges)					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

ITEM NO.			COMPONENT NAME	VERIFIED (NO	VERIFIED	FIXES NEEDED	NOT- APPLICABLE	COMMENTS
	10.3		If the specific conductance is > 2,500 µS/cm, *C. dubia* should not be tested. *H. azteca* can be used instead if samples are not already being tested for *H. azteca* toxicity.					

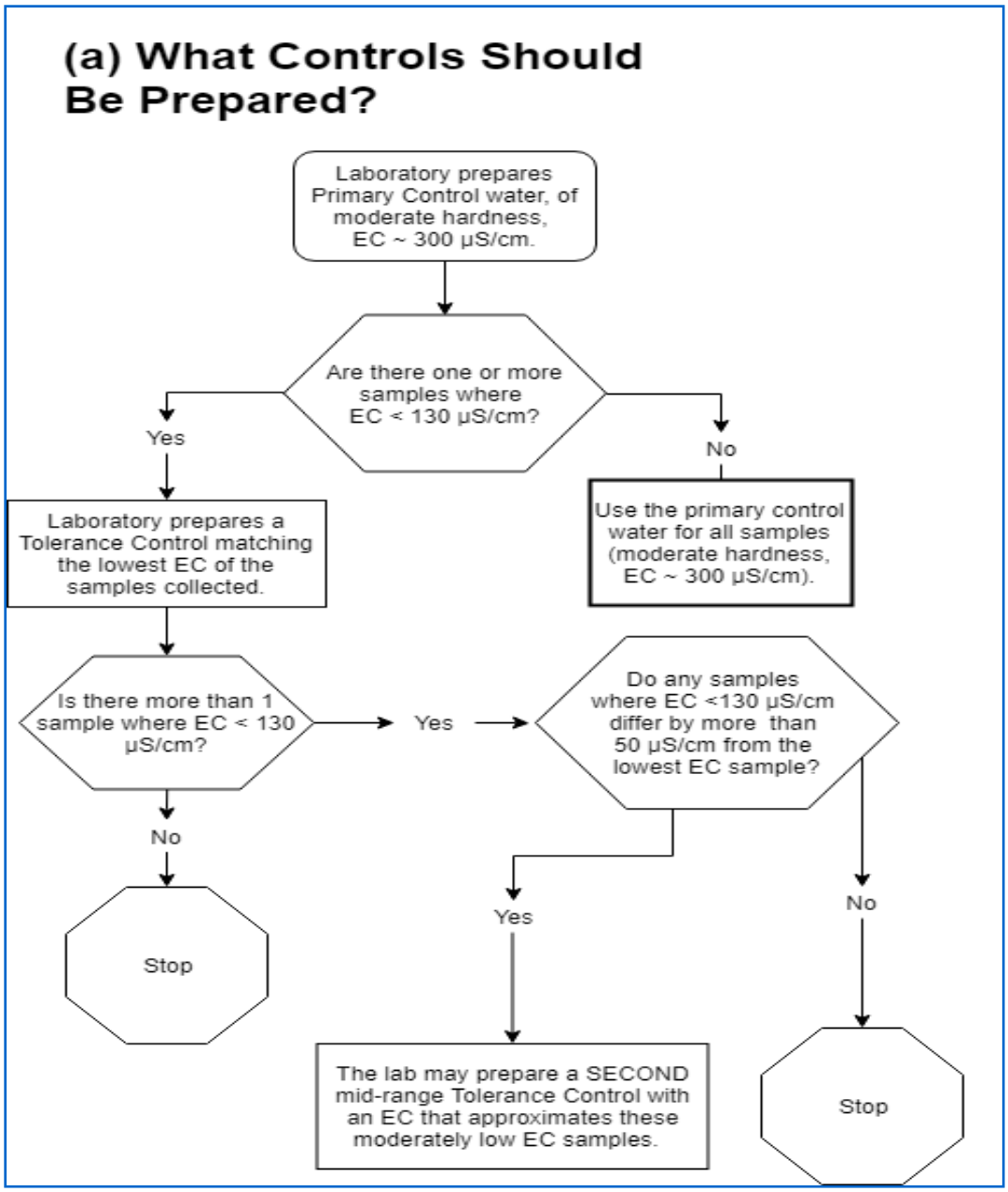
DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Salinity Controls

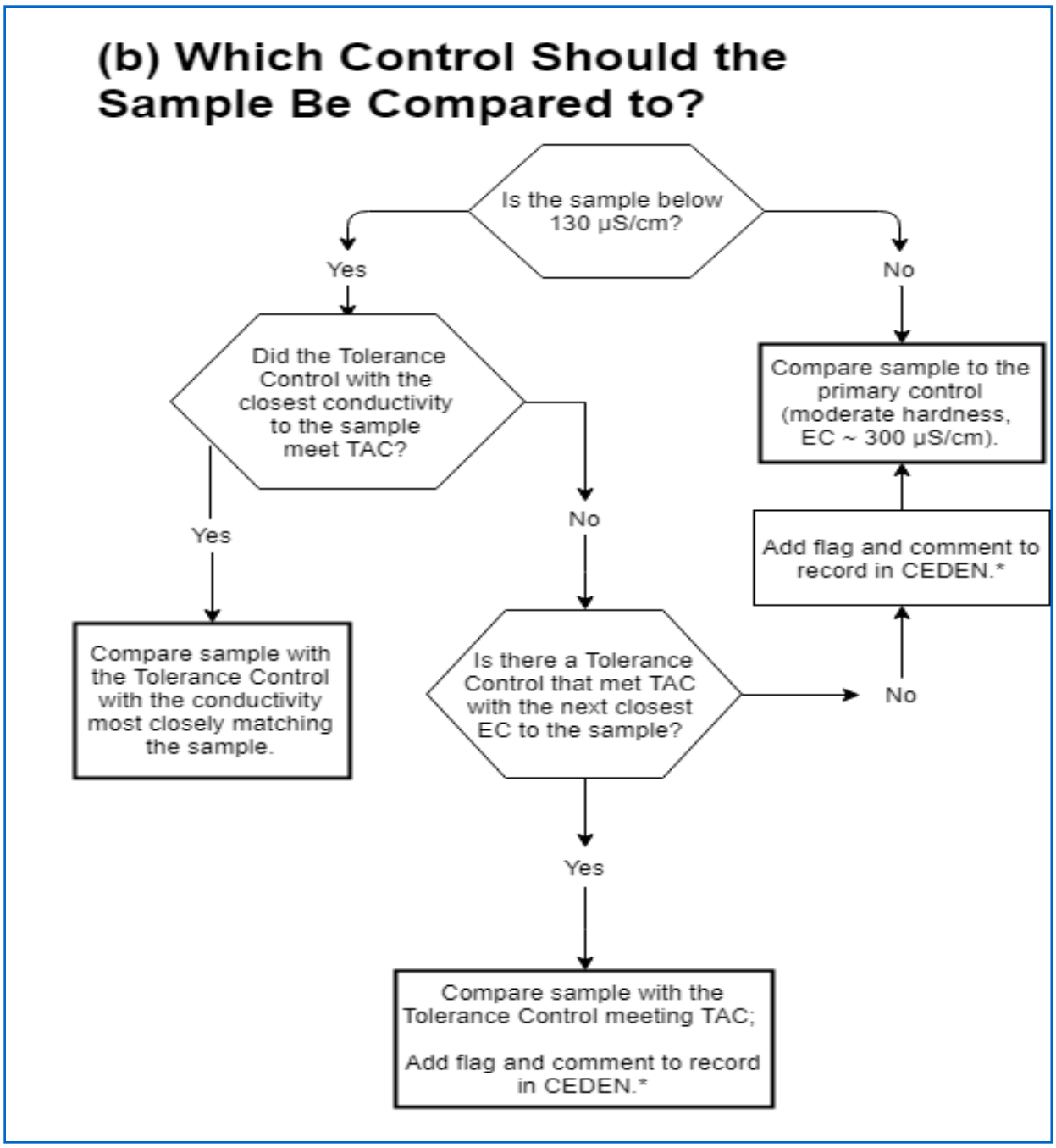
The Delta RMP performs toxicity testing and data management following SWAMP guidance and associated information. There are some specific situations when additional negative controls are performed, and associated data will need to be flagged either on the result and/or batch level.

CONTROL DECISION TREES

The following decision trees were developed by the Delta RMP Pesticide Subcommittee to provide guidance on when a tolerance control should be performed, what kind of tolerance control should be created, and which samples should be compared to which controls.



DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2



DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

FLAGGING BUSINESS RULES

The following image reflects the scenarios and flagging combinations that have been discussed and agreed upon by the Delta RMP Pesticide Subcommittee; these will rules will be followed to ensure consistency in flagging and comments across years.

Table 12 is used to illustrate scenarios for combinations of passed and failed TAccC for CNEG and CNSL controls in a tox test batch. Batches with conductivity above tolerance range (requiring a CNSL high sample instead, or in addition) would be flagged similarly to the CNSL low cases.

The most notable is case 2, where the CNEG fails (-), but the CNSL passes (+). Even though the CNSL passes and could hypothetically be used as a control for significance testing versus low conductivity samples, those tests for samples are deemed "R" "rejected" due to failure of the CNEG.

Another notable situation is case 3, where the CNEG passes, but the CNSL fails. The standard procedure is to use the CNEG as the control against which samples (even those outside of tolerance range) are compared, but there may be cases where the apparent toxic response and the CNSL failure are very similar.

Table 12. QACodes Applied to Control and Test Samples for Possible CNEG and CNSL pass/fail Combinations.

Case	CNEG	CNSL low	BatchVer Code	Batch ComplianceCode	Control used for samples in tolerance range	QACode on CNEG	QACode on samples in tolerance range	Control used for samples below tolerance range	QACode on CNSL	QACode on samples below tolerance range
1: CNEG+ CNSL+	pass TAccC	pass TAccC	VAC	Com	CNEG	None	None	CNSL low	TAC	TAC,TCI
2: CNEG- CNSL+	fail TAccC	pass TAccC	VAC,VCN	Rej	-- N/A	R	R	NA	R,TCF	R,TCI
3: ##CNEG + CNSL-	pass TAccC	fail TAccC	VAC,VMD	Qual (only applied to low conductivity samples and CNSL)	CNEG	None	None	CNEG	TCF	TCI
4: CNEG- CNSL-	fail TAccC	fail TAccC	VAC,VCN	Rej	-- N/A	R	R	NA	R,TCF	R,TCI

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Batch Verification Code Scenarios

Toxicity batches are assigned batch verification codes based on the quality control of samples within the batch using CEDEN codes. There have been unique situations during the history of the Delta RMP where the batch verification code needs to reflect a minor deviation (VMD), a serious deviation (VSD), or rejection (VR). The following instances are example situations where these codes have been applied to date. The assignment of a batch verification code when deviations occur should be reported to the Delta RMP Technical Program Manager and the Pesticide TAC. This table may be added to or revised over time based on guidance from the Pesticide TAC and State Board.

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Table 10. Examples of instances where the batch verification code reflects data with minor deviations, serious deviations, or are rejected.

Instance: Samples outside of organism tolerance range, CNSL either not run or fails TAccC, statistical tests (for low or high conductivity samples) run against CNEG instead
BatchVerification Code: VSD (serious deviation)
Rationale: With the absence of a CNSL similar to low or high conductivity samples, whether any apparent toxic effect (for those samples out of tolerance range) is entirely or partly due to that parameter is unknown; for test batches where the CNSL is run but fails TAccC, the failure of the CNSL itself may indicate the influence of being outside of the tolerance range, and any apparent toxicity may include that confounding factor. VSD is to caveat potential data users that the deviations may not be "minor", which may be misinterpreted as equivalent to having "insignificant" effect.
Date added: 2021/03/09
Instance: Test condition "recommended" ranges deviations within 2x of the accepted range (e.g., for temperature outside of 25 ± 1°C recommendation, but still within 25 ± 2°C)
BatchVerification Code: VMD (minor deviation)
Rationale: Many method recommendations include a margin of safety, or show negligible or smaller degrees of effect where deviations are only slightly beyond target ranges. This table may be edited or refined for parameters with sharper cutoffs where notable effects are observed with smaller deviations outside of the range.
Date Added: 2021/03/09
Instance: Test condition "recommended" ranges deviations well outside of the accepted range (e.g., for 25 ± 1°C recommendation, may be outside of 25 ± 2°C)
BatchVerification Code: VSD (serious deviation)
Rationale: Deviations well outside of a recommended range have a higher probability of exceeding any margin of safety built into a method, and may show effects. VSD is to qualify data deviations may not be "minor", t. If there are parameters that are identified as being less sensitive to deviations, specific exceptions or handling rules for those may be added at a later date.
Date Added: 2021/03/09
Instance: Test condition "REQUIRED" are not met
BatchVerification Code: VR (rejected)
Rationale: Deviations outside of method "requirements" are presumed to be extremely serious, sufficient to warrant rejection of data in most cases. This table may be edited or refined for parameters where notable effects are not expected or observed, in cases rejection might be too extreme, and would otherwise remove data that might be useful for more limited purposes (e.g., if a VSD were applied instead).
Date Added: 2021/03/09
Instance:
BatchVerification Code:
Rationale:
Date Added:

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

ATTACHMENT C. MLJ ENVIRONMENTAL TISSUE ANALYSIS REVIEW CHECKLIST

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

MLJ Tissue Analysis Checklist

Item No.		Component Name	Verified (No	Verified	Fixes Needed	Not Applicable	Comments
1		Fish Composite Check (If applicable)					
1.1		Sample and Collection Verification					
	1.1.1	Lab Sample Details: Compare sample collection information from the database to the EDD to verify they are the same.					
1.2		Organism Checks					
	1.2.1	TisSource = NA					
	1.2.2	OrganismID is in a consistent format.					
	1.2.3	Fork Length < Total Length.					
	1.2.4	Project Specific: Check that the difference between the smallest fish length compared to the largest fish length is not more than 20%.					
	1.2.5	Review for outliers: fork length, total length and weight of fish.					
1.3		Tissue Checks					
	1.3.1	TissueID consistent format.					
	1.3.2	Project Specific: TissueName = fillet, PartsPrepPreservationName = Skin off					
	1.3.3	Review for outliers: tissue weight and weight of fish. Create a pivot table to review that the tissue weights are each less than the fish weights (or that they are similar values if using the whole fish).					
1.4		Composite Checks					
	1.4.1	Check the CompositeID is in a consistent format. CompositeIDs should usually include the StationCode, SampleDate and Organism reference. If program has individual vs composite samples typically “I” or “C” are referenced in the CompositeID.					
	1.4.2	Check that the CompositeType, CompositeReplicate, CompositeWeight, UnitCompositeWeight, HomogDate, OrganismGroup, ComAgencyCode are the same for each CompositeID.					
	1.4.3	Review for outliers: use the pivot table to check the individual organism weights against the CompositeWeight.					
2		Bivalve Composite Check (If applicable)					
2.1		Sample and Collection Verification					
	2.1.1	Lab Sample Details: Compare sample collection information from the database to the EDD to verify they are the same.					
2.2		Organism Checks					
	2.2.1	TisSource = “Resident” or “Transplant”					
	2.2.2	OrganismID is in a consistent format.					
	2.2.3	Check that individual bivalve measurements are provided (unless the QAPP specifically allows average measurements).					
	2.2.4	Review for outliers: use the pivot table to check for consistent values for ShellLength, ShellWidth and LengthWidthType					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Item No.			Component Name	Verified (No	Verified	Fixes Needed	Not Applicable	Comments
	2.3		Tissue Checks					
		2.3.1	TissueIDs are in a consistent format.					
		2.3.2	Project Specific: TissueName = soft tissue without gonads, PartsPrepPreservationName = None					
		2.3.3	Review for outliers: use the pivot table to check tissue weight against organism weight (if reported).					
	2.4		Composite Checks					
		2.4.1	Check the CompositeID is in a consistent format. CompositeIDs should usually include the StationCode, SampleDate and Organism reference. If program has individual vs composite samples typically "I" or "C" are referenced in the CompositeID.					
		2.4.2	Check the CompositeType, CompositeReplicate, CompositeWeight, UnitCompositeWeight, HomogDate, OrganismGroup, ComAgencyCode are the same for each CompositeID.					
		2.4.3	Review for outliers: use the pivot table to check the individual organism weights against the CompositeWeight.					
3			Super Composite Check (If applicable)					
	3.1		Composite Checks					
		3.1.1	CompositeSourceID matches ID from original composite worksheet					
		3.1.2	SuperCompositeID is in a consistent format.					
		3.1.3	Check the CompositeType, CompositeReplicate, CompositeWeight and UnitCompositeWeight are the same for each SuperCompositeID					
		3.1.4	CompositeType = super					
4			Results Check					
	4.1		Verify Results with the PDF					
		4.1.1	Check 10% of the results. Filter on the sample information to ensure that the sample information lines up with the results. If the 10% check is all correct, then proceed with processing the EDD. If errors are found, check all results against the PDF.					
		4.1.2	Check the case narrative in each PDF for important information about reanalysis, hold time violations, or anything that appears out of the ordinary that could affect specific samples or the entire batch. Paste snips of pertinent information into the LaboratoryQuestions tab, and update LabResultsComments if necessary.					
		4.1.3	Check the CompositeID matches corresponding composite worksheet CompositeID.					
		4.1.4	OrganismGroup = correct composite grouping.					
5			Sample Information					
	5.1		Coalition Samples (Grab, field duplicates, field blanks, matrix spikes)					
		5.1.1	SampleTypeCode = Composite (for normal samples)					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Item No.		Component Name	Verified (No	Verified	Fixes Needed	Not Applicable	Comments
6		Processing and Analysis Information					
	6.1	Lab Batches					
	6.1.1	Batch names should conform to the CV RDC batch naming guidelines, stored here: X:\P_CV_RDC\Management_Documentation\2_Documentation_EntryManuals\File-BatchName (or online at CV RDC batch naming conventions).					
	6.1.2	Batches are defined by Method. Each batch should have same Units (excluding surrogates) and Analysis Date. Analysis Dates in a batch should be within 24 hours of each other; if there is a Digest Date then digests/extractions should all be within 24 hours.					
	6.2	Method Name, Analyte Name, Fraction Name, Unit, MDL and RL					
	6.2.1	Each method, analyte, fraction and unit has correct Preparation & Digestion. Review eQAPP to verify.					
	6.3	ExpectedValue					
	6.3.1	All MS, LCS, CRM or Surrogate samples have an expected value.					
	6.4	LabSampleComments					
	6.4.1	LabReplicates of 2 should have an RPD (Relative Percent Difference) recorded (excluding surrogate samples).					
	6.4.2	All LCS and MS have a PR (Percent Recovery) recorded					
	6.4.3	Check the correct format for PR and RPD was applied: use “PR XX” or “RPD XX”; when in combination (such as for an MSD), use “PR XX, RPD XX” (e.g., PR 99, RPD 5)					
	6.5	Submitting Agency					
	6.5.1	Submitting Agency is MLJ Environmental					
	6.6	BatchVerificationCode					
	6.6.1	Populate BatchVerificationCode column with VAC if all checks in this checklist are performed.					
7		QA Checks					
	7.1	Batch Amount Check: Verify laboratory batches have the correct amount of QC required by the QAPP; if QC is missing batch is appropriately flagged with a LabSubmissionCode of QI and a lab batch comment is included. (Verify with lab first as to why it is missing)					
	7.2	Hold Time Check: Check extraction/analysis occurred within the appropriate holding times; if holding times were not met the batch is appropriately flagged and a lab batch comment is included.					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

	Item No.		Component Name	Verified (No	Verified	Fixes Needed	Not Applicable	Comments
	7.3		Laboratory QC Check: Laboratory QC (MS, LCS, MSD, Lab Blank, Lab Duplicates) Verify samples are within the eQAPP requirements; if QC is outside of requirements the batch is appropriately flagged and a lab batch comment is included. Verify LabBlanks, Matrix Spikes, Lab duplicates and LCS's and any other specific MQO's according to eQAPP.					
	7.4		LabBatch Comments Check: Once all QACodes are applied use a pivot table to verify that LabBatch comments reflect all QACodes in the Results tab. (Make sure to refresh pivot table before check and use the Standardized LabBatchComments.) Check that all QC issues explained at beginning of report are recorded in EDD with either a QACode or in the batch comment. Standardized LabBatchComments excel file is located here: W:\P_ILRP\2.3_DataMgmt\6_ReviewEDDs\EDDChecking					
	7.5		Project Specific: Look at LabReplicates: if either lab results are ND, the RPD values should be NA. Change the value the lab has calculated to RPD NA if either rep 1 or rep 2 has a result of ND.					
	7.6		LabSubmissionCode Check: If the batch has any QACode other than "None", labbatch CANNOT be "A"; should be "A,MD" with a batch comment explaining the code; note that there is NO space between the "A," and "MD".					
	7.7		Lab Report qualifiers: double check PDF lab report and make sure any appropriate qualifiers are added to either the result or batch comments					
8			Unique Row Check					
	8.1		Unique Row: Verify that each row is unique. Sample and database unique.					
9			Data Checker					
	9.1		Data Checker: Run file through data checker and resolve any issues. http://checker.cv.mpsl.mlml.calstate.edu/CVRDC/CVRDCUpload.php. When errors are found run through data checker again until all applicable items are resolved. For CEDEN template use: http://ceden.org/CEDEN_checker/Checker/CEDENUpload.php					
	9.2		LabBatch naming convention changed. Verify less than 50 characters (max for the database). The data checker will show an error for anything over 35 characters, which is ok. No action necessary to change if under 50 characters.					
10			Tracking					
	10.1		Counts: Refresh pivot table for counting analytes for each environmental sample. Update analysis count in MIS ensure all analytes expected were received.					

DocuSign Envelope ID: 28D2C5B9-34CA-4F38-8A7F-73CC6DFB96B2

Item No.			Component Name	Verified (No Verified	Fixes Needed	Not Applicable	Comments
	10.2		Tracking: Update MIS, LaboratoryDataProcessing group, qry2_ReportEDDProcessing with date EDD is complete and your name.					