DRAFT
Please do not distribute or copy

Quality Assurance Plan for the State Water Resources Control Board's California Integrated Water Quality System

Revised: January 24, 2008

TABLE OF CONTENTS

PREPARATION OF THE QUALITY ASSURANCE PLAN FOR THE CALIFORNIA INTEGRATED WATER QUALITY SYSTEM

Month, DD, YYYY

APPROVED:

CIWQS QA Team Leader	**Date**
State Water Resources Control Board QA Officer	**Date**
CIWQS Executive Sponsor	**Date**

List of Acronyms

BRT	Business Rules Team
CHC	CIWQS Help Center
CIWQS	California Integrated Water Quality System
CVS	Concurrent Versions System
DBA	Database Administrator
DBS	Database System
DIT	Division of Information Technology
EDM	Enterprise Data Model
USEPA	United States Environmental Protection Agency
eSMR	Electronic Self Monitoring Report
eWRIMS	Electronic Water Rights Information Management System
IT	Information Technology
MMP	Mandatory Minimum Penalty
MS	Microsoft
QAP	Quality Assurance Plan
QMP	Quality Management Plan
SMARTS	Storm Water Multi-Application Reporting and Tracking System
SOP	Standard Operating Procedure
SQL	Structured Query Language
SSO	Sanitary Sewer Overflow
SWARM	Storm Water Annual Reporting Module
SWIM	System for Water Information Management
TTWQ	Threat to Water Quality

1. INTRODUCTION

1.1 Background

California's Integrated Water Quality System (CIWQS) is an enterprise database that tracks information about places of environmental interest, manages permits and other orders, tracks inspections, violations and enforcement activities for the State Water Resources Control Board (State Water Board) and its stakeholders. It was developed in 2005 to replace the existing System for Water Information Management (SWIM) database and its accompanying Compliance Module.

Essentially, CIWQS collects data from a variety of sources, for the purpose of storing, aggregating, analyzing, and disseminating information. A secondary role of CIWQS is to improve staff efficiency through the use of automated tools and automatic processing of voluminous data sets.

The aim of the CIWQS database is to provide one central location to store data from many sources. It enables users (staff, stakeholders, and the public) to access this vast array of information by:

- Storing billing information
- Storing discharger contact information
- Enabling dischargers to submit their self-monitoring reports electronically (eSMR)
- Storing administrative and performance data about regulated facilities
- Allowing staff to monitor and prioritize their workload
- Storing information that can be shared with the public and other stakeholders

There are two types of data in CIWQS. The first type of data is information that has been and is currently being loaded following CIWQS's documented procedures. There is also data that was migrated from other systems. The second type of data, "migrated" data, was not subject to a QAP and was neither verified nor validated.

The Quality Assurance Team Leader will augment this section once theState Water Board Quality Management Plan (QMP) is developed. In general, it is the intent of the CIWQS Quality Assurance program to meet quality assurance and documentation requirements as described in the State Water Board QMP. Objectives and management structures discussed in the forthcoming State Water Board QMP will be integrated with this Quality Assurance Plan (QAP).

The following table lists what this document covers and doesn't cover:

Included	Outside Scope of Document
Sample results as reported	Sample collection
Permit information	Sample analysis
Violation and Enforcement information	Laboratory reporting
Regulated facility inspection information	Analytical methods
Party and place contact information	Sampling instrument testing and maintenance
Data reporting (permits, violations, etc.)	Sampling instrument calibration
Data migration	Lab inspections
Manual data entry	Data acquisition
System-generated data (e.g., calculations)	Chain-of-custody

1.2 Purpose

The purpose of this QAP is to provide a single point of reference on the topic of quality for the project and to identify, communicate, and approve Quality Assurance (QA) activities for the CIWQS database. The QAP describes the standards, processes, and procedures used to ensure the qualitative and quantitative accuracy of data entered into CIWQS. It also identifies personnel responsible for implementing the QA program.

The QAP provides a framework intended to help the Water Boards achieve the data quality objectives described in Section 8 of this document.

1.3 Data Quality

Managing data quality in CIWQS is complicated due to the disparate regulatory contributors and end users of the system. These include:

- The State Water Board and Regional Water Quality Control Boards (Regional Water Boards)
- Dischargers
- The public
- The State Legislature

Further, there are a variety of regulatory programs that do not have clearly defined business rules and individual quality assurance (QA) programs.

The above diversity is reflected in CIWQS' data sources, which include:

- Manual data entry
- Batch loading[1] of select data
- Electronic Self Monitoring Reports (eSMR)
- Sanitary sewer overflow (SSO) spill reporting
- System for Water Information Management (SWIM) migration
- Stormwater migration
- Electronic Water Rights Information Management System (eWRIMS)

Because the above users and sources have widely varying objectives, they have differing needs regarding data type, quality, and quantity. CIWQS must present data of known and documented quality. Data quality in CIWQS is assessed using its quality indicators, including:

[1] Batch loading can be defined as uploading data automatically from a group of files rather than manually entering/editing and saving one record at a time.

- Reports
- Audits
- Training
- Data entry time
- Accounting
- Relations[2]
- Interface[3]
- Data sample results
- Enhancements[3] and updates
- Corrective actions
- Historical data migration[3]
- Testing
- Maintenance
- Data retention[3]
- Timelines
- Hardware and software
- Security

The assessment of each of these indicators is detailed in Section 5 of this QAP.

1.4 Resource Allocation and Commitment

CIWQS is an essential part of the Water Boards' business. QA activities that sustain CIWQS as an information tool require effort, resources, and time, just like any other Water Board activity. Adequate resources must be allocated for its development, maintenance, and operation. This includes funding and resource dedication for quality control activities such as data cleanup, data entry training, and an audit of the database.

[2] In a Relations Database Model, a set of rows, otherwise known as a table in a database.

[3] See Appendix 3 for definition of terms.

2. SCOPE

The scope of this QAP includes QA measures for data cleanup, training, ongoing implementation, and future migration. The QAP will address:

- Organizational Structure
- Roles and Responsibilities
- Quality Indicators
- Testing Procedures
- QA Activities
- Problem Reporting and Corrective Actions
- Assessment
- Migration, Planning, and Design of Future Modules
- Software, Hardware, and Data Storage

3. PRINCIPLE OPERATING DIRECTIVES

Staff and Water Board management use these operating directives as they develop plans, work with, and make decisions regarding CIWQS. All decisions should conform to these directives and variances must be justified and approved by the CIWQS Executive Committee, whose role it is to enforce these directives.

3.1 Purpose of Operating Directives

The primary role of CIWQS is to adequately collect data, process it, and share information. The secondary role of CIWQS is to improve staff efficiency, though the primary role is independent of the secondary role. For CIWQS to fulfill these roles, changes may be needed. Changes requiring a modification to existing business practices must have full acceptance from those responsible for implementing the change.

3.2 Order of Precedence

CIWQS serves user groups who may have competing interests and different

levels of authority. Because of the interdependence of different parts of the CIWQS system, simple prioritization is not always possible. If a priority is placed on a function that is in a higher order, the lower order activities must be addressed adequately first. Precedence for services in CIWQS should be as follows:

1. Business Units (or Programs) – the first level of service for CIWQS must satisfy the information management needs of the Water Boards' business units to support regulatory activity.
2. Regulated Community – dischargers and permittees are not only CIWQS data providers, but are also the beneficiaries of information from the CIWQS system, enabling them to verify their performance.
3. Executive Management and Centralized Statewide Analysis - Water Boards' management must have access to the collected data within CIWQS to manage resources, analyze trends, and provide reports to the legislature as required by law. Without the satisfactory data from the business units and the dischargers, this group's information and decision-making function cannot be completed adequately.
4. Public – the public cannot be adequately served unless the previously listed areas of need are also satisfied.

3.3 Business Optimization

Business units from all Water Boards will utilize CIWQS to handle the information processing required to fulfill their core missions by:

1. Identifying the necessary information needed to achieve their objectives and proposing actions to the meet the need.
2. Identifying where information is currently generated and maintained to utilize this business process instead of creating a new one.
3. Diverting resources necessary from other core tasks to input information into CIWQS.
4. Simplifying CIWQS processes whenever possible.
5. Utilizing CIWQS to inform decisions.

3.4 Data Quality Standard

Data entry and data quality are prioritized above other activities. All activities in CIWQS should be evaluation from their direct and indirect impact on data quality.

1. No modification or migration of data will be allowed if it relies on data cleanup at some later time.
2. Data will not be uploaded from other sources if it will create errors, violates database logical rules, or creates conflicts with data already in the database.
3. Not all data is equal in value, thus the highest level of effort should go to data that has the highest value to the organization.
4. No data will be captured without a documented high need and use of the data.
5. All potential system enhancements will be evaluated for their impact on data quality.

3.5 Module Quality Standard

Every module that is operational or proposed as an addition to CIWQS must be properly designed and adequately functional to fulfill its purpose.

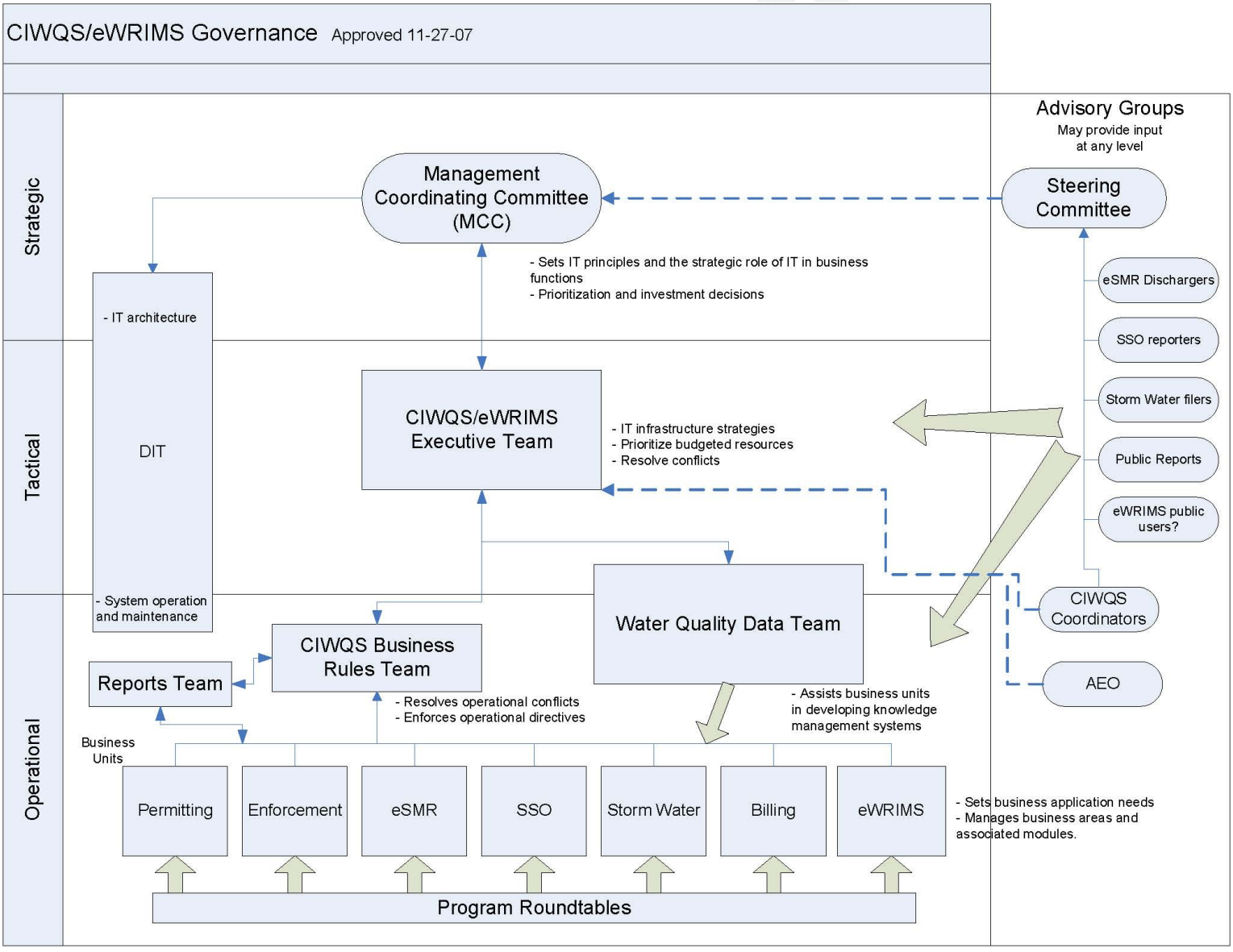
3.6 Expansion of CIWQS

The continued expansion of CIWQS is desirable when the following criteria are met:

1. The needs of the existing modules have been adequately addressed.
2. The need for a new database module has been identified and justified.
3. Resources for the new database module, including development, maintenance, training, and other aspects of proper implementation have been determine, are available, and have been adequately allocated.
4. There is common data and common functionality between the new modules and existing modules.
5. The benefits of integration outweigh the disadvantages.

4. ORGANIZATIONAL STRUCTURE

The Organizational Structure is defined in the CIWQS Governance Document. Management Coordinating Committee approved the CIWQS Governance Organizational Chart (figure below) and the document is currently being written and is not yet in its first draft.



5. ROLES AND RESPONSIBILITIES

Because the Governance Document has not yet been drafted, the following roles reflect how we have been structured and functioning over the last year. Appendix 1 contains a list of staff and contact information for each role specified below.

5.1 CIWQS Sponsor

- Provides funding for the development of the Database System (DBS)
- Sits on the Executive Committee
- Provides the authority to withdraw funding from the project if the Executive Committee indicates that the State Water Board is not able to meet the specifications of this QAP
- Approves the QAP

5.2 Executive Committee

- Reserves the right either to perform assigned tasks or designate tasks to an appropriate party
- Directs the implementation of the QAP
- Provides oversight to the QA Team Leader
- Communicates with the sponsor on project status

5.3 QA Team Leader

- Provides oversight for the Business Rules Team in implementing the QAP
- Is the first to sign off on the QAP
- Provides a means of communication from CIWQS users, the BRT, and CIWQS Coordinators to the Executive Committee
- Ensures that the BRT has access to the data, standard operating procedures (SOPs), and other records pertaining to the operation and maintenance of the computer systems
- Manages documentation

- Reviews enhancements to the system
- Identifies additional documentation that may be needed for specific tasks
- Ensures that all major issues, audits, or user comments are addressed appropriately
- Coordinates and facilitates Quality Controls such as data verification and cleanup
- Ensures that the BRT has access to project information in order to carry out the activities defined in this QAP

5.4 BRT

5.4.1 General

- Provides QA oversight for CIWQS business rules
- Develops data quality objectives[3] in the QAP
- Provides comments on the QAP
- Adheres to the processes, procedures, and standards defined in the QAP
- Ensures that all deviations from QAP specifications have been corrected, approved, and documented
- Maintains involvement throughout the entire project
- Suggests enhancements to the system
- Programmatically ensure that quality is built into fixes and related services

5.4.2 Communication

- Works to foster constructive communication
- Provides feedback to the QA Team Leader
- Detects system problems
- Discusses alternative solutions

5.4.3 Auditing

- Oversees audits and reviews specified deliverables according to the

QAP

- Ensures that products adhere to QAP standards
- Ensures that the requirements of this QAP, CIWQS business rules, and programmatic SOPs are met

5.5 QA Professionals

- QA professionals, such as the State Water Board Division of Water Quality QA Program Manager, United States Environmental Protection Agency (USEPA) QA offices, QA researchers, and QA consultants will be utilized.

5.6 QA Design Team

Made up of the QA and SOP Leads, QA consultants and the Division of Water Quality's Regulatory Section Chief, the QA Design Team drafts and designs QA-related documents and proposes QA activities. These drafts and plans are tentative until the BRT, QA and SOP Leads, and/or the Executive Team approve them.

5.7 CIWQS Coordinators

- Represent Regional Water Boards and State Water Board Divisions
- Provide feedback on task orders and enhancements to the system from the perspective of the average user
- Report to the QA Team Leader regarding data cleanup efforts, system failures, and QA issues
- Oversee manual data cleanup for their regions and programs

5.8 Division of Information Technology Assistant Deputy Director

- Oversees all aspects of product development and the maintenance agreement
- Gives final approval for completed products and ongoing support
- Ensures staffing is adequate to appropriately maintain CIWQS
- Ensures that staff has adequate education, training, and experience to

perform assigned computer system functions and has technical support as needed from on-call contractor/s

5.9 Development Project Manager

The Development Project Manager is a subject matter expert in information technology (IT) project management.

5.9.1 General Project Management

- Oversees the prioritization of application requirements
- Develops mitigation strategies and contingency plans and monitors project risks
- Coordinates project work efforts
- Develops project management-related deliverables
- Reviews all project deliverables
- Elevates budget, schedules, client, and technical issues to the Statewide CIWQS Coordinator, as necessary
- Leads the CIWQS Maintenance Team

5.9.2 Communication

- Ensures that QA activities are understood by IT staff and that time is allotted for QA activities
- Works with developers, the product manager, and the QA Team Leader to define a timeline and output acceptable to all parties
- Facilitates IT staff (e.g., database administrators (DBAs), contractors, programmers) training on QA and business rules management
- Evaluates implementation effectiveness of CIWQS fixes and maintenance and communicates need for additional implementation efforts
- Provides oversight of all aspects of project development for the development organization
- Ensures problems are resolved in accordance with the QAP
- Ensures that the project plan[3] is approved by the BRT

5.9.3 Documentation

- Ensures that the CIWQS Data Design document is updated
- Updates the CIWQS Standard Procedures Document
- Works with developers to define the work plan
- Manages and implements the implementation work plan
- Monitors the development of and adherence to the project management plan
- Maintains project work plan

5.10 Development Team/Technical Staff

- Perform technical and programmatic project activities including database design and issue resolution testing and implementation
- Approves the project scope and approach from a technical IT perspective
- Assures project technical feasibility, adherence to standards, and appropriateness to the overall information strategy
- Checks plans; estimates and makes IT resources available
- Determines the suitability and soundness of the overall technical architecture from an IT perspective
- Elevates risks and mitigation measures to the appropriate organization level

6. DATA QUALITY INDICATORS

6.1 Purpose

Data quality indicators (DQIs) are characteristics that translate technical aspects of a system into measurable components, which can be used in several ways. DQIs are best assessed as a series of questions. We can use these indicators in our data quality assessments, like the CIWQS online database audit and the quarterly quality assurance reports. Questions similar to the ones listed below are included in the audit checklist, as attachment to the CIWQS SOP: *Auditing the CIWQS Online Database.* Further, these

indicators are enforced through corrective action, training, and other standard operating procedures.

Answering these questions will help us to assess the quality of our data. Some questions can be answered with a simple “yes” or “no,” while others require a lengthier response. For example, the question, “are the user’s manual, help desk manual, and maintenance manual current and available?” can be answered with a “yes” or “no,” but a better answer would indicate where the manuals reside and include the date of the last update. If the answer is “no,” the response should include a plan to have them updated and distributed.

These DQIs will be used to evaluate whether we are meeting our Data Quality Objectives (DQOs).

Program-related questions

6.2 Reports

The following should be used by the Reports Team to test reports, by the Data Cleanup Committee to evaluate data, by the QA Lead to develop the quarterly Quality Assurance report (CIWQS SOP: *Quality Assurance Reports)*.

- Does the information in the report match the source data? Does the information contained in the report correspond correctly to the input from the user?
- Do the reports contain all of the information expected by the user?
- Are errors (e.g., illogical values, null values, and inconsistent data) global or isolated events?
- Have reports been distributed according to CIWQS protocols?
- Have report-related corrective actions been addressed, documented, and closed?
- Are reports being stored according to CIWQS protocols?
- Is the CIWQS SOP: *Quality Assurance Reports* current?

6.3 Audits

The following questions should be used by the QA Lead, the BRT, and the Exec Committee to ensure the audit procedure is effective.

- Has the frequency of audits met CIWQS protocols?
- Have audit-related corrective actions been addressed, documented, and closed?
- Have submitted audit reports been complete?
- Have submitted reports been distributed according to CIWQS protocols?
- Are audit reports being stored according to CIWQS protocols?
- Is the CIWQS SOP: *Auditing the CIWQS Online Database* current?

6.4 Training

The following should be used by the Trainers, QA Lead, and BRT to assess whether the training plan is meeting user needs.

- Has the frequency of training met CIWQS protocols?
- Does the training program contain all of the information necessary to successfully input and retrieve information from CIWQS?
- Have training-related corrective actions been addressed, documented, and closed?
- Is training documentation produced according to CIWQS protocols?
- Is training documentation stored according to CIWQS protocols?
- Have program trainers been trained appropriately?
- Is the *CIWQS Training Program Plan* current?
- Is the CIWQS SOP: *Training for Use of the CIWQS Online Database* current?
- Are the user's manual, help desk manual, and maintenance manual current and available?
- Is training documentation stored in a data repository with automated backup procedures in place?

6.5 Accounting

These questions should be used by the Division of Administrative Services staff to prepare for annual billing and external audits.

- Are addresses current?
- Are there explicit protocols for maintenance of user accounts so they are current and accurate?
- Do addresses match the correct organization or person (i.e., party)?
- Are the billing codes accurate and current?
- Have accounting-related corrective actions been addressed, documented, and closed?
- Does the database correctly reflect assessed liabilities?
- Do the checks accounting receives match what is recorded in the database?

6.7 Corrective Actions

These questions should be used by the BRT to enforce procedural standards and by the QA Lead to prepare QA reports (CIWQS SOP: *Quality Assurance Reports)*.

- Have closed issues recurred?
- Is the CIWQS *Corrective Action* SOP current?
- Does corrective action receive sufficient coverage in other CIWQS SOPs?

6.8 Data Migration

The following questions should be used by the BRT to protect the integrity of existing data.

- Does migrated data meet CIWQS requirements?
- Was migrated data entered and reported under an approved quality system document?
- Has the data entry been verified and validated?

- Has a portion of the migrated data been verified after it is in CIWQS?
- Have data migration-related corrective actions been addressed, documented, and closed?

6.9 Timeline

These questions should be used by the BRT to prevent data entry backlog.

- Has the data entry timeline been followed?
- Are the data entry timelines communicated to and understood by Regional Boards and State Board CIWQS programs? Are Business Rules for data entry times current and assessable?

Information Technology-related questions

6.10 Software Issues

These questions should be asked by the project manager during a CIWQS release or software update and by the QA Lead to ensure compliance with this QAP.

- Have software patches been applied to CIWQS on a timely basis?
- Was the software upgrade done in the test environment prior to being loaded into production?
- Has the software patch been well researched to confirm its appropriateness and efficacy?

6.11 Data Entry Time

These questions should be asked by the audit team during an audit of the CIWQS database. They should also be asked by the QA Lead to ensure compliance with this QAP and ensure timely data entry and prevent data entry backlog. These questions should be asked by the Project manager who would be responsible for taking action.

- Have data entry times met CIWQS protocols?
- Does data entry time negatively affect regional data entry deadlines?
- Have data entry time-related corrective actions been addressed, documented, and closed?

6.12 Relationships

These questions should be asked by the audit team during an audit of the CIWQS database. They should also be asked by the QA Lead to ensure compliance with this QAP.

- Does a current entity relationship diagram (ERD)[4] exist?
- Does the ERD accurately reflect the input and output requirements of CIWQS?
- Is the ERD designed so that CIWQS can be modified depending on future needs?
- Is the mapping document[5] current?

6.13 Interface

These questions should be asked by the QA Lead and the Internal Staff User Group[6].

- Are there specified protocols for soliciting and processing feedback regarding the user interface?
- Does the interface include clear protocols for submitting and retrieving information from CIWQS?
- Have user suggestions and concerns regarding interface been addressed?
- Have interface-related corrective actions been addressed, documented, and closed?

---

[4] An ERD is a diagram of chart that represents the logical structure of a database.

[5] The mapping document related fields seen in the interface (on the screen) to where they exist in the database tables.

[6] There are several different types of user groups (public report users, eSMR submitters, etc.). The Internal Staff User Group discusses and addresses issues related to Water Board data and data entry.

- Is the database available to users at all times?
- Does the interface have adequate online help that addresses topics critical to submitting and retrieving information from CIWQS?

6.14 Enhancements and Updates

These questions should be asked by the BRT, the QA Lead, and the Project Manager to ensure priority and data quality-related issues are being addressed.

- Do all reported corrective actions result in appropriate enhancements or updates?
- Are updates reported to the user in a timely and clear manner?
- Have enhancements been appropriately prioritized and updated?

6.15 Testing

These questions should be asked by the QA Lead and Project Manager during and after a CIWQS release. These questions should also be asked by the Audit Team during an external audit of DIT.

- Have issues been tested in the Test Database before entering the production environment?
- Does testing include load testing with a load that will approximate the highest estimated simultaneous use scenario?
- Does the testing plan include user testing by the customer representatives on a system that is identical to the proposed end product?
- Are tests documented in enough detail to ensure that the results of the test are complete and easily understood?
- Have testing-related corrective actions been addressed, documented, and closed?
- Are test protocols for hardware and software in place to ensure the intended performance?
- Has the validation matrix been filled out for remaining issues?
- Has the validation matrix been distributed according to CIWQS

protocols?

- Has the validation matrix been stored according to CIWQS protocols?
- Is the *CIWQS Standard Procedure for Module Integration and Maintenance* Document current?

6.16 Maintenance

These questions should be asked by the QA Lead and Project Manager to ensure the maintenance process follows protocols described in the CIWQS Standard Procedures document. They should also be asked by the Audit Team.

- Is there a specified schedule of database maintenance?
- Are there specified protocols for informing users of downtime during periods of routine maintenance?
- Has the frequency of maintenance met CIWQS protocols?
- Have maintenance-related corrective actions been addressed, documented, and closed?
- Is there a plan in place for system back-up, data archival, and disaster recovery?
- Is maintenance documentation distributed according to CIWQS protocols?
- Is maintenance documentation stored according to CIWQS protocols?
- Has the validation matrix been updated?
- Is the *CIWQS Standard Procedure for Module Integration and Maintenance* document current?

6.17 Data Retention

These questions should be asked by the Project Manager and QA Lead to ensure compliance with this QAP. These questions will also be asked by the Audit Team.

- Is data retained according to CIWQS protocols?
- Does the duration of data retention meet CIWQS protocols?
- Is data retained in a secure manner?

- Is data backed up according to CIWQS protocols?
- Have data retention-related corrective actions been addressed, documented, and closed?
- Is the *CIWQS Standard Procedure for Module Integration and Maintenance* document current?

6.18 Hardware/Software

These questions should be asked by the Project Manager and QA Lead to ensure compliance with this QAP. These questions will also be asked by the Audit Team.

- Is *hardware adequately designed to ensure reliability and the abil*ity to perform all documented functions?
- Is hardware of adequate capacity to accommodate capability and data storage needs?
- Is hardware installed and operated in accordance with manufacturer's recommendations?
- Prior to use, is the system tested to ensure conformance to pre-determined acceptance criteria?
- Is all hardware housed in environmental conditions that are regulated to protect against data loss?
- Are all computer system documentation and records readily available?
- Are problems that arise from software updates or replacements adequately documented?
- Are version control methods in place to document software currently in use?

6.19 Security

These questions should be asked by the Project Manager and QA Lead to protect the database from both intentional and unintentional threats to the system. These questions will also be asked by the Audit Team.

- Is there a security plan that describes security features and how specific threats will be prevented?

- Are there separate passwords for user logon and access to sensitive portions of the database?
- Is access to software and data restricted to authorized personnel, and are there established access categories for various levels?
- Is a list of authorized personnel and their level of access maintained (available in the Administrator User's Module)?
- Is there a system in place for audit trails that records data transactions - including date, time, and responsible party?
- Is the system physically secured to prevent tampering or other adverse actions?
- Is there controlled authorization to change the system password, and is the password changed periodically?

7. TESTING PROCEDURES

Testing procedures are addressed in the document *California Integrated Water Quality System (CIWQS) Standard Procedure for Module Integration and Maintenance* (Version: 2.1, February 22, 2007). This document may be obtained from the State Water Board Division of Information technology (DIT) and is listed in the reference section of this QAP.

8. QUALITY OBJECTIVES AND ASSURANCE ACTIVITIES

Data Quality Objectives (DQOs) are tolerable qualitative criteria on the quality and quantity of the data to be collected based on the data's eventual use[7]. DQOs are statements about how reliable the data need to be to meet system and program goals.

These DQOs can be evaluated using the data quality indicators and reported in the QA reports (CIWQS SOP: *Quality Assurance Reports).* The assurance activities will support and enforce them.

[7] Definition from *Guidance on Systematic Planning Using the Data Quality Objectives Process* USEPA, Office of Environmental Information: Washington DC, 2006

8.1 Broad Goals

- Provide standardized data management at all entry points for same data sets
- Gain stakeholder confidence by making accurate, complete information available to all stakeholders in a timely manner
- Ensure that decision-making is sound and based on current and accurate data
- Get buy-in from stakeholders and users
- Assess and understand data quality status

8.2 Specific Goals

This section highlights more specific goals. Through their implementation, we hope to meet our broader goals.

8.2.1 Standardized Data Management

- Assess how regions and programs manage data differently from each other
- Utilize a creative approach to develop systems and tools that will ensure data quality and improve efficiency

8.2.2 Information Availability to Stakeholders

- Implement Report Prioritization SOP
- Evaluate Report Prioritization SOP annually
- Meet with stakeholders to discuss reports (annually, at a minimum)
- Create a process for outside stakeholders to obtain information not available on the internet
- Report CIWQS metrics (e.g., data cleanup, number of reports available, data entry, number of data submitters, number of reports)

8.2.3 Facilitating the use of data for decision making

- Meet with program roundtables annually to discuss CIWQS as a decision support system
- Assign roundtables to list the questions they need the database to answer
- Suggest database queries that may facilitate decision-making and program management
- Inform State and Regional Water Board management of how well the system meets its quality objectives
- Meet with State and Regional Water Board management to find out information they need the database to provide

8.2.4 Buy-in from Stakeholders and Users

- Create an excellent working relationship with all project stakeholders to ensure wide-ranging satisfaction with the QA program
- Update steering committee and user groups on QA activities and data cleanup efforts
- Eliminate erroneous and extraneous fields that cause confusion or lead to dissatisfaction with the system
- Ensure that all fields provide actionable data

8.2.5 Assess and Understand Data Quality Status

- Ensure that the system contains data of known and documented quality as defined and judged by CIWQS quality indicators (section 5) and program-specific quality objectives
- Develop and reassess quality objectives as needed

8.3 Quality Objectives

Establishing and implementing DQOs is not a static process. Both the DQOs and the QAP will continue to be reassessed and revised. The following objectives are meant as an achievable starting point and not as final goals. For this reason, suggestions on new and immediately less

attainable objectives have been included in appendix 4.

- Ensure that there is no data entry backlog
- Assess the accuracy of the 13385 legislative report
- Assess the accuracy of the mandatory minimum penalty (MMP)[3]
- Ensure that canned reports hyperlinks work and that the reports contain logical information with reasonable numbers
- Ensure that searches in CIWQS promptly return valuable and reasonable results
- Ensure that billing information is complete (e.g., billing name, address, and phone; complexity; design flow; fee code; threat to water quality (TTWQ), major/minor flag)
- Ensure that enforcement actions with fulfilled liabilities and projects have the status of “historical”
- Ensure that formal enforcement actions have the applicable Regional or State Water Board document uploaded under the “Enforcement” tab of the “Regulatory Measures” module
- Ensure that business rules are established and enforced
- Ensure that fields with a BRT ranking of "5" have built-in data validation and force the user to pick a suitable value
- Address duplicate records
- Ensure that a training program is in place and implemented
- Ensure that hardware resources are adequate to allow a stable and acceptable operation of the system
- Ensure that software design is adequate to allow a stable and acceptable operation of the system

8.4 Data Cleanup[3] Procedures

- Ensure that a systematic plan is developed and implemented
- The Statewide CIWQS Coordinator and CIWQS QA Leader will create data cleanup reports
- The BRT will prioritize data cleanup reports based on objective criteria
- The Statewide CIWQS Coordinator and CIWQS QA Leader will confirm that issues in the report were resolved

8.5 Reports

As we provide more useful reports to line staff and project officers, we will start getting more feedback regarding erroneous data and incorrect report design. The data cleanup and reporting effort are integrated. As staff uses the data in the database, via reports, data errors will be found and remedied.

- Ensure that internal canned reports are available in CIWQS
- Ensure public canned reports are posted on the Internet
- Ensure that ad hoc reports can be created by users via the Discoverer software
- Ensure that every field in CIWQS with a BRT ranking of "5" (5 is highest) is available in the end-user layer
- Ensure that a list of data cleanup reports are need-specific, created in Discoverer, and posted on the Intranet site
- Ensure that internal and public reports contain links (available only to internal users) to CIWQS to facilitate data cleanup
- Ensure that Discoverer training emphasizes the use of the unique CIWQS identifiers in ad hoc reports to facilitate data cleanup
- Ensure that reports function as designed

8.6 Audits (please see Section 9)

8.7 Standard Operating Procedures (SOPs)

An SOP is a set of written instructions detailing a process or routine followed by an organization. SOPs document the manner in which the process should be followed to ensure conformance to the system requirements and to maintain data quality. If SOPs are not clearly and succinctly written, they may be difficult to follow. Conversely, if not followed, a well-written SOP will be unsuccessful[8]. In short, SOPs limit

[8] *Guidance for Preparing Standard Operating Procedures (SOPs);* USEPA, Office of Environmental Information: Washington DC, 2007.

variation and non-conformity, while promoting consistency and quality.

SOPs are written for a variety of QA activities. Appendix 2 is a list of SOPs and their current status.

In general, SOPs will consist of six elements: Title page, Purpose, Responsibilities, Procedures, Corrective Action, and References. All SOPs are subject to the *Document Management* SOP and deviations from a SOP are subject to the *Corrective Action* SOP. A SOP longer than eight (8) pages will have a table of contents.

Several factors dictate the level of detail in a SOP including:

- Complexity of the process
- Importance of the process
- Number of people needing to follow the process
- Level of training of those performing the process
- How often the SOP is used[8].

The SOPs will be drafted by the QA Design Team, or delegate(s), and will first be reviewed internally by the QA Design Team. Once the SOP Lead approves the SOP, he/she will solicit feedback from the BRT. Comments from the BRT will be addressed and integrated as appropriate. The SOP becomes final once the signature of the BRT chair(s) is obtained.
The BRT also has the authority to propose topics for SOPs and to prioritize their development.

8.8 Training Program

The Training Program is documented in its own SOP: *CIWQS Training Program.* It discusses how training is related to data quality and includes as attachments the business rules, training workbooks, course outline, course schedule, training evaluation, training log, and training quizzes.

9. PROBLEM REPORTING AND CORRECTIVE ACTIONS

CIWQS users, coordinators, project managers, software developers, script writers, etc. will report issues using the CIWQS issue tracking tool: Mantis. Issues will be logged into Mantis with complete information for all required fields. Mantis logs issues into a master list and assigns a unique issue number according to the type of issue. CIWQS Help Center (CHC) staff and students then assign the issue to the most qualified person to review and resolve the issue.

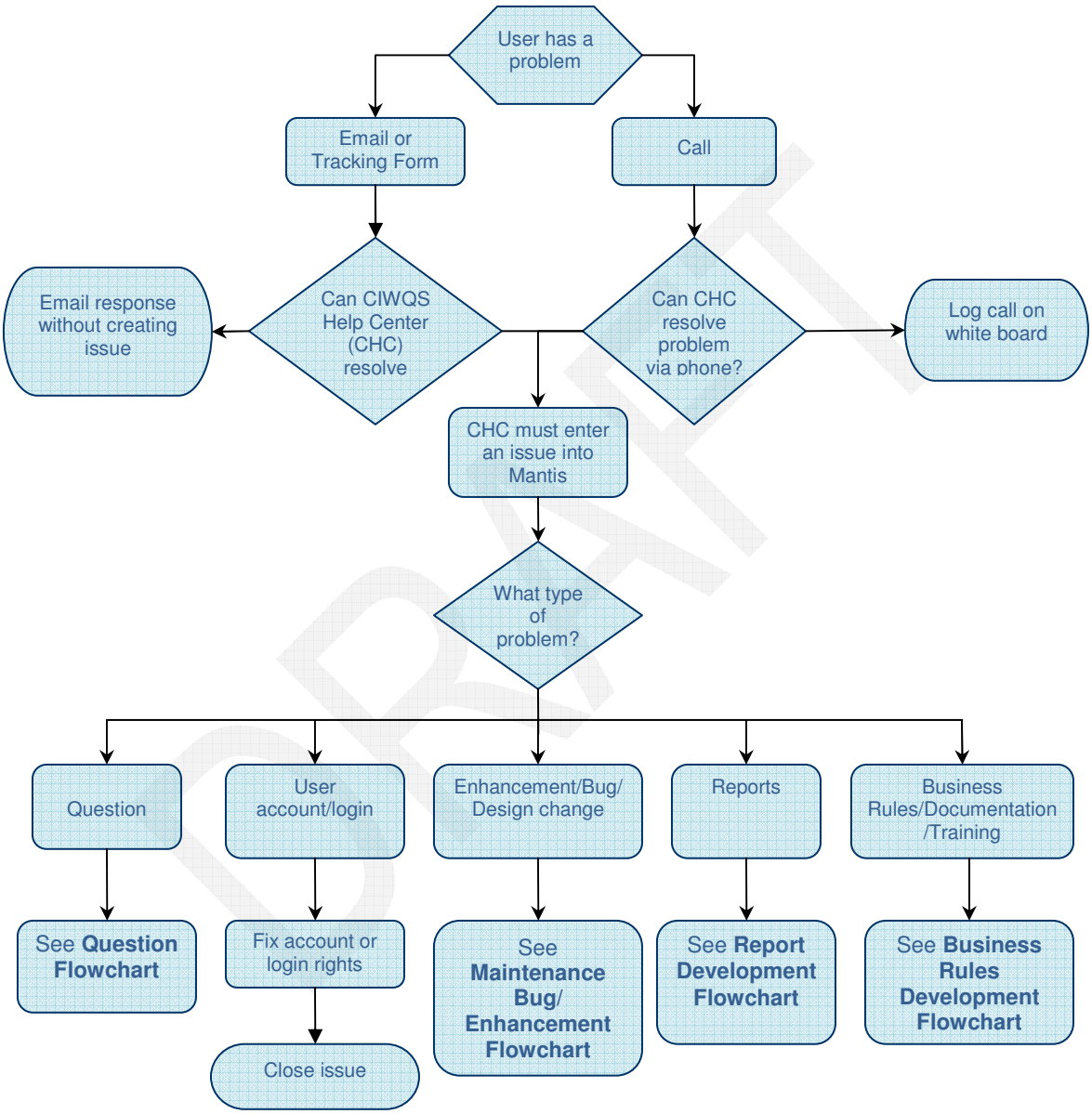
This designee is responsible for providing feedback or resolution to his or her assigned issues. The project manager or assistant project manager will review issues weekly. Issues will be resolved according to priority. Bugs that stop work for both staff and external users are given the highest priority. Major enhancements are prioritized by the BRT using objective criteria found in the CIWQS SOP: *Enhancement Ranking.* Issues that have been reported on multiple occasions and by more than one person are given higher priority. The project manager, assistant project manager, and Statewide CIWQS Coordinator use best professional judgment to determine which priority issues will be addressed in the upcoming release.

These prioritized issues are relayed to the contractor in writing using an informal Work Plan.

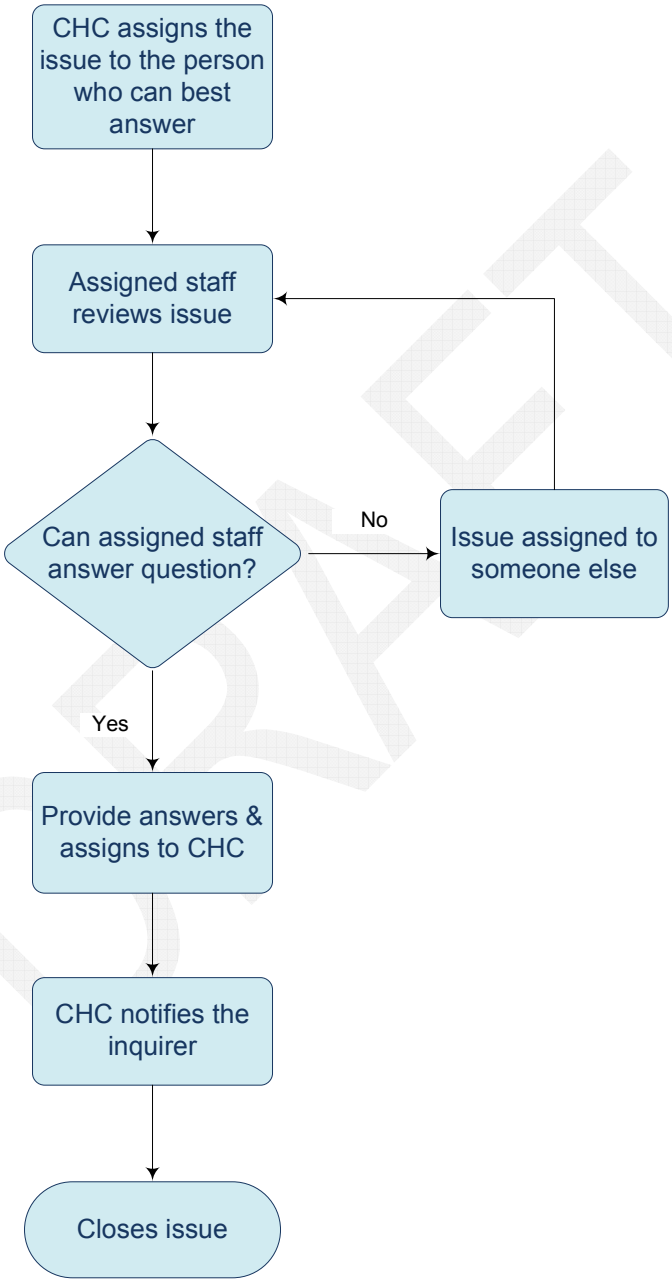
If issues are not resolved, those issues will be evaluated as a risk or as too trivial and will be added and tracked by the project manager and appropriate team members. When possible, problems are resolved with the DIT, or the appropriate task leader.

Issue reporting as it is tracked in Mantis is demonstrated in the following flowcharts:

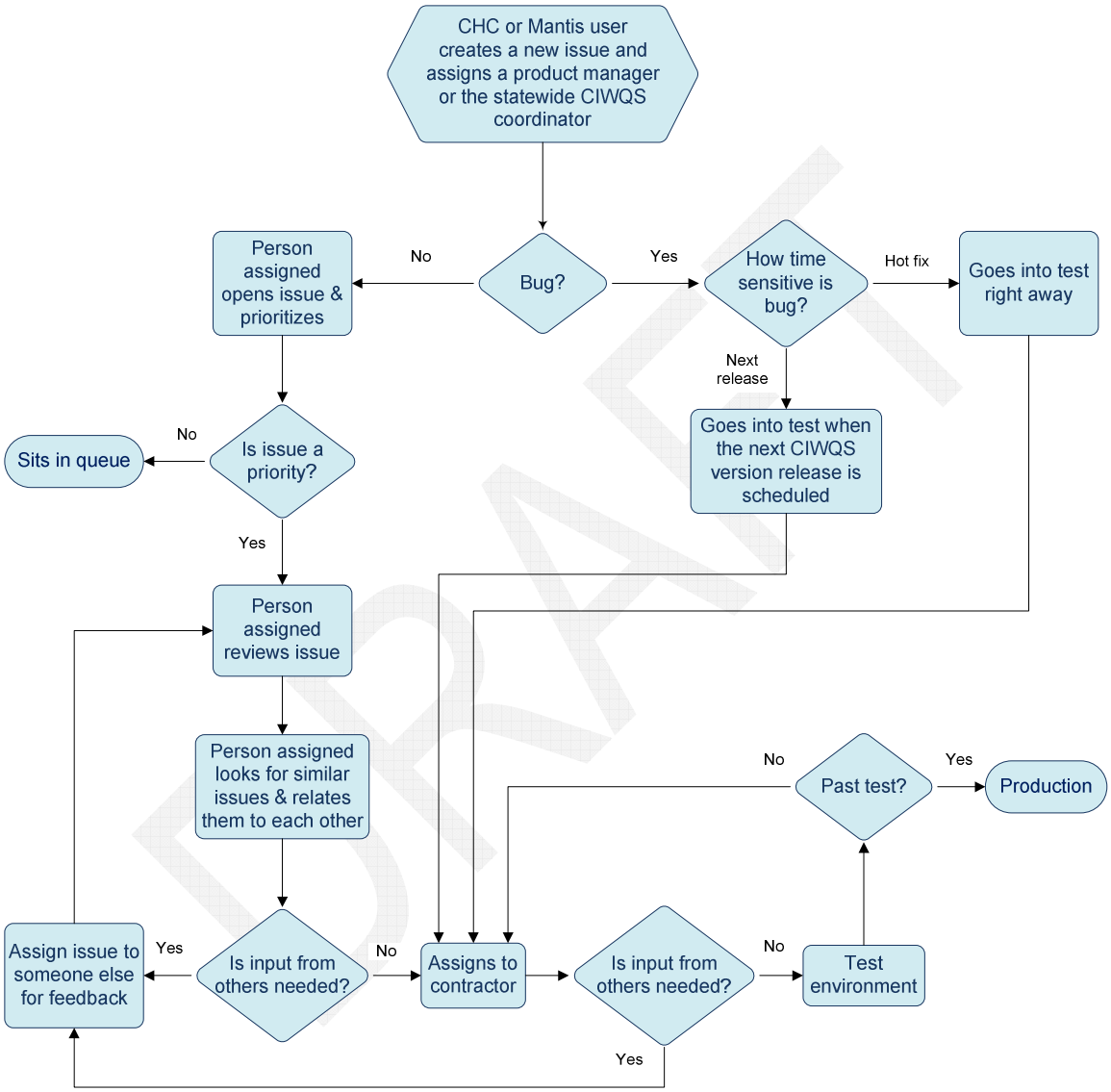
Problem Assessment



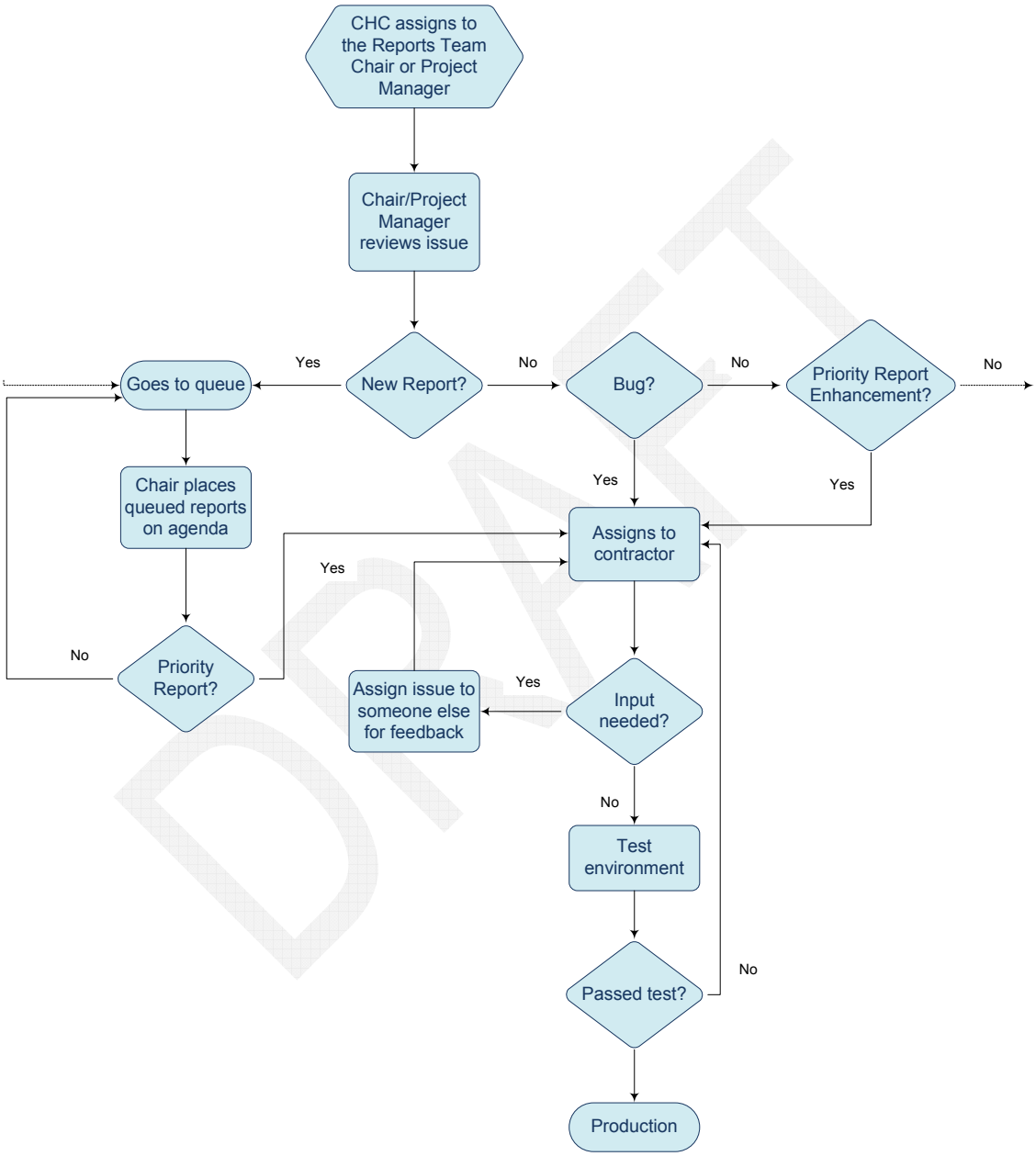
Question



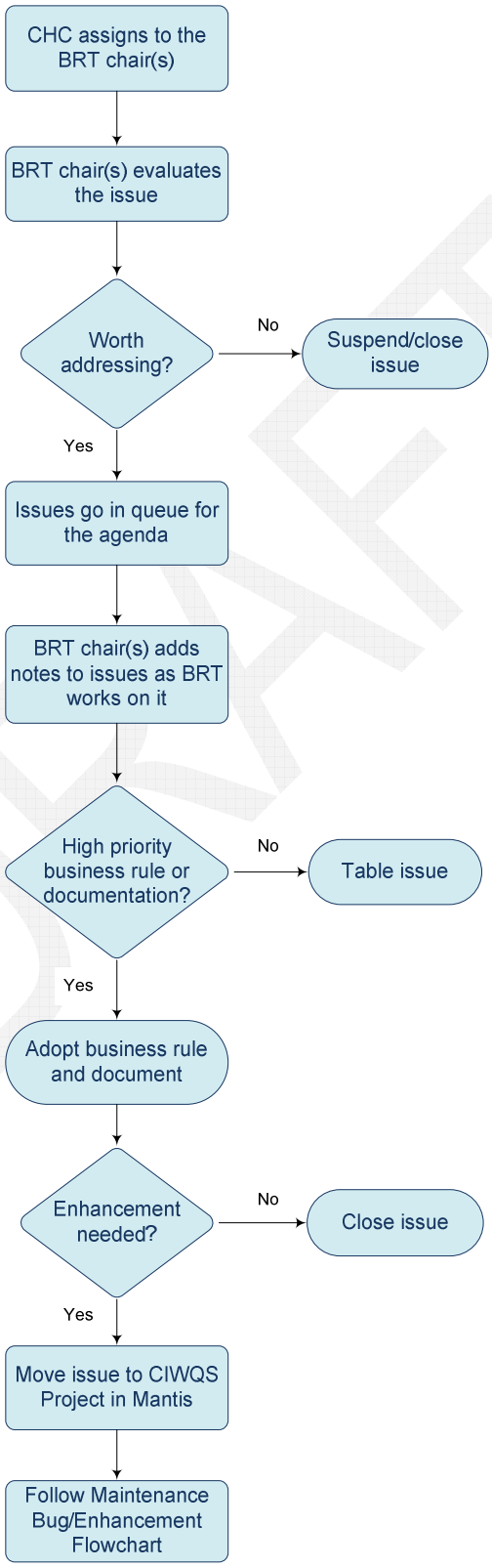
Maintenance Bug/Enhancement



Reports



Business Rules Development



All other issues in violation of this QAP, CIWQS business rules, and relevant SOPs will be reported according to CIWQS SOP: *Corrective Action*. The associated *Corrective Action Report* allows the tracking of individual failures, as well as recurrences that may be evidence of a systemic deficiency.

10. AUDITS

USEPA defines an audit as a systematic and independent examination to determine whether operational activities or processes conform to planned arrangements and are being implemented effectively and suitably to achieve objectives. In the context of CIWQS, database audits are used to determine if the system meets the quality indicators detailed in Section 5. They are based on this QAP, programmatic business rules, the CIWQS SOP: *Auditing the CIWQS Online Database*, and other programmatic documents.

CIWQS database audits will initially be conducted by a third party and have been designed to ensure continuity with subsequent audits. The initial audit of the CIWQS Online Database is tentatively scheduled for spring 2008. Subsequent audits should take place every two years or in response to database updates or failures.

Deficiencies noted during the audit are compiled by the auditor and reported as either “Findings” or “Observations.” These terms are defined as follows:

Observation – A single event that does not meet CIWQS requirements (EPA, *Guidance on Technical Audits and Related Assessments for Environmental Data Operations*).

Finding – Multiple observations within a single system, or the failure of a system (EPA, *Guidance on Technical Audits…)*.

The auditor may also include “recommendations[3]” for items that are compliant but subject to improvement. Findings, observations, and recommendations are then detailed in an audit report.

The Audit Procedure is laid out in detail in the CIWQS SOP: *Auditing the CIWQS Online Database.* It includes a standard auditing procedure, as prescribed in the USEPA document, *Guidance on Technical Audits and Related Assessments for Environmental Data Operations* and an audit checklist. To help guide the audit, it also includes an attachment that has every field in core CIWQS given a ranking of importance.

11. MIGRATION, PLANNING, AND DESIGN OF FUTURE MODULES & NEW PROJECTS

The project manager and product manager will oversee the development of a migration plan that details the steps for data migration and conversion. The plan will also provide an opportunity for process review before migration takes place.

11.1 The Database System Development Plan

The database system development plan must include:

- Scope of the project
- Constraints and assumptions
- Functional requirements
- System specifications
- Software design requirements
- Risks and risk management

11.2 Needs Assessment and High-Level Requirements Definition

During the business analysis phase of the new CIWQS module or new project, program requirements must be clearly documented and given a priority. Both IT technical staff and Water Board program staff must participate is this defining process. Flowcharts for the various business processes may also be created to help communicate business practices.

11.3 Detailed Requirements Analysis

This should include a Dataset Universe Inventory List that contains the universe of all data sources that could be candidates for data migration. The Dataset Priority Inventory List contains those datasets that have been prioritized by program and have been selected to be migrated.

This may not be applicable to a new project, which may be adding a new process to collect data and no historical data exists.

11.4 Software Design

An Entity Relationship Diagram[3] must be developed, which represents the tables where existing data will be migrated. All new and existing fields must be defined and documented. Further, a data mapping document must be created and must govern the migration process.

All software used by project staff will be in accordance with DIT software standards. Product versions will be compatible with products in use at DIT. The following list identifies the project development related software currently used:

- Concurrent Versions System (CVS) – Used for source code and document version control as defined and managed by the State Water Board DIT
- *Erwin* – Used for data monitoring and creating Entity-Relationship diagrams of source databases and data mapping them to CIWQS EDM
- *Mantis* – Used for tracking and resolution of issues
- *MS Project* – Used to create, maintain, monitor, and report project schedule
- *MS Excel* – Used to supplement tracking of data of intermediate work products of all tasks
- *MS Access* – Used to track CIWQS dataset inventory information, and may serve as a primary intermediate data staging server for source databases in Tetra Tech's production environment
- *MS Word* – Used to create and maintain document deliverables

- *SQL Loader* – Used to facilitate extraction, transformation, and loading of data to the CIWQS Oracle database
- *SQL+* – User to develop data migration and integration scripts
- *Oracle Designer* – Used to manage data modeling versions at the State Water Board production environment

11.5 The System Configuration Management Plan

The following sections outline the steps for migration at a high level. More detailed steps are project-specific and will be included as part of an individual project's documentation.

11.5.1 Implementation Plan

Data migration steps include:

- Finalize data mapping
- Document value translations (e.g., definitions of existing values)
- Perform data migration into new environment
- Perform an initial data review to determine migration issues (alpha testing)
- Perform migration testing (section 10.5.2 below) to verify data is correct (beta testing)
- Develop business rules prior to migration to ensure data is keyed in accurately
- Conduct data entry training prior to migration to ensure business rules are followed

11.5.2 Testing, Verification, and Validation Plan

The role of reviews, inspections, and walkthroughs is to assess whether or not processes are properly conducted and documented. QA assists the verification and validation process by ensuring that any actions required are assigned, documented, scheduled, and updated. Various levels of software testing will be conducted to verify and validate each product. Software testing, such as acceptance testing, is done in accordance with the individual project's test plan. Testing documentation will be reviewed

for completeness and adherence to standards. The documentation review includes test plans, test specifications, test procedures, and test reports. Testing nonconformance will be resolved prior to software release. Testing will ensure that:

- Data migration and integration is complete, and data is ready for use according to screen design specifications
- Test procedures have evaluated migrated data in accordance with test plans and screen design specifications
- Test procedures are verified and followed, and nonconformance issues are documented and recorded
- Test reports are accurate and complete, and resolution of all non-conformance matters are validated prior to delivery
- New data can be entered according to predefined program requirements

12. REFERENCES

California Integrated Water Quality System (CIWQS) Data Conversion and Migration Plan; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2004.

California Integrated Water Quality System (CIWQS) Maintenance and Support Plan; State Water Resources Control Board: Sacramento, CA, 2005.

California Integrated Water Quality System (CIWQS) Project Feasibility Study Report: November 17, 2003 Version 1.1; State Water Resources Control Board: Sacramento, CA, 2003.

California Integrated Water Quality System (CIWQS) Project Team Roles and Responsibilities; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2004.

California Integrated Water Quality System (CIWQS) Software Design Specification, June 30, 2007; Tetra Tech, Inc.: Fairfax, VA 2006.

California Integrated Water Quality System (CIWQS) Standard Procedure for Module Integration and Maintenance, version 2.1; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2007.

California Integrated Water Quality System (CIWQS) Water Board User's Guide, March 2006; Tetra Tech, Inc.: Fairfax, VA, 2006.

California Integrated Water Quality System (CIWQS) Workbooks, version 2.6.1; State Water Resources Control Board: Sacramento, CA, 2006.

CEQA Review Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2007.

Change in Ownership Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2006.

Corrective Action. California Integrated Water Quality Management System Standard Operating Procedure. October 30, 2007.

Data Cleanup. California Integrated Water Quality Management System Standard Operating Procedure. October 30, 2007

Document Management. California Integrated Water Quality Management System Standard Operating Procedure. October 30, 2007.

Enforcement Tab Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2006.

Expired NPDES Permit Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2007.

Guidance for Environmental Data Verification and Data Validation; United States Environmental Protection Agency, Office of Environmental Information: Washington DC, 2002.

Guidance for Preparing Standard Operating Procedures (SOPs); United States Environmental Protection Agency, Office of Environmental Information: Washington DC, 2007.

Guidance on Assessing Quality Systems; United States Environmental Protection Agency, Office of Environmental Information: Washington DC, 2003.

Guidance on Technical Audits and Related Assessments for Environmental Data Operations; United States Environmental Protection Agency, Office of Environmental Information: Washington DC, 2000.

Inspections Module Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2006.

Mandatory Minimum Penalty Report Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2007.

Party Module Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2006.

Place Module Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2006.

Project Plan - Development of the California Integrated Water Quality System, July 27, 2004; Tetra Tech Inc.: Fairfax, VA, 2004.

Quality Assurance Reports. California Integrated Water Quality Management System Standard Operating Procedure. October 30, 2007.

Regulatory Measures Module Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2006.

Rescinded NPDES Permit Module Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2007.

Rescinded Through Renewal Module Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2007.

Auditing the CIWQS Online Database. California Integrated Water Quality Management System Standard Operating Procedure. Month xx, 2007

Violations Module Business Rules; State Water Resources Control Board, Division of Information Technology: Sacramento, CA, 2007.

APPENDIX 1 CIWQS Personnel

CIWQS Position	Organization or Department	Name of Individual	Contact Information
QA Team Leader	Division of Water Quality	Erin Mustain	(916) 445-9379 or emustain@waterboards.ca.gov
Business Rules Chair/Statewide CIWQS Coordinator	Division of Water Quality	Jarma Bennett	(916) 341-5532 or jbennett@waterboards.ca.gov
Business Rules co-Chair/Regional CIWQS Coordinator	Santa Ana Regional Water Board	Gary Stewart	(951) 782-4379 or gstewart@waterboards.ca.gov
Business Rules Team	Division of Water Quality	Erin Mustain	(916) 445-9379 or emustain@waterboards.ca.gov
Business Rules Team	Division of Water Quality	Phil Isorena	(916) 341-5544 or pisorena@waterboards.ca.gov
Business Rules Team	Los Angeles Regional Water Board	Russ Colby	(212) 620-6373 or rcolby@waterboards.ca.gov
Business Rules Team	Central Valley Regional Water Board (Frenso Office)	Jo Anne Kipps	(559) 445-5035 or jkipps@waterboards.ca.gov
Business Rules Team	Colorado Regional Water Board	John Carmona	(760) 340-4521 or jcarmona@waterboards.ca.gov
Business Rules Team	Office of Research, Planning and Performance	Jeff Barnickol	(916) 341-5270 or jbarnickol@waterboards.ca.gov
Business Rules Team	Central Valley Regional Water Board (Sacramento Office)	Steve Rosenbaum	(916) 464-4631 or srosenbaum@waterboards.ca.gov
Business Rules Team	Division of Administrative Services	Lucy Howard	(916) 341-5021 or lhoward@waterboards.ca.gov
Business Rules Team	Division of Administrative Services	Bob Rinker	(916) 341-5129 or rrinker@waterboards.ca.gov
Sponsor and Executive Committee Member	State Water Board Executive Office	Jon Bishop, Chief Deputy Director	(916) 341-5602 or jsbishop@waterboards.ca.gov

CIWQS Position	Organization or Department	Name of Individual	Contact Information
Executive Committee Member	Central Valley Regional Water Board	Pamela Creedon, Executive Officer	(916) 464-4839 or pcreedon@waterboards.ca.gov
Executive Committee Member	State Water Board Executive Office	Tom Howard, Chief Deputy Director	(916) 341-5602 or thoward@waterboards.ca.gov
Executive Committee Member	Lahontan Regional Water Board	Harold Singer, Executive Officer	(530) 542-5412 or hsinger@waterboards.ca.gov
Executive Committee Member	Los Angeles Regional Water Board	Tracy Egoscue, Executive Officer	(213) 576-6605 or tegoscue@waterboards.ca.gov
Executive Committee Member	Santa Ana Regional Water Board	Jerry Thibeault, Executive Officer	(951) 782-3284 or gthibeault@waterboards.ca.gov
Executive Committee Member and Water Quality Data Team Lead	Division of Water Quality	Darrin Polhemus, Deputy Director	(916) 341-5458 or dpolhemus@waterboards.ca.gov
Executive Committee Member	Division of Water Rights	Vicky Whitney, Deputy Director	(916) 341-5302 or vwhitney@waterboards.ca.gov
Development Manager	Division of Information Technology	Amy Tong, Assistant Deputy Director	(916) 341-5762 or atong@waterboards.ca.gov
Development Project Manager	Division of Information Technology	Ron Robinette	(916) 341-5211 or rrobinette@waterboards.ca.gov
Water Quality Data Team	Division of Information Technology	Francisco Chiang	(916) 445-2134 or fchiang@waterboards.ca.gov
Water Quality Data Team	Division of Information Technology	Paul Yao	(916) 341-5047 or pyao@waterboards.ca.gov
Water Quality Data Team	Division of Information Technology	Hoang Nguyen	(916) 341-5535 or hanguyen@waterboards.ca.gov
Water Quality Data Team	Division of Information Technology	James Miers	(916) 341-5219 or jmiers@waterboards.ca.gov

CIWQS Position	Organization or Department	Name of Individual	Contact Information
Water Quality Data Team	Division of Information Technology	Rueen-Fang Wang	(916) 341-5212 or rwang@waterboards.ca.gov
Water Quality Data Team	Division of Information Technology	Don Swiden	(916) 341-5163 or dswiden@waterboards.ca.gov
Water Quality Data Team	Division of Water Quality	Annalisa Kihara	(916) 324-6786 or akihara@waterboards.ca.gov
Water Quality Data Team	Division of Water Quality	Rassam Zarghami	(916) 341-5516 or rzarghami@waterboards.ca.gov
Water Quality Data Team	Division of Water Quality	Erin Mustain	(916) 445-9379 or emustain@waterboards.ca.gov
Water Quality Data Team	Division of Water Quality	Jarma Bennett	(916) 341-5532 or jbennett@waterboards.ca.gov
CIWQS Coordinator	North Coast Regional Water Board	Lori Foster	(707) 576-2656 or lfoster@waterboards.ca.gov
CIWQS Coordinator	San Francisco Bay Regional Water Board	Christine Boschen	(51) 622-2346 or cboschen@waterboards.ca.gov
CIWQS Coordinator	Central Coast Regional Water Board	Sandy Cheek	(805) 542-4633 or scheek@waterboards.ca.gov
CIWQS Coordinator	Los Angeles Regional Water Board	Russ Colby	(212) 620-6373 or rcolby@waterboards.ca.gov
CIWQS Coordinator	Central Valley Regional Water Board (Frenso Office)	Jo Anne Kipps	(559) 445-5035 or jkipps@waterboards.ca.gov
CIWQS Coordinator	Los Angeles Regional Water Board	Jack Price	(213) 576-6669 or jprice@waterboards.ca.gov
CIWQS Coordinator	Los Angeles Regional Water Board	Alex Carlos	(213) 576-6726 or acarlos@waterboards.ca.gov
CIWQS Coordinator	Los Angeles Regional Water Board	Al Novak	(213) 576-6650 or anovak@waterboards.ca.gov

CIWQS Position	Organization or Department	Name of Individual	Contact Information
CIWQS Coordinator	Central Valley Regional Water Board (Sacramento Office)	Walter Bahm	(916) 464-4814 or wbahm@waterboards.ca.gov
CIWQS Coordinator	Central Valley Regional Water Board (Sacramento Office)	Susan Kelly	(916) 464-4734 or skelly@waterboards.ca.gov
CIWQS Coordinator	Central Valley Regional Water Board (Fresno Office)	Roberto Moreno	(559) 445-5357 or rmoreno@waterboards.ca.gov
CIWQS Coordinator	Central Valley Regional Water Board (Fresno Office)	Ed Balch	(559) 445-5548 or ebalch@waterboards.ca.gov
CIWQS Coordinator	Lahontan Regional Water Board	Cheryl Hanley	(530) 542-5422 or chanley@waterboards.ca.gov
CIWQS Coordinator	Lahontan Regional Water Board	Katie Everett	(530) 542-5578 or keverett@waterboards.ca.gov
CIWQS Coordinator	Colorado Regional Water Board	Maribel Ramos	(760) 776-8941 or mramos@waterboards.ca.gov
CIWQS Coordinator	Colorado Regional Water Board	Michael Kashak	(760) 776-8948 or mkashak@waterboards.ca.gov
CIWQS Coordinator	Santa Ana Regional Water Board	Gary Stewart	(951) 782-4379 or gstewart@waterboards.ca.gov
CIWQS Coordinator	Santa Ana Regional Water Board	Michelle Beckwith	(951) 782-4433 or mbeckwith@waterboards.ca.gov
CIWQS Coordinator	San Diego Regional Water Board	Brian Kelley	(858) 467-4254 or bkelley@waterboards.ca.gov

APPENDIX 2 Standard Operating Procedures

SOP Title	Date Effective	Audience	Brief Purpose
Data Validation	Pending	CIWQS Coordinators	To determine how many errors have occurred for a given set of data for a given time period.
Corrective Action	10/30/07	All CIWQS Users	To identify deviations from CIWQS procedures, log them, and fix them.
Audits	Slated for 3/4/08	All CIWQS Users	To determine gaps in CIWQS processes and procedures and determine the level of data quality for high priority fields.
Data Cleanup	10/30/07	CIWQS Coordinators	To identify and fix data.
Global Data Fixes	Pending	Water Quality Data Team	When data errors are consistent and part of a large data set, they are subject to a global fix, performed by DIT or contractor.
Data Cleanup Prioritization	Pending	Business Rules Team	Due to large amounts of uncertainty in legacy data, cleanup must be subject to an object ranking system.
Report Development	In draft	Reports Team	Reports are needed for a variety of audiences (internal and external). Reports are prioritized using an objective ranking system.
Enhancements – Issues Ranking	In draft	Business Rules Team	Significant enhancements are ranked based on objective criteria and are elevated to Task Order status.
13385 Reports	Pending	Reports Team, Enforcement Unit, data entry staff	Intended to document the process of generating the tables in the annual 13385 report.
QA Reports to Management	10/30/07	Executive Committee, Executive Officers, and Assistant Executive Officers	To report quality assurance activities and significant findings to management.
Document Control	10/30/07	All CIWQS Users	To ensure that the most up-to-date document is in use, this SOP has procedures for dating, storing, and archiving CIWQS documents.

SOP Title	Date Effective	Audience	Brief Purpose
Migration (Project-Specific)	Pending	Business Rules Team, New Module Project Team	To ensure that when new data is migrated, it doesn't negatively impact current data.
Internal User Training	Slated for 3/4/08	Internal users	To maintain a high level of data quality, it is important to have a consistent, effective training program.
Discharger Training	Pending	External users	To facilitate the submittal of data, dischargers are trained by the State Water Board Trainer.
eSMR Data Verification	In draft	Permit coders and CIWQS students	To ensure that all permit requirements have been properly coded in CIWQS by checking against the coding sheet.
Data Verification	Pending	CIWQS Coordinators	To ensure manually entered data is checked for accuracy.
eSMR Coding Sheet Development	Pending	Permit coders	To ensure that the requirements in a permit are accurately recorded on the coding sheet.
eSMR Permit Coding	Pending	Permit coders	To ensure that the requirements on the permit coding sheet are accurately entered into CIWQS.
Discoverer Enhancement	In draft	Discoverer User Group	To rank requests for reports, fields, enhancements, sorting features, and fixes that would help them build ad hoc reports.
Discoverer Testing	In draft	Discoverer User Group	To test enhancements and ensure that Discoverer users find Discoverer easy to use and are satisfied with the content of the End User Layer.

APPENDIX 3 Glossary

Actionable data - meaningful, timely data that encourages reliable and sensible decision making.

Assessment[9] – the evaluation process used to measure the performance or effectiveness of a system and its elements.

Audit[9] - a systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.

Business Rules - operations, definitions, and constraints that apply to data entry and how CIWQS data is used.

California Integrated Water Quality System (CIWQS) – the California State Water Board's online database.

Canned reports – permanent standardized reports that are readily assessable, but inflexible in content.

Core CIWQS – refers to the initial, global modules of the database (party, place, inspection, violation, and regulatory measure).

Corrective Action[9] – an action taken to eliminate the causes of an existing nonconformance, deficiency, or other undesirable situation in order to prevent recurrence.

CIWQS Data Design Document - This document provides a detailed description of how each CIWQS screen and major function interacts with the underlying database, based on the Water Boards Enterprise Data Model (EDM).

---

[9] Definition taken from *Guidance on Technical Audits and Related Assessments for Environmental Data Operations,* cited in section 11.

CIWQS maintenance team - comprised of members from the Divisions of Water Quality and Information Technology, as well as the contracted development staff to solve various maintenance items as prioritized by the Division of Water Quality.

CIWQS Project Plan – describes the development of CIWQS

CIWQS Standard Procedures Document – DIT's procedural document that covers maintenance and data integration procedures, source code procedures, database tools and scripts standards, CHC issue routing, issue testing, and deleting records from a CIWQS table.

Data[10] – refer to an elementary description of things, events, activities, and transactions that are recorded, classified, and stored but are not organized to convey any specific meaning. Data items can be numbers, letters, figures, or pictures. An example is an address.

Data cleanup – altering erroneous data so that it conforms to the business rules and to the raw data.

Data Quality Objectives - tolerable qualitative criteria on the quality and quantity of the data to be collected based on the data's eventual use.[7]

Data Quality Indicators - characteristics that translate technical aspects of a system into measurable components.

Data mapping – used by the Water Board in two senses: 1) in terms of relating the CIWQS interface to the CIWQS database tables and 2) during migration planning to identify the link between a data source and a destination.

Data migration – the process of transferring data from one database to another.

Data retention – storing data for backup and historical purposes.

[10] Definition from *Introduction to Information Systems* John Wiley & Sons Inc.: Hoboken, NJ, 2007.

Data validation[11] – The evaluation of a particular data point after the verification process (on a larger scale or longer term) to determine data quality and/or limitations with the process or procedure.

Data verification[12]- The process of evaluating the completeness, correctness, and conformance/compliance of a specific information set against the method, procedural, or contractual specifications for that activity.

Decision support system - computer-based information system that facilitates the collection of facts, generates alternatives, and makes choices.

Discharger – person or organization that directly or indirectly releases wastewater into surface or groundwater.

Discoverer – ad hoc query and reporting tool, used by Water Board staff to create impromptu reports.

Electronic Self-Monitoring Reports (eSMR) – process by which dischargers submit required monitoring data to the Regional Water Boards.

Electronic Water Rights Information Management System (eWRIMS) – a database that shares tables with CIWQS that tracks information on water rights such as water right permits and licenses.

Enhancement – a change made to the CIWQS database or interface that either makes the system easier to use or creates a needed function not previously available.

Entity Relationship Diagram (ERD) – a diagram or chart that represents the logical structure of a database.

---

[11] This is an internal definition. USEPA defines Data Validation as an analyte- and sample-specific process that evaluates the information after the verification process (i.e., determination of method, procedural, or contractual compliance) to determine analytical quality and any limitations.

[12] Definition taken from *Guidance on Environmental Data Verification and Data Validation*, cited in section 11.

Finding - An assessment conclusion, either positive or negative, that identifies a condition having a significant effect on an item or activity and which is normally accompanied by specific examples of the observed condition.

Historical Data - Previously collected information from one or more projects which may or may not be useful for a new purpose; also, known as existing data or secondary data.

Information[10] – refers to data that have been organized so that they have meaning and value to the recipient.

Integration[13] - the process by which smaller pieces of software are brought together to form a larger piece of software

Interface –the database data entry screens, which are the means by which people interact with the CIWQS database.

Mandatory minimum penalty – minimum penalty for discharges to waters of the U.S. that violate certain types of permit limits, which general include chronic violations; single acute violations with an exceedance of 20 or 40% of the limit, depending on the constituent; and reports more than thirty days late.

Mantis - free web-based software bug tracking system used by the Water Boards to track problems with and proposed enhancement to CIWQS.

Metrics[14] - a system of parameters or ways to quantitatively assess a process to be measured.

Migration – the process by which data from another database or historical system is transferred into CIWQS.

---

[13] Definition was taken from Wikipedia.

[14] The Water Board is using this term to report on the performance of the database and how the database is used. It is not directly related to the data. For example a metric may be a report on how much data entry is done within a given amount of time.

Nonconformance[15] – a negative assessment finding of a deviation from standards, specifications, and documented practices, which may be either a deficiency or a weakness.

Observation - An assessment that identifies a condition (either positive or negative).

Product manager – the person responsible for the non-software and IT-related aspects of an IT project.

Project manager – the person responsible for executing a software development or other IT-related project.

Quality Assurance[9] – an integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client.

Quality Assurance Plan[9] – a document that describes the quality system in terms of the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, documenting, and assessing all activities conducted.

Quality Control[9] – the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated specifications established by the customer; operational techniques and activities that are used to fulfill specifications for quality.

Quality Indicator – measurable attribute used to determine the extent of consistency and conformity to a standard or achievement of quality goals.

Quality Management Plan[9] - a document that describes an organization's

[15] Definition taken from *Guidance on Assessing Quality Systems,* cited in section 11.

system in terms of its organizational structure, policy and procedures, staff functional responsibilities, lines of authority, and interfaces for those planning, implementing, documenting, and assessing all activities conducted.

Quality Objective – measurable statement of a specific goal related to quality.

Recommendation - A recommendation is a desirable action recommended by the auditor.

Regional Water Quality Control Board (Regional Water Board) – nine semi-autonomous Regional Water Boards, located throughout California, serve to control water pollution and protect water quality within their regions.

Risk management - Risk management is the systematic process of identifying, analyzing, and responding to project risks. Project risks are factors that jeopardize the successful accomplishment of project goals.

Risk management plan - a document drafted and used by the project manager to foresee risks, to estimate the effectiveness, and to create response plans to mitigate them.

Roundtable – a group of program managers, representing State and all nine Regional Water Boards that meet to discuss a particular business area.

Sanitary Sewer Overflow (SSO) Module – a module in CIWQS that allows dischargers to report sanitary sewer spills.

Standard Operating Procedure (SOP)[9] – a written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps; a procedure that is officially approved as the method for performing certain routine or repetitive tasks.

State Water Resources Control Board (State Water Board) – the regulatory agency with authority to protect water quality and allocate water rights.

Storm Water Annual Reporting Module (SWARM) – a CIWQS module that

allows dischargers to prepare and submit their annual reports online.

Storm Water Multi-Application Reporting and Tracking System (SMARTS) – a CIWQS module used to track storm water Notices of Intent, billing information, and Notices of Termination.

System failures – "System" refers to a procedure such as those described in an SOP. A system failure is a breakdown of a QA process (e.g., adopting a set of Business Rules, but not distributing them to the appropriate data entry staff and CIWQS coordinators). System failures require corrective action to be remedied.

System for Water Information Management (SWIM) – the former Water Board database for tracking permit and other regulatory information.

Work Plan – a document that communicates priority issues and a work schedule to the contractor

APPENDIX 4 Future Enhancements to the QAP

Due to limited resources, the processes listed in the body of the QAP are not ideal. The State Water Board is in the process of requesting additional resources for CIWQS and specifically for QAP implementation and enhancement. This list allows us to document and motivate goals that are not currently attainable. It is not exhaustive and can be updated as new goals are defined.

Have a dedicated Quality Assurance Team

Currently, the BRT acts and functions like a QA Team. In the near future we would like to separate these functions and have two dedicated teams.

Have Quality Controls built into CIWQS

As it is now, the interface allows the user to input inconsistent and incorrect data. The ideal interface would restrict the user to a limited number of choices, therefore decreasing the probability of data entry error.

Improve usability and data entry times

There is a current proposal to redesign the CIWQS interface to make it easier to use. This effort is likely to reduce data entry time. Also necessary, is improved system response time. While dramatically reduced in the last year, more work is needed.

Improve the Help function of CIWQS to include business rules

Currently, the Help link in CIWQS takes the CIWQS User's Guide- a long document that is difficult to navigate. To help enforce business rules and improve data entry consistency, information links should be available for each required field and should include the applicable business rule.

Establish desired percentage of accuracy for reports

We have yet to establish the current percentage of accuracy for any of our canned reports. The goal of assessing the accuracy of our high priority reports is noted under Section 8.2.6. In the future, we plan to establish a phased approach

for the desired percentage of accuracy (e.g., 80% accuracy by July 20XX, 90% accuracy by January 20XX). We also plan to expand the focus beyond enforcement-related public reports.

Enforcement Actions

Ensure that enforcement actions, including MMPs, ACLs, etc. are adequately entered following the business rules, procedures and standards, as prescribed in SOPs

APPENDIX 5 Corrective Actions

Corrective Actions for the CIWQS			
Problem	**Occurrence Date**	**Required Corrective Action**	**Date Resolved**

APPENDIX 6 – Error Chart