Guidelines for the Preparation of an Engineering Report for the Production, Distribution and Use of Recycled Water

(Nonpotable and indirect potable reuses only)

State Water Resources Control Board

Division of Drinking Water

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CALIFORNIA Water Boards

STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

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(Replaces March 2001 Version)

The intent of these guidelines is to provide a framework to assist in developing a comprehensive engineering report which addresses all necessary elements of a proposed or modified project. Such an engineering report is necessary to allow for the required regulatory review and approval of a recycled water project, which must meet all requirements set forth in the California Water Recycling Criteria (Title 22).

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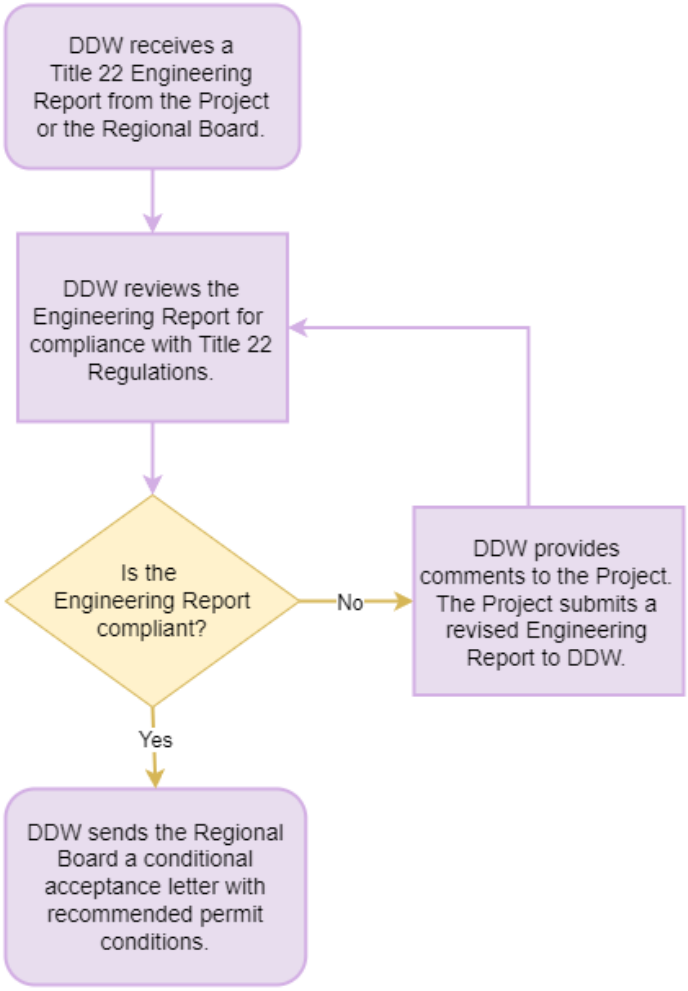
1. Introduction

The State of California Water Recycling Criteria (Title 22 Section 60323) requires an engineering report, approved by the State Water Resources Control Board – Division of Drinking Water (DDW), for all recycled water projects. The engineering report should be submitted to the applicable California Regional Water Quality Control Board (Regional Board) and DDW before recycled water projects are implemented. Projects are encouraged to contact the Regional Board and DDW in advance of and/or during preparation of the engineering report to address any questions. Additionally, the engineering report must be amended prior to any modification to existing projects. Figure 1 provides a summary of the engineering report review process.

Figure 1. DDW Review Process for the Engineering Report



The purpose of an engineering report is to describe how a project will comply with the Water Recycling Criteria. The Water Recycling Criteria are contained in Sections 60301 through 60355, and Section 64668 inclusive of the California Code of Regulations, Title 22. The Criteria prescribe:

- Recycled water quality and wastewater treatment requirements for the various types of allowed uses (see Title 22 Sections 60303 through 60307);
- Use area requirements pertaining to the actual location of use of the recycled water - including dual plumbed facilities (see Title 22 Sections 60310 through 60316); and
- Reliability features required in the treatment facilities to ensure safe performance (see Title 22 Sections 60333 through 60355).

Title 22 Section 60323 specifies that the engineering report be prepared by a qualified engineer, licensed in California, and experienced in the field of wastewater treatment.

Recycled water projects vary in complexity. Therefore, engineering reports will vary in content, and the detail presented will depend on the scope of the proposed project and the number and nature of the agencies involved in the production, distribution, and use of the recycled water. The engineering report should contain sufficient information to assure the regulatory agencies that the degree and reliability of treatment is commensurate with the requirements for the proposed use, and that the distribution and use of the recycled water will not create a health hazard or nuisance.

References which may assist in addressing various project elements include:

- State of California Water Recycling Criteria
- California Waterworks Standards
- California Water Code
- Cross-Connection Control Policy Handbook
- DDW Alternative Treatment Technology Report for Recycled Water
- Planning for the Distribution of Reclaimed Water, AWWA Manual M24

- Guidelines for the On-Site Retrofit of Facilities Using Disinfected Tertiary Recycled Water
- NWRI Ultraviolet Disinfection – Guidelines for Drinking Water and Water Reuse
- Australian WaterVal Validation Protocol on Chlorine Disinfection
- Australian WaterVal Validation Protocol on Membrane Bioreactor

2. Recycled Water Project

The following sections discuss the type of information that should be presented and described in the engineering report. Some sections may be applicable only to certain types of recycled water, as summarized below.

Table 1. Types of recycled water and applicable areas in the Title 22 Engineering Report Guidelines.

Types of Recycled Water	Applicable Areas in the Engineering Report Preparation Guidelines
Undisinfected Secondary	1 – 4, 5.1, 5.7
Disinfected Secondary-23	1 – 4, 5.1, 5.2, 5.3, 5.7
Disinfected Secondary-2.2	1 – 4, 5.1, 5.2, 5.3, 5.7
Disinfected Tertiary	1 – 4, 5.1, 5.2, 5.3, 5.4, 5.7

2.1. General

The engineering report shall identify all agencies or entities that will be involved in the design, treatment, distribution, construction, operation, and maintenance of the recycled facilities, including a description of any legal arrangements outlining authorities and responsibilities between the agencies with respect to treatment, distribution, and use of recycled water. In areas where more than one agency/entity is involved in the reuse project, a description of arrangements for coordinating all reuse-related activities (e.g., line construction/repairs) shall be provided. An organizational chart may be useful.

2.2. Rules and Regulations

The procedures, restrictions, and other requirements that will be imposed by the distributor and/or user should be described. In multiple projects covered under a Master Permit issued by the Regional Boards where the reuse oversight responsibility is delegated to the distributor and/or user, the requirements and restrictions should be codified into a set of enforceable rules and regulations. The rules and regulations should include a compliance program to be used to protect public health and prevent cross connections. Describe in the engineering report the adoption of enforceable rules and regulations that cover the design and construction, operation and maintenance of the distribution systems and use areas, as well as use area control measures. Provide a description of the organization of the agency or agencies who have the authority to implement and enforce the rules and regulations, and the responsibilities of pertinent personnel involved in the reuse program. Reference to any ordinances, rules of service, contractual arrangements, etc. should be provided.

2.3. Producer – Distributor – User

The producer is the public or private entity that will produce the recycled water used in the project. The producer may also be the distributor of recycled water.

The distributor is the entity that distributes recycled water to users. In some cases, a distributor may provide additional treatment (such as disinfection).

The users take physical possession of the recycled water from producers and/or distributors for an approved recycled water use.

Where more than one entity is involved in the treatment and/or distribution of the recycled water, the roles and responsibilities of each entity (i.e., producer, distributor, user) should be described.

2.4. Raw Wastewater

The engineering report should describe the raw wastewater. The description should include:

- Chemical quality, including minimum, maximum, median and 95th percentile values (historical data should be provided where available)

- Applicable flow conditions (historical data should be provided where available)
- Source of the wastewater to be used and the proportion and types of industrial waste
- Source control programs

2.5. Treatment Processes and Operations

Process Flow Diagram. Provide a process flow diagram of the recycled water treatment train. Include the following, if applicable:

- All treatment processes
- Chemical dosing locations
- Flow metering
- Process monitoring
- Compliance sampling locations
- Path(s) for diversion of non-compliant water

Chemicals. State the chemicals that will be used, the method of mixing, the degree of mixing, the point of application, and the dosages. Also describe the chemical storage and handling facilities;

Filtration. If filtration is provided, include design criteria (specify filtration and backwash rates, filter depth and media specifications, etc.). State the expected turbidities of the filter influent (prior to the addition of chemicals) and the filter effluent.

Disinfection. If disinfection is provided, describe the design and operation of the proposed disinfection system. Additionally, for disinfected tertiary recycled water, describe how the project will comply with Title 22 Section 60301.230.

Tracer Study. Where a tracer study is required to demonstrate that the requirements of Title 22 Section 60301.230(a)(1) for modal contact time and CT are met, a tracer test protocol should be submitted to DDW for review and approval prior to conducting the test.

Free Chlorine. Where free chlorine is used for disinfection, the requirements of Title 22 Section 60301.230(a)(2) should be met. The *WaterVal Validation Protocol for Chlorine Disinfection* may be used to meet this requirement.

UV Disinfection. Where UV disinfection is proposed per Title 22 Section 60301.230(a)(2), refer to the *NWRI UV Disinfection Guidelines*.

- UV System Validation. Identify the proposed UV manufacturer and UV system model. It is recommended that this UV system be validated and that a DDW conditional acceptance letter has been issued. If the UV system has not been accepted by DDW previously, an extensive validation must be performed onsite to demonstrate Title 22 Section 60301.230(a)(2) is met. The conditional acceptance letter specifies some of the critical requirements for design, monitoring and operation. Conditionally accepted UV systems will be identified in the DDW *Alternative Treatment Technology Report*.

- Spot-check Bioassay Test. For these off-site validated and conditionally accepted UV systems, an onsite spot-check bioassay test will be required upon installation and commissioning. The testing protocol and commissioning procedures must be submitted for review and approval by DDW.

- Commissioning Tests. The project should describe how commissioning tests and other conditions in the *NWRI UV Disinfection Guidelines* will be met.

Personnel. List personnel that will operate the facility including their position, training certifications, and hours during which the facility will be staffed (see Title 22 Section 60325).

Maintenance. Describe the preventive maintenance program (see Title 22 Section 60327).

Manuals. Describe the operation and maintenance manuals available (see Title 22 Section 60329).

2.6. Plant Reliability Features

The engineering report should include detailed descriptions of the plant reliability features proposed to comply with Title 22 Sections 60333 through 60355. The discussion of each reliability feature should state under what conditions it will be

actuated. When alarms are used to indicate system failure, the engineering report should state where the alarm will be received, how the location is staffed, and who will be notified.

2.7. Supplemental Water Supply

The engineering report should describe all supplemental water supplies. The description should include:

- Purpose
- Source
- Quality
- Quantity available
- Cross-connection control and backflow prevention measures

Where applicable, describe how the requirements of the Cross Connection Control Policy Handbook will be met.

2.8. Monitoring and Reporting

The engineering report should describe the planned monitoring and reporting program, including all monitoring required by the Water Recycling Criteria and the frequency and location of sampling. Where continuous analysis and recording equipment is used, the method and frequency of calibration should be stated. All laboratory analyses shall be performed by a laboratory approved by the California Environmental Laboratory Accreditation Program (ELAP) and accredited for the method.

2.9. Contingency Plan

Title 22 Section 60323(c) requires that the engineering report contain a contingency plan designed to prevent inadequately treated wastewater from being delivered to the user. The contingency plan should include:

- A list of conditions which would require an immediate diversion to take place;
- A description of the diversion procedures;

- A description of the diversion area including capacity, holding time and return capabilities;
- A description of plans for activation of supplemental supplies (if applicable);
- A plan for the disposal or treatment of any inadequately treated effluent;
- A description of fail-safe features in the event of a power failure; and
- A plan (including methods) for notifying the recycled water user(s), the Regional Board, DDW, the state and local health departments, and other agencies as appropriate, of any treatment failures that could result in the delivery of inadequately treated recycled water to the use area.

3. Transmission and Distribution Systems

Maps and/or plans showing the service area boundary, location of the transmission facilities and the distribution system layout should be provided. The plans should include the ownership and location of all potable water lines, recycled water lines and sewer lines within the recycled water service area and use area(s).

Where recycled water hauling will be conducted, a description of the water hauling program must be provided.

4. Use Areas

Requirements for use areas are described in Title 22 Section 60310. The engineering report description of each use area should include:

- The type of land uses;
- The specific type of reuse proposed;
- The party(s) responsible for the distribution and use of the recycled water at the use area;
- Identification of other governmental entities which may have regulatory jurisdiction over the use area such as the US Department of Agriculture, California Department of Public Health, Food and Drug Branch, the California Department of Public Health, Licensing and Certification Program, etc. These agencies should also be consulted and provided with a copy of the Title 22 Engineering Report for review and comment.

- Use area containment measures;
- A map showing:
    - Specific areas of use
    - Areas of public access
    - Surrounding land uses
    - The location and construction details of wells in or within 1000 feet of the use area
    - Location and type of signage;
- The degree of potential access by employees and/or the public; and
- For use areas where both potable and recycled water lines exist, a description of the cross-connection control procedures which will be used.

4.1. Use Area Design

The engineering report should discuss how domestic water distribution system shall be protected from the recycled water in accordance with the Cross Connection Control Policy Handbook and the California Waterworks Standards, and measures to prevent recycled water leaving the designated use area.

4.2. Use Area Inspections and Monitoring

The engineering report should describe the use area inspection and monitoring program. It should identify the locations at the use area where problems are most likely to occur (e.g., ponding, runoff, overspray, cross-connections, etc.), the frequency of inspections and monitoring, and the personnel in charge of the monitoring and reporting of use area problems. If a user supervisor is designated, the engineering report should describe user supervisor training and qualification requirements.

4.3. Use Area Employee Training

The engineering report should describe the training which use area employees will receive to ensure compliance with the Water Recycling Criteria and identify the entity that will provide the training and its frequency. The engineering report should also identify any written manuals of practice to be made available to employees.

4.4. Dual Plumbed Use Areas

A dual plumbed system is defined in Title 22 Section 60301.250. When a system is determined to be dual plumbed, the project should comply with Title 22 Sections 60313 through 60316.

5. Recycled Water Uses

Where applicable, for the engineering report should describe the following specific proposed uses:

5.1. Irrigation

Requirements for irrigation uses are described in Title 22 Section 60304. The engineering report should include the following:

- Detailed plans showing all piping networks within the use area including recycled, potable, sewage, and others as applicable;
- Description of what will be irrigated (e.g., landscape, specific food crop, etc.);
- Method of irrigation (e.g., spray, flood, or drip);
- The location of domestic water supply facilities in or adjacent to the use area;
- Use area containment measures;
- Measures to be taken to minimize ponding and runoff from leaving the use area;
- The direction of drainage and a description of the area to which the drainage will flow;
- A map and/or description of how the setback distances of Title 22 Section 60310 will be maintained;

- Protection measures of drinking water fountains and designated outdoor eating areas, if applicable;
- Location and wording of public warning signs;
- The proposed irrigation schedule (if public access is included); and
- Measures to be taken to exclude or minimize public contact.

5.2. Impoundments

Requirements for impoundment uses are described in Title 22 Section 60305. The engineering report should include the following:

- The type of use or activity to be allowed on the impoundment;
- Description of the degree of public access;
- The conditions under which the impoundment can be expected to overflow and the expected frequency; and
- The direction of drainage and a description of the area to which the drainage will flow.

5.3. Cooling

Requirements for cooling uses, are described in Title 22 Section 60306. The engineering report should include the following:

- Type of cooling system (e.g., cooling tower, spray, condenser, etc.);
- Type of biocide to be used, if applicable;
- Type of drift eliminator to be used, if applicable; and
- Potential for employee or public exposure, and mitigative measures to be employed.

5.4. Indirect Potable Reuse: Groundwater Replenishment – Surface Application

Requirements for groundwater replenishment reuse projects are described in Title 22 Sections 60320.100 through 60320.130.

5.5. Indirect Potable Reuse: Groundwater Replenishment – Subsurface Application

Requirements for groundwater replenishment reuse projects are described in Title 22 Sections 60320.200 through 60320.230.

5.6. Indirect Potable Reuse: Surface Water Augmentation

Requirements for surface water augmentation are described in Title 22 Sections 60320.300 through 60320.328 and Sections 64668.05 through 64668.30.

5.7. Use of Recycled Water for Other Purposes

Requirements for the use of disinfected tertiary recycled water for other purposes are described in Title 22 Section 60307(a).

Requirements for the use of disinfected secondary recycled water for other purposes are described in Title 22 Section 60307(b).

Requirements for the use of undisinfected secondary recycled water for other purposes are described in Title 22 Section 60307(c).

6. References

1. State of California (2000). “Water Recycling Criteria.” California Code of Regulations, Title 22, Division 4, Chapter 3.

2. State of California (2008). “California Waterworks Standards.” California Code of Regulations, Title 22, Division 4, Chapter 16.

3. California Water Code.

4. State of California (2022). Cross-Connection Control Policy Handbook (Draft).

5. CA State Water Resources Control Board, Division of Drinking (2023). Alternative Treatment Technology Report for Recycled Water.

6. American Water Works Association (2018), Planning for the Distribution of Reclaimed Water, Manual M24. Fourth Edition. Denver (US).

7. California-Nevada Section - American Water Works Association (1997). Guidelines for the On-Site Retrofit of Facilities Using Disinfected Tertiary Recycled Water.

8. National Water Research Institute (NWRI) and Water Research Foundation (WRF) (2012), Ultraviolet Disinfection. Guidelines for Drinking Water and Water Reuse. Fountain Valley (US).

9. WaterSecure (2017), Chlorine Disinfection, WaterVal Validation Protocol, Australian WaterSecure Innovations Ltd, Brisbane.

10. WaterSecure (2017), Membrane Bio-reactor, WaterVal Validation Protocol, Australian WaterSecure Innovations Ltd, Brisbane.