

**Scope of Work Document as prepared by Hazen and Sawyer, P.C.
Development of Operation and Maintenance Plan and Training and
Certification Framework for Direct Potable Reuse (DPR) Systems
(WRRF-13-13)**

In order to address the gaps in training, certification, and permitting programs and to support the California DPR initiative, the objective of this project is to develop a standard operations and maintenance plan framework for various DPR treatment processes and to develop a DPR Training and Certification framework for DPR system operators.

To meet these objectives, we propose a two-phase approach that will be described in detail in the remainder of this proposal. Our phased approach to this project in this project will allow us to effectively answer two questions:

1. What are the vital operational and maintenance requirements that must be integrated into a permitting scheme to ensure the success of DPR?
2. Based on these requirements, how can we ensure operators can meet these requirements?

As such, the following phases and Tasks will be completed as part of this Scope of Work:

Phase 1: Develop a Standard Operations and Maintenance Plan for DPR Schemes

Task 1.1: Evaluate California Code of Regulations and its Adequacy for DPR Systems and Recommend any Changes

Task 1.2: Identify and Recommend a DPR Permit Structure, Operator Certification Program, and Permitting Authority

Task 1.3: Develop O&M Protocols/Framework for DPR Systems from Source to Tap

Phase 2: Develop a DPR Training and Certification Curriculum Framework for DPR System Operators

Task 2.1: Recommend DPR System Staffing

Task 2.2: Develop Recommended Operator Staff Training and Certification Framework

Scope of Work Description

Phase 1: Develop a Standard Operations and Maintenance Plan for DPR Schemes

Task 1.1: Evaluate California Code of Regulations and its Adequacy for DPR Systems and Recommend any Changes

Our project approach will begin with a thorough review of the current and draft future California Code of Regulations (Title 17 and Title 22, specifically) to identify sections that may be applicable to DPR systems. Debra Burris of DDB Engineering, Inc. will assist in leading this effort. Debra has assisted with the regulatory permitting and compliance of a number of IPR schemes in California including for West Basin Municipal Water District, OCWD Groundwater Replenishment Scheme and the City of San Diego. She is also well versed in the HACCP process, having played a significant role developing HACCP plans for WateReuse Research Foundation project “Utilization of HACCP Approach for Evaluating Integrity of Treatment Barriers for Reuse (WRF-09-03)”.

We will conduct a gap analysis concurrent to the review to determine what additional elements that may be unique to DPR systems (such as the requirement in Title 17 to consider the cross connection of recycled water to the distribution system, which is currently prohibited). Additionally, we will incorporate the safeguards offered by HACCP, which we will incorporate from the findings of WRRF 13-03 and WRRF 09-03, to assist to minimize health risks. Necessarily, this will extend not only from elements of the water recycling plant, but also to operations and maintenance requirements of downstream water treatment and distribution systems.

It is important that we recognize work that is being conducted in parallel to the timeline of this project that will have an impact of any future DPR regulation. As previously noted, the CDPH is currently working to adopt uniform water recycling criteria for groundwater recharge and surface water augmentation, we will carefully review and provide a gap analysis of the Draft Groundwater Replenishment Reuse Regulations and work to engage with CDPH to be cognizant of developments of their surface water augmentation framework as it is developed.

Overall we anticipate that DPR regulations may be based on IPR draft regulations, incorporating many of the same requirements for enhanced source control, full advanced treatment with multiple barriers, as well as on-line monitoring of critical control points for compliance with critical limits to control public health risks in manner similar to that of HACCP.

As a part of this exercise, we will engage with operations and maintenance staff from our participating utilities and operating companies to catalog their experience with existing permitting processes for IPR systems and obtain feedback and recommendations for how permitting for DPR could be workably integrated into a new framework. We will develop case studies for each of these utilities (OCWD GWRS, WBMWD, LACSD – Terminal Is Facility, and City of San Diego) based in the current permitting system and identify what would need to occur at those facilities should they be extended to DPR.

Deliverables from this task will include a written summary of key components of Title 17 and 22 regulations that could apply to DPR facilities, a listing of gaps that will need to be addressed for DPR facilities, and a summary of feedback and recommendations obtained from interviews with operators and water companies. We recommend that this information be supplied to the PAC in written form and followed by a conference call to discuss any feedback or suggestions from the PAC in order to ensure efficiency during Tasks 1.2 and 1.3.

Task 1.2: Identify and Recommend a DPR Permit Structure, Operator Certification Program, and Permitting Authority

The natural focus of this project is to identify the important elements of operations and maintenance that must be captured to ensure the reliability and safety of a DPR scheme. In the task above we will have identified the gaps in existing permitting and regulation, thus our next task will be to provide guidance as to where those requirements should be captured.

As we have already described, the regulatory environment is a changing landscape involving a variety of stakeholders, while the CDPH requirements for drinking water quality are consolidated into the SWRCB umbrella. We anticipate that there may be some challenges in remaining cognizant of the progress of the consolidation, and its impact on the existing permit structures that we have reviewed. Additionally, on a parallel timeframe we recognize that an already convened expert panel

will be advising the California legislature of the feasibility of DPR, and that some work in parallel may occur and in fact be used to support the expert panel.

Given these challenges, once we have identified necessary permitting and training requirements in Task 1.1, we will work to develop the critical elements required in a framework and certification program, understanding that changes may occur to existing regulatory frameworks in parallel that may drive where and how DPR regulation would be structured. In order to facilitate this, we recommend working with the Foundation and the PAC to identify a key liaison/s within CDPH, SWRCB and the State convened expert panel to ensure that the outcomes of this project are coordinated, aligned and up to date with those developments.

The deliverable from this task will be a recommendation document that will clearly identify how the key requirements for DPR could be captured and integrated with existing recycled water and drinking water requirements. This will outline a framework for required permitting, as much as possible aligned with current changes to recycled water regulation, which we will ensure from liaison with the expert panel. We will identify the key overarching requirements for operator certification (with more detail to follow in Phase 2 of the project). The document will identify possible permitting authority or authorities as much as possible aligned with the current consolidation.

Task 1.3: Develop O&M Protocols/Framework for DPR Systems from Source to Tap

The objective of this task is to develop operation and maintenance (O&M) protocols for O₃ – BAC – GAC – UV – Cl₂ and MF/UF – RO – UV/H₂O₂ – Cl₂ DPR systems with engineered storage as well as for the upstream wastewater and downstream drinking water treatment plants. Typically, the development of an Operations and Maintenance Plan is Plant- or Scheme-specific. In the case of the protocols to be developed for this project, those protocols must be developed to be inherently generic so they can be adapted and applied at any future DPR facility while also including the particular requirements that would be universal for any DPR scheme.

In light of this, we will develop protocols that address the key requirements necessary to ensure the safety and reliability of the scheme, in terms of operational monitoring, technology management, reporting, asset management, and maintenance and auditing validation. The protocols will have sufficient detail where required, and provide potential alternatives where different process technologies may be used at different plants. The O&M protocols will address the range of possible treatment options and can be adapted for plant-specific and process-specific needs. Based on the framework we provided included in Section 2.0 (Figure 1) we will develop an O&M protocol that will include:

Element	Description
Operational Monitoring	Water quality sampling plans including how the plan must be developed, required sampling locations and frequencies, sampling and laboratory QA/QC, training certification requirements for operators that sample, and reporting requirements.
	On Line Monitoring including requirements for instrument verification and calibration, maintenance and validation/QA/QC. Particular emphasis will be paid to analyzers that monitor at CCPs.

	Process performance monitoring including key elements of treatment barrier processes that must be regularly monitored and reporting frequencies.
Non Conformances Preventative/Corrective Actions	Critical Control Point Response Procedures Developed as part of WRRF 13-03, these will be integrated into the O&M Protocol. This will include a standard format for the procedures, based on a flow chart approach, and including reporting and communication requirements.
Managing Incidents and Emergencies	Emergency Response Procedures and Emergency Response communication requirements will be included.
Operating Interface Protocols	This will provide detail on the interface requirements for upstream and downstream entities. Often, recycled water plants operate independently from upstream wastewater plants. In the DPR scenario, the protocol will lay out agreed operating procedures, communications protocols, data sharing and other elements necessary to integrate multiple entities in the one DPR scheme. This will focus on both wastewater and drinking water treatment interfaces.
Operating Procedures	Define the structure of operating procedures, including a clear highlight of specific HACCP requirements. This will not develop a full suite of operating procedures, but rather identify a framework for those procedures, identify HACCP inclusions, and provide key elements required for specific process technologies that must be captured (e.g. repair of hollow fiber membranes, backwash management of GAC).
Asset Management and Maintenance	This will define requirements for a maintenance management system, condition assessment and risk review and associated reporting requirements. It will provide specific requirements for key process barrier elements (e.g. membrane management requirements) that are critical for ensuring safety and reliability of DPR.
Operator Skills and Training	This element will cover key competencies that must be mastered by operational staff at a DPR facility, based on the work to be conducted in Task 2.2.
Validation and Auditing	A key element of HACCP, but important in good operational management practice, this will identify the key validation and auditing requirements for the operations plan overall, with a view to providing a continuous improvement approach to O&M.

The outcome of this task will be a report containing a draft O&M protocol for DPR focused on both treatment trains O₃ – BAC – GAC – UV –Cl₂ and MF/UF – RO – UV/H₂O₂ – Cl₂.

Phase 2: Develop a DPR Training and Certification Curriculum Framework for DPR System Operators

Once the operational and maintenance requirements have been developed for DPR, the second phase of the project will work to ensure that operators have the capacity to meet those requirements with clearly defined and targeted training.

Task 2.1: Recommend DPR System Staffing

For this task, we will work with our collaborating utilities/operators and our Project Team to establish the required staffing for DPR schemes, taking into account their size (as is currently the case in Title 22) and process complexity. We will conduct benchmarking for staffing levels of participating IPR utilities and incorporate the additional requirements predicated by the HACCP outcomes of WRRF 09-03 and WRRF 13-13.

The outcome of this task will be a recommendation report recommending staffing levels for DPR schemes, with reference to plant size and process selection/type.

Task 2.2: Develop Recommended Operator Staff Training and Certification Framework

As discussed in Section 2.0 of this proposal, there are multiple currently-identified gaps in the training and certification of operators that work on existing IPR schemes. Our objective in this task is to develop a recommended operator staff training and certification framework, including recommendations on approaches to updating the curriculum in the future. Effective operations and maintenance training for DPR should not only focus on technology, but must also ensure that operations staff understand the important operations/management aspects of a DPR scheme. Therefore, we will include training of the O&M protocol requirements overall, the importance and key aspects of those elements (e.g. monitoring, reporting) as well as HACCP elements (CCP response procedures), in addition to addressing specific technologies.

The outcome of this task will be a report recommending a training and certification framework, with an outline of a recommended curriculum and suggestions for future curriculum updates.