

**PLUME TRACKING MONITORING PLAN FOR THE
POINT LOMA AND SOUTH BAY OCEAN OUTFALL REGIONS,
SAN DIEGO, CALIFORNIA**

**Progress Report
March 2025**

Report Period: January – December 2024

City of San Diego Point Loma Wastewater Treatment Plant
(NPDES CA0107409; Order No. R9-2017-0007 as amended by Order No. R9-2022-0078)

City of San Diego South Bay Water Reclamation Plant
(NPDES CA0109045; Order No. R9-2021-0011)

U.S. IBWC South Bay International Wastewater Treatment Plant
(NPDES CA0108928; Order No. R9-2021-0001)

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Background

The Plume Tracking Monitoring Plan (PTMP) was designed to develop new and effective procedures for enhanced water quality monitoring and adaptive plume tracking in the San Diego region. These procedures include: (a) the deployment of real-time oceanographic mooring systems (RTOMS) located near the terminal diffuser wye structures of the Point Loma Ocean Outfall (PLOO) and the South Bay Ocean Outfall (SBOO); (b) deployment of static Acoustic Doppler Current Profiler (ADCP) and thermistor moorings; and (c) deployment and testing of a remotely operated towed vehicle (ROTV; i.e., ScanFish III).

Detailed here are significant activities that have been completed during the past year to achieve the objectives outlined in the PTMP. This Progress Report also details the current timeline of activities for the next year of sampling, including expected RTOMS deployment and recovery dates.

The original scope of the PTMP outlined activities through 2024 and the City is continuing to operate under these guidelines until a new work plan is in place.

Activities Completed (2024)

For detailed information regarding events prior to the current reporting year, please refer to previously submitted Progress Reports. Further, for real-time data plots from RTOMS deployments in 2024, see the SIO website (PLOO-05: https://mooring.ucsd.edu/ploo/ploo_05/; SBOO-06: https://mooring.ucsd.edu/sboo/sboo_06/).

2023

December

- PLOO RTOMS - Fifth deployment of PLOO RTOMS (12/20/23)

2024

February

- ROTV Training on EIVA ROTV software completed with OARS Group liaison (02/26 - 02/29/24)

March

- 2023 PTMP Progress Report submitted to the Regional Board (03/01/24)
- Completed QA/QC review and assigned qualifiers for RTOMS data through 2024.
- ROTV Survey PLOO completed (03/01/2024) and (03/04 - 03/06/2024)
- ROTV Survey SBOO completed (03/07/2024) *small craft advisory*

April

- PLOO Static Mooring ROV recovery (04/29/2024)
- PLOO Static Mooring ROV recovery (04/30/2024)

May

- SBOO Static Mooring ADCP and thermistor recovery/redeployment (05/01/2024)
- SBOO RTOMS - Fifth recovery of SBOO RTOMS (05/21/24)

June

- 2022 – 2023 Biennial Receiving Waters Monitoring Report submitted, including RTOMS and ROTV results.

July

- SBOO RTOMS - Sixth deployment of RTOMS (07/30/24)

September

- PLOO RTOMS – Hardware failure of the buoy solar panels resulted in loss of power for the AIS and pCO₂ sensor, which became non-operational for remainder of deployment (09/11/24)
- PLOO Static Moorings Thermistors recover and redeploy. SBOO thermistor did not surface will require ROV for recovery (09/11/2024)
- PLOO Static Mooring ADCP recover and redeploy. SBOO ADCP failed to surface needs to be recovered with ROV (09/19/2024)

December

- PLOO RTOMS – Fifth recovery of PLOO RTOMS (12/09/24)
- ROTV - Scheduled ROTV survey completed in PLOO and SBOO regions (12/3-5/2024)

Overview of 2024 Activities and Changes to Project Plan

The 2023 PTMP Progress Report, submitted in March 2024, detailed significant issues and challenges the City experienced with RTOMS deployments, including the complete loss of the South Bay RTOMS (November 2022) and subsequent manufacturer delays to the replacement of the buoy, hardware, and instruments. In addition, the Point Loma RTOMS was severely entangled in fishing nets upon recovery (October 2023), which resulted in an incredibly difficult recovery and damage to the A-frame on the M/V Oceanus. Though instruments were recovered safely, this put the vessel out of service until December 2023 and resulted in delays of anchor recovery and RTOMS redeployment.

Though less severe than 2023, several challenges to RTOMS deployments and ROTV operations occurred in 2024. Staffing and other project challenges at the Send lab at the Scripps Institution of Oceanography (SIO) resulted in delays of buoy assembly and servicing controllers and other components for the SBOO RTOMS, followed by scheduling conflicts with other permit-mandated City sampling in July 2024. In addition, servicing of several essential oceanographic sensors subsequently delayed redeployment of the PLOO RTOMS, followed by both SIO and City staffing challenges and scheduling conflicts with permit mandated sampling. Due to these challenges, the next deployment of the PLOO RTOMS is planned for early April 2025.

Additionally, instrument manufacturers have discontinued servicing and production of two instruments. Sea-Bird, the manufacturer of the pH instruments, has been unable to service or produce shallow SeaFET pH instruments since fall 2022, which has hindered our ability to conduct accurate pH monitoring. Sea-Bird was not able to return our deep SeaFET instrument in time for the fifth PLOO RTOMS deployment, so bottom pH data was absent in 2024. Sea-Bird anticipates

resuming service and production of shallow SeaFETs in 2025, though this date keeps getting pushed back and the future of these sensors is unknown. However, Sea-Bird is producing and servicing deep SeaFETs, so the City is in process of acquiring additional deep instruments to provide coverage for pH monitoring. In addition, Chelsea Technologies has discontinued the Uvilux BOD sensor and will no longer service existing sensors. Thus, BOD sensors are not being used on RTOMS going forward.

When possible, the City continued to operate static moorings in both the PLOO and SBOO regions to act as data back-ups for the RTOMS. Although these static moorings are limited in their data collection to temperature and current profiles, they are much smaller and logistically less challenging to retrieve and deploy. However, in 2024, recovery of the static moorings was problematic because two of the bottom-mounted moorings did not surface due to acoustic release failure. This equipment failure also occurred in 2023 resulting in the need to recover the static mooring using the ROV. Three ROV recoveries from 2023 static moorings that did not surface occurred in April 2024. To date, one static ADCP and one thermistor array in South Bay still need to be recovered as schedule and conditions allow.

In 2024, ROTV operations were limited to two sampling windows, March 3-7 and December 3-5, due to scheduling conflicts related CA State Lands Commission mandated outfall inspections, permit mandated monitoring (SBOO RTOMS recovery/redeployment), understaffing, and vessel unavailability in August and September due to required maintenance. In February of 2024, city staff participated in training provided by an OARS/EIVA representative who covered ROTV software capabilities in depth, advised staff on the integration of new data streams into the platform, and participated in field testing occurring March 3-7. Results from training include improved staff understanding of ROTV software capabilities and limits, as well as improved data formatting, resulting in more efficient processes for visualizing and analyzing results. A new Sea-Bird Sea-Owl (colored dissolved organic matter (CDOM); chlorophyll *a*) was installed and made operational ahead of March testing. City staff are currently working with the company EIVA on City-funded enhancements to the ROTV software including the integration of real-time sensor calibration calculations and spatial interpolation of the data. Both upgrades are intended to facilitate in-field, real-time assessment and decision making, and to anticipate and reduce the loss of survey time due to technical issues through improved data visualization tools. Concerns about the feasibility of sampling in kelp-dense areas, around commercial fishing equipment, and in the shallow South Bay persist. The risk of piloting the ROTV in the South Bay was addressed in both March and December missions that included single transect surveys. An offshore, subsurface effluent signature was detected in both the PLOO and SBOO regions during the March and December sampling periods, characterized by elevated CDOM and optical brightener concentrations localized near each outfall.

Despite limited use, the ROTV sampling has proven to provide an excellent snapshot of the plume location during surveys. Obstacles remain regarding the implementation of an adaptive ROTV sampling program. As the City works to develop an in-house data management system for RTOMS data (currently managed by SIO), a system for automated data flagging and notification is in discussion. However, ROTV surveys on the M/V *Oceanus* require preparations (e.g., winch-spool changeover to a ROTV compatible wire) that are not easily implemented in a short timeframe. The

addition of a new, larger vessel to the City's fleet (planned for end of 2028) may alleviate some of this challenge.

Equipment Issues from Current Reporting Period: 2024

M/V OCEANUS

- *August 1 – September 18, 2024:* Out of service for required maintenance.

M/V Monitor III

- *November 2024 – February 2025:* Out of service for required maintenance.

PLOO-05

- *December 2023:* Sea-Bird ECO triplet sensor @ 1 m: initial CDOM and turbidity values were high, likely due to bubbles in the flow path of the surface flow chamber (12/20/23). After one day, data returned to reasonable values (12/21/23).
- *January – December 2024:* Sea-Bird SBE37IM sensor @ 20 m: occasional low spikes in salinity values beginning in January, followed by large downward drift of data in June. Upon recovery, it was noted that the conductivity cell guard (sensor for salinity) had fallen off and the conductivity cell was likely damaged. As a result, much of the salinity data at 20 m will be flagged as suspect and omitted from reporting, particularly for the second half of the year.
- *May – December 2024:* Sea-Bird SeapHOx pH sensor @ 30 m: oxygen measurements for the SBE37-ODO part of the package started to report intermittently (05/06/24) with large gaps in data from May to August. The oxygen sensor stopped reporting before the mooring was recovered (11/29/24). This was likely due to a faulty connection for the bulkhead on the ODO sensor.
- *September – December 2024:* Pro-Oceanus pCO₂ sensor @ 1 m (surface): No values reported for the remainder of the deployment due to a lack of power. One solar panel on the buoy had a compromised seal and no longer functioned to charge the solar batteries sufficiently to power the instrument (09/11/24).
- *April – December 2024:* Sea-Bird ECO triplet sensor @ 1 m: the CDOM data channel drifted into negative values for the remainder of the deployment and may require further drift correction in the future (04/18/24). Note the surface ECO triplet was deployed in a flow cell to lessen biofouling impacts.
- *November – December 2024:* Teledyne RDI ADCP instrument @ 1 m: current and backscatter data values at near bottom depths had poor quality, resulting in data gaps from approximately 60 m to the bottom. This issue was likely due to interference from heavy biofouling and growth on the buoy near the end of the deployment.

SBOO-05

- *July 2023 – May 2024:* Scripps custom-built controller @ 26 m: controller stopped working and stopped sending data (07/28/23). Controller gave error messages and unable to resume sampling remotely. Upon recovery, it was noted that the controller board and clock had become corrupt, which was a unique failure noted by SIO.

SeapHox data (temperature, salinity, oxygen, and pH) was recorded internally in the instrument. However, the other instruments (nitrate, chlorophyll, CDOM, turbidity, and BOD) require a functional controller to collect data, so those parameters are a complete loss for most of the deployment at the bottom depth.

- *November 2023 – May 2024: Pro-Oceanus pCO₂ sensor @ 1 m: instrument stopped reporting data due to power loss from failure of solar charging system (11/04/23). At sea, upon visual inspection of buoy, no obvious problems were noted. After recovery, it was noted that one of the cable connections to the solar panel was compromised.*
- *November 2023 – May 2024: Sea-Bird SeapHOx pH sensor @ 1 m (surface): pH values dropped significantly low out of range (11/24/23) and noise occurred in both internal and external electrodes. Values drifted high and are suspect for the remainder of the deployment.*
- *July 2023 – May 2024: Sea-Bird SUNA nitrate sensor @ 1 m: instrument reported negative data for most of the deployment, along with some noisy and out of range values (09/03/23 - 09/17/23), possibly due to fouling of flow path. Values will be compared to nitrate water sample results for potential drift correction, if possible.*

SBOO-06

- *August – December 2024: Sea-Bird SUNA nitrate sensor @ 26 m: values spiked high and then flatlined to -1 uM for most of the deployment (08/19/24). Beginning in late December 2024, the sensor appeared to recover and report reasonable values, so the sensor will be further investigated upon recovery and values will be compared to nitrate water sample results.*
- *January 2025: Small loss of all real-time data occurred due to a software bug in SIO anti-malware software on the data server (01/28/25 - 01/31/25). The bug was resolved quickly and real-time data communications resumed.*
- *No other significant instrument/equipment issues noted for 2024.*

ROTV

- *February 26 – February 29, 2024: EIVA (ROTV manufacturer) trainer present for training of MBOO staff. ROTV survey and EIVA software training at MBOO facility with contracted EIVA training staff. Software limitations reduce the ability to collect entirety of sensor information.*
- *March 1 – 7, 2024: ROTV operations were completed in PLOO and SBOO regions.*
- *December 3 – 5, 2024: ROTV operations were completed in PLOO and SBOO regions.*

Planned Activities (2025)

The City continues to assess the effectiveness of the PTMP to develop a revised workplan for future mooring and ROTV deployments to assist in wastewater plume tracking. A revised work plan is being prepared and we hope to present it to the Regional Board for consideration by December 31, 2025, but in the meantime, the City will continue to implement the *2018 Plume Tracking Monitoring Plan for the Point Loma and South Bay Ocean Outfall Regions*.

2025*January*

- Continue to assess future of Adaptive Plume Tracking for PLOO and SBOO. Develop work plan for future effort.

February

- Complete analysis of data from PLOO and SBOO RTOMS for inclusion in the City's 2024 Interim Receiving Waters Monitoring Report.
- PLOO Static Mooring recovery and redeployment (02/24 - 02/26/2025)

March

- Submit 2024 PTMP Progress Report.
- Complete QA/QC review and assign qualifiers for RTOMS data through 2024.
- PLOO Static Mooring recovery and redeployment (03/17/2025)
- PLOO RTOMS – Continue assembly, testing, and documentation of mooring
- ROTV – Tentative ROTV surveys in PLOO/SBOO regions

April

- PLOO RTOMS - Deployment of sixth PLOO RTOMS
- SBOO static moorings – ROV retrieval and redeployment of static ADCP and thermistor moorings that did not surface in 2024

May

- SBOO RTOMS – Tentative retrieval of sixth SBOO RTOMS
- ROTV – ROTV survey PLOO/SBOO following quarterly water quality

June

- Submit 2024 Interim Receiving Waters Monitoring Report, including results from RTOMS
- SBOO RTOMS – Tentative deployment of seventh RTOMS (pending completion of spare buoy)

August

- ROTV – ROTV survey PLOO/SBOO following quarterly water quality

September

- RTOMS – Tentative capital improvement project – Begin testing phase of new data acquisition and website, transferring from SIO servers to City servers with the help of CGI and Zensar.
- PLOO/SBOO static moorings - Retrieval and redeployment of static ADCP and thermistor moorings in both regions.

November

- PLOO RTOMS – Tentative retrieval of sixth PLOO RTOMS
- ROTV – ROTV survey PLOO/SBOO following quarterly water quality

December

- PLOO RTOMS – Tentative deployment of seventh PLOO RTOMS (pending completion of spare buoy and CGI project).
- RTOMS – Tentative capital improvement project – Begin implementation phase of new data acquisition and website on City servers, with assistance from CGI.