Section D: Regulatory Coordination

Regulatory Coordination - Key Findings

- The combination of advanced water purification technology and San Vicente Reservoir conditions provide public health and environmental safeguards that make reservoir augmentation feasible from a regulatory perspective.
- Regulatory acceptance of the City's Demonstration Project was validated through a Concept Approval letter from the California Department of Public Health and a Resolution of Support and a letter confirming acceptability of the proposed regulatory pathway from the San Diego Regional Water Quality Control Board.

Prior to implementation, a reservoir augmentation project at San Vicente Reservoir would require approval by CDPH and the Regional Board. Neither CDPH nor the Regional Board has specific regulations in place for projects using purified water for reservoir augmentation, making the process for securing regulatory approval a challenge. A key objective of the Demonstration Project was to work closely with the regulatory agencies to identify appropriate requirements for a reservoir augmentation project at San Vicente Reservoir, and to determine whether a full-scale project incorporating water purification technologies and San Vicente Reservoir could meet these requirements.

This section describes regulatory conditions, including key considerations for each regulatory agency, the process used to identify regulatory requirements for a reservoir augmentation project at San Vicente Reservoir, and an assessment of the feasibility of a reservoir augmentation project at San Vicente Reservoir.

Although reservoir augmentation at San Vicente Reservoir would use the same water purification processes as the Orange County GWRS, its regulatory pathway is less established. CDPH has established guidelines for groundwater augmentation projects such as the Orange County GWRS, but permits reservoir augmentation projects on a case-by-case basis.

Regulatory Conditions

Projects in California that employ water purification processes are regulated by both CDPH and the State Board (administered by the local Regional Boards). To date, seven projects involving groundwater replenishment with purified water have been permitted in California, but no reservoir augmentation projects with purified water have been permitted or are operational statewide. Reservoir augmentation is practiced in other parts of the United States. For example, since 1978 the Upper Occoquan Service Authority has added recycled water into a stream above Occoquan Reservoir that supplies a drinking water treatment plant in Fairfax County, Virginia. The following sections discuss specific regulatory requirements for a reservoir augmentation project at San Vicente Reservoir.

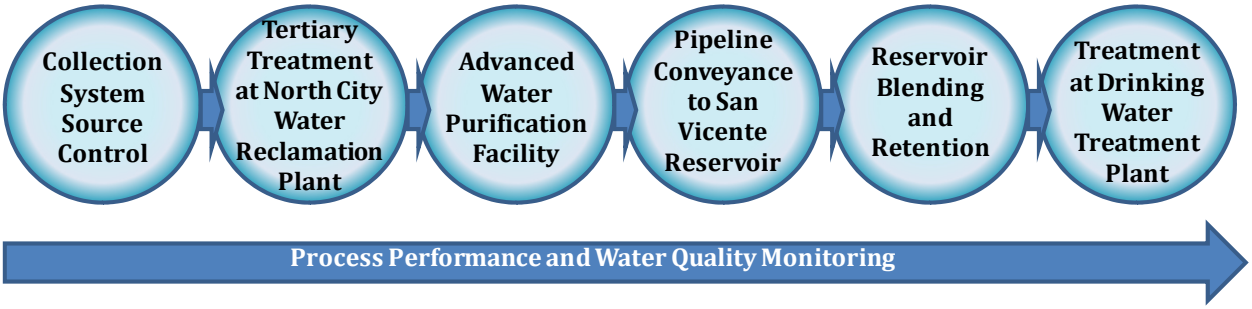
Protecting Public Health: California Department of Public Health

CDPH is responsible for developing and administering regulations to protect public health in California, including permitting public water supply projects. Because the City's reservoir augmentation project at San Vicente Reservoir would include augmentation of drinking water supplies, this project would require approval from CDPH (in the form of a permit) in order to operate.

State legislation passed in 2010 requires CDPH to finalize regulations by December 31, 2013 for projects using water purification for groundwater replenishment such as the Orange County GWRS. That same legislation requires CDPH to adopt regulations for reservoir augmentation projects by December 31, 2016. In advance of adopting regulations, CDPH can approve reservoir augmentation projects such as the City's potential reservoir augmentation project at San Vicente Reservoir on a case-by-case basis.

In order to ensure that public health is protected, CDPH requires that projects involving purified water incorporate a multiple barrier strategy. A multiple barrier strategy protects public health by incorporating safeguards into the process, which ensure that a failure or error at any given treatment step would not compromise public health. The public health safeguards that would be implemented in a reservoir augmentation project at San Vicente Reservoir are presented in Figure D-1, and described further in the following paragraphs.

Figure D - 1: Public Health Safeguards of the Potential Reservoir Augmentation Project at San Vicente Reservoir



Enhanced Source Control. The first step in the multiple barrier strategy for water purification is enhanced source control in the wastewater collection system, which refers to the prevention of contaminants from entering the wastewater stream. The City already operates a robust source control program focusing on controlling contaminants in industrial discharges upstream of North City (refer to Section F for more information). A reservoir augmentation project at San Vicente Reservoir would likely require the City to enhance that program by addressing commercial and residential discharges and focusing on preventing chemicals with potential public health implications from entering the collection system. Strategies to achieve this could include developing a Chemical Inventory Program and GIS Tracking System, implementing a Pollutant Prioritization Program, and performing an annual Local Limits Evaluation, as described in Section F.

Tertiary Treatment. This step would involve some or all of the processes that are already in place at North City to treat wastewater in accordance with Title 22 of the California Code of Regulations. Tertiary treatment produces what is commonly referred to as recycled water, suitable for irrigation and industrial purposes.

Advanced Water Purification Technology. CDPH requires that advanced water purification technology be incorporated into projects that augment the existing wastewater and recycled water treatment steps. Advanced water purification provides additional barriers to potential pathogens and chemical contaminants such as CECs. Advanced water purification technology produces purified water, which refers to recycled water that has been further purified so that it may be released into a groundwater basin or surface water reservoir that supplies water to a drinking water treatment plant (refer to Section B, Advanced Water Purification Facility for more information). A full-scale AWP facility associated with a reservoir augmentation project at San Vicente Reservoir would be located at North City.

Pipeline System Conveyance. Moving purified water from the advanced water purification facility, which would be located at North City, to the San Vicente Reservoir would require construction of a 22-mile extension to the City's existing recycled water system. At peak production capacity, it would take purified water at least 10 hours to travel to San Vicente Reservoir. In the unlikely event of a purification technology malfunction, this travel time would provide an opportunity to capture and divert purified water before it reached San Vicente Reservoir.

San Vicente Reservoir (Environmental Buffer). San Vicente Reservoir would serve as an "environmental buffer," or a natural water barrier that provides blending of purified water with other sources. San Vicente Reservoir would also provide substantial retention, meaning that it would retain purified water for an extended period of time prior to it entering the drinking water treatment plant. This would enable agencies to respond, should an unexpected problem occur in the upstream treatment processes (refer to Section C, San Vicente Reservoir Study for more information). CDPH requires that projects using water purification processes include an environmental buffer.

Drinking Water Treatment Plant. Purified water that is blended with other water sources in San Vicente Reservoir would be considered raw water, not yet suitable for drinking. Following retention

in the reservoir, purified water would receive additional treatment at a drinking water treatment plant prior to public consumption. This would further protect public health by providing an additional barrier to potential pathogens or chemical contaminants. If the City were to implement a reservoir augmentation project at San Vicente Reservoir, this raw water would be treated at the Alvarado Water Treatment Plant or another municipal drinking water treatment plant.

Process Performance and Water Quality Monitoring. CDPH requires that a comprehensive and robust combination of water purification process performance monitoring, and monitoring of the purified water quality, be conducted to assure that all of the safeguards built into projects using water purification continuously function as planned.

CDPH would establish requirements for the City's potential reservoir augmentation project at San Vicente Reservoir through two permitting mechanisms.

- **Water Supply Permit:** The CDPH Water Supply Permit governing the existing drinking water system would need to be amended to include the additional source water (purified water) along with operating and water quality conditions specific to this new source.
- **National Pollutant Discharge Elimination System Permit:** CDPH would provide specific operating and water quality conditions to the Regional Board for inclusion in the NPDES permit discussed in the Regional Board section below.

Together, these operating permits would govern the advanced water purification technologies, operating features, resultant purified water quality requirements, and reservoir operating features providing redundant and reliable public health protections. Ultimately, a reservoir augmentation project at San Vicente Reservoir would need to meet not only drinking water quality standards applicable to all drinking water systems, but additional water quality standards intended to protect the health of aquatic organisms that may be present in the reservoir. Because some aquatic organisms may be more sensitive to certain water quality constituents than humans, some water purification standards are more stringent than conventional drinking water requirements.

Protecting Environmental Health: Regional Water Quality Control Board

The Regional Board is responsible for developing and enforcing water quality objectives for surface water and groundwater bodies within the San Diego region. Since the City's potential reservoir augmentation project at San Vicente Reservoir would involve releasing purified water into San Vicente Reservoir (the required environmental buffer), the project would fall under the jurisdiction of the Regional Board.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

The Regional Board is responsible for enforcing water quality objectives in the San Diego Region.

The Regional Board's existing regulatory framework is designed to manage the discharge of waste to the environment. Water purification technology has been demonstrated to remove "wastes" from recycled water, and statewide legislation (Assembly Bill 2398) was introduced in 2012 to remove

purified water from the purview of the Regional Board to reflect the position that purified water should not be considered waste due to its exceptional quality. This omnibus legislation has since been tabled, but a stakeholder group is continuing this discussion with the ultimate goal of removing purified water from Regional Board purview. In the meantime, a reservoir augmentation project at San Vicente Reservoir would need to abide by the Regional Board's regulatory framework.

Because groundwater replenishment projects release purified water to groundwater as opposed to surface water, these projects typically require only a WDR permit issued by the Regional Board. The City's reservoir augmentation project at San Vicente Reservoir would involve releasing purified water to a surface water body and would, therefore, require a full NPDES permit, which is more involved than a WDR and includes EPA approval. An NPDES permit for the City's potential reservoir augmentation project at San Vicente Reservoir would place limitations on the purified water released to San Vicente Reservoir in accordance with the Basin Plan, which is the primary source of water quality standards for San Vicente Reservoir. These water quality standards are based on specific uses designated for San Vicente Reservoir. The Regional Board also regulates surface water bodies via the California Toxics Rule, which establishes water quality criteria for 126 priority pollutants. Together, Basin Plan standards and California Toxics Rule criteria provide a comprehensive set of water quality standards designed to protect the integrity and purpose of San Vicente Reservoir.

Regulatory Coordination Activities

The City began working closely with both CDPH and the Regional Board regarding potential reservoir augmentation at San Vicente Reservoir long before the start of the Demonstration Project. The City's Water Repurification Project, initiated in 1994 and formally stopped in 1999, included a regulatory coordination effort that culminated in the conceptual approval of reservoir augmentation at San Vicente Reservoir. New state policies and water quality concerns that emerged following that Water Repurification effort prompted the City to initiate new discussions with CDPH and the Regional Board during the Water Reuse Study. The City first met with both the Regional Board and CDPH in 2004-2005 during development of the Water Reuse Study. The City then met with CDPH in December 2007 to receive an update on the potential regulatory framework for reservoir augmentation at San Vicente Reservoir. Two things were concluded from that meeting:

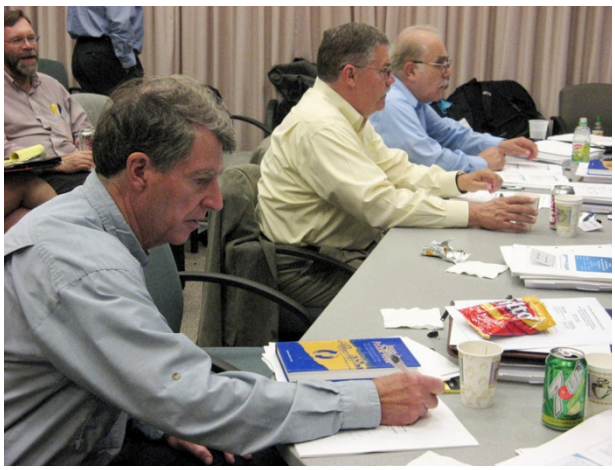
- The City would need to demonstrate the performance of water purification technologies that would be used in reservoir augmentation at San Vicente Reservoir
- An IAP would need to be formed to oversee technical studies and review the findings as required by CDPH to form the basis for concept approval of a reservoir augmentation project at San Vicente Reservoir

Based on initial CDPH input, the City formulated a preliminary plan for the Demonstration Project, and met again with CDPH in March 2008 to present a proposed work plan for the Demonstration Project. The objective of this meeting was to clarify Demonstration Project objectives and obtain input on the City's proposed Demonstration Project work plan that formed the basis for the project

scope and costs that develop the rate case. The City also coordinated with the County of San Diego Department of Environmental Health (DEH) at the request of CDPH; County DEH was invited to all meetings held with the IAP.

Preliminary conversations were also held with the Regional Board. After an initial meeting with Regional Board staff in 2008 to introduce the Demonstration Project concept, subsequent meetings of the IAP and its subcommittees included both regulatory agencies. Table D-1 summarizes the IAP meetings held in support of the Demonstration Project.

Based on initial meetings with CDPH and the Regional Board, a plan to achieve regulatory conceptual approval was developed. This plan provided the framework for regulatory activities that would ultimately lead to preliminary regulatory approval for a reservoir augmentation project at San Vicente Reservoir. This plan identified key technical topics that would need to be addressed and a schedule of regulatory and IAP meetings to address these topics. Topical IAP subcommittees and working groups were convened to support the amount and complexity of technical considerations to be addressed and provide input on specific work products for the Demonstration Project.



The Independent Advisory Panel validated results and conclusions of the Demonstration Project.

The regulatory plan was structured around the following regulatory objectives:

1. Validate the ability of the AWP Facility to produce purified water meeting all regulatory requirements
2. Demonstrate the ability of San Vicente Reservoir to provide a substantial environmental buffer year-round
3. Validate that the addition of purified water would protect San Vicente Reservoir water quality

Technical activities and regulatory and IAP subcommittee meetings were held throughout the Demonstration Project consistent with the regulatory implementation plan. The timing of specific Demonstration Project activities necessary to achieve the regulatory objectives is presented in Table D-1 through D-5.

Table D - 1: Summary of IAP Meetings

Meeting No.	Date	Topic
1	May 11-12, 2009	Introductory meeting for the full IAP to discuss the Demonstration Project Scope
2	March 29-30, 2010	Limnology (reservoir-related) Subcommittee Meeting No. 1 to discuss set-up and calibration of the San Vicente Reservoir Model[1]
3	September 2, 2010	Limnology Working Group Meeting No. 1 to specify and discuss details pertaining to the San Vicente Reservoir Model[2]
4	October 21, 2010	AWP Facility Subcommittee Meeting No. 1 to discuss the draft Testing and Monitoring Plan[3]
5	March 17, 2011	Limnology Working Group Meeting No. 2 to review San Vicente Reservoir modeling scenarios, determine potential "worst case scenarios," and discuss pathogen removal[2]
6	June 6-7, 2011	Second meeting of the full IAP to update the group on the Limnology Subcommittee, Limnology Working Group, and AWP Facility Subcommittee activities, and tour the AWP Facility
7	December 6, 2011	Limnology Subcommittee Meeting No. 2 to review and receive comments on the draft San Vicente Reservoir modeling study, and receive input on proposed reservoir public health-related regulatory conditions[1]
8	December 19, 2011	AWP Facility Subcommittee Meeting No. 2 to review AWP Facility operational and water quality data[3]
9	March 9-21, 2012	Conference calls to review and discuss Draft CDPH Proposal[4]
10	March 13, 2012	Limnology Subcommittee Meeting No. 3 to review the San Vicente Reservoir Water Quality Report[1]
11	November 15-16, 2012	Third meeting of the full IAP to review and comment on the draft Demonstration Project Report, Quarterly Testing Report No. 4, and AWP Facility Study Report (CDM Smith and MWH 2013b)

Footnotes:

1. The Limnology Subcommittee was comprised of four IAP members focused on the Limnology Study.
2. The Limnology Working Group was comprised of two IAP members and project staff specifically assigned to vetting the details of the reservoir study.
3. The AWP Facility Subcommittee was comprised of four IAP members focused on the operation and results of the AWP Facility.
4. An ad-hoc subcommittee provided review and comment via a series of conference calls in lieu of face-to-face meetings.

Objective 1: *Validate the ability of the AWP Facility to produce purified water meeting all regulatory requirements*[5].

A series of actions were taken between October 2010 and December 2012 to assist in validating the ability of the AWP Facility to produce purified water meeting regulatory requirements. Construction of the AWP Facility began in September 2010 and ran through June 2011. During construction, a detailed Testing and Monitoring Plan was developed and revised in coordination with the IAP prior to being submitted to CDPH for approval. Following CDPH approval and completion of AWP Facility construction, the Testing and Monitoring Plan was implemented. The monitoring results were summarized in a Draft AWP Facility Report, which was reviewed with the IAP prior to being submitted to CDPH. Together, these actions have demonstrated that the AWP Facility produces purified water meeting all regulatory requirements. CDPH issued concept approval for the project in September 2012. CDPH's Concept Approval Letter is included as Appendix B to this report. Table D-2 provides an overview of the timeline of each action implemented in support of Objective 1.

Table D - 2: Timeline of Activities Completed in Support of Objective 1

Activity	Date
Procure and Fabricate AWP Facility equipment	October 2010
Prepare Testing and Monitoring Plan	September 2010
Conduct IAP AWP Facility Subcommittee meeting No. 1	October 2010
Submit Testing and Monitoring Plan for CDPH approval	December 2010
Perform AWP Facility Testing	August 2011 – July 2012
Conduct IAP AWP Facility Subcommittee meeting No. 2	December 2011
Submit Concept Proposal for Full-Scale Reservoir Augmentation Project at San Vicente Reservoir to CDPH	March 2012
CDPH issues Concept Approval for Full-Scale Reservoir Augmentation Project at San Vicente Reservoir to CDPH	September 2012
Submit Draft AWP Facility Report for IAP review	October 2012
Submit AWP Facility Draft Quarterly Testing Report No. 4 to CDPH	October 2012

[5] For specific information regarding the AWP Facility, please refer to Section B of this report.

Objective 2: *Demonstrate ability of San Vicente Reservoir to maintain a substantial environmental buffer year-round.*[6]

Demonstrating that San Vicente Reservoir maintains a substantial environmental barrier involves providing evidence that purified water is either held in the reservoir for an acceptable period of time or substantially blended year-round.

Between late 2009 and December 2011, activities were undertaken to demonstrate that San Vicente Reservoir provides a substantial environmental buffer year-round. As described in Section C: San Vicente Reservoir Study, a three-dimensional hydrodynamic computer model was used to demonstrate that purified water would either be held in the reservoir for a period of time acceptable to regulatory agencies or substantially diluted year-round. The model was then reviewed with the IAP to ensure that it would provide an accurate representation of how purified water would move through the expanded reservoir.

Once the computer model was set up and validated by the IAP, modeling was performed to simulate the range of potential conditions for introducing purified water into San Vicente Reservoir under a reservoir augmentation project. A Limnology Working Group was convened to review these initial modeling results and recommend additional model scenarios. The Limnology Working Group was comprised of IAP members specifically assigned to vetting the details of all the reservoir work.

Additional modeling was performed to assess the worst-case conditions in San Vicente Reservoir to demonstrate that, even under these worst-case conditions, the reservoir would provide a substantial environmental buffer. Based on the modeling results, preliminary regulatory metrics for the reservoir were proposed. The results of the modeling efforts were summarized in a Reservoir Study ("Retention and Mixing Report"), which was reviewed with the IAP prior to being submitted to CDPH for consideration. Table D-3 provides an overview of the timeline of each action implemented in support of Objective 2.

The regulatory activities noted above focused primarily on CDPH requirements, because the environmental buffer regulatory standard is required by CDPH. In addition to these activities, the City has worked with Regional Board staff throughout the Demonstration Project, including holding project-specific meetings at the Regional Board office and inviting Regional Board staff to attend IAP meetings.

[6] For specific information regarding the San Vicente Reservoir Study and the San Vicente Reservoir Model, please refer to Section C of this report.

Table D - 3: Timeline of Activities Completed in Support of Objective 2

Activity	Date
Create a three-dimensional hydrodynamic computer model (San Vicente Reservoir Model)	Late 2009
Validate the San Vicente Reservoir Model using 1997 tracer study results	Late 2009
Adjust the San Vicente Reservoir Model to consider components of the expanded San Vicente Reservoir	Early 2010
Conduct IAP Limnology Subcommittee Meeting No. 1 to validate model calibration and applicability	March 2010
Finalize Reservoir Study - Model Development Report (San Vicente Reservoir Model development, validation, scalability)	June 2010
Perform initial modeling	June-October 2010
Conduct Limnology Working Group Meeting No. 1 to review initial model scenario results and recommend additional model scenarios	September 2010
Prepare and Submit draft San Vicente Reservoir Pathogen Removal Issues Paper	November 2010-February 2011
Conduct IAP Subcommittee Meeting No. 2 to assess initial modeling results and pathogen removal capacity of San Vicente Reservoir	March 2011
Assess worse-case San Vicente Reservoir retention scenario using results of second set of San Vicente Reservoir three-dimensional modeling results	April-June 2011
Prepare preliminary reservoir regulatory metrics	August–September 2011
Prepare Reservoir Study –Retention and Mixing Report	August-October 2011
Submit Reservoir Study – Retention and Mixing Report	November 2011
Conduct IAP Subcommittee Meeting No. 3 to review Retention and Mixing Report and preliminary reservoir regulatory metrics	December 2011
Submit Proposal to Augment San Vicente Reservoir with Purified Recycled Water	March 2012
Receive Concept Approval for San Vicente Reservoir Augmentation Project from CDPH	September 2012

***Objective 3**: Demonstrate protection of San Vicente Reservoir water quality (specifically focusing on nutrients).*

Demonstrating that San Vicente Reservoir water quality would not be adversely impacted by a reservoir augmentation project at San Vicente Reservoir involved updating the computer model as described under Objective 2 to include a water quality component, or subroutine, so that the effects

of purified water on reservoir water quality could be simulated. After meeting with the Regional Board, modeling was performed to demonstrate the negligible effect that adding purified water would have on San Vicente Reservoir water quality. Once the results of the modeling scenarios were presented to the Regional Board, the Regional Board adopted a resolution supporting the City's potential reservoir augmentation project at San Vicente Reservoir.

The modeling effort assessed potential effects of purified water on nitrogen loading into San Vicente Reservoir.

The Testing and Monitoring Plan for the AWP Facility was implemented during the period from August 2011 through July 2012. This involved collecting water quality data including parameters of interest to both CDPH and the Regional Board. These data were assessed to determine whether the quality of purified water produced at the AWP Facility would be suitable to meet Regional Board water quality standards, which – in some cases – are more stringent than CDPH standards. Because nutrient levels in purified water would be slightly higher than potentially required by the Basin Plan, additional model scenarios were performed to simulate the effects of adding purified water on nutrient loading to the reservoir.

Results of these simulations were summarized in a Reservoir Study - Water Quality Report, which was submitted to the IAP and the Regional Board. Nutrient loading was determined to be one area in which additional work would need to be completed to clarify regulatory requirements for a potential full-scale AWP facility. The City met with the Regional Board to discuss the results of the water quality evaluation and outline an approach for achieving regulatory compliance. This approach was summarized in a Proposed Regional Board Compliance Approach, which was submitted to the Regional Board for consideration. Table D-4 provides an overview of the timeline of each action implemented in support of Objective 3.

As described above, the City prepared submittals to both CDPH and the Regional Board to conclude the Demonstration Project regulatory coordination activities and elicit regulatory response. These submittals presented the regulatory framework for a potential reservoir augmentation project at San Vicente Reservoir as understood by the City. More detail on these submittals and the regulatory response is presented in the following sections.

Table D - 4: Timeline of Activities Completed in Support of Objective 3

Activity	Date
Meet with Regional Board to introduce the potential San Vicente Reservoir Augmentation Project	October 2008
Rerun initial San Vicente Reservoir model with water quality component	September 2011
Make presentation to Regional Board on Reservoir Augmentation Project at San Vicente Reservoir and Regional Board adopts resolution supporting the City's potential reservoir augmentation project at San Vicente Reservoir	October 2011
Assess AWP Facility monitoring data regarding Regional Board requirements	December 2011 – February 2012
Perform additional model scenarios to assess addition of purified water and reservoir expansion on nutrient loading	November – December 2011
Prepare Reservoir Study – Water Quality Report	January – February 2012
Submit Reservoir Study – Water Quality Report to Regional Board	March 2012
Conduct IAP Limnology Subcommittee meeting No. 3	March 2012
Meet with Regional Board to discuss San Vicente Reservoir 303(d) Listing and associated nutrient regulatory approach	June 2012
Prepare Proposed Regional Board Compliance Approach	June-August 2012
Submit Proposed Regional Board Compliance Approach to Regional Board	August 2012

CDPH Regulatory Acceptability

CDPH has the authority to approve reservoir augmentation projects on a case-by-case basis. One goal of the Demonstration Project was to receive concept approval from CDPH for a potential reservoir augmentation project at San Vicente Reservoir. The City submitted a proposal to CDPH in March 2012 that presented specific public health protections provided by a reservoir augmentation project at San Vicente Reservoir and summarized technical study results obtained throughout the Demonstration Project and validated by an IAP. The City's proposal, provided in Appendix A, articulated how a reservoir augmentation project at San Vicente Reservoir would provide a multiple barrier approach fundamental to public health protection by incorporating the following elements:

- Enhanced source control to prevent potential contaminants from entering the wastewater stream
- Pathogenic microorganism control through implementation of recycled water treatment and advanced water purification processes
- Control of nutrients including nitrogen compounds through implementation of advanced water purification processes
- Monitoring for regulated contaminants, additional chemicals, and other contaminants
- TOC control, achieved through implementation of an advanced water purification process and a monitoring plan focused on removal of these constituents

- Reliability and redundancy to meet regulatory requirements and prevent purified water from entering San Vicente Reservoir if necessary
- Monitoring and response plan designed to detect any unexpected operational issues at the AWP facility or source water contamination before the purified water reaches the reservoir

Based on the multiple barrier approach outlined in the City's proposal, CDPH issued a Concept Approval Letter to the City in September 2012, in which CDPH approved of the reservoir augmentation at San Vicente Reservoir concept proposed by the City (Appendix B).

Based on the body of technical work completed as part of the Demonstration Project and the successful operation of similar projects elsewhere in California, the program elements listed below were suggested to be implemented as part of the CDPH regulatory framework for the City's potential reservoir augmentation project at San Vicente Reservoir.

Table D - 5: Potential Reservoir Augmentation Project at San Vicente Reservoir Regulatory Program Elements - CDPH

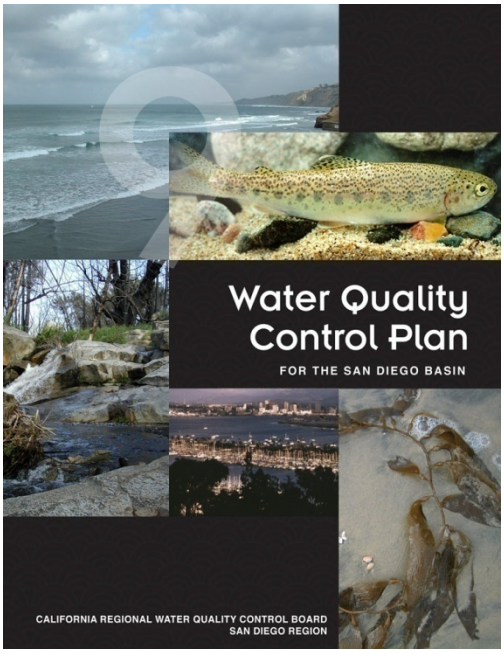
Control Point: Prior to Entering the Wastewater Collection System
• Establish enhanced source control program for the North City service area to prevent target contaminants from entering the wastewater stream.
Control Point: North City Water Reclamation Plant (source of recycled water for advanced water purification)
• Implement flow equalization to deliver a constant flow of recycled water from North City to the AWP Facility, simplifying process operation.
• Achieve full nitrification in the secondary aeration process to assist in reducing the amount of nitrogen in recycled water produced at North City.
• Operate with no return flows from biosolids processes (biosolids from North City are processed off-site) to produce the highest quality recycled water.
• Use tertiary-filtered water from North City as the source water for the AWP Facility.
Control Point: Advanced Water Purification Facility (AWP Facility)
• Treat the entire amount of water sent to the AWP Facility with membrane filtration and reverse osmosis meeting applicable CDPH specifications and performance measures to ensure the best quality of purified water possible.
• Treat the entire amount of water sent to the AWP Facility with advanced oxidation meeting applicable CDPH specifications and performance measures to ensure the best quality of purified water possible.
• Implement a Critical Control Point Monitoring Plan that includes surrogate indicators recommended by the industry at time of implementation. Surrogate indicators allow the City to quickly and easily detect any unexpected treatment process interruptions so that they may be addressed right away.
• Maintain a certified operator on-site at all times (24 hours/day) to ensure proper facility operation and oversight.

Control Point: San Vicente Reservoir
• Maintain an adequate combination of retention time and blending in the reservoir at all times to meet regulatory requirements and provide a barrier to potential pathogens.
• Locate the purified water inlet (where purified water enters the reservoir) and the reservoir outlet (where water leaves San Vicente Reservoir) such that purified water moves along a lengthy path from the inlet to the outlet, increasing the time that the water is held in the reservoir.
• Achieve a minimum blend of purified water with ambient reservoir water, at the outlet, of 100:1 at all times to achieve regulatory requirements to provide a substantial environmental buffer.
• Demonstrate criteria to ensure that purified water moves along a lengthy path from the inlet to the outlet and the criteria for blending of purified water at the outlet using a calibrated and validated hydrodynamic model. This allows the City to demonstrate that the requirements for a substantial environmental buffer would be achieved.
• Release purified water above the lower layer of water within San Vicente Reservoir, and withdraw water from the lower layer when layers are present (refer to Section C of this report for more information). This will allow the City to ensure that purified water remains in the reservoir for a longer period of time prior to being withdrawn.
• Treat water withdrawn from the reservoir at a drinking water treatment plant before distribution to the City's customers to provide an additional level of public health protection.
• Maintain the ability to take the reservoir offline as a source of supply to the drinking water system within 24 hours at all times to allow quick response time in the unlikely event that an unexpected process interruption requires the reservoir to be taken offline.

Regional Board Acceptability

Potential challenges associated with permitting a water purification project within the Regional Board regulatory framework were thoroughly discussed in meetings and correspondence conducted between the City and Regional Board throughout the Demonstration Project. Despite the exceptional quality of the purified water that would be released into San Vicente Reservoir, addressing the full array of applicable state and federal water quality standards, plans, and policies could require substantial time and effort. For example, although the nitrogen level in purified water would be comparable to that in imported water inflows to San Vicente Reservoir, purified water inflows would require a Regional Board permit and compliance with Basin Plan water quality objectives, whereas imported water inflows do not. Nitrogen loading associated with releasing purified water into the reservoir is an example of an issue that would require further Regional Board consideration before a reservoir augmentation project at San Vicente Reservoir could be implemented.

Based on coordination with the Regional Board, the City prepared a submittal to the Regional Board entitled "Proposed Regional Water Quality Control Board Compliance Approach" (Appendix D). This document, submitted to the Regional Board in August 2012, summarized the reservoir augmentation at San Vicente Reservoir concept and identified key permitting issues and Regional Board regulatory decisions and actions that would be required in order for the Regional Board to approve a project at San Vicente Reservoir. This document indicates that based upon the Regional Board's interpretation of nitrogen limits within the Basin Plan, purified water flows to San Vicente Reservoir may be required to achieve a total nitrogen concentration limit of 0.25 mg/L to 1.0 mg/L. Water quality testing undertaken at the AWP facility indicates that the average concentration of total nitrogen in purified water is 0.8 mg/L, meaning that purified water could potentially exceed nitrogen concentration requirements established within the Basin Plan. Although purified water nitrogen concentrations could potentially exceed regulatory limits, total nitrogen concentrations in purified water are comparable to or lower than current water inflows to San Vicente Reservoir. Nitrogen concentrations in imported water inflows to San Vicente Reservoir range from 0.17 mg/L to 0.68 mg/L, and nitrogen concentrations in surface water runoff to San Vicente Reservoir range from 0.18 mg/L to 4.2 mg/L.



Although nitrogen levels in the purified water could potentially exceed Basin Plan requirements, total nitrogen levels in purified water are comparable to or lower than current nitrogen concentrations in San Vicente Reservoir.

The submittal noted the following:

- AWP Facility monitoring data indicate that the purified water supply would be equal or superior in quality to existing San Vicente Reservoir inflows for virtually all constituents. Nitrogen could be the only exception to this, as purified water nitrogen concentrations would be slightly higher than existing imported water inflows to San Vicente Reservoir, but superior in quality to the local runoff captured within the reservoir.
- Comprehensive reservoir modeling conducted as part of the Demonstration Project indicate that nitrogen concentrations under a reservoir augmentation project at the expanded San Vicente Reservoir are projected to be less than historic nitrogen concentrations in the reservoir.

On October 12, 2011, the Regional Board adopted Resolution No. R9-2011-0069, which documented the Regional Board's support for a reservoir augmentation project at San Vicente Reservoir. That resolution, included as Appendix C, also sets forth the Regional Board's proposed means of regulating the full-scale project.

The Regional Board noted that two key procedural questions will determine the pathway the City would need to take to proceed with applying for and receiving an NPDES permit for a full-scale project. These questions include:

- Prior to the Regional Board's consideration of an NPDES permit for reservoir augmentation at San Vicente Reservoir, would the Regional Board, State Board, and EPA need to take actions to modify the Clean Water Act Section 303(d) impaired water list for San Vicente Reservoir?
- Prior to the Regional Board's consideration of an NPDES permit for reservoir augmentation at San Vicente Reservoir, would the Regional Board, State Board, and EPA need to modify any requirements within the Regional Board's Basin Plan?

Excerpt from Regional Board Resolution No. R9-2011-0069

NOW THEREFORE, BE IT RESOLVED THAT, the San Diego Regional Water Quality Control Board:

- Supports the efforts to develop the Reservoir Augmentation Project at the San Vicente Reservoir as a means to reduce reliance on imported water, increase the use of recycled water, and to implement goals in California Water Code section 13510 and the 2008-2012 Strategic Plan Update for the Water Boards.
- In accordance with implementation provisions of the Basin Plan, the San Diego Water Board will regulate San Diego Region recycled water reservoir augmentation projects through the issuance of project-specific NPDES Permits.
- Reservoir augmentation NPDES permits issued by the San Diego Water Board will incorporate requirements established and the provisions recommended by California Department of Public Health.

The City's submittal provided a recommended pathway to address these procedural questions expeditiously, and noted that if the answer to both questions is "no", the pathway for approval would be straightforward. The City believes that this direct approval pathway (no Basin Plan modification or 303(d) list revisions) would be both feasible and appropriate. If the answer to either question is "yes", the project would remain feasible, but up to two years could be added to the project's implementation timeline.

.In response to the City's submittal, the Regional Board issued a letter concurring with the recommended regulatory pathway, acknowledging that neither the 303(d) impaired water listing nor the Basin Plan would need to be modified in order to permit a full-scale reservoir augmentation project at San Vicente Reservoir. This February 2013 Regional Board Letter of Concurrence (Appendix E) also reaffirmed that agency's strong support for the City's efforts in moving forward with a full-scale project, and noted that EPA concurs with this support and regulatory pathway.