POSEIDON CARLSBAD CLAUDE "BUD" LEWIS DESALINATION PLANT TOUR

May 21, 2019
10:00 pm

Regional Board Members
Daniel Selmi
Kris Murray

Regional Board Staff
Hope Smythe
Terri Reeder
Mark Smythe
Julio Lara

Regional Board Legal Counsel
Teresita Sablan

State Water Resources Control Board Staff
Daniel Ellis

Poseidon Water
Peter MacLaggan
Scott Maloni
Jessica Jones
Josie McKinley

San Diego Water Authority
Bob Yamada

Public in Attendance
Ray Hiemstra, Orange County Coastkeeper
Martin Wisckol, OC Register
Michael Nieto, WRA
Michael Josselyn, WRA
Brett Korte, UCI Law Clinic
Mandy Sackett, Surfrider Foundation
Staley Prom, Surfrider Foundation
Amy Fos, Surfrider Foundation
Nolan Pargo, Surfrider Foundation
Kelly Rowe, OCWD
Jim Atkinson, Mesa Water

Tour Summary

Mr. Peter MacLaggan of Poseidon Water provided a PowerPoint overview (Attachment 1) of the Carlsbad Desalination facility (Facility) describing the open ocean intake location in the Aqua Hedionda Lagoon. Mr. MacLaggan described the initial treatment process, including the withdrawal of seawater and the first stage of treatment to remove large particles via anthracite and sand filtration. He then described the additional filtration process to remove small particles followed by reverse osmosis (RO) to remove salt. Approximately one-third of the RO product water is sent through another round of RO treatment to remove boron. This water is then re-mineralized and disinfected. The Facility produces 54 MGD of product water.
Mr. MacLaggan talked about the San Diego Regional Board permit that requires evaluation of a new intake system. He then spoke about the required mitigation, which will be the restoration of 68 acres at the south end of San Diego Bay.

Mr. Bob Yamada with the San Diego Water Authority (SDWA) provided an overview of the SDWA (Attachment 2). He indicated that the SDWA consists of 24-member retail agencies and serves 3.3 million people. SDWA's goal is to diversify water supply with indirect potable reuse and desalination as part of their water portfolio. Mr. Yamada indicated that in 2012 the SDWA entered into a purchaser agreement with Poseidon, which provides SDWA with the option to buy out Poseidon after 10 years and transfer the facility to public ownership after 30 years.

The on-site tour of the facility conducted by Mr. MacLaggan began with the pre-treatment filters and the reverse osmosis filters. The tour continued to the product water deck (post-treatment and delivery area) where participants were offered samples of the product water. From there, the tour went inside to the Supervisory Control and Data Acquisition (SCADA) SCADA control room. The tour concluded near the seawater intake area in the Aqua Hedionda Lagoon. Mr. MacLaggan and Mr. Scott Maloni answered questions from the Regional Board, Board staff, and the public.

Public Comments

Board Member Daniel Selmi opened the public comment period.

Mandy Sacket, Surfrider Foundation: Ms. Sacket spoke about the chronic toxicity violations that have been occurring at the Poseidon facility and the implications for ocean recreational users. Ms. Sacket raised concern that there has been no identification of the reason for the toxicity and that, even though the effluent may be diluted by ocean water, there is the potential for pollutants and toxicants to accumulate in the environment. Ms. Sacket suggested that sediment sampling should be required since that would pick up the presence of toxicants.

Ray Hiemstra, Orange County Coastkeeper: Mr. Hiemstra noted that the Facility used state-of-the-art treatment technologies, but this was not so for the obsolete intake and discharge technologies. Mr. Hiemstra stated that the Facility's intake and discharge systems were not allowed elsewhere in the state. For future desalination plants, he expects full compliance with the Ocean Plan/Water Code. Mr. Hiemstra further indicated that the wedge-wire screen was only 1% effective in preventing entrainment of marine organisms and noted that the San Diego Regional Board's NPDES permit requires Poseidon to conduct an intake study. Mr. Hiemstra also referenced comment letters from Surfrider Foundation and Orange County Coastkeeper sent to the San Diego Regional Board that raised concern about the implications of the Carlsbad desalination facility's exceedances of their toxicity permit limits (Attachment 3).

Respectively submitted,

Hope Smythe
Executive Officer

Attachment 1: Poseidon Water Carlsbad Desalination Project PowerPoint;

Attachment 2: SDWA Carlsbad Desalination Plant Information Sheets

Attachment 3: OCCK/Surfrider Submittals:

1. Poseidon Resources (Channelside) LLC, Order No. R9-2006-0065, NPDES No. CA0109223 - pg 12 and 2017 Annual Report

2. August 23, 2017 – SDWA, Report on Claude "Bud" Lewis Carlsbad Desalination Plant Operations for Fiscal Year 2017 (Presentation)

3. August 15, 2018 – SDWA Report on Claude "Bud" Lewis Carlsbad Desalination Plant Operations for Fiscal Year 2018 (Presentation)

4. January 28, 2019 – OCCK/Surfrider letter to David Gibson re: Surfrider Foundation Poseidon Water LLC's Carlsbad Desalination Plant stand-alone operations pursuant to Tentative Order no. R9-2019-0003 and NPDES no. CA010922

5. February 20, 2019 – OCCK/Surfrider letter to David Gibson, Re: Follow-up Comments to Poseidon Water LLC's Carlsbad Desalination Plant stand-alone operations pursuant to Tentative Order no. R9-2019-0003 and NPDES no. CA010922

Carlsbad Desalination Project

May 21, 2019

Santa Ana Regional Board Site Tour

POSEIDON WATER

ATTACHMENT 1

Discharge
Intake

POSEIDON WATER AND THE AGUA HEDIONDA LAGOON:
Committed to Preserving & Protecting Our Coastal Environment

1580 Cannon Rd.
Carlsbad, CA 92008

1 Claude "Bud" Lewis Carlsbad Desalination Plant

The Carlsbad Desalination Plant produces over 50 million gallons of high-quality and climate resilient drinking water each day, meeting approximately 10 percent of the region's water demand.

In 2019, plant owner and operator Poseidon Water assumed stewardship of the lagoon, along with its recreational and marine resources.

2 Improved Coastal Access and Lagoon Restoration

Through the lagoon stewardship, Poseidon Water is enhancing coastal access and oceanfront land for hiking trails, beach access, and beach parking and an expansion of the Hubbs-SeaWorld fish hatchery. Poseidon Water is also ensuring the restoration and protection of marine life through the periodic dredging and maintenance of the lagoon.

3 Protecting Marine Habitats

Agua Hedionda Lagoon encompasses over 400 acres of marine, estuarine, and wetlands habitat that is home to hundreds of fish, invertebrate and bird species. Among them are the vibrant California state marine fish, the Garibaldi, which are found in greater numbers here than comparable habitats in the pristine environments of Coronado, San Clemente and Santa Catalina islands.

4 YMCA Aquatic Park

The YMCA Aquatic Park, better known as Camp H20, is a summer camp geared towards seven- to twelve-year-olds and offers affordable day camp activities including swimming, kayaking, boating and fishing. The camp plays an important role in educating youth about the precious marine environment and the need to preserve the lagoon for future generations.

5 Hubbs-SeaWorld Fish Hatchery

Hubbs-SeaWorld Resources Enhancement and Hatchery Program includes a 22,000 square-foot fish hatchery on the lagoon. The Program actively contributes to the restoration of the California white seabass population, adding over 350,000 juveniles annually. Hubbs-SeaWorld has begun to expand its marine restoration activities as a result of additional acreage donated by Poseidon Water.

6 Beach Sand Replenishment

Historically, tidal patterns affecting Carlsbad State Beach removed most of the beach's sand, leaving only rough cobblestones. As stewards of the lagoon, Poseidon Water will continue the periodic lagoon dredging, which provides the beach with a permanent sand supply and replenishment.

7 Warm Water Jetties Surf Break

The power plant's discharge channel acted as a manmade river mouth that delivered sand to the end of the jetties, creating a natural sand bar. For years, this has created one of the most popular surf spots in North San Diego County. With the decommissioning of the power plant, the surf break was threatened. However, with the Carlsbad Desalination Plant's use of the jetties, the surf break will exist for years to come.

8 Agua Hedionda Lagoon Foundation Discovery Center

Opened in 2006, the Discovery Center offers visitors an opportunity to learn about the lagoon's native plants and marine life through exhibits and educational programs.

9 Recreational Boating

Boating remains one of the most popular lagoon activities for residents and visitors. California Water Sports offers expert lessons and rents a variety of boats, including kayaks, canoes and paddleboats to the public.

10 Carlsbad Aquafarm

The lagoon is home to the Carlsbad Aquafarm, Southern California's only shellfish aquafarm, where over 1.5 million pounds of shellfish are grown sustainably each year. The farm is a growing contributor to the $1.5 billion U.S. aquafarming industry and the San Diego region's local economy.

carlsbaddesal.com @CarlsbadDesal @CarlsbadDesal @carlsbaddesal

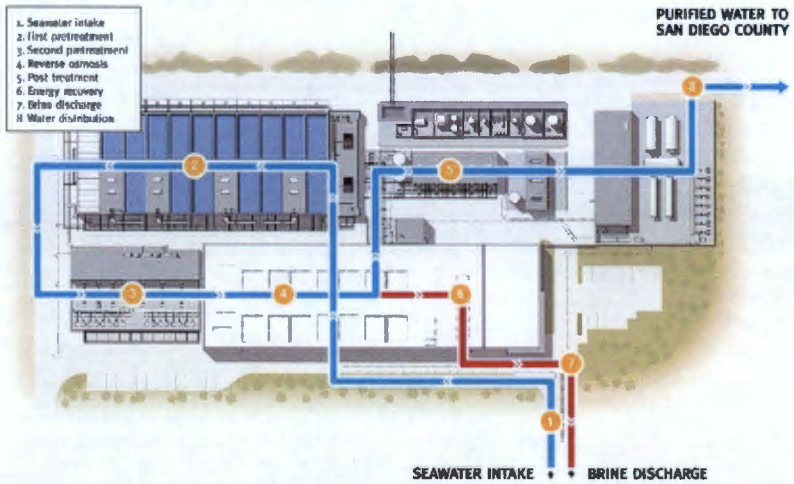
POSEIDON WATER

THE CARLSBAD
Desalination Project
Enhancing Water Reliability for San Diego County

The Carlsbad Desalination Plant is capable of delivering more than 50 million gallons of fresh, desalinated drinking water per day—enough to serve approximately 400,000 people in San Diego County. Commercial operations began in late 2015, providing the region with a reliable and locally controlled water source.

Produces **50 MILLION GALLONS of water per day** → Serving **400,000 people in San Diego County**

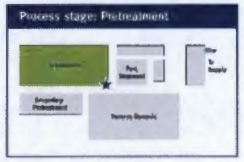
The Desalination Plant and Process Locations

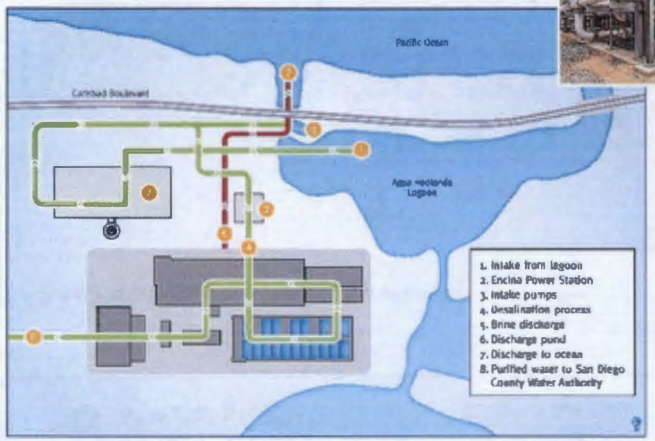


Drawing Water from the Pacific Ocean

On a typical day, the Carlsbad Desalination Plant uses 100 million gallons of seawater from the Pacific Ocean that enters through an intake on the shores of Agua Hedionda Lagoon. Seawater is drawn into the pump station and transported to the plant via the 72-inch seawater feed pipe to begin the desalination process.

Roughly half of the water flowing through the plant is converted into drinking water for the region. The remaining water, carrying all of the original salt and minerals, is returned to the ocean.



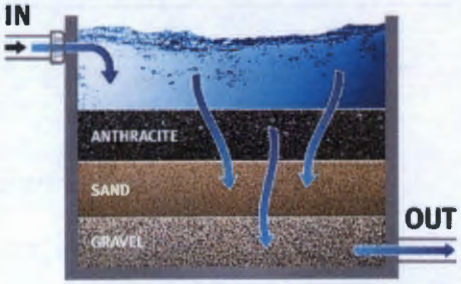


TRANSPORTS **100 MILLION GALLONS** OF SEAWATER INTO THE PLANT PER DAY

Removing Impurities

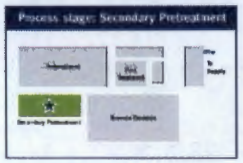
Most people think of desalination only as removing salt, but the process also removes other mineral, biological and organic impurities to produce extremely high-quality water.

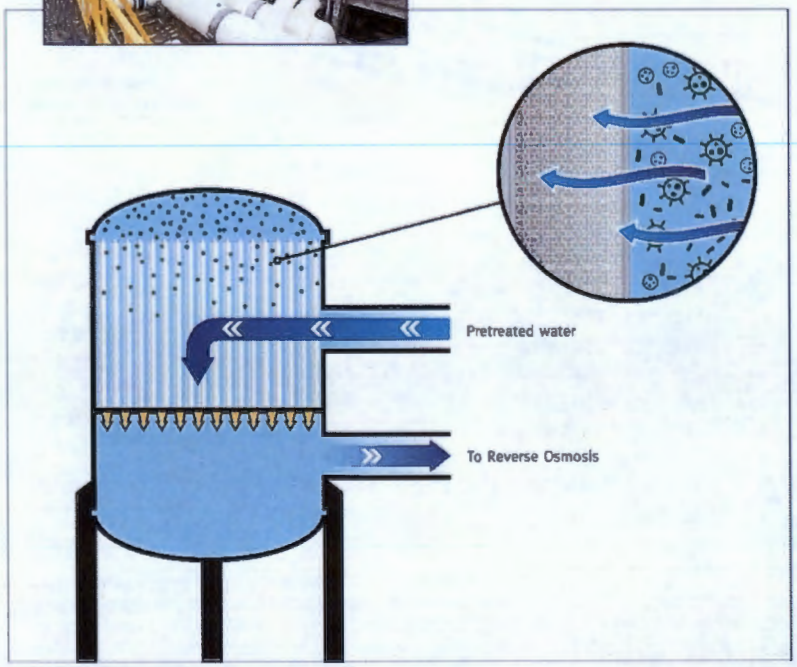
When seawater arrives at the plant, it goes through a pretreatment process to eliminate algae, organic materials and other particles. Seawater is pumped into multimedia filter tanks which contain layers of anthracite and sand atop a bed of gravel. Then, the water moves into the second pretreatment stage to remove smaller impurities.



Secondary Pretreatment

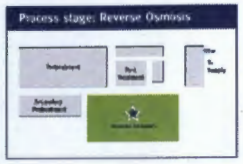
Before seawater enters the reverse osmosis filters to separate the salts, it must go through the second stage of pretreatment called microfiltration to remove smaller–oftentimes microscopic–impurities. At this point, virtually all impurities other than dissolved salts and minerals have been removed from the water, but it still needs to go through one more step to remove the dissolved salts and minerals to be ready for drinking.

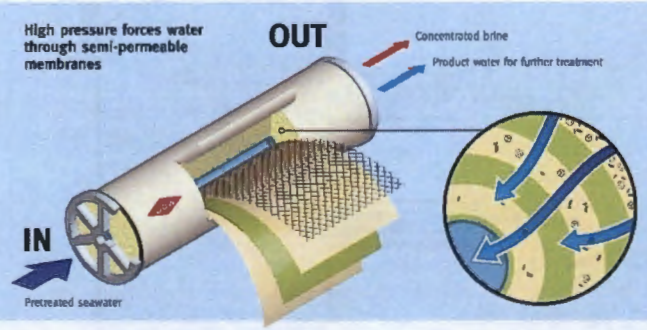




The Center of the Desalination Process

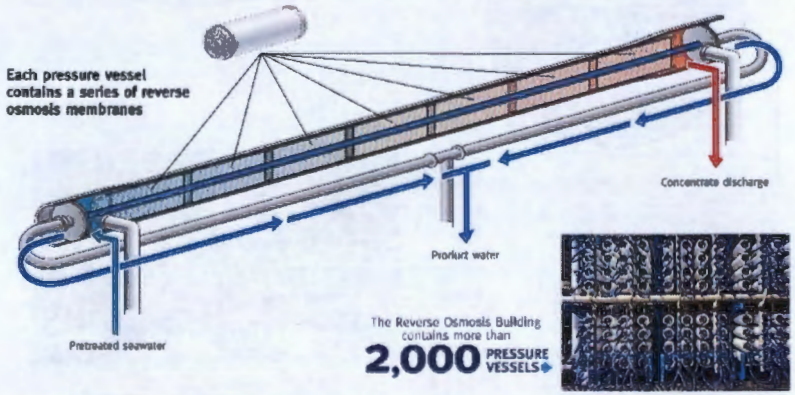
Reverse osmosis is the heart of the Carlsbad Desalination Plant. During this process, dissolved salt and other minerals are separated from the water, making it fit for consumption. This reverse osmosis building contains more than 2,000 pressure vessels housing more than 16,000 reverse osmosis membranes.





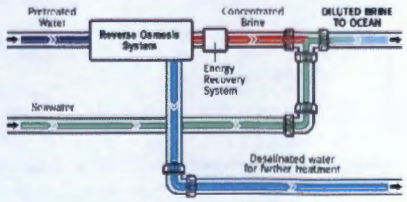
How Reverse Osmosis Works

Reverse osmosis is a process that separates dissolved minerals and other impurities from water by pushing water through semi-permeable membranes. These membranes act like microscopic strainers that allow only water molecules to pass through, leaving behind the salt, minerals and other impurities such as bacteria and viruses.



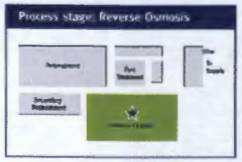
Returning Salty Water to the Sea

The byproduct of reverse osmosis—called brine—contains roughly twice as much salt as seawater. Before it's discharged to the ocean, brine from the plant is diluted with seawater to reduce its salinity and ensure minimal impacts to the ocean.



Recycling Energy to Conserve Resources

The Carlsbad Desalination Plant uses energy recovery devices that recycle the pressure from the reverse osmosis process. These devices save an estimated 146 million kilowatt-hours of energy per year, reducing carbon emissions by 42,000 metric tons annually – roughly equivalent to the annual greenhouse gas emissions from 9,000 passenger vehicles.



There are 144 energy recovery devices at work in the plant, reducing the overall energy consumption of the reverse osmosis process by 46 percent.

The energy recovery devices capture the hydraulic energy created by the high pressure reject stream of seawater produced during the reverse osmosis processes and transfer it into incoming seawater, without consuming any electrical power themselves.

144 energy recovery devices reduce reverse osmosis energy consumption at the plant by 46%

Annual savings from Energy Recovery devices:

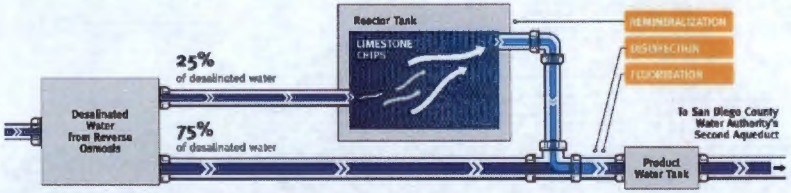
42,000 METRIC TONS OF CO_2

Equivalent to

EMISSIONS FROM 9,000 PASSENGER VEHICLES

Finishing the Process

After reverse osmosis filtration, the fresh water is nearly ready for consumption. But before making its way into your faucet, the water must undergo "post treatment." This includes adding some minerals back into the water and disinfection with chlorine.



From the Carlsbad Desalination Plant to You

Now the water begins its journey from the plant to taps all across San Diego County. That process starts by pumping water through a 10-mile, 54-inch pipeline to the east through Carlsbad, Vista and San Marcos to the San Diego County Water Authority's Second Aqueduct. Then, the water moves north to the Water Authority's Twin Oaks Valley Water Treatment Plant, where it's blended with imported water supplies and routed into large-diameter pipes for delivery throughout the region.

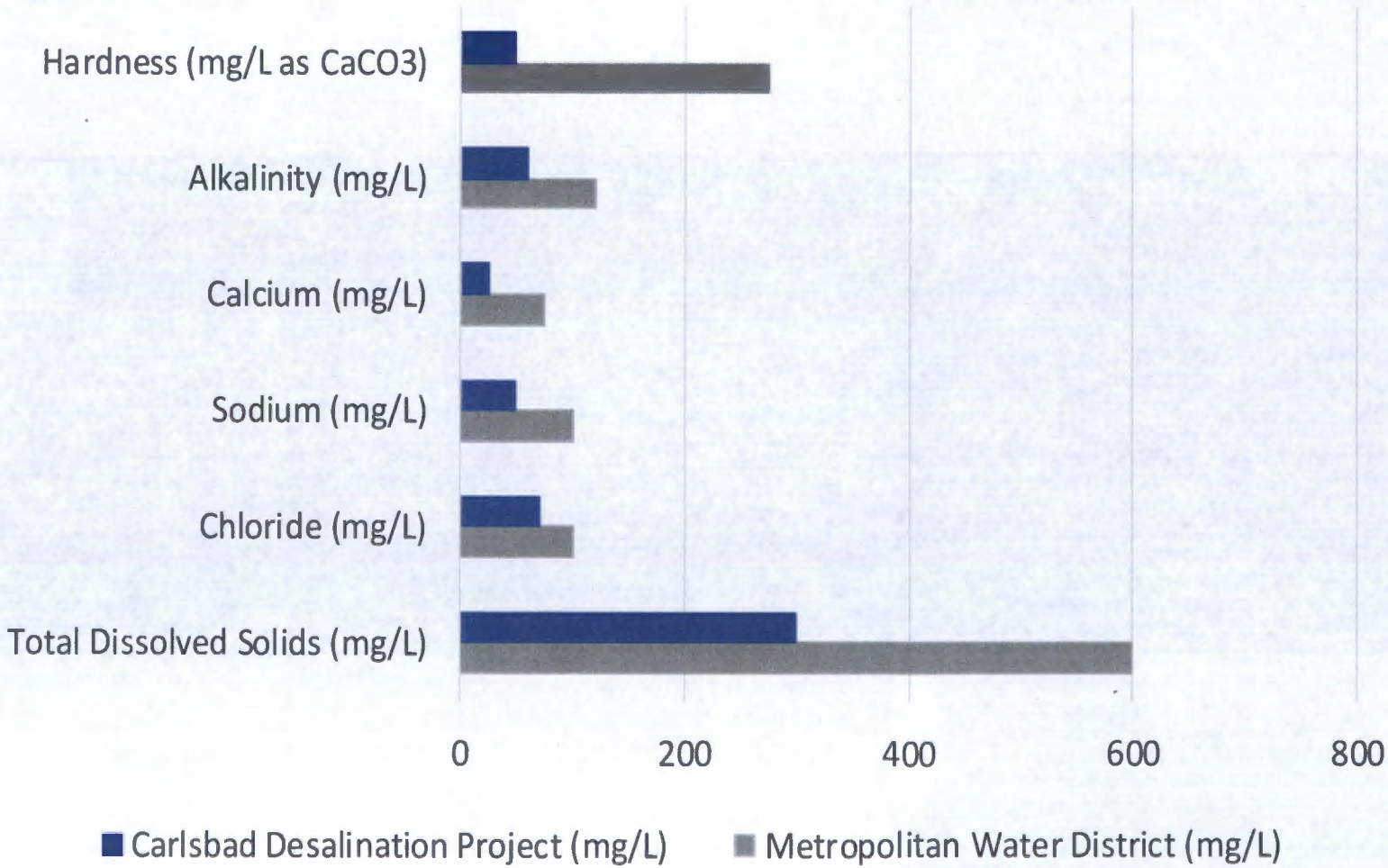
Benefits for the San Diego Region

The Carlsbad Desalination Project improves our regional quality of life by protecting and preserving the coastal environment. It ensures the continued stewardship of the 300-acre Agua Hedionda Lagoon adjacent to the plant, along with its recreational and marine resources. In addition, Poseidon Water is restoring 66 acres of coastal wetlands in San Diego Bay. To top it off, the Carlsbad Desalination Project is the first major infrastructure project in California that has adopted a comprehensive strategy to eliminate its carbon footprint. That means we can have a highly reliable, drought-proof water source in an environmentally responsible way.

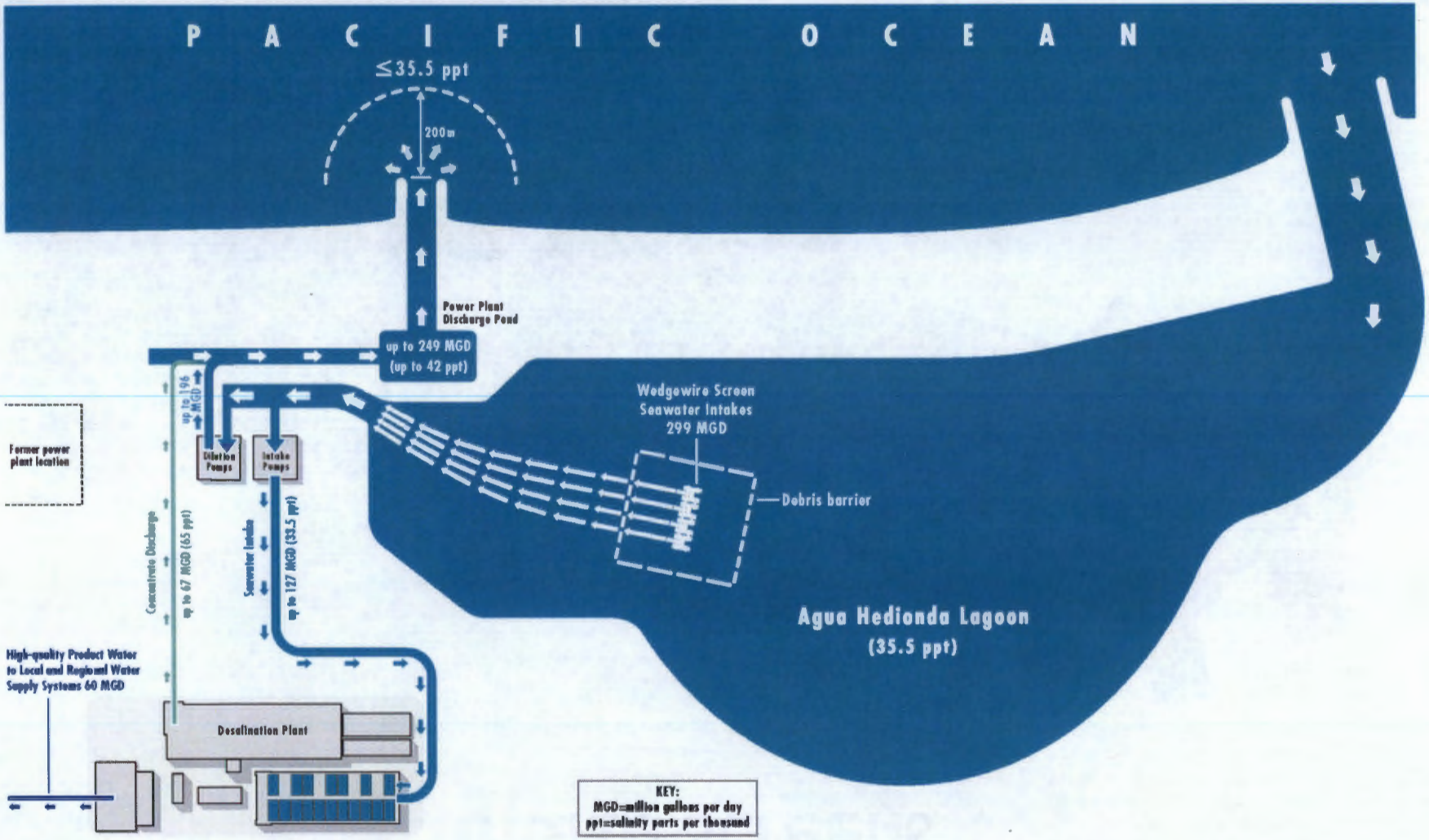
The Carlsbad Desalination Plant provides San Diego County with an independently-controlled, drought proof supply of drinking water. This has effectively improved regional water supply reliability by reducing reliance on imported water sources dependent on rain and snowpack. While there is no single method to combat San Diego County's water supply challenges, the plant is a critical resource for meeting the region's current and future needs. By restoring local control to the region's water supply, the Carlsbad Desalination Plant stands as a pillar of its water reliability future, which will be quenching the thirst of San Diego County for generations to come.

Product Water Delivery System

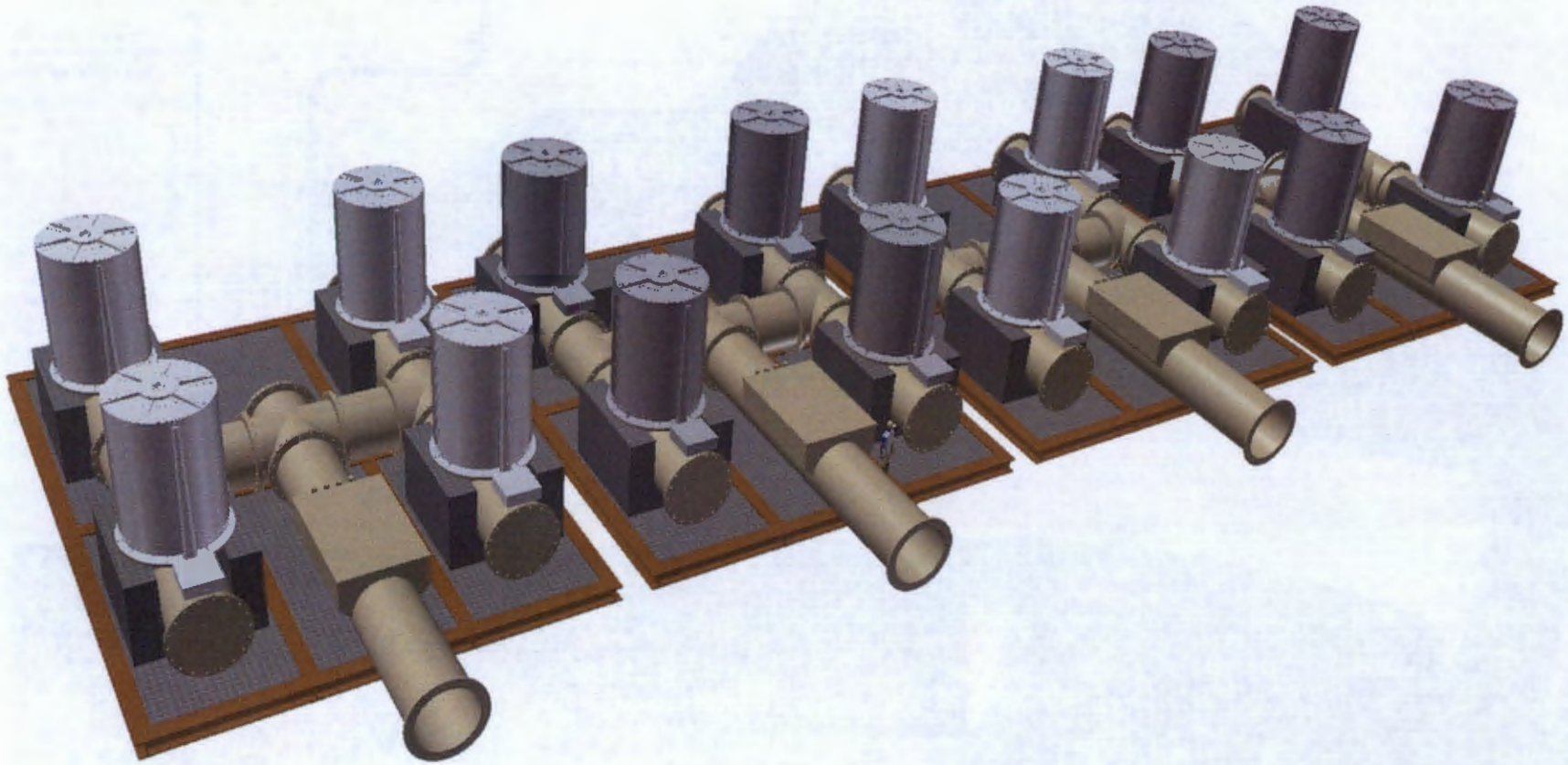
Water Quality Improvement



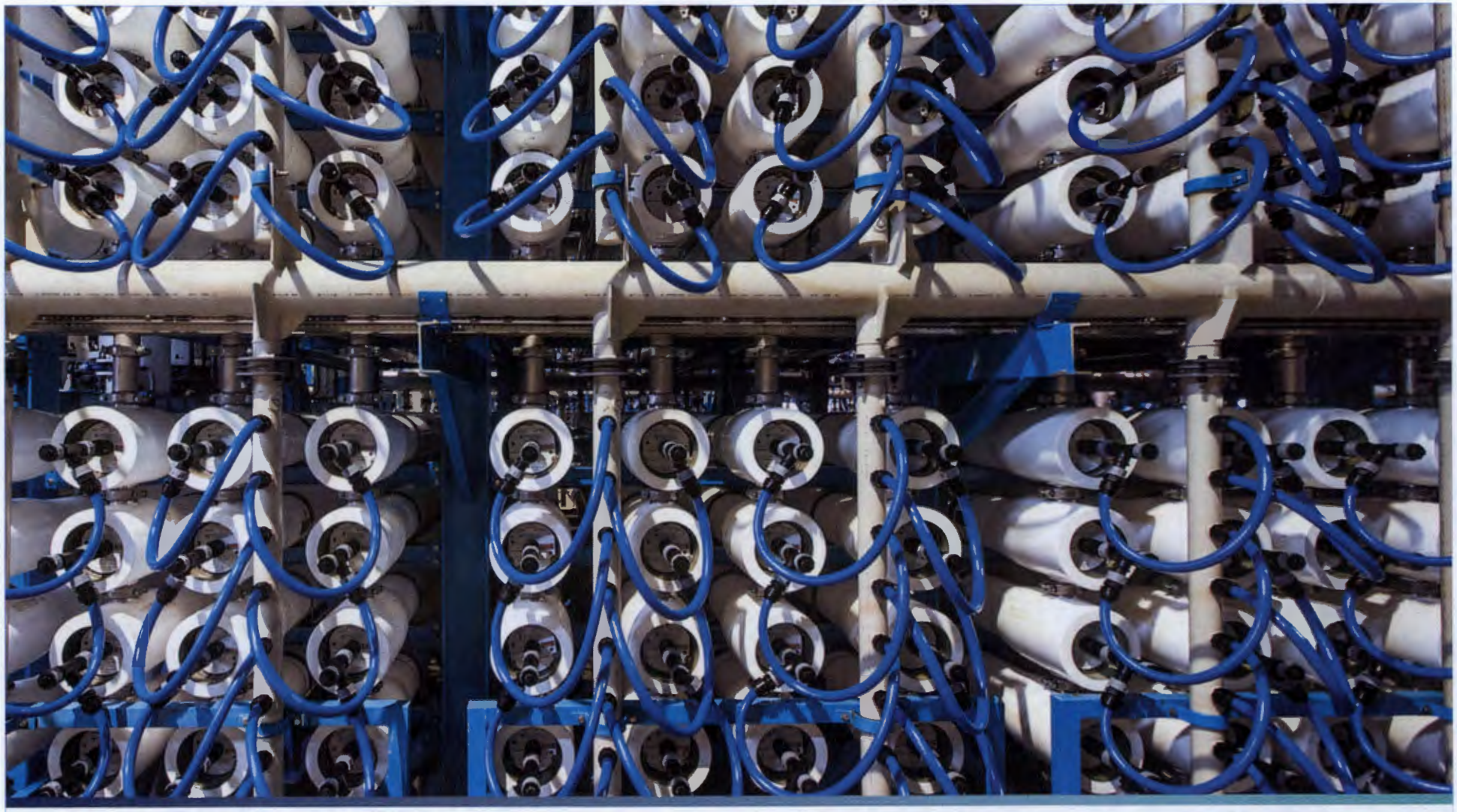
Future Configuration



Intake Screens



Wetlands Restoration Project



Background Information

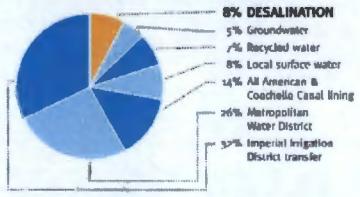
POSEIDON WATER

The Plant's Role in San Diego County

This semiarid region has limited local water resources, with relatively small aquifers and no major rivers. In recent decades, San Diego County has imported more than 80 percent of its water from Northern California and the Colorado River.

The Carlsbad Desalination Project is an important component of the San Diego County Water Authority's long-term strategy to improve the region's water supply reliability by diversifying its supply sources. This strategy has allowed the region to reduce its dependence on imported water sources that are vulnerable to droughts, natural disasters and regulatory restrictions. The plant accounts for about one-third of all water generated in the county.

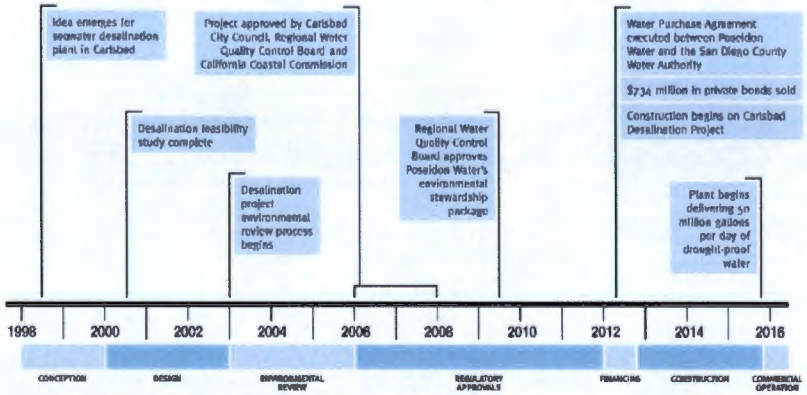
Projected San Diego County Water Sources in 2020



The Road to Desalination in Carlsbad

The idea for a seawater desalination plant in Carlsbad arose in the 1990s, and it took years of planning and review to make that vision a reality. Taking into account the needs of the local community, the region and the environment, a team of engineers and experts developed a proposal for a desalination plant adjacent to the Encina Power Station on the Agua Hedionda Lagoon and a 10-mile pipeline to transport the desalinated water to the Water Authority's Second Aqueduct in San Marcos.

By the end of 2012, all of the necessary approvals were in place. The Water Authority and Poseidon Water entered into a 30-year Water Purchase Agreement for the entire output of the plant, and construction began. It took nearly three years and more than 1 million labor hours to complete the project and start commercial operations.



Water Boards

Media Release

Carlsbad Desalination Plant Updated Permit Approved by San Diego Water Board

State Standard Assures More Protection for Fish and Marine Life

For Immediate Release
May 8, 2019

Contact: Ailene Voisin
ailene.voisin@waterboards.ca.gov

SAN DIEGO – The San Diego Regional Water Quality Control Board today renewed a permit governing discharges from the Claude "Bud" Lewis Carlsbad Desalination Plant into the Pacific Ocean that includes structural and operational changes to provide greater protection for marine life and water quality.

The Board's action authorizes the facility's owner, Poseidon Water, to construct a stand-alone pumping station to draw its seawater and build a new intake structure with smaller screens to reduce the number of fish sucked into the plant. The permit also establishes more stringent brine discharge guidelines to minimize the toxic impact on bottom-dwelling marine life and requires Poseidon to offset potential harm by creating 68.3 acres of wetlands in south San Diego Bay.

"Desalinated water, as regulated by the permit for Poseidon, is an important component of our overall water supply portfolio," said San Diego Water Board chair Henry Abarbanel.

The updates are expected to increase the facility's drinking water production from 54 to 60 million gallons per day, a significant boost in light of the region's arid climate and inevitability of droughts. The renewed permit supports the use of ocean water as a reliable supplement to traditional water supplies and features a number of environmental protections adopted by the State Water Board in its Desalination Amendment in May 2015. California is a world leader in desalination permitting and environmental protection.

Located 30 miles north of San Diego on the shores of the Agua Hedionda Lagoon, the Carlsbad plant is the largest and most technologically advanced seawater desalination project in the Western Hemisphere. The project relies on reverse osmosis, a filtering process that separates salt from seawater and eliminates impurities such as bacteria and viruses. Approximately 100 million gallons per day of ocean water from the adjacent lagoon enters the plant through a 72-inch pipe, then cycles through a multi-layer tank that uses sand, gravel and anthracite to remove algae and other large impurities. Then, a reverse osmosis cycle removes

the salt. Once the filtering is complete, the potable water is disinfected with chlorine and pumped to retailers throughout the county. The brine that remains is diluted with seawater and returned to the ocean.

"In approving the permit," Abarbanel said, "the Board balanced the environmental impacts and costs of source water intake and brine disposal for the next several decades with the many beneficial uses of the Pacific Ocean and Aqua Hedionda Lagoon."

Poseidon sells its product to the San Diego County Water Authority, which supplies 10 percent of the county's drinkable water.

While Carlsbad is one of 12 existing desalination plants in California - a state that more heavily relies on conservation, recycling, stormwater capture and groundwater recharge for its water supply - ocean filtration systems operate in more than 120 countries and are considered a vital water source alternative in many regions, particularly the Middle East, the Mediterranean and the Caribbean.

Israel's extensive and effective use of desalination to counter chronic drought conditions is frequently cited as a success story, and in fact, the company contracted by Poseidon to operate the Carlsbad plant is the Israel-based Desalination Enterprises. Desalination programs currently provide more than 50 percent of water for Israeli households, agriculture and industrial use, with some projecting the percentage to reach 70 percent by 2050.

To learn more about desalination issues, visit the State Water Resources Control Board's website here.

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U.S. Fish & Wildlife Service

San Diego Bay National Wildlife Refuge (South San Diego Bay Unit)

Restoration Update - October 2018

Otay River Estuary Restoration Project

The selected restoration action for the ORERP proposes to restore native coastal wetland and upland habitats on the South San Diego Bay Unit of the San Diego Bay National Wildlife Refuge.

When restored, the 33.5-acre Otay River Floodplain Site will support primarily intertidal salt marsh habitat, along with areas of intertidal mudflat, high tide refugia, and native upland vegetation. The 91-acre Pond 15 Site will support a combination of subtidal, intertidal mudflat, and intertidal salt marsh habitat, with smaller areas of high tide refugia and native upland vegetation.

USFWS Announces the Availability of the Record of Decision for the Otay River Estuary Restoration Project

The U.S. Fish and Wildlife Service (Service) has issued the Record of Decision (ROD) for the Otay River Estuary Restoration Project (ORERP) Final Environmental Impact Statement (FEIS). This follows the Service's Notice of Availability of the ORERP FEIS that was published in the Federal Register on May 18, 2018 (83 FR 23289) and the U.S. Environmental Protection Agency's Notice of Availability of the FEIS published on May 21, 2018 (83 FR 23461).

The ROD and FEIS were prepared by the Service in accordance with the National Environmental Policy Act (NEPA) of 1969. The U.S. Army Corps of Engineers participated in the NEPA process as a cooperating agency. The FEIS analyzed three alternatives including the no action alternative and two action alternatives (i.e., intertidal restoration alternative, subtidal restoration alternative). The ROD documents the decision of the Service to select the intertidal restoration alternative for implementation. This alternative was identified in the FEIS as the preferred alternative.

The ROD also includes a discussion of the basis for the decision to select the intertidal restoration alternative, provides descriptions of all alternatives considered in the FEIS, presents an overview of the measures to be implemented to avoid and minimize environmental effects, and includes a summary of the NEPA public involvement process. The ROD is available for downloading on-line at https://www.fws.gov/refuge/San_Diego_Bay/what_we_do/Resource_Management/Otay_Restoration.html.

Poseidon Resources (Channelside) LP will implement the project on the Refuge to fulfill part of their mitigation requirements from the California Coastal Commission and Regional Water Quality Control Board for the construction and operation of the Claude "Bud" Lewis Carlsbad Desalination Plant, Carlsbad, California. The project will restore approximately 125 acres of coastal wetland and native upland habitats for the benefit of native fish, migratory birds, and other coastal dependent species consistent with the goals and objectives of the Service's San Diego Bay National Wildlife Refuge Comprehensive Conservation Plan.

United States Department of the Interior
Fish & Wildlife Service, San Diego NWR Complex
P.O. Box 2358
Chula Vista, CA 91912-2358

First Class Mail
Postage and Fees
PAID
US Department
of the Interior
Permit G-77

The Record of Decision for the Otay River Estuary Restoration Project (ORERP) Final EIS is available on-line at:

https://www.fws.gov/refuge/San_Diego_Bay/what_we_do/Resource_Management/Otay_Restoration.html

Construction related to the restoration project is expected to begin in Fall 2019. Updates on the progress of this restoration project will be periodically posted on-line at the web address provided above.

For questions or more information about the ORERP, contact Brian Collins, Refuge Manager, at Brian_Collins@fws.gov.

Claude "Bud" Lewis
Carlsbad Desalination Plant

Since operations began three years ago, the Carlsbad Desalination Plant has produced

40 Billion Gallons

of drinking water. That's the equivalent of:

1 Billion Bathtubs

4 Lake Hodges

145 Empire State Buildings

10% of America's daily water demand

PACIFIC ON TAP

Every day the plant produces

More than **50 million** gallons of water

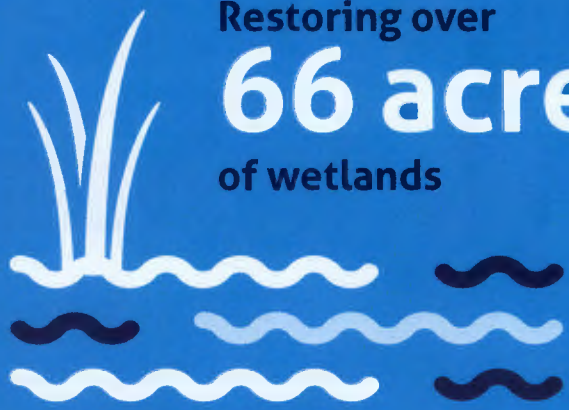
Enough to serve **400,000** San Diego County residents

Claude "Bud" Lewis
Carlsbad Desalination Plant

Poseidon Water is taking steps to

Protect and Preserve our Coastal Environment

Assuming stewardship of the
400-acre
Agua Hedionda Lagoon



Restoring over
66 acres
of wetlands

Planted
5,000 trees
in areas damaged by local wildfires

Eliminating the Plant's carbon footprint

Reducing carbon emissions by
42,000
metric tons annually – roughly equivalent to the annual greenhouse gas emissions from 9,000 passenger vehicles

By the Numbers
Desalination Energy Usage

Making fresh drinking water from the ocean requires energy, but not as much as some of our other favorite things, like TV's, Air-conditioning, and electric vehicles.

Seawater desalination has long been used in regions all over the world where fresh water is in short supply and recent improvements in desalination technology have resulted in reduced energy consumption and lower operating costs.

Poseidon's Carlsbad and Huntington Beach desalination projects will not only be the first large-scale seawater desalination plants built in the state, they will be the largest, most technologically advanced, energy efficient and environmentally friendly seawater desalination plants in the Western Hemisphere.

AC Unit
24 kWh
Central Air conditioning unit for an average day.

Data Center
19.4 kWh
Required to run a single server unit in a data center for an entire day.

Electric Vehicle
13.2 kWh
Used to drive an electric vehicle for one day.

Water Heater
12.5 kWh
Hot Water for an average household per day.

Desalination
7.6 kWh
Required to produce the daily water supply for an average household.

Sources:
- AC Unit – Duke Energy
- Data Center – Data Science Association
- Electric vehicle – US Environmental Protection Agency & Federal Housing Administration
- Water heater – Duke Energy
- Desal – Poseidon Water's Carlsbad Seawater Desalination Plant

Carlsbad | Awards and Accolades

AMTA
American Membrane Technology Association
Improving America's Waters through Membrane Filtration and Desalting
WWW.AMTAORG.COM

~ 2017 ~
Membrane Facility of the Year

ACEC
American Council of Engineering Companies
100 Years of Excellence

~ 2017 ~
Grand Award for Engineering Excellence

ACWA
Association of California Water Agencies

~ 2017 ~
Claire Hill Award for Excellence

DBIA
DESIGN-BUILD INSTITUTE OF AMERICA

~ 2016 ~
Design-Build Project of the Year

SDGE
A Sempra Energy utility®

~ 2016 ~
Energy Champion

GWi
WATER IS OUR CONCERN

~ 2016 ~
International Desalination Plant of the Year

THE BOND BUYER

~ 2013 ~
Deal of the Year for the Far West Region

PEI Alternative Insight
INFRASTRUCTURE INVESTOR

~ 2012 ~
North American Infrastructure Deal of the Year

ACEC
American Council of Engineering Companies
100 Years of Excellence

~ 2019 ~
Award for Engineering Excellence

GWi
WATER IS OUR CONCERN

~ 2012 ~
Global Desalination Deal of the Year

ProjectFinance

~ 2012 ~
North American Water Deal of the Year

Bloomberg NEWS

~ 2012 ~
Largest U.S. Project Financing Deal

ATTACHMENT 2

THE CARLSBAD
Desalination Project
Enhancing Water Reliability for San Diego County

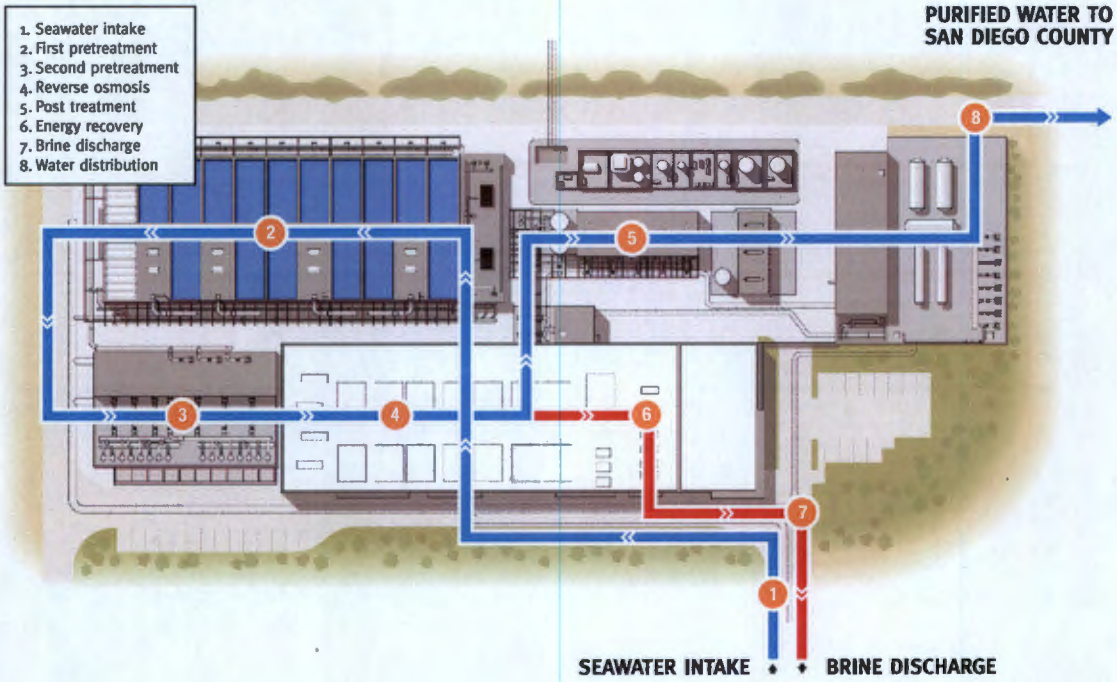
The Carlsbad Desalination Plant is capable of delivering more than 50 million gallons of fresh, desalinated drinking water per day–enough to serve approximately 400,000 people in San Diego County. Commercial operations began in late 2015, providing the region with a reliable and locally controlled water source.

Produces
50 MILLION GALLONS of water per day

→

Serving
400,000 people in San Diego County

The Desalination Plant and Process Locations



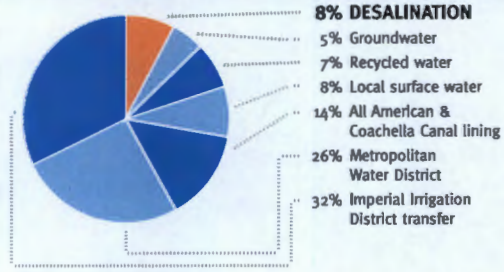
POSEIDON WATER
San Diego County Water Authority

The Plant's Role in San Diego County

This semiarid region has limited local water resources, with relatively small aquifers and no major rivers. In recent decades, San Diego County has imported more than 80 percent of its water from Northern California and the Colorado River.

The Carlsbad Desalination Project is an important component of the San Diego County Water Authority's long-term strategy to improve the region's water supply reliability by diversifying its supply sources. This strategy has allowed the region to reduce its dependence on imported water sources that are vulnerable to droughts, natural disasters and regulatory restrictions. The plant accounts for about one-third of all water generated in the county.

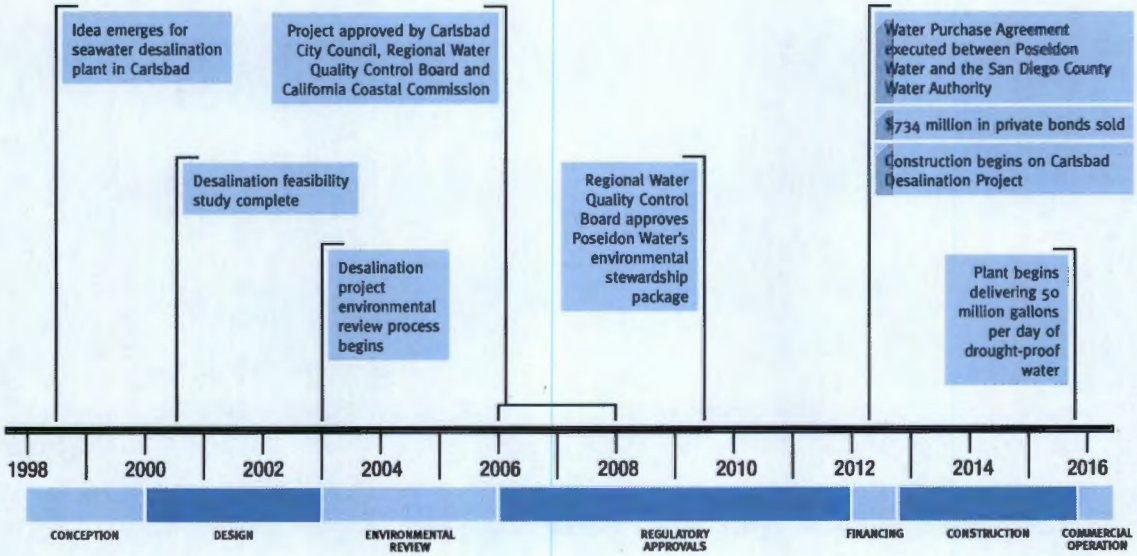
Projected San Diego County Water Sources in 2020



The Road to Desalination in Carlsbad

The idea for a seawater desalination plant in Carlsbad arose in the 1990s, and it took years of planning and review to make that vision a reality. Taking into account the needs of the local community, the region and the environment, a team of engineers and experts developed a proposal for a desalination plant adjacent to the Encina Power Station on the Agua Hedionda Lagoon and a 10-mile pipeline to transport the desalinated water to the Water Authority's Second Aqueduct in San Marcos.

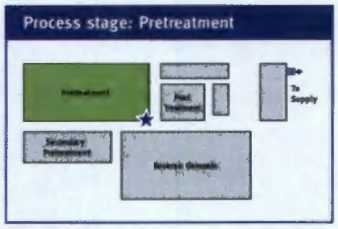
By the end of 2012, all of the necessary approvals were in place. The Water Authority and Poseidon Water entered into a 30-year Water Purchase Agreement for the entire output of the plant, and construction began. It took nearly three years and more than 1 million labor hours to complete the project and start commercial operations.

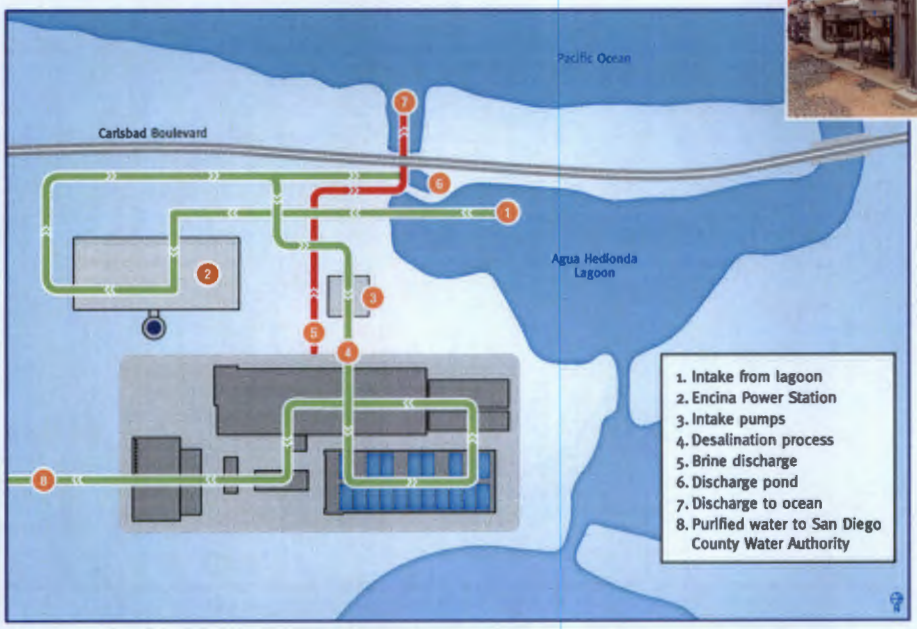


Drawing Water from the Pacific Ocean

On a typical day, the Carlsbad Desalination Plant uses 100 million gallons of seawater from the Pacific Ocean that enters through an intake on the shores of Agua Hedionda Lagoon. Seawater is drawn into the pump station and transported to the plant via the 72-inch seawater feed pipe to begin the desalination process.

Roughly half of the water flowing through the plant is converted into drinking water for the region. The remaining water, carrying all of the original salt and minerals, is returned to the ocean.



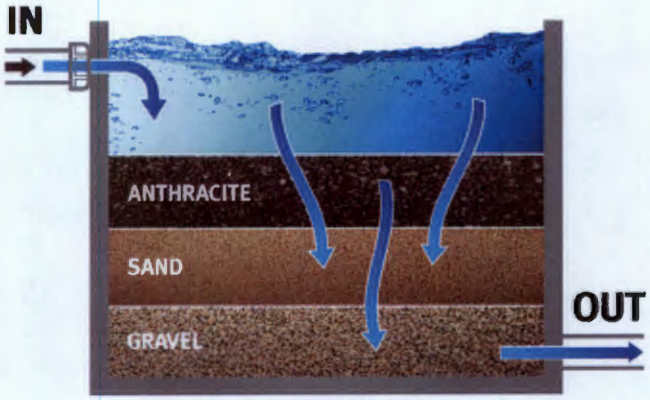


TRANSPORTS
100 MILLION GALLONS
OF SEAWATER INTO THE PLANT PER DAY

Removing Impurities

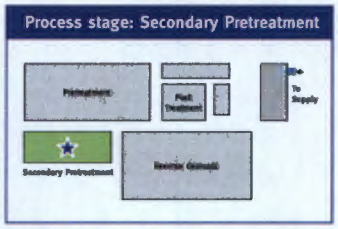
Most people think of desalination only as removing salt, but the process also removes other mineral, biological and organic impurities to produce extremely high-quality water.

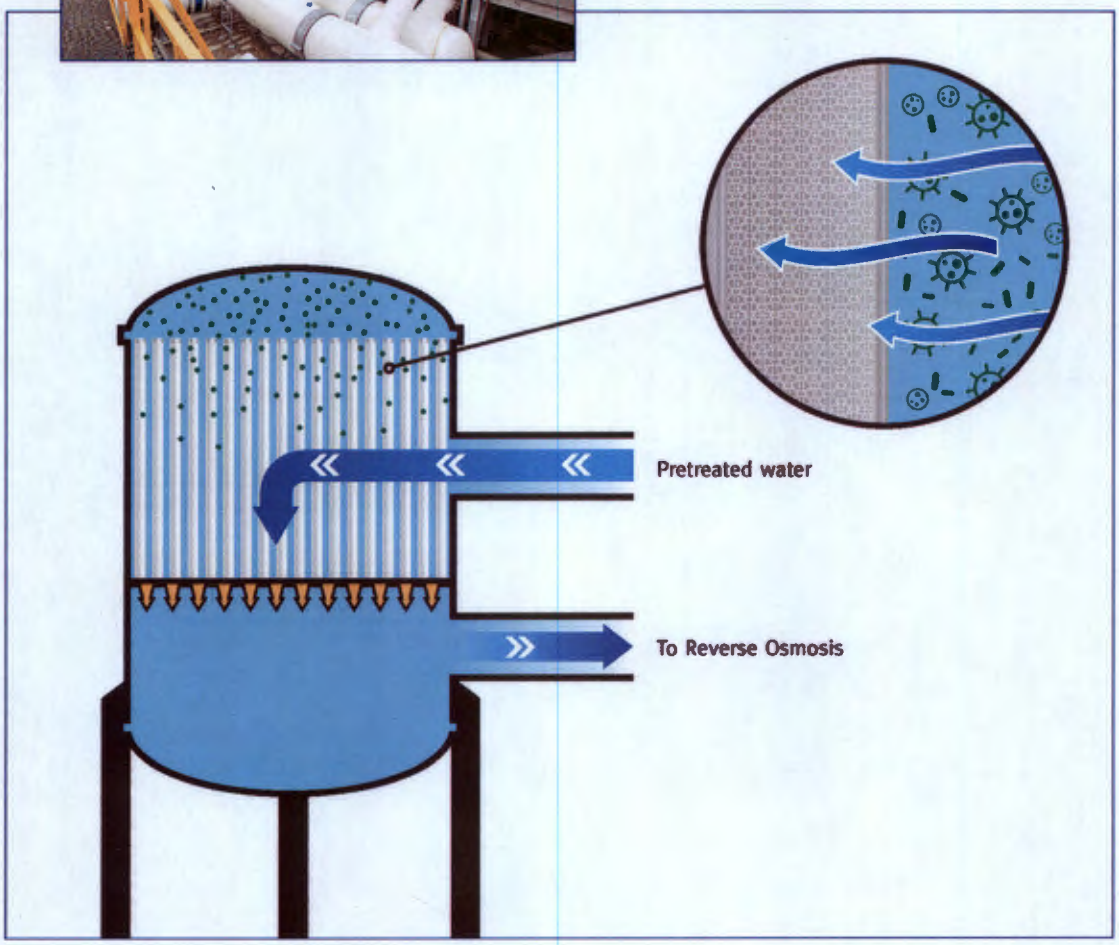
When seawater arrives at the plant, it goes through a pretreatment process to eliminate algae, organic materials and other particles. Seawater is pumped into multimedia filter tanks which contain layers of anthracite and sand atop a bed of gravel. Then, the water moves into the second pretreatment stage to remove smaller impurities.



Secondary Pretreatment

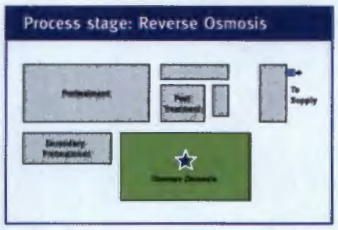
Before seawater enters the reverse osmosis filters to separate the salts, it must go through the second stage of pretreatment called microfiltration to remove smaller–oftentimes microscopic–impurities. At this point, virtually all impurities other than dissolved salts and minerals have been removed from the water, but it still needs to go through one more step to remove the dissolved salts and minerals to be ready for drinking.

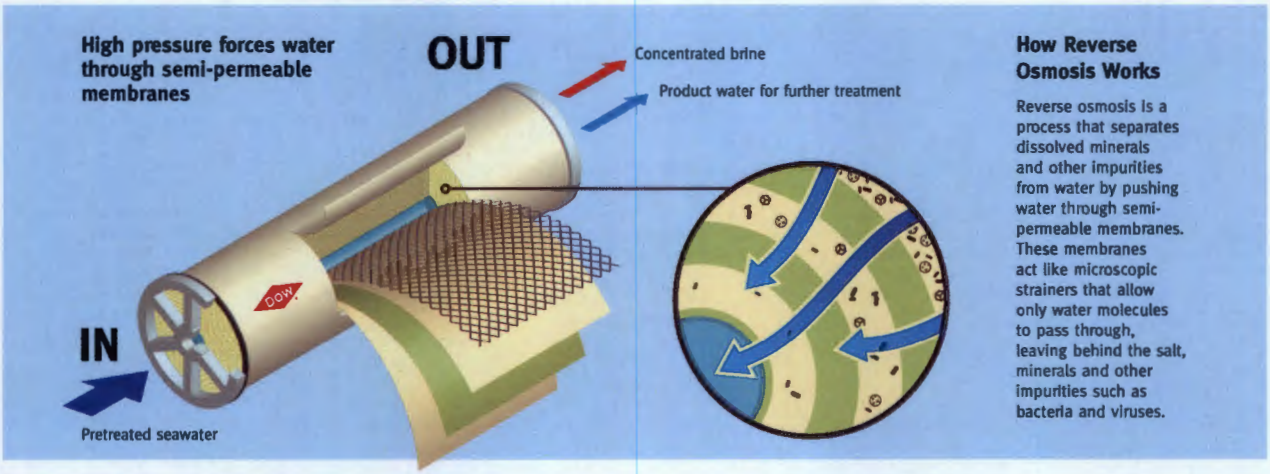




The Center of the Desalination Process

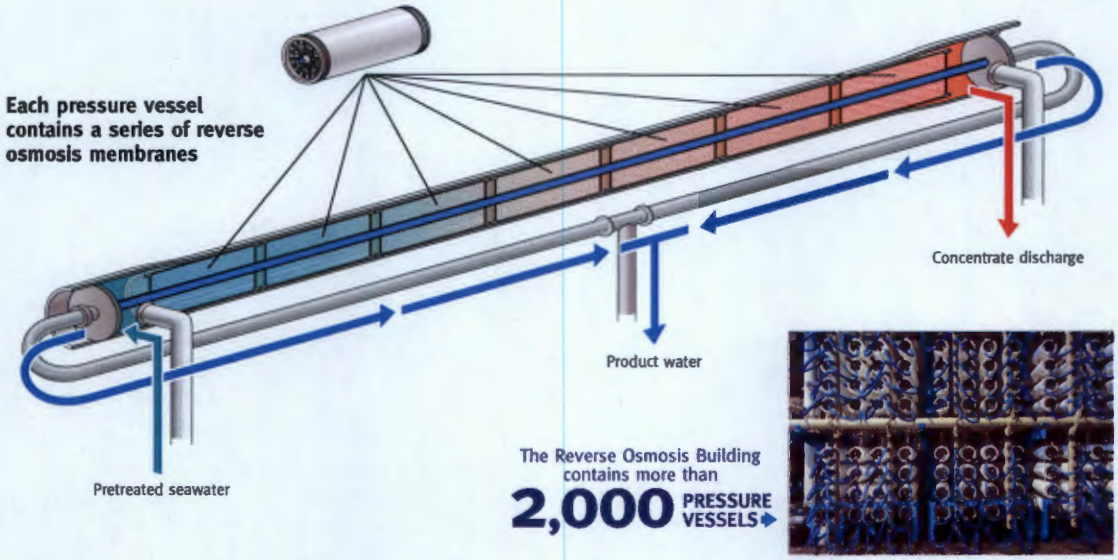
Reverse osmosis is the heart of the Carlsbad Desalination Plant. During this process, dissolved salt and other minerals are separated from the water, making it fit for consumption. This reverse osmosis building contains more than 2,000 pressure vessels housing more than 16,000 reverse osmosis membranes.





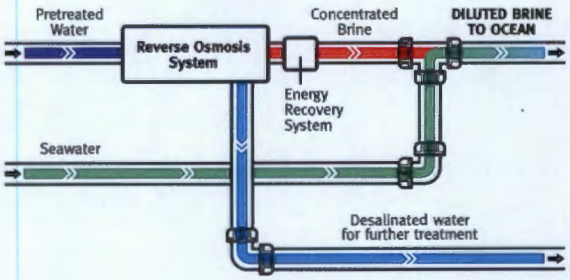
How Reverse Osmosis Works

Reverse osmosis is a process that separates dissolved minerals and other impurities from water by pushing water through semi-permeable membranes. These membranes act like microscopic strainers that allow only water molecules to pass through, leaving behind the salt, minerals and other impurities such as bacteria and viruses.



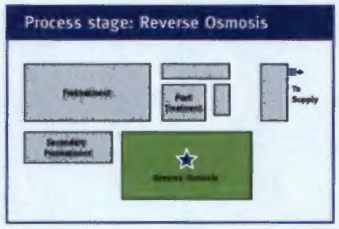
Returning Salty Water to the Sea

The byproduct of reverse osmosis–called brine–contains roughly twice as much salt as seawater. Before it's discharged to the ocean, brine from the plant is diluted with seawater to reduce its salinity and ensure minimal impacts to the ocean.



Recycling Energy to Conserve Resources

The Carlsbad Desalination Plant uses energy recovery devices that recycle the pressure from the reverse osmosis process. These devices save an estimated 146 million kilowatt-hours of energy per year, reducing carbon emissions by 42,000 metric tons annually–roughly equivalent to the annual greenhouse gas emissions from 9,000 passenger vehicles.



There are 144 energy recovery devices at work in the plant, reducing the overall energy consumption of the reverse osmosis process by 46 percent.

The energy recovery devices capture the hydraulic energy created by the high pressure reject stream of seawater produced during the reverse osmosis processes and transfer it into incoming seawater, without consuming any electrical power themselves.

144 energy recovery devices reduce reverse osmosis energy consumption at the plant by 46%

Annual savings from Energy Recovery devices:

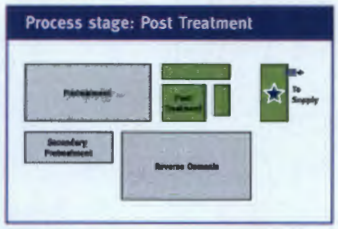
42,000 METRIC TONS OF CO_2

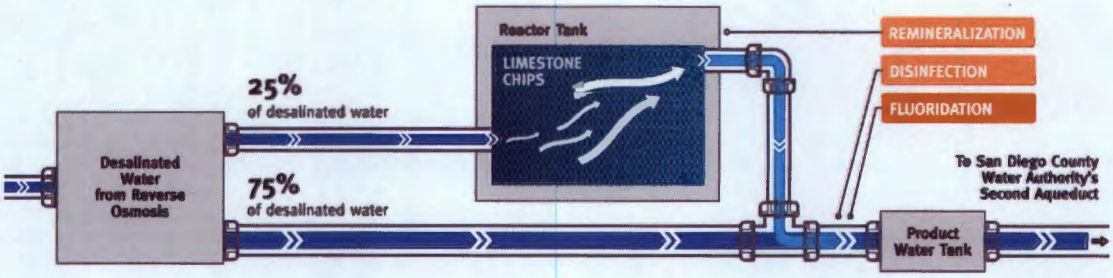
Equivalent to

EMISSIONS FROM 9,000 PASSENGER VEHICLES

Finishing the Process

After reverse osmosis filtration, the fresh water is nearly ready for consumption. But before making its way into your faucet, the water must undergo "post treatment." This includes adding some minerals back into the water and disinfection with chlorine.





From the Carlsbad Desalination Plant to You

Now the water begins its journey from the plant to taps all across San Diego County. That process starts by pumping water through a 10-mile, 54-inch pipeline to the east through Carlsbad, Vista and San Marcos to the San Diego County Water Authority's Second Aqueduct. Then, the water moves north to the Water Authority's Twin Oaks Valley Water Treatment Plant, where it's blended with imported water supplies and routed into large-diameter pipes for delivery throughout the region.

Benefits for the San Diego Region

The Carlsbad Desalination Project improves our regional quality of life by protecting and preserving the coastal environment. It ensures the continued stewardship of the 300-acre Agua Hedionda Lagoon adjacent to the plant, along with its recreational and marine resources. In addition, Poseidon Water is restoring 66 acres of coastal wetlands in San Diego Bay. To top it off, the Carlsbad Desalination Project is the first major infrastructure project in California that has adopted a comprehensive strategy to eliminate its carbon footprint. That means we can have a highly reliable, drought-proof water source in an environmentally responsible way.

The Carlsbad Desalination Plant provides San Diego County with an independently-controlled, drought proof supply of drinking water. This has effectively improved regional water supply reliability by reducing reliance on imported water sources dependent on rain and snowpack. While there is no single method to combat San Diego County's water supply challenges, the plant is a critical resource for meeting the region's current and future needs. By restoring local control to the region's water supply, the Carlsbad Desalination Plant stands as a pillar of its water reliability future, which will be quenching the thirst of San Diego County for generations to come.

4. The calendar-monthly average of daily effluent discharge flow rates from the Discharger's Facilities to the Pacific Ocean shall not exceed the flow rates established in Table 7, *Monthly Average Flow Limitation Based on Pretreatment Technology.*

Table 7. Monthly Average Flow Limitation Based on Pretreatment Technology

Pretreatment Technology[1]	Maximum Monthly Average Flow Rate[2]
Granular Media Filtration	54 MGD
Membrane Filtration	57 MGD

1 The effluent flow shall be limited to the flow rates indicated in this tables based on the pretreatment technology option selected by the Discharger and reported to the Regional Water Board as specified in Section VI.C.2.a of this permit.

2 Pretreatment process flows or reverse osmosis product flows may be temporarily discharged back into the Pacific Ocean during initial plant start-up, during or after plant maintenance, or periods when it is otherwise not possible to deliver demineralized product water to the regional water system. During such temporary periods, maximum allowable flows returned to the ocean shall not exceed 120.6 MGD for the granular media filtration option or 129 MGD for the membrane filtration pretreatment option. Temporarily returning pretreatment process flows or reverse osmosis flows to the ocean during such periods does not constitute a "bypass" as defined by Section G of Appendix D of this permit.

B. Effluent Limitations and Performance Goals

The discharge of effluent from Discharge Point No. 001 shall be measured at Monitoring Location M-001 as described in the Attachment E, Monitoring and Reporting Program. The effluent limitations below are enforceable to the number of significant digits given in the effluent limitation.

1. The discharge of effluent from CDP to Discharge Point No. 001, as monitored at Monitoring Location M-001, shall maintain compliance with the following effluent limitations:

Table 8. Effluent Limitations

Constituent	Units	Effluent Limitations					
		Max Daily	Average Monthly	Average Weekly	Instantaneous Min	Instantaneous Max	6 Month Median
Total Suspended Solids	mg/L		60				
pH	Standard units				6.0	9.0	
Oil and Grease	mg/L		25	40		75	
Settleable Solids	ml/L		1.0	1.5		3.0	
Turbidity	NTU		75	100		225	
Chronic Toxicity[1]	TU_c	16.5					

[1] Chronic toxicity expressed as Chronic Toxicity Units (TU_c) = 100 / NOEL, where NOEL (No Observed Effect Level) is expressed as the maximum percent effluent or receiving water that causes no observable effect on a test organism, as determined by the result of critical life stage toxicity tests identified in Section VI of Monitoring and Reporting Program No. R9-2006-0065.

2. The discharge of CDP effluent shall not cause the combined CDP and EPS effluent to exceed the following salinity concentrations, as measured at Monitoring Location M-002:

POSEIDON CHANNELSIDE
a Poseidon Water company

March 1, 2018

Ben Neill
Water Resources Control Engineer
Core Regulatory Unit
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92123

SUBJECT: Order R9-2006-0065 Discharge Monitoring Report – 2017 Annual

PROJECT: Carlsbad Desalination Plant (CDP), 4590 Carlsbad Blvd., Carlsbad, CA 92008

Dear Mr. Neill,

Poseidon Resources (Channelside), LP (Discharger) is submitting its monthly discharge monitoring report in compliance with the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit Number CA0109223, Order Number R9-2006-0065. For reference, a summary of the order for the site is presented below:

NPDES Permit	Order No.	Adopted	Order Effective Date
CA0109223	R9-2006-0065	June 14, 2006	October 1, 2006

During the 2017 NPDES reporting period, discharges occurred in accordance with NPDES Permit Number CA0109223. As required in Attachment E of the Order, samples were taken throughout the year.

In January of 2017, the CDP was offline from January 23rd to January 26th in support of scheduled NRG shutdown and tunnel cleaning. Two compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. The Discharger submitted one violation for chronic toxicity result from January 2017 reporting period.

In February of 2017, the CDP was offline from February 16th to February 27th in support of scheduled SDCWA maintenance activities. CDP was offline again from February 28th to March 1st due to intake water quality. Three compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. The Discharger submitted one violation for chronic toxicity result during the February 2017 reporting period.

In March of 2017, the CDP resumed normal operations after the February 28th shutdown. CDP was offline again from March 26th to March 30th for scheduled monthly product water tank inspection. Six chronic toxicity samples were analyzed during the March reporting period with results consistently below the permit limit. The Discharger self-reported two deficient monitoring violations for not conducting daily monitoring during a temporary maintenance/bypass period as required under Attachment E, Footnote 15 of the Order during the March 2017 reporting period.

Poseidon Channelside
5780 Fleet St., Suite 140 Carlsbad, California 92008 Phone: (760) 655-3900 Fax: (760) 655-3901
www.poseidonwater.com

In April of 2017, the CDP was offline from April 2nd to April 3rd in support of scheduled NRG shutdown and tunnel cleaning. CDP was offline again from April 11th to April 27th due to an algal bloom and intake water quality. Eleven chronic toxicity samples were analyzed during the April reporting period with results consistently below the permit limit. The Discharger self-reported six deficient monitoring for weekly analysis not conducted as required under Attachment E, Table 3 and Table 5 of the Order during the April 2017 reporting period. Deficient Monitoring violations occurred during the plant bypass/maintenance period. Daily grab sample analysis at monitoring location M-001 indicated that CDP effluent discharge remained within compliance during this operational period.

In May of 2017, the CDP was offline on May 3rd from 3:00am to 8:00am due to an erroneous command entered into the SCADA system. CDP was offline again on May 30th from 1:00pm to 9:00pm for SWRO maintenance activities. Five compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. The Discharger submitted three violations for chronic toxicity results during the May 2017 reporting period. The Discharger self-reported one deficient monitoring violation for not conducting daily monitoring during a temporary maintenance/bypass period as required under Attachment E, Footnote 15 of the Order during the May 2017 reporting period.

In June of 2017, the CDP was offline on June 22nd from 10:42am to 8:04pm due to a SCADA interlock between a tripped pressure switch and ammonia dosing skid. CDP was offline again on June 26th from 5:36am to 8:40pm to repair a manifold leak in the cascade and address high cluster UCL's on RO Trains 2 and 8. Six compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. Due to the results of the accelerated chronic toxicity analyses in May and June, CDP initiated TRE/TIE screening on June 29th in an effort to further identify and mitigate the source(s) contributing to the toxicity. The Discharger submitted four violations for chronic toxicity results during the June 2017 reporting period. The Discharger self-reported two deficient monitoring violations for not conducting chronic toxicity analysis during the June 2017 reporting period.

In July of 2017, the CDP was offline from July 25th to July 26th due to a VFD failure on P-900-002. Special water quality sample analysis of product water overflow were collected during this event and were upload to CIWQS as attachments for the July 2017 reporting period. Six compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. The Discharger submitted three violations for chronic toxicity results during the July 2017 reporting period.

In August of 2017, the CDP was offline from August 4th to August 10th due to an ammonia feed loss at the product water pumps and reverse flow from the SDCWA pipeline to increase chlorine residual within the pipeline. On August 17th CDP initiated a complete plant shutdown due to a manifold failure on SWRO Train 5; CDP restarted pretreatment on August 18th to operate the facility in a bypass/maintenance mode. CDP maintained this operational mode throughout the duration of August while repairs were being conducted. Twenty-two compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. The Discharger submitted three violations for chronic toxicity results during the August 2017 reporting period.

In August of 2017, CDP initiated biannual 3 species chronic toxicity screening. There were no adverse effects observed at the 6.06 percent concentration (IWC) for any of the species tested. Therefore, all test results passed and were within permit compliance. Although there were no adverse effects observed in any of the tests at the IWC, the abalone was the only species to be adversely affected at the highest test concentration and was clearly the most sensitive during this round of testing. Analysis for the 3 species screening have been uploaded to CIWQS as attachments for the 2017 Annual reporting period.

In September of 2017, CDP resumed normal operations after the August 17th shutdown on September 20th. Twenty-two compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. **The Discharger submitted eight violations for chronic toxicity results during the September 2017 reporting period**

In October of 2017, the CDP maintained operations and delivery to SDCWA. Five compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. **The Discharger submitted four violations for chronic toxicity results during the October 2017 reporting period. The Discharger self-reported one incomplete report violation for not completing daily water quality analysis** as required under Attachment E, Footnote 15 of the Order during the October 2017 reporting period while running a RO train off-spec for Bacti analysis during normal operations with 12 RO trains delivering water to the San Diego County Water Authority.

In October of 2017, CDP conducted the second series of analysis for the 3 species chronic toxicity screening. There were no adverse effects observed at the 6.06 percent concentration (IWC) for any of the species tested. Although there were no adverse effects observed in any of the tests at the IWC, the abalone was the only species to be adversely affected at the highest test concentration and was clearly the most sensitive during this round of testing. Analysis for the 3 species screening have been uploaded to CIWQS as attachments for the 2017 Annual reporting period.

In November of 2017, the CDP shutdown operations on November 4th for a coordinated maintenance shutdown with the SDCWA. CDP restarted pretreatment on November 9th th to operate the facility in a bypass/maintenance mode. CDP maintained this operational mode until delivery was resumed to SDCWA on November 17th. Ten compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments. **The Discharger submitted five violations for chronic toxicity results during the November2017 reporting period. The Discharger self-reported one incomplete report violation for not completing daily water quality analysis** as required under Attachment E, Footnote 15 of the Order during the November 2017 reporting period while running a RO train off-spec during normal operations with 12 RO trains delivering water to the San Diego County Water Authority.

In December of 2017, the CDP was offline from December 4th to December 6th to a scheduled NRG shutdown and tunnel cleaning. On December 15, 2017 CDP conducted spike studies for coagulant AC-125 and polymer AEF-330 as part of the TIE/TRE evaluation. Both the coagulant and polymer showed no toxic effect at the concentrations expected in the plant discharge at M-001. Final reports for the spike studies were uploaded to CIWQS as attachments for the CY17 H2 reporting period. Nine compliance chronic toxicity samples were collected and uploaded to CIWQS as attachments.

The Discharger submitted four violations for chronic toxicity results during the December 2017 reporting period.

In December of 2017, CDP conducted the third and final series of analysis for the 3 species chronic toxicity screening. There were no adverse effects observed at the 6.06 percent concentration (IWC) for any of the species tested. Although there were no adverse effects observed in any of the tests at the IWC, the abalone was the only species to be adversely affected at the highest test concentration and was clearly the most sensitive during this round of testing. Analysis for the 3 species screening have been uploaded to CIWQS as attachments for the 2017 Annual reporting period.

The chronic toxicity results are an artifact of the conservative toxicity testing procedure set forth in the NPDES permit for the CDP, and did not result in harm to the environment. Under existing regulations, the CDP is required to meet the toxicity standard after initial mixing occurs. Initial mixing includes the mixing of the CDP's brine discharge with the discharge from the Encina Power Plant (four gallons of seawater exiting the power plant is mixed with every gallon of brine leaving the CDP); and then the combined CDP/power plant discharge receives additional mixing in the ocean prior to reaching the compliance point under the permit that is located 1,000 feet offshore (15 gallons of seawater mixes with every gallon of combined CDP/power plant discharge prior to reaching the compliance point).

Under the terms of the permit, the CDP is required to test for toxicity at higher discharge concentrations than is actually occurring at the compliance point. This is because the conservative testing regime set forth in the permit fails to take into consideration the initial dilution provided by the power plant.

The Discharger has been conducting two sets of toxicity tests since this problem was first identified in December 2015. For the period beginning December 9, 2015 through December 27, 2017 69 out of 173 monthly, weekly, and daily chronic toxicity samples tested demonstrated some level of toxicity; whereas 56 out of 58 of the samples tested with the full initial dilution provided by the power plant and in the ocean have been below the 3 toxicity limit in the permit. These results effectively demonstrate that the exceedance of the toxicity limit is a result of the failure to account for the dilution provided by the power plant discharge in toxicity monitoring procedure included in the permit, and not an indication of the plant causing toxic conditions in the Pacific Ocean.

In accordance with the Order, further steps are being taken to identify and minimize source(s) of toxicity. Accelerated toxicity monitoring was initiated immediately after the first test demonstrating a toxicity issue and a Toxicity Investigation Evaluation (TIE) is being conducted in conformance with a Regional Water Board approved Toxicity Reduction Evaluation (TRE) Plan. The TIE includes investigative toxicity testing to identify the source of the toxicity.

The Discharger has been in close communication with the Regional Water Board on the CDP toxicity monitoring and the TIE. Additional sampling and testing will continue in an effort to identify and minimize the source(s) of toxicity.

I Certify under penalty of law that his document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel

properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Peter MacLaggan

San Diego County Water Authority

August 23, 2017

Attention: Water Planning Committee

Report on Claude "Bud" Lewis Carlsbad Desalination Plant Operations for Fiscal Year 2017 (Presentation)

Purpose
To provide a summary of Contract Year 2016/2017 operational performance for the Claude "Bud" Lewis Carlsbad Desalination Plant.

Background
The Claude "Bud" Lewis Carlsbad Desalination Plant (CDP) started commercial operations on December 23, 2015. The project is a result of a long-term Water Purchase Agreement (WPA) executed between the Water Authority and Poseidon that was approved by the Water Authority Board on November 29, 2012. Under the WPA, the Water Authority agreed to purchase the entire output of the CDP – a minimum of 48,000 acre-feet and up to 56,000 acre-feet of product water annually. The Water Authority's water purchase payments compensate Poseidon for the fixed and variable costs of the CDP including debt and equity payments, as well as fixed and variable plant costs for electricity and operations and maintenance. All fixed costs are paid for through the purchase of the initial 48,000 acre-feet. Annual product water deliveries beyond 48,000 acre-feet up to 56,000 acre-feet are purchased at a price that includes just the variable costs of production.

The period from December 23, 2015 to June 30, 2016 was a partial contract year for CDP operations. During that period, 21,886 acre-feet of desalinated product water was delivered by Poseidon to the Water Authority. Contract year 2016/2017 (from July 1, 2016 to June 30, 2017) was the first full contract year for plant operations. Going forward, staff intends to report out on CDP performance following the conclusion of each full contract year.

Discussion
For purposes of this report, CDP performance is evaluated in the following categories: 1) water delivery; 2) water quality; 3) regulatory compliance; and 4) cost. Each of these categories are discussed below.

Water Delivery
Prior to the end of each contract year, and as required per the terms of the WPA, Poseidon and the Water Authority agree to monthly supply and demand commitments for the upcoming contract year. These commitments represent the monthly supply availability guaranteed by Poseidon totaling 56,000 acre-feet for the year and the minimum monthly delivery guaranteed by the Water Authority totaling 48,000 acre-feet per year.

The Water Authority met each month's minimum demand commitment, avoiding any "take-or-pay" penalty provisions of the WPA, and overall exceeded the minimum annual demand

commitment by 1,615 acre-feet. Since Poseidon was unable to meet the Water Authority's demand orders, Poseidon will be making an annual supply commitment true-up payment to the Water Authority for not meeting this supply obligation.

If Poseidon were able to deliver the full amount of water requested by the Water Authority, the requested deliveries over 48,000 acre-feet and up to 56,000 acre-feet, would have been purchased at just the variable cost of production (approximately $800/AF).

Poseidon was unable to deliver 9,196 acre-feet (49,615 AF – 40,419 AF) of requested water. The WPA accounts for this undelivered supply under different defined categories.

- Excused Supply Shortfall (estimated 1,605 acre-feet for contract year 2016/2017): For undelivered water classified as Excused Supply Shortfall, Poseidon has the opportunity to supply this amount of water in the future, under certain conditions. However, the Water Authority does not pay for the water until the water is actually delivered.
- Unexcused Supply Shortfall (estimated 5,961 acre-feet for contract year 2016/2017): For undelivered water classified as Unexcused Supply Shortfall, the Water Authority does not pay for this water and Poseidon has no opportunity to supply this water in the future. Unexcused supply shortfalls occurred during the months of January (68 AF), February (41 AF), March, (162 AF), April (3,364 AF), May (767 AF) and June (1,559 AF), 2017.
- Unscheduled Outage Units (1,630 acre-feet for contract year 2016/2017): For certain documented, unplanned outages at the plant, up to 1,630 acre-feet can be designated by Poseidon as Unscheduled Outage Units. Under the terms of the WPA, the Water Authority pays the fixed costs on this water.

During the initial operating years for large water treatment facilities such as the CDP, facility outages are not unusual as operators are fine-tuning control systems and adjusting to actual and changing source water conditions. In the case of CDP operations for contract year 2016/2017, the primary cause of the supply shortfalls, indicated above, was associated with operation of the reverse osmosis membrane system.

Beginning in late March 2017, Poseidon and its plant operator (IDE) began reporting high levels of chlorophyll and phytoplankton in the plant's feedwater from Aqua Hedionda Lagoon, that resulted in high turbidity in the pretreatment system filter effluent. Although the plant is designed to handle chlorophyll and phytoplankton (i.e., algae) in the feedwater, the level seen this past spring was an extreme, though not excused, event that led to a precautionary plant shutdown in April. It is also likely that the high filter effluent turbidity levels, along with the "learning curve" associated with optimizing the use of the plant's membrane cleaning system, contributed to premature fouling of the reverse osmosis membranes that resulted in reduced CDP production beginning in April and continuing through the end of the contract year. Other issues stemming from membrane fouling include rolled O-rings in the membrane pressure vessels and increased differential pressures. These conditions require the whole reverse osmosis skid (there

are 14 total skids in the plant) to be temporarily removed from service lowering the production capacity of the CDP.

In coordination with IDE, Poseidon is aggressively addressing the challenges and has taken the following measures to minimize operational impacts caused by these issues:

- Purchase and installation of new membranes to replace fouled membranes
- Off-site membrane cleaning to supplement the plant's Clean-In-Place system
- Review of membrane Clean-In-Place procedures and frequency
- Operation at lower recovery levels (temporary condition)
- Installation of real-time monitoring of algae in the lagoon and offshore
- Development of a proactive operational protocol for treating seawater with elevated algae content
- Installation of chlorination capacity at the intake to breakdown biological material coming into the intake and install monitors, aeration equipment, and improved coagulant and polymer feed capabilities ahead of the pretreatment filters to enhance biological removal of organic material in the pretreatment filters

Many of these corrective actions have already produced positive results and Poseidon anticipates the plant to be back at full capacity by next month. Because the WPA transfers operational risk to Poseidon, Poseidon has not requested, nor is it entitled to performance relief for these issues. Additionally, costs associated with correcting the membrane fouling issue are not the responsibility of the Water Authority.

Water Quality

The WPA sets parameters for raw seawater that the CDP is required to process and product water quality guarantees that must be met. Poseidon is afforded performance relief during events that cause raw seawater characteristics to be outside of the contractual limits, and is subject to financial penalties if product water quality falls outside its contractual limits. Product water and raw seawater quality for Contract Year 2016/2017 is summarized below.

Product Water Quality

Delivered product water quality met contractual water quality requirements, including federal and state drinking water standards for the contract year. On five occasions, IDE took corrective steps to address brief exceedances of pH concentration limits that were outside of the contractual water quality requirements. In these instances, IDE discharged the off-specification product water prior to delivery to the Water Authority until the contract requirements could be met. At no time was Water Authority system water quality impacted. IDE also worked with the Water Authority to develop a communications protocol to properly and timely notify the Water Authority and regulatory agencies of potential water quality issues.

Raw Seawater Quality

Raw seawater characteristics feeding the CDP were within contractual limits for the contract year except for short periods of time where either temperature or turbidity was outside of contractual parameters of 84.2 degrees F and 24 NTU, respectively. These issues led to temporary reductions to plant capacity.

Regulatory Compliance

The primary permits that regulate product water quality and plant discharges include the National Pollutant Discharge Elimination System (NPDES) issued by the San Diego Water Board, the Wastewater Discharge Permit issued by the Encina Wastewater Authority, and the Domestic Water Supply Permit issued by the Division of Drinking Water. Regulatory compliance is the responsibility of Poseidon along with any enforcement action associated with permit violations. The Water Authority receives copies of all compliance correspondence and may coordinate with Poseidon on issue resolution, as necessary.

Over the last year of operation, Poseidon received four notices requesting corrective action associated with permit compliance. These notices are summarized below:

- Sewer Discharge pH Exceedance (Encina Wastewater Authority) – Test results of a single sample was 0.3 mg/L above the allowable permit concentration of 12.0 mg/L
- Procedural issue (Encina Wastewater Authority) – Compliance sample was not taken within the required sampling period; late one day
- Administrative issue (Encina Wastewater Authority) – Meter calibration and training logs were not maintained properly
- Operational Corrective Action (Division of Drinking Water) – A high turbidity event at the Intake Pump Station was not responded to in accordance with the approved Operations Plan

Poseidon/IDE took corrective steps that were appropriate to resolve each action request and no outstanding issues remain open from the list above.

Poseidon has also self-reported on another ongoing permit condition related to chronic toxicity test results. Poseidon reported to the Water Authority that non-compliant results began in the previous contract year, and are an artifact of the conservative toxicity testing procedure set forth in the NPDES permit for the CDP and do not result in harm to the environment. Under the terms of the permit, the CDP is required to test for toxicity at higher discharge concentrations than are actually occurring at the compliance point. This is because the conservative testing regime set forth in the permit fails to take into consideration the initial dilution provided by the power plant. If the full initial dilution that is actually occurring is considered, provided in the ocean and by the power plant, 43 out of 44 of the samples tested from December 2015 to June 2017 have been below the toxicity limit in the permit. These results effectively demonstrate that the exceedance of the toxicity limit is a result of the failure in the permit's toxicity monitoring procedures to account for the dilution provided by the power plant discharge, and is not an

indication of the plant causing toxic conditions in the Pacific Ocean. Poseidon is working with the San Diego Water Board on a renewal of the NPDES permit that is expected to include a revised methodology for calculating toxicity compliance that will take into consideration the full dilution of the CDP discharge.

Poseidon is also working with the State Division of Drinking Water (DDW) to develop a modified approach to addressing minor salinity fluctuations within the reverse osmosis process. DDW used a conservative approach to establish salinity fluctuation limits in order to detect a potential breach in membrane integrity. However, the established limits also capture expected slight increases in salt passage due to temperature variation. The goal is to develop set limits that will protect public health while avoiding unnecessary shutdown of the reverse osmosis trains.

Cost

Payment to Poseidon for Contract Year 2016/2017 was approximately $91,053,000. Taking into account the payments from Poseidon to the Water Authority for not meeting its supply obligations (estimated at $3,585,000), the average unit cost for the year including conveyance pipeline costs was $2,412 per acre-foot. This cost is higher than the $2,368 per acre-foot projected unit cost for contract year 2016/2017 due to San Diego Gas & Electric Company electricity tariff increases beyond what was originally anticipated. Table 3 summarizes the cost components.

Table 3. Costs for Contract Year 2016/2017

	Contract Year 2016/2017
Total Water Purchase Cost*	$91,053,343
Desal Conveyance Pipeline Cost	$10,064,460
SUBTOTAL	***$101,117,803***
Poseidon Penalties	($3,584,478)
TOTAL	**$97,533,325**

* Includes debt service, equity return, fixed electricity and operating, variable electricity and operating, and unscheduled outage allowance charges

Although the CDP experienced numerous operational challenges last year, the Water Authority was protected by terms of the WPA from any financial burden linked to those challenges as outlined above. Staff is currently working with Poseidon on its annual reconciliation of the monthly invoices and will finalize all payments for Contract Year 2016/2017 by September 2017. The projected unit cost for contract year 2017/2018 is estimated at $2,439 per acre-foot.

Prepared by: Jeremy Crutchfield, Principal Engineer
Reviewed by: Robert R. Yamada, Director of Water Resources
Approved by: Sandra L. Kerl, Deputy General Manager

Our Region's Trusted Water Leader
San Diego County Water Authority

August 15, 2018

Attention: Water Planning Committee

Report on Claude "Bud" Lewis Carlsbad Desalination Plant Operations for Fiscal Year 2018 (Presentation)

Purpose
To provide a summary of Contract Year 2017/2018 operational performance for the Claude "Bud" Lewis Carlsbad Desalination Plant.

Executive Summary

- At the end of each contract year (July 1st through June 30th), staff provides an annual update to the Board regarding operational performance for the Claude "Bud" Lewis Carlsbad Desalination Plant.
- Poseidon delivered 40,892 acre-feet as compared to 40,419 acre-feet the previous contract year.
- The actual unit cost of Carlsbad Desalination Plant product water in Contract Year 2017/2018 was $2,511 per acre-foot (including conveyance pipeline debt service).

Background
The Claude "Bud" Lewis Carlsbad Desalination Plant (CDP) started commercial operations on December 23, 2015. The project is the result of a long-term Water Purchase Agreement (WPA) executed between the Water Authority and Poseidon that was approved by the Water Authority Board on November 29, 2012. Under the WPA, the Water Authority agreed to purchase the entire output of the CDP – a minimum of 48,000 acre-feet and up to 56,000 acre-feet of product water annually. The Water Authority's water purchase payments compensate Poseidon for the fixed and variable costs of the CDP including debt and equity payments, as well as fixed and variable plant costs for electricity and operations and maintenance. All fixed costs are paid for through the purchase of the initial 48,000 acre-feet. Annual product water deliveries beyond 48,000 acre-feet up to 56,000 acre-feet are purchased at a price that includes just the variable costs of production.

Contract Year 2016/2017 (from July 1, 2016 to June 30, 2017) was the first full contract year for plant operations. During that period, 40,419 acre-feet of desalinated product water was delivered by Poseidon to the Water Authority, meeting all contractual water quality requirements, including federal and state drinking water standards. Staff intends to report out on CDP performance following the conclusion of each full contract year.

Discussion
For purposes of this report, CDP performance is evaluated in the following categories: 1) water delivery; 2) water quality; 3) regulatory compliance; and 4) cost. Each of these categories are discussed below.

Water Delivery
Prior to the end of each contract year, and as required per the terms of the WPA, Poseidon and the Water Authority agree to monthly supply and demand commitments for the upcoming contract year. These commitments represent the maximum monthly supply availability guaranteed by Poseidon totaling 56,000 acre-feet for the year and the minimum monthly water order guaranteed by the Water Authority totaling 48,000 acre-feet per year. The Water Authority met each month's minimum demand commitment ordering a total of 51,772 acre-feet, avoiding any "take-or-pay" penalty provisions of the WPA.

Poseidon delivered 40,892 acre-feet to the Water Authority, inclusive of Vallecitos Water District and Carlsbad Municipal Water District contract deliveries. If Poseidon were able to deliver the full amount of water requested by the Water Authority, the requested deliveries over 48,000 acre-feet would have been purchased at just the variable cost of production (approximately $810/AF). Since Poseidon was unable to meet the Water Authority's demand orders, Poseidon is responsible for an annual supply commitment true-up payment to the Water Authority for not meeting this supply obligation.

Poseidon was unable to deliver 10,880 acre-feet (51,772 AF – 40,892 AF) of requested water. The WPA accounts for this undelivered supply under different defined categories.

- Excused Supply Shortfall (estimated 7,094 acre-feet for Contract Year 2017/2018 due to SDG&E power curtailments and an insurable event related to a mechanical equipment failure): For undelivered water classified as Excused Supply Shortfall, Poseidon can supply this amount of water in the future, under certain conditions governed by the WPA. However, the Water Authority does not pay for the water until the water is actually delivered.
- Unexcused Supply Shortfall (estimated 2,156 acre-feet for Contract Year 2017/2018): For undelivered water classified as Unexcused Supply Shortfall, the Water Authority does not pay for this water and Poseidon has no opportunity to supply this water in the future. Unexcused supply shortfalls occurred during the months of August (874 AF), November (89 AF), April (363 AF), May (383 AF), and June (447 AF).
- Unscheduled Outage Units (1,630 acre-feet for Contract Year 2017/2018): For certain documented, unplanned outages at the plant, up to 1,630 acre-feet can be designated by Poseidon as Unscheduled Outage Units. Under the terms of the WPA, the Water Authority pays the fixed costs on this water.

In the case of CDP operations for Contract Year 2017/2018, the primary cause of the supply shortfalls indicated above was a mechanical failure on the plant's reverse osmosis high-pressure feed piping. The mechanical failure occurred on August 17, 2017 on the high-pressure feed piping associated with Train 5 of the reverse osmosis system. (The reverse osmosis system

contains 14 separate trains that can be isolated from one another.) The event resulted in an immediate plant shutdown and the entire plant remained offline until September 20, 2018; 34 days after the initial failure. After a full inspection of the reverse osmosis system and implementation of corrective actions to prevent future failures, the 13 reverse osmosis trains unimpacted by the mechanical failure were brought back on line. The plant can operate at full capacity with 13 reverse osmosis trains, but the loss of redundancy with Train 5 out of service has caused periodic minor reductions in overall plant output capacity through the course of normal maintenance operations of the reverse osmosis system. Poseidon and their operator (IDE) are actively working on repairs to Train 5 and anticipate it to be back online in November of this year.

Other causes of supply shortfall were associated with fluctuations in feed water quality, warranty inspections and repairs, regulatory permit operating constraints[1], and SDG&E power outages. During the initial operating years for large, complex water treatment facilities such as the CDP, facility outages such as these are not unusual as operators are fine-tuning control systems and adjusting to actual and changing source water conditions. In coordination with IDE, Poseidon is aggressively addressing these challenges that are within their control and have taken the following measures to minimize the associated operational impacts:

- Installed additional monitoring and treatment equipment and modified operating protocols improve plant performance during challenging source water conditions
- Purchased and installed new membranes to replace fouled membranes
- Optimized membrane Clean-In-Place procedures and frequency; and established an off-site membrane cleaning option
- Improved monitoring and supply of replacement cartridge filters for the second stage of pretreatment
- Coordinated with State Division of Drinking Water (DDW) to revise alarm protocol and corrective operational strategies to eliminate shutdowns due to permit-driven alarms not associated with water quality
- Increased lines of communication with SDG&E to anticipate potential system outages and expedite return to service
- Engaged a consultant to make the asset management system more robust to improve on the preventive and predictive maintenance
- Working with the RWB to increase maximum monthly ocean discharge flow limit that is artificially constraining plant production

Many of these corrective actions have already produced positive results and are expected to improve the overall resiliency of plant operations and reduce potential shortfalls going forward. Because the WPA transfers operational risk to Poseidon, Poseidon has not requested, nor is it

[1] The Regional Water Board (RWB) permit includes a monthly maximum ocean discharge flow limit that can, under certain conditions, artificially constrain the amount of water that can be produced and delivered to the Water Authority each month. Poseidon is working with the RWB on revisions to the discharge permit, including an increase in the monthly maximum discharge flow limit that would eliminate this operational constraint. The RWB is expected to consider adoption of a revised permit in the first quarter of 2019.

entitled to performance relief for these issues. Additionally, costs associated with correcting any membrane fouling issues are not the responsibility of the Water Authority.

Water Quality
The WPA sets parameters for raw seawater that the CDP is required to process and product water quality guarantees that must be met. Product water and raw seawater quality for Contract Year 2017/2018 is summarized below.

Product Water Quality

All product water distributed by the Water Authority to member agencies met contractual water quality requirements, including federal and state drinking water standards for the contract year. As a precautionary measure, on two occasions, a partial drain down of the product water pipeline was conducted to remove potable, but non-compliant water before it reached any customers. Incidents on June 1st (high turbidity) and June 21st, (free chlorine) 2018 each required a temporary shutdown of the plant, allowing that water to be removed well before reaching any customers and avoiding any potential water quality issues. IDE continues to work with the Water Authority to improve communications and to timely notify the Water Authority and regulatory agencies of potential water quality issues.

Raw Seawater Quality

Raw seawater characteristics feeding the CDP were within contractual limits for the contract year except for short periods of time where either temperature or turbidity was outside of contractual parameters of 84.2 degrees F and 24 NTU, respectively. These issues led to temporary reductions to plant capacity.

Regulatory Compliance
The primary permits that regulate product water quality and plant discharges include the National Pollutant Discharge Elimination System issued by the RWB, the Wastewater Discharge Permit issued by the Encina Wastewater Authority, and the Domestic Water Supply Permit issued by the DDW. Regulatory compliance is the responsibility of Poseidon along with any enforcement action associated with permit violations. The Water Authority receives copies of all compliance correspondence and may coordinate with Poseidon on issue resolution, as necessary.

Over the last year of operation, Poseidon received four notices requesting corrective action associated with permit compliance. These notices are summarized below:

- Sewer Discharge Copper Exceedance (Encina Wastewater Authority) – Test results of a single sample was 15.8 ppm, above the allowable permit concentration of 11.0 ppm.
- Sewer Discharge pH Exceedance (Encina Wastewater Authority) – Test results of a single sample was 1.6, outside the allowable permit limitations between 5.5-11.0.

- Administrative issue (San Diego County, Cal EPA) – Inspection of CDP operations staff's standard procedures by the County identified several administrative issues related to identification of hazardous materials and associated training.
- Post Treatment Event (DDW) – Failure to operate per approved Operations Plan and Permit Provisions.

Poseidon/IDE took corrective steps that were appropriate to resolve each action request and no outstanding issues remain open from the list above.

Cost

Payment to Poseidon for Contract Year 2017/2018 was $97,962,817. Considering the payments from Poseidon to the Water Authority for not meeting its supply obligations (estimated at $5,359,070), the average unit cost for the year including conveyance pipeline costs was $2,511 per acre-foot.

Table 3. Costs for Contract Year 2017/2018

	Contract Year 2017/2018
Total Water Purchase Cost*	$97,962,817
Desal Conveyance Pipeline Cost	$10,066,165
SUBTOTAL	***$108,028,982***
Poseidon Penalties	($5,359,070)
TOTAL	**$102,669,912**

* Includes debt service, equity return, fixed electricity and operating, variable electricity and operating, and unscheduled outage allowance charges.

Although the CDP experienced operational challenges last year, the Water Authority was protected by terms of the WPA from any financial burden linked to those challenges as outlined above. Nearly 60% of the delivery shortfall for the year was attributable to one event – the mechanical connection failure. Poseidon has implemented appropriate corrective measures to prevent a recurrence of this event, address other operational and regulatory constraints, and improve the overall resiliency of plant operations.

Staff is currently working with Poseidon on the annual reconciliation of the monthly invoices and will finalize all payments for Contract Year 2017/2018 by September 2018. The projected unit cost for Contract Year 2018/2019 is estimated at $2,559 per acre-foot.

Prepared by: Eric Rubalcava, Senior Water Resource Specialist
Jeremy Crutchfield, Principal Engineer
Reviewed by: Robert R. Yamada, Director of Water Resources
Approved by: Sandra L. Kerl, Deputy General Manager

SURFRIDER FOUNDATION

ORANGE COUNTY COASTKEEPER.

January 28, 2019

David Gibson, Executive Officer
San Diego Regional Water Quality Control Board
2375 Northside Dr.
San Diego, CA 92108

CC: Brandi Outwin- Beals, Senior Water Resources Control Engineer
Ben Neill, Water Resource Control Engineer

Re: Poseidon Water LLC's Carlsbad Desalination Plant stand-alone operations pursuant to Tentative Order no. R9-2019-0003 and NPDES no. CA010922

Dear David Gibson,

On behalf of the Surfrider Foundation and Orange County Coastkeeper (Organizations), we submit the following comments regarding Poseidon Water LLC's (Poseidon) Carlsbad Desalination Plant (Carlsbad plant) stand-alone operations pursuant to Tentative Order no. R9-2019-0003 and NPDES no. CA010922. The Surfrider Foundation is a non-profit grassroots organization dedicated to the protection and enjoyment of our world's ocean, waves and beaches. Surfrider maintains over 20 local chapters throughout California and is fueled by a powerful network of activists. Orange County Coastkeeper believes all people have the inalienable right to clean water. We promote and restore water resources that are Drinkable, Fishable, Swimmable and Sustainable.

The Organizations have significant concerns regarding the Tentative Order (TO), its compliance with the State Water Resources Control Board (State Water Board) 2015 Ocean Plan with Desalination Amendment (OPA) and the ability of the applicant to meet the proposed requirements set in the TO. As such, we urge you to consider the following comments.

Discharge and Flow Augmentation

Flow Augmentation Impacts

Flow augmentation is one of the least effective technologies that currently exists to minimize impacts to marine life from seawater desalination brine discharge. As such, all future ocean desalination facilities – besides Carlsbad – are prohibited from using flow augmentation. According to the tentative order (TO), "Flow augmentation provides a dilution of 1-part undiluted effluent (60 MGD) to 2.97 parts flow augmentation dilution water (178 MGD), resulting in a total of 3.97 parts water." Hence, as a result of using flow augmentation, the Carlsbad plant intakes approximately three times the amount of sea water when compared to discharge alternatives such as comingling brine with wastewater streams or multiport diffusers.

According to the TO and the OPA, 100% marine life mortality should be assumed with all surface level intake technology, meaning triple the intake would result in triple the impact to marine life. Further, the OPA assumes wedgewire screens will reduce entrainment mortality by a mere 1%. Some recent studies indicate that multiport diffusers, for example, result in a higher mortality ratio at discharge sites when compared to flow augmentation. However, more recent analyses suggest that the impacts are significantly less in total than that which would result from the inordinately higher amount of water intake (and associated 100% marine life mortality) required with flow augmentation. See Attachment A.

Carlsbad Plant Flow Augmentation Exemption

Under the OPA, flow augmentation as an alternative brine discharge technology is generally prohibited. However, the Carlsbad plant, which was far along in the permitting process before passage of the OPA, received a special condition for their original temporary permit co-located with the Encina Power Plant stating, "the facility must: use low turbulence intakes (e.g., screw centrifugal pumps or axial flow pumps) and conveyance pipes; convey and mix dilution water in a manner that limits thermal stress, osmotic stress, turbulent shear stress, and other factors that could cause intake and mortality of all forms of marine life; comply with chapter III.M.2.d.(1); and not discharge through multiport diffusers." However, with the decommissioning of the Encina Power Plant, the Carlsbad plant must now operate under a ***new*** NPDES permit as a stand-alone operation. This new permit must be in full compliance with the OPA and the above mentioned exemption is now void.

Flow Augmentation Prohibited

As stated, flow augmentation as an alternative brine discharge technology is generally prohibited in the OPA. In order for Poseidon to use flow augmentation and simultaneously comply with the OPA, the application must, "demonstrate to the regional water board that the technology provides a comparable level of intake and mortality of all forms of marine life as wastewater dilution if wastewater is available, or multiport diffusers if wastewater is unavailable." Poseidon has yet to effectively demonstrate that the proposed flow augmentation will comply with this exception. Given the unlikelihood of Poseidon's proposed flow augmentation to meet this standard based on the impacts described above, the plant will be operating out of compliance with the OPA in the interim period from adoption of the Final Order and when stand-alone operation construction and the Brine Discharge Empirical Study is completed. Also an additional period of noncompliance is anticipated in the TO through the suggestion that a Time Schedule Order may have to be issued as a mechanism to bring the plant into compliance if the Empirical Study shows noncompliance with OPA.

Poseidon did provide an analysis to compare flow augmentation impacts with that of a multiport diffuser to the Regional Water Board using the preferred Roberts methodology and submitted it in late 2018. However, the analysis is inadequate and has not yet been accepted by Regional Water Board staff for consideration in the tentative order. It appears that the study Poseidon submitted found that diffusers would entrain 170MGD. See TO at H 1-33. Based on that finding, combining the approximate entrainment from an approximate 100MGD intake and 170MGD diffuser, the comparison clearly shows

intake and mortality would be minimized by 10% compared to a 300MGD intake flow. And as Attachment A points out, rough estimates suggest an even more disparate impact is likely.

Arguably there is enough evidence for the Final Order to require Poseidon to build a 100MGD intake that minimizes intake and mortality, and a properly sited and designed diffuser. But at a minimum, the Organizations request this analysis be reviewed and verified before issuance of a Final Order and NPDES permit. The Roberts methodology represents the best available science for estimating the impact of multiport diffusers. **The Organizations strongly urge the San Diego Regional Water Quality Control Board (Regional Water Board) to require an acceptable analysis using the *Brine Diffusers and Shear Mortality* report by Philip J.W. Roberts, April 18, 2018, referenced as the Roberts Report in Finding 31 of Attachment H.1 of the tentative order, prior to issuance of the Final Order.**

Brine Discharge Empirical Study and Final Report

Despite the OPA special conditions, the TO for Poseidon's Carlsbad plant allows for the continued use of flow augmentation in order to dilute concentrated brine prior to discharge. In an attempt to comply with the OPA, the TO's Special Provisions 2a, requires Poseidon to submit a Brine Discharge Technology Empirical Study and Final Report (Empirical Study). This report will be conducted over 12 consecutive months following initial operation of the new intake structure and finalized within 6 months. However, the time table provided in the TO, allows Poseidon up to 5 years to complete construction of the intake infrastructure. Five years is the maximum amount of time allowable under the OPA; however, the Regional Water Board is not obligated to allow the maximum.

Indeed, 5 years is unreasonably long given that the entire plant was constructed in two years and the shutdown of the Encina Power Plant was a clearly foreseeable event before construction was completed. In the TO as drafted, the Carlsbad plant will potentially be able to continue with interim operations for up to five years. After construction is complete, the trigger for the 18 month Empirical Study and Final Report will begin. Thus, the new intake structures may be constructed and operating for 6.5 years before compliance with the OPA is verified. This is unacceptable and unreasonable. Even worse, the TO suggests a Time Schedule Order may be needed after noncompliance with the OPA is confirmed by the Empirical Study, potentially adding five or more years of noncompliance.

Further, the OPA requires, ""Within 18 months of ***beginning operation***, submit to the regional water board an empirical study that evaluates intake and mortality of all forms of marine life associated with the alternative brine discharge technology." (emphasis added). The OPA requires the empirical study to begin with 18 months of beginning operation. The Carlsbad plant operations and use of flow augmentation are ongoing and technically begin at the date of issuance of the Final Order and NPDES permit issuance. Arguably, the empirical study should be completed within 18 months and certainly not 6.5 years post issuance. **Nonetheless, the Organizations strongly recommend that the Regional Water Board require construction of the new intake infrastructure to be completed within two years with finalization of the Brine Discharge Empirical Study. Further, given the likelihood the Brine Discharge Empirical Study will show that minimizing intake volume combined with a properly sited and designed**

diffuser would be a superior alternative (ie, not favorably "comparable"), the Final Order should include enforcement provisions – as discussed below.

Compliance with OPA

Finally, and most importantly, the Regional Water Board must provide stronger assurance that the Carlsbad plant will not be allowed to operate for prolonged periods of non-compliance with the OPA in the Final Order. This is especially prudent given the high likelihood that flow augmentation will not be found to have a comparable level of intake and mortality as wastewater dilution or multiport diffusers. The TO includes the following language in an attempt to ensure compliance:

"If the Final Report shows that the flow augmentation choice for brine discharge technology results in more intake and mortality of marine life than if the Facility used wastewater dilution or multiport diffusers, then the Discharger must also submit with the Final Report a proposed schedule to either:

(a) Cease using the alternative brine discharge technology and install and use wastewater dilution or multiport diffusers to discharge brine waste; *or*
(b) Re-design the alternative brine discharge technology system to minimize intake and mortality of all forms of marine life to a level that is comparable with wastewater dilution if wastewater is available or multiport diffusers if wastewater is unavailable, subject to San Diego Water Board approval."

Further, similar to the enforcement provisions in Attachment D section 1.B. of the TO ["Need to Halt or Reduce Activity Not a Defense"], the provisions for the Brine Discharge Empirical Study should make perfectly clear that if the Study Report shows augmented intake flow results in greater intake and mortality than minimized flow and diffusers, the plant must cease operations and modify the intake and construct the diffuser, and that an additional noncompliance period through a Time Schedule Order is not an option.

The Organizations support statements made in sections (a) and (b) and urge the Regional Water Board to further clarify and strengthen these requirements. The Final Orders should state:

> "If the Brine Discharge Empirical Study and Report shows that mortality with ~100 MGD intake and use of multiport diffusers is less than the mortality from the augmented flow intake at ~299MGD, Poseidon must cease operations and change the technology. Poseidon assumes all financial responsibility for proceeding with the proposed flow augmentation design option and may not rely on a financial infeasibility claim (for a design change) upon non-compliance with the OPA. Poseidon will be expected to change technology and/or discontinue operations immediately. This order is final."

This clarification will ensure that the Carlsbad plant will not be given an unjustified exception to the OPA and that Poseidon is expected to comply with state laws and regulations. **The Organizations strongly recommend the Regional Water Board include additional language to clarify and strengthen the requirement for compliance with the OPA.**

According to the tentative order, construction costs for the Carlsbad plant's stand-alone operations will be up to $84 million. This is a considerable amount of financial resources. Poseidon must assume all financial liability for the extremely risky decision to proceed. Indeed, the court ruling in Surfrider Foundation v. California Regional Water Quality Control Board, San Diego Region and Poseidon Resources (Channelside) Llc, et.al. (Super. Ct. No. 37-2010-90436-CUWM-OTL), found that the Carlsbad plant did not violate section 13142.5(b) of California Water Code while co-located with the Encina Power Plant. However, the findings state that, "Poseidon will be required to reapply to the Regional Board for authorization to operate in a stand-alone mode, and the Regional Board, in that instance, will review whether additional measures are necessary for compliance with section 13142.5(b)" – indicating that Poseidon remains subject to liability and additional compliance verification with state laws and regulations in their stand-alone permit.

Chronic Toxicity

The Carlsbad plant began delivering water to San Diego County in December 2015 and is the nation's largest seawater desalination plant. Unfortunately, the Carlsbad plant has continuously violated the Regional Water Board's discharge permit and has done so since operations began in 2015. In April 2016, the Regional Water Board issued a notice of violation finding that the Carlsbad plant had failed to comply with several provisions of its discharge permit, including failures to comply with discharge prohibitions, receiving water limitations, and effluent limitations, and failure to monitor in accordance with discharge provisions. Later, in December 2016, the Regional Water Board issued a staff enforcement letter describing 19 occasions on which Poseidon had exceeded daily maximum toxicity limits. In its annual discharge permit monitoring report for 2016, Poseidon stated that it had exceeded chronic toxicity limits in 30% of tests. In 2017, the Regional Water Board cited for exceeding chronic toxicity violations in 36 out of 90 total toxicity tests as well as 11 deficient monitoring and 2 reporting violations. In 2018, Poseidon has been cited for 11 chronic toxicity violations, 1 deficient monitoring violation and 1 Category one pollutant violation for exceeding total suspended solids effluent limitations.

Since opening, Poseidon has been unable or unwilling to resolve this toxicity issue. The testing limits established for chronic toxicity at location M-001 (pre-dilution) are listed as enforceable in the existing NPDES permit. In the new stand-alone operations permit and tentative order, chronic toxicity is listed as enforceable only at location M-002, after the brine is diluted and no longer at M-001. The tentative order cites Poseidon's explanation of the toxicity without any further justification for changing the testing requirements. The tentative order states that:

> "Additionally, between December 2015 through January 2018, the Discharger reported 61 exceedances of the chronic toxicity maximum daily effluent limitation of 16.5 TUc at monitoring location M-001 of the undiluted brine. In response to the effluent limitation exceedances for chronic toxicity, ***the Discharger reported that the violations are an artifact of the chronic toxicity effluent limitation in Order No. R9-2006-0065 not accounting for the flow augmentation dilution water provided by the Encina Power Station.*** Monitoring samples that

account for the flow-augmentation dilution water provided by the Encina Power Station did meet the chronic toxicity effluent limitation prior to discharging to the Pacific Ocean, and also passed the TST statistical approach for determining compliance with chronic toxicity monitoring included in this Order. ***Nevertheless, the Discharger conducted an extensive Toxicity Identification Evaluation (TIE), and the results were inconclusive as to the source and cause of toxicity***" (emphasis added).

Poseidon's explanation for the violations is that the brine is undiluted. However, this is precisely the point of the enforceable testing location M-001 in the existing NPDES permit. The pre-dilution limitation was set according to acceptable chronic toxicity limitations in concentrated brine. Testing location M-001 is crucial to understanding the Carlsbad plant's discharge and must remain enforceable for chronic toxicity. There is an acceptable limit of chronic toxicity – no matter how much the brine is diluted. This is because the discharge is released into the nearshore environment in which marine life, ocean users, beach goers and recreational users rely. According to toxicologists, there is a potential for accumulation of elements of the choric toxicity in the nearshore environment, despite dilution. Poseidon's statement that the violations at M-001 are an artifact of the chronic toxicity effluent limitation in Order No. R9-2006-0065 not accounting for the flow augmentation dilution water provided by the Encina Power Station are not relevant to the continuing need to identify the source of toxicity of the brine and need to be removed from the TO.

As mentioned in the tentative order, Poseidon completed a series of toxicity evaluations to determine the cause of the chronic toxicity and released the final evaluation report (TRE) in April 2018. The report rules out several potential direct causes such as salinity and harmful algal blooms. The report also finds that certain chemical and polymer additives could contribute to the toxicity findings at higher concentrations. And though the evaluation did not test the actual concentration of polymer additives in the final effluent, the report states that the effluent is "suspected" to have low enough additive concentration levels that polymers would not have a significant effect. The report speculates that a confluence of polymer and chemical additives may be at fault, however. **In light of the Carlsbad plant's past and ongoing discharge permit violations and the inconclusive results of the Poseidon's toxicity evaluations, the Organizations strongly urge the final order to include chronic toxicity as an enforceable limitation at testing location M-001.**

Sediment Assessment for Physical and Chemical Properties

The tentative order requires Poseidon to conduct a Sediment Assessment for Physical and Chemical Properties (Sediment Assessment) as part of the Benthic Monitoring Work Plan described in Attachment E. According to the tentative order, "Sediments can accumulate these particles over the years until the point where sediment quality is degraded and beneficial uses are impaired. Benthic organisms are strongly affected by sediment contaminant exposure because these organisms often live in continual direct contact with sediment/pore water, and many species ingest significant quantities of sediment as a source of nutrition." **Given the potential for serious impacts as stated, along with ongoing chronic toxicity violations at the Carlsbad plant, the Organizations strongly support the Sediment Assessment.**

The chronic toxicity violations highlight the urgent need for sediment sampling, especially given the inconclusive nature of the cause of the violations. As previously stated, according to local toxicologists, there is a potential for accumulation of elements of the choric toxicity in the nearshore environment, despite dilution. And given the results of the TRE were inconclusive, sampling to understand the potential impact is especially prudent. The sampling for the Sediment Assessment is required on a biannual basis in the tentative order. **The Organizations strongly urge the final order to require sediment sampling to be conducted twice per year, rather than every other year.** This will provide a much more representative sample given the dynamic nature of sediment in the marine environment and seasonal fluctuations.

We commend the Regional Water Board for their efforts to reduce and mitigate the tremendous environmental impacts of the Carlsbad plant and hope to see further incorporation of protective measures to achieve compliance with the OPA in order to protect marine life and water quality. Thank you for your consideration of these comments.

Sincerely,

Mandy Sackett
California Policy Coordinator
Surfrider Foundation

Raymond Hiemstra
Associate Director
Orange County Coastkeeper

ATTACHMENT A: ESTIMATED MORTALITY COMPARISON

The Organizations offer the text below as a simple illustration of the likelihood that the proposed flow augmentation will result in more entrainment mortality than minimizing the intake and discharging the waste through multiport diffusers.

The Tentative Order (at Section VI.C.2) would require Poseidon to conduct a study to compare the entrainment effects resulting from flow augmentation versus those that would result from a multiport diffuser. Based on currently available information, it appears likely that the facility would cause substantially less total entrainment if it did away with flow augmentation and instead used some form of diffuser technology.

We offer these rough calculations and considerations to illustrate the high likelihood that minimizing intake flow in combination with brine discharge through multiport diffusers will reduce entrainment mortality compared to the proposed "augmented intake flow."

- Poseidon currently uses about 100 MGD of its intake volume to produce water and about 200 MGD of its intake volume as flow augmentation to dilute its discharge. Existing evidence shows essentially 100% mortality from the total intake volume of 304 MGD. The Ocean Plan finds that wedgewire screens like those proposed in the Tentative Order would reduce entrainment by a modest 1%.
- Without flow augmentation, Poseidon's intake flows would presumably be reduced by about two-thirds – from 304 million gallons per day ("MGD") to about 100 MGD – which would result in a proportional reduction of entrainment. The facility's discharge volume would also be reduced to roughly 50 MGD.
- Analyses done for Poseidon's proposed Huntington Beach facility show that a diffuser is expected to result in about 50-60% more entrainment than that caused by the intake (https://www.waterboards.ca.gov/santaana/water_issues/programs/Wastewater/Poseidon/2018/DUDEK.pdf – see page 13, which identifies a 168 MGD diffuser-entrained flow resulting from that facility's 106 MGD intake flow and its approximately 50 MGD discharge flow). The total volume causing entrainment would therefore be 104 MGD +168 MGD = 272 MGD.
- Those volumes would be similar to Poseidon's Carlsbad facility operating without flow augmentation, so it would presumably result in less total entrainment – instead of causing entrainment in 304 MGD, it would cause it in ~272 MGD.
- Notably, the Huntington Beach example involves the intake and discharge affecting the same nearshore water (and same plankton community). However, Carlsbad's intake takes water from a more productive estuary with higher population densities and discharges it into less productive nearshore waters. The Carlsbad-Poseidon Marine Life Mitigation Plan, and Ocean Plan Amendment, found that estuaries are significantly more biologically productive and the mitigation ratio of 10:1 was reasonable for creation of estuarine habitat to replace the entrainment mortality of ocean species. Therefore, even though Carlsbad would have about the discharge entrainment volume of 168 MGD with diffusers in the nearshore compared to nearly 200MGD in the estuary, it would be entraining substantially fewer organisms and result in far less (~1/10th) overall mortality than when it operates using flow augmentation in the estuary.

While the Board's approach allows for a study that presumably will better characterize the expected entrainment from the screened intake, it will also result in Poseidon initially installing a much larger screened intake system than may be needed if the study results show that a diffuser have more positive results (less entrainment) compared to flow augmentation. Further, the augmented intake through screened intakes would have already been in operation for approximately 6.5 years (on top of the current non-compliant operation), causing cumulative impacts. Finally, it is our understanding the Marine Life Mitigation Plan has yet to be completed, so the entrainment impacts are not currently mitigated. Also, after the current Temporary Permit was issued, the ETM/APF compensatory calculation was modified and adopted into the OPA -- consequently the Poseidon-Carlsbad MLMP may need revisions to fully comply with the new ETM/APF formula.

February 20, 2019

David Gibson, Executive Officer
San Diego Regional Water Quality Control Board
2375 Northside Dr.
San Diego, CA 92108

CC: Brandi Outwin- Beals, Senior Water Resources Control Engineer
Ben Neill, Water Resource Control Engineer

Re: Follow-up Comments to Poseidon Water LLC's Carlsbad Desalination Plant stand-alone operations pursuant to Tentative Order no. R9-2019-0003 and NPDES no. CA010922

On behalf of the Surfrider Foundation and Orange County Coastkeeper (Organizations), we submit the following comments regarding Poseidon Water LLC's (Poseidon) Carlsbad Desalination Plant (Carlsbad plant) stand-alone operations pursuant to Tentative Order no. R9-2019-0003 and NPDES no. CA010922.These comments build upon our original comment letter submitted on January 28, 2019. We are submitting these additional comments because it has come to our attention that the application submitted by Poseidon for a renewed permit is for an "expanded" facility, as defined in the Ocean Plan amendment for desalination section III.M (OPA).

To reiterate, the Organizations have significant concerns regarding the Tentative Order (TO), its compliance with the State Water Resources Control Board (State Water Board) 2015 Ocean Plan with Desalination Amendment and the ability of the applicant to meet the proposed requirements set in the TO. As such, we urge you to consider the following comments.

As explained below, we believe that the considerations and alternatives for expanded facilities differ from those evaluated in the Tentative Order (TO).

1. Expanded Facilities

Section III.M.1.b.2 defines "expanded facilities" as:

> *For purposes of chapter III.M, "expanded facilities" means existing facilities for which, after January 28, 2016, the owner or operator does either of the following in a manner that could increase intake or mortality of all forms of marine life beyond that which was originally approved in any NPDES permit or Water Code section 13142.5, subdivision (b) (hereafter Water Code section 13142.5(b)) determination: 1) increases the amount of seawater used either exclusively by the facility or used by the facility in conjunction with other facilities or uses, or* **2) changes the design or operation of the facility**. *To the extent that the*

> *desalination facility is co-located with another facility that withdraws water for a different purpose and that other facility reduces the volume of water withdrawn to a level less than the desalination facility's volume of water withdrawn, the desalination facility is considered to be an expanded facility.* [emphasis added]

The proposed facility meets this definition for two reasons - and we believe the distinction is important. The proposed facility significantly changes "the design or operation of the facility" by increasing the production capacity by 20% (from 50mgd to 60mgd) and modifying the discharge dilution by increasing the volume of brine discharged and decreasing the volume of seawater used for in-plant dilution.

The 2009 conditional permit describes a facility that withdraws 107mgd as source water for the production plant, creating 50mgd of potable water and 57mgd of brine to be mixed with 197 of dilution water. See Attachment "Carlsbad 2009 permit".

The current Tentative Order, at page H-1, describes an expanded plant as:

> Under the current stand-alone operations as regulated under this Order, CDP intakes source seawater from Agua Hedionda lagoon at a flowrate of 299 MGD. 127 MGD of the source water will be used to produce up to 60 MGD of potable water. The remaining water that is not used for potable water production will be used to dilute the brine wastewater and other wastewater flows for Poseidon to meet the discharge salinity requirements of this Order. The discharge flow rate will vary in accordance with CDP operations. For example, at 50 MGD of potable water production, the discharge flow rate is 249 MGD (54 MGD of wastewater with 195 MGD of dilution water). At 60 MGD of potable water production, the discharge flow rate is 239 MGD (67 MGD of wastewater and 172 MGD of dilution water) into the Pacific Ocean.

The change of design and operation requires different considerations and alternatives analyses than the simpler analysis of an updated conditional approved facility.

Section III.M.2.a.3 states:

> *The regional water board's Water Code section 13142.5(b) analysis for expanded facilities may be limited to those expansions or other changes that result in the increased intake or mortality of all forms of marine life,* **unless the regional water board determines that additional measures that minimize intake and mortality of all forms of marine life* are feasible* for the existing portions of the facility.** [emphasis added]

In brief, the current Tentative Order requires analyses of the applicability of the OPA to the "expanded" portion of the proposed facility, unless the Regional Board determines that additional modifications to the "existing" portion are feasible. It is not adequate to analyze the

proposed facility as a whole – the analyses must include a 13142.5(b) determination for the expansion in isolation of the conditionally approved facility.

2. Intake Alternatives

Water Code section 13142.5(b) requires analyses of the best available site, design, technology and mitigation feasible – both as individual components and in combination – to minimize intake and mortality of marine life. In brief, the OPA implementation regulations require the use of subsurface intakes unless they are proven not feasible. The production capacity is not allowed as a factor in the feasibility determination unless the applicant shows a "need" in an Urban Water Management Plan.

First, the Tentative Order Attachment H1-15 at section 10 states:

> *The UWMP describes the additional annual average potable water output potentially resulting from the proposed CDP modifications as an adaptive management supply that could be used to meet projected regional growth and water demands.*

The language doesn't satisfy the requirement to identify a "need" in an Urban Water Management Plan sufficient to allow an exemption from the requirement to use sub-surface intakes for the expanded capacity.

Even if the Urban Water Management Plan were adequate proof of "need" for the additional product water, the Tentative Order must be revised to include analyses of whether subsurface intakes would be feasible for the expanded production capacity expansion in isolation from the previous conditionally approved 50mgd capacity as required in III.M.2.a(3). The Tentative Order must answer the question: "can a subsurface intake feasibly supply water to a 10mgd production expansion?".

3. Brine Discharge Alternatives

Sub-section M.2.d(2)(c) allows for "alternative" types of discharge technologies, including the requirements to do a "comparable marine life mortality" analysis. And section M.3.d describes how that works.

That sub-section [...d.(2)(c)] follows several that define dilution with wastewater as "best" and diffusers as "second best" where wastewater isn't available. <u>But that sub-section on "alternative discharge technologies" was only intended to allow future technologies that</u>

weren't available when the OPA was adopted. Augmented flows is NOT an "alternative technology."

The very next sub-section, M.2.d(2)(d), makes it clear that augmented flow for dilution is prohibited (ie, NOT an "alternative technology") except in 2 circumstances:
- for facilities with a "conditional permit and 80% built" before the OPA was adopted; or,
- for facilities using sub-surface intakes to supply the augmented flow. But Poseidon is proposing expanding the production capacity – which increases the volume of wastewater and decreases the volume of dilution water.

With the expansion, Poseidon no longer has a "conditional permit" for the new design. It is an "expanded facility" as described in Section M.1.b(2).

Poseidon can continue using flow augmentation for the facility as it was conditionally approved in 2009. But they cannot use flow augmentation for an expanded facility – flow augmentation is not an allowed "alternative technology" for expanded facilities. And if they propose to use flow augmentation for the conditionally approved facility (ie, 50mgd production), they have to dilute the brine within a MAXIMUM of a 200 meter BMZ. **See M.3.d** below

The OPA definitions include:

Brine mixing zone (BMZ)

> *The area where salinity may exceed 2.0 parts per thousand above natural background salinity, or the concentration of salinity approved as part of an alternative receiving water limitation. The standard brine mixing zone shall not exceed 100 meters (328 feet) laterally from the point(s) of discharge and throughout the water column.* **An alternative brine mixing zone**, *if approved as described in the Ocean Plan chapter III.M.3.d,* **shall not exceed 200 meters** *(656 feet) laterally from the point(s) of discharge and throughout the water column. The brine mixing zone is an allocated impact zone where there may be toxic effects on marine life due to elevated salinity.* [emphasis added]

Further, the Regional Board should be aware that the 100 meter BMZ was determined by analyzing the "near field" of brine dilution exiting a properly designed diffuser. The concern at the time was that improperly diluted brine could accumulate on the seafloor outside the BMZ (the "far field") and create ever-growing areas of hypoxic conditions.

Therefore, section III.M.3(d) states:

> *The owner or operator of a facility that has received a conditional Water Code section 13142.5(b) determination and is over 80 percent constructed by January 28, 2016 that proposes flow augmentation using a surface water intake may submit a proposal to the*

> *regional water board in consultation with the State Water Board staff for approval of an alternative brine mixing zone not to exceed 200 meters laterally from the discharge point and throughout the water column. The owner or operator of such a facility must demonstrate, in accordance with chapter III.M.2.d.(2)(c),* **that the combination of the alternative brine mixing zone and flow augmentation using a surface water intake provide a comparable level of intake and mortality of all forms of marine life as the combination of the standard brine mixing zone and wastewater dilution if wastewater is available, or multiport diffusers if wastewater is unavailable.** *In addition to the analysis of the effects required by chapter III.M.2.d.(2)(c), the owner or operator must also evaluate the individual and cumulative effects of the alternative brine mixing zone on the intake and mortality of all forms of marine life.* **In no case may the discharge result in hypoxic conditions outside of the alternative brine mixing zone.** *If an alternative brine mixing zone is approved, the alternative distance and the areal extent of the alternative brine mixing zone shall be used in lieu of the standard brine mixing zone for all purposes, including establishing an effluent limitation and a receiving water limitation for salinity, in chapter III.M.* [emphasis added]

The description of the brine flow in the Tentative Order states:

> *[Based] on the model, the effluent discharge plume will be negatively buoyant (denser than seawater) and will flow along the ocean bottom downslope and off-shore towards the west-northwest. When the brine plume becomes stationary, at a distance of approximately* **1,851 meters** *from Discharge Point No. 001, the model predicts a difference in the salinity of the plume and the ambient ocean water to be less than 1 percent....* See Tentative Order at Attachment F-8

This description of the brine plume sinking to the seafloor at the point of discharge and migrating offshore to 1851 meters and still not reaching ambient salinity is, ironically, the description of brine behavior that provided the rationale for requiring wastewater dilution or diffusers. The brine migrates to depressions where it is no longer exposed to currents and other mixing mechanisms, and accumulates into ever greater hypoxic zones inside and outside the BMZ.

The proposed facility is an "expanded facility" and is no longer a "conditionally approved facility with 80% construction completed" before adoption of the OPA. As such, the facility now must use wastewater for dilution, diffusers, or any alternative that meets the requirements in the OPA. But augmented flows for expanded facilities is strictly prohibited under section III.M.2(d)(2)

4. Mitigation Alternatives

Poseidon's conditional permit Marine Life Mitigation Plan (MLMP) used an ETM/APF calculation based on an 80% statistical confidence. After quite a bit of debate during the drafting process for the OPA, the required confidence level was increased to 95%. See III.M.2.e(1)(a) *"[The] APF shall be calculated using a one-sided, upper 95 percent confidence bound for the 95th percentile of the APF distribution...."*

Regardless of whether the proposed facility is considered an "expanded facility" or an update of the 2009 conditional permit, the Tentative Order must analyze the mitigation provisions in the OPA.

It is our understanding, in a very general way, that this change in statistical confidence would approximately double the acreage that was required in the 2009 conditional permit.

There are a number of other new considerations for mitigation in the OPA. It doesn't appear like the Tentative Order has adequately analyzed those new mitigation requirements and incorporated them into an updated MLMP.

Section III.M.2.e(3)(b)(viii) states:

> *For both in-kind* and out-of-kind mitigation,* the regional water boards may increase the required mitigation ratio for any species and impacted natural habitat calculated in the Marine Life Mortality Report when appropriate to account for imprecisions associated with mitigation including, but not limited to, the likelihood of success, temporal delays in productivity, and the difficulty of restoring or establishing the desired productivity functions.*

For example: first, the MLMP must compensate for all area affected by brine above 2ppt. See M.3.e(1)(b). This additional area should include reasonably foreseeable brine accumulation spreading on the seafloor for the plant's operating life – as briefly mentioned above.

Second, it is our understanding that no restoration has begun. This delay must be calculated into the new MLMP. See M.3.e(3)(b)(viii).

These are just two examples of additional analyses of the MLMP that must be included before final adoption. The full requirements are found in III.M.

5. CONCLUSION

Had Poseidon applied for an expanded facility based only on the power plant discontinuing operation of their once-through cooling system, the analyses would have followed a path dictated for "conditionally approved facilities with 80% construction completed" prior to adoption of the Ocean Plan amendment for desalination. However, this application is for an

expanded facility based on the increased production capacity, increased volume of brine discharge, and reduced volume of dilution water. The analysis is more complicated.

To summarize, the Tentative Order must analyze:

- Whether a separate subsurface intake is feasible for the proposed total source water pumped into the production plant (127mgd), or a separate subsurface intake for only the additional source water for production (127-107= 20mgd);
- The expansion, based on the changes in design and operation, makes the distribution alternatives limited to three options: wastewater for dilution, diffusers, or an approved "alternative" technology. However, augmented flow for dilution is strictly prohibited for expanded facilities based on changes to "design or operation", and;
- The Marine Life Mitigation Plan must be revised to fully comply with the Ocean Plan amendment requirements.

Thank you for your consideration of our additional comments.

Sincerely,

Mandy Sackett
Surfrider Foundation

Ray Heimstra

Ray Heimstra
Orange County Coastkeeper