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Ms. Joann Lim
Executive Office
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Re: U.S. Section of the International and Boundary Water Commission South Bay International Waste Water Treatment Plant Tentative Order No. R9-2014-0009 NPDES No. CA 0108928

Dear Ms. Lim:

Please accept this letter of comment to the San Diego Regional Water Quality Control Board (the Board) regarding Tentative Order No. R-9-2014-0009 for the South Bay International Wastewater Treatment Plant (IWTP).

The current monitoring programs for for the US International Boundary and Water Commission (IBWC), South Bay International Wastewater Treatment Plant (IWTP) are 19th and 20th century technologies that in 2014 are seriously out of date. The new monitoring requirements for the IWTP provide an opportunity for the SD Region, California Regional Water Quality Control Board to update and modernize the ocean monitoring plan, representing current oceanographic knowledge of the region and state of the art tools. We suggest the implementation of a numerical simulation of the San Diego South Bay region, including the Tijuana River Estuary and coastal ocean from Pt. Loma down to near Baja Malibu (Mexico), to help improve monitoring efforts, plan for future changes in outfall capacity, and respond to potential spills or other events.

SCCOOS already operates a plume tracker model. Unfortunately this model has several shortcomings that a detailed hydrodynamic model of the type we envision could remedy. In particular the plume tracker is driven with HF radar-derived surface currents. Although valuable, the surface current data is non-existent within ≈1.5 miles of the shoreline. The plume tracker has to extrapolate the currents closer to the shoreline, which is known to seriously misrepresent near-coast currents. In particular, nearshore (within 500 yds of shore) wave-driven currents can be much stronger than those offshore and dominate pollution transport. In general, coastal currents are impacted by a variety of mechanisms that are all captured in a modern hydrodynamic ocean models. In addition the plume tracker only predicts surface tracks, while in reality, the release and dispersion of plumes from both ocean outfalls and rivers are highly three-dimensional. For example, the SBOO is released at ≈30 m (100 ft) depth and depending on its buoyancy may rise to the surface or get trapped somewhere mid-water column,. From there is can move onshore subsurface and eventually mix agree to the surface closer to shore where mixing intensity is larger.

A state of the art realistic, hydrodynamic model for the region could be relatively easily built using existing realistic forcing parameters including: oceanic boundary conditions from the larger scale Southern California Bight model run maintained by JPL/SCCOOS, wave conditions from CDIP, atmospheric forcing from WRF, river flow (Tijuana River Estuary, San Diego River) and ocean outfall data (South Bay Ocean Outfall, SBOO from IBWC data, and even the Pt. Loma Ocean Outfall). The model could then be validated using hindcasts compared to existing datasets of currents, salinity, temperature, and pressure throughout the region from SCCWRP, IB09, and new mooring data from the city of San Diego (Tim Stebbins). The value of such a San Diego South Bay model system is illustrated in Figure 1, which shows an analogous modeling system (at a much larger scale) for the Columbia River (Oregon/Washington border) plume in the coastal ocean. The Columbia River plume can go north hugging the coast and not diluting (Figure 1,left) or propagate offshore and dilute (Figure 1,right). A San Diego South Bay model would reveal similar patterns and quantify plume transport and dilution rates.

A tool of this nature could significantly improve IWTP and SBOO management, for example:

1. Monitoring locations could be adapted to represent the most likely locations for the plume. Typical monitoring locations could be designed from plume location from multiple years of hindcast simulations. Adaptable monitoring programs could be established for particular events by running the model under realistic real-time forcing conditions.
2. Future changes in outfall capacity or concentrations on plume dispersion could be examined with the model. Increased outfall capacity could be tested directly using the model. Furthermore, the City of San Diego has plans to eventually implement an extensive recycled water program which would increase the brine concentrations in the effluent, thus changing its density and potentially greatly changing the plume's dispersion and ultimate location. Model runs with the anticipated future concentrations and capacity could be run in advance to help understand the potential impacts of this program on the coastal ocean.
3. This model could also be run in real-time to predict locations at risk for potential spills, including spills from trans-boundary flows, flow exceeding the IWTP capacity, or effluent through the SBOO exceeding required standards.
4. This model can differentiate sources of contamination. For example, when a beach becomes contaminated, a near real-time model can help determine whether the source for that contamination was trans-boundary flows, IWTP overflow, the SBOO, or transport from plumes off of the Mexican coastline. This would be valuable in helping to prevent further contamination, and mitigating contamination events.

These are just a few of the beneficial uses for such a tool. Further development could include real-time model operation/prediction which would predict beach closure events, incorporation of a bio-geochemical model, and a user-friendly on-line interface to investigate model results. Most importantly, however this tool would greatly enhance the monitoring program and help inform future management decisions to keep ocean waters safe for recreation, the ocean ecosystem, and fishing.

Please do not hesitate to contact us if you have further questions.
Thank you.

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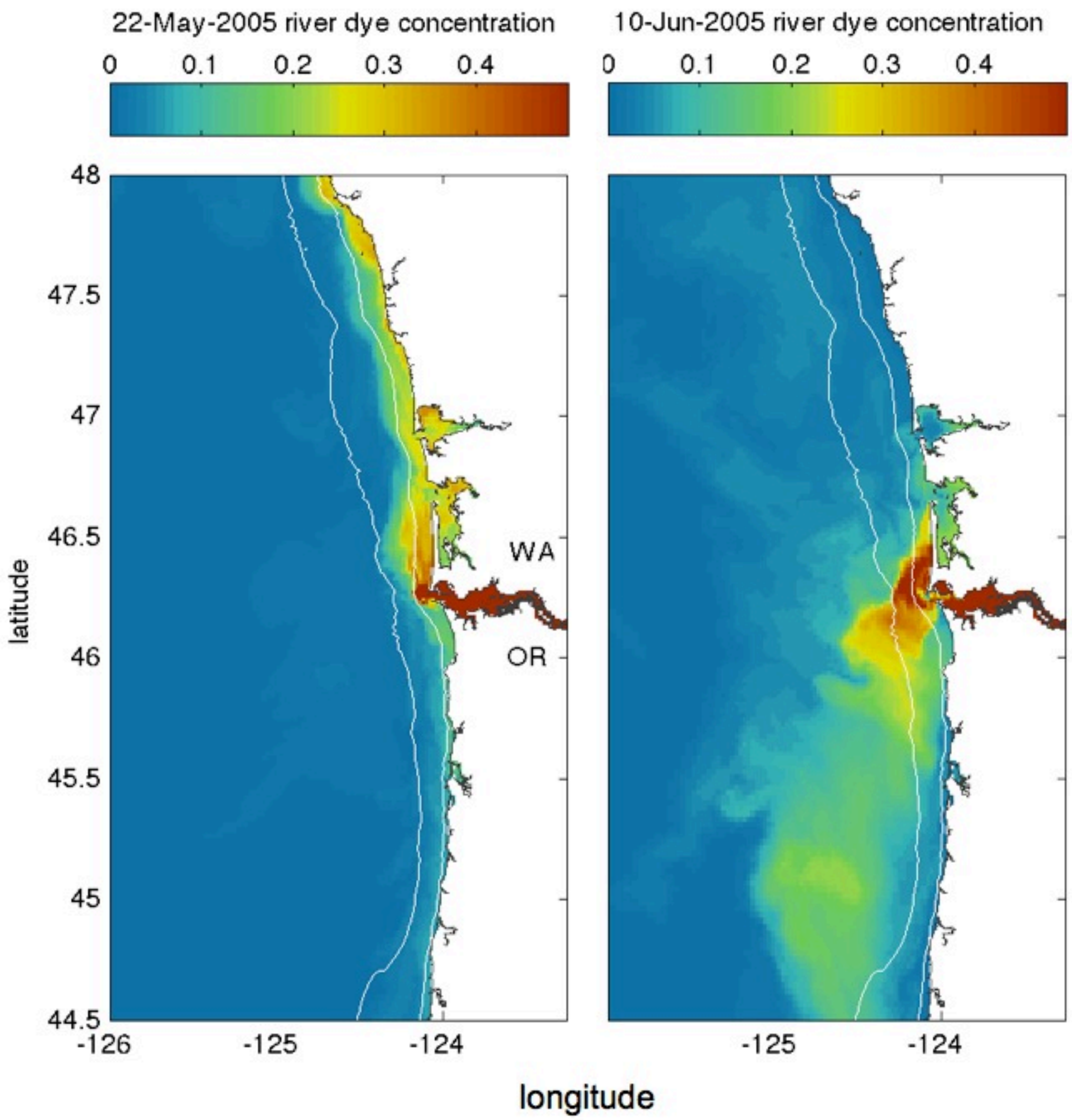

Figure 1: Columbia river (Oregon/Washington border) dye tracer model simulations showing dye concentration in color (see scale above). White curves represent the 100 ft and 1000 ft depth contours. (Left) The Columbia River plume flowed northward, hugging the coast all the way to Puget Sound with little dilution along the coast (Right) The plume flows southwestward and dilutes away from the source. SBOO model simulations would reveal similar information about the SBOO, TJRE, and other plumes in the San Diego South Bay Region. Figure from Giddings et al., 2014, in prep.