NOTICE OF SPECIAL MEETING
OF THE
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

ENGINEERING COMMITTEE
TELECONFERENCE MEETING

TELECONFERENCE PHONE NUMBER: (213) 279-1455
TELECONFERENCE ID: 732 508 907

September 17, 2020

8:30 a.m.

NOTICE IS HEREBY GIVEN that a Special Meeting of the South Orange County Wastewater Authority (SOCWA) Engineering Committee was called to be held by Teleconference on **September 17, 2020** at **8:30 a.m.** SOCWA staff will be present and conducting the call at the SOCWA Administrative Office located at 34156 Del Obispo Street, Dana Point, California. This meeting is being conducted via Teleconference pursuant to the California Governor Executive Order N-29-20.

MEMBERS OF THE PUBLIC ARE INVITED TO PARTICIPATE IN THIS TELECONFERENCE MEETING AND MAY JOIN THE MEETING VIA THE TELECONFERENCE PHONE NUMBER AND ENTER THE ID CODE. THIS IS A PHONE CALL MEETING AND NOT A WEB-CAST MEETING SO PLEASE REFER TO AGENDA MATERIALS AS POSTED WITH THE AGENDA THE WEB-SITE WWW.SOCWA.COM. ON YOUR REQUEST, EVERY EFFORT WILL BE MADE TO ACCOMMODATE PARTICIPATION. IF YOU REQUIRE ANY SPECIAL DISABILITY RELATED ACCOMMODATIONS, PLEASE CONTACT THE SOUTH ORANGE COUNTY WASTEWATER AUTHORITY SECRETARY'S OFFICE AT (949) 234-5452 AT LEAST TWENTY-FOUR (24) HOURS PRIOR TO THE SCHEDULED MEETING TO REQUEST DISABILITY RELATED ACCOMMODATIONS. THIS AGENDA CAN BE OBTAINED IN ALTERNATE FORMAT UPON REQUEST TO THE SOUTH ORANGE COUNTY WASTEWATER AUTHORITY'S SECRETARY AT LEAST TWENTY-FOUR (24) HOURS PRIOR TO THE SCHEDULED MEETING.

AGENDA EXHIBITS AND OTHER WRITINGS THAT ARE DISCLOSABLE PUBLIC RECORDS DISTRIBUTED TO ALL, OR A MAJORITY OF, THE MEMBERS OF THE SOUTH ORANGE COUNTY WASTEWATER AUTHORITY ENGINEERING COMMITTEE IN CONNECTION WITH A MATTER SUBJECT FOR DISCUSSION OR CONSIDERATION AT AN OPEN MEETING OF THE ENGINEERING COMMITTEE ARE AVAILABLE BY PHONE REQUEST MADE TO THE AUTHORITY ADMINISTRATIVE OFFICE AT 949-234-5452. THE AUTHORITY ADMINISTRATIVE OFFICES ARE LOCATED AT 34156 DEL OBISPO STREET, DANA POINT, CA ("AUTHORITY OFFICE"). IF SUCH WRITINGS ARE DISTRIBUTED TO MEMBERS OF THE ENGINEERING COMMITTEE LESS THAN TWENTY-FOUR (24) HOURS PRIOR TO THE MEETING, THEY WILL BE SENT TO PARTICIPANTS REQUESTING VIA EMAIL DELIVERY. IF SUCH WRITINGS ARE DISTRIBUTED IMMEDIATELY PRIOR TO, OR DURING, THE MEETING, THEY WILL BE AVAILABLE IMMEDIATELY ON VERBAL REQUEST TO BE DELIVERED VIA EMAIL TO REQUESTING PARTIES.

AGENDA

1. **Call Meeting to Order**

2. **Public Comments**

   THOSE WISHING TO ADDRESS THE ENGINEERING COMMITTEE ON ANY ITEM LISTED ON THE AGENDA WILL BE REQUESTED TO IDENTIFY AT THE OPENING OF THE MEETING AND PRIOR TO THE CLOSE OF THE MEETING. THE AUTHORITY REQUESTS THAT YOU STATE YOUR NAME

WHEN MAKING THE REQUEST IN ORDER THAT YOUR NAME MAY BE CALLED TO SPEAK ON THE ITEM OF INTEREST. THE CHAIR OF THE MEETING WILL RECOGNIZE SPEAKERS FOR COMMENT AND GENERAL MEETING DECORUM SHOULD BE OBSERVED IN ORDER THAT SPEAKERS ARE NOT TALKING OVER EACH OTHER DURING THE CALL.

3. Approval of Minutes

a. Engineering Committee Meeting of July 9, 2020
b. PC-5 Engineering Committee Meeting of July 16, 2020; and
c. Engineering Committee Meeting of August 13, 2020

Recommended Action:

Staff recommends the Engineering Committee to approve Minutes of July 9, 2020, and August 13, 2020 as submitted; and Staff recommends the PC-5 Engineering Committee to approve Minutes of July 16, 2020 as submitted

4. Operations Report

Recommended Action:

Information Item

5. Review of the Technical Assessment of the ROMS-BEC Model of Ocean Acidification in the Southern California Bright

Recommended Action: Staff recommends that the Engineering Committee support staffs intended efforts of working with CASA and SCAP for further discussion on this matter

6. Capital Improvement Construction Projects Report

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-15 Boad of Directors to approve Change Orders 9, and 10 totaling $68,291; and that the PC-17 Board of Directors to approve Change Orders 8 through 14 totaling $29,257

7. DUDEK Program and Construction Management Services Update [Project Committees 5, 17, & 24]

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-17 Board of Directors to approve Change Order 1 for the Dudek Program and Consttuction Management Services in the amount of $60,660 for a total revised contract amount of $317,205

8. San Juan Creek Ocean Outfall Junction Structure Rehabilitation Update [Project Committee 5]

Recommended Action:

Information Item

9. JB Latham Plant 2 Grit Area Rehabilitation Project [Project Committee 5]

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-2 Board of Directors to approve the SSMechanical JBL Plant 2 Grit Area Rehabilitation Project in the amount of $60,000

10. Coastal Treatment Plant Personnel Building Rehabilitation Project Update [Project Committee 15]

Recommended Action:

Information Item

11. Coastal Treatment Plant Sludge Force Main Design and Permitting Project Update [Project Committee 15]

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-15 Board of Directors to approve Change Order No. 18 for the Dudek Coastal Treatment Plant Sludge Force Main Design and Permitting Project for $78,100 for a total revised contract amount of $788,888 to the Board of Directors

Adjournment

I hereby certify that the foregoing Notice was personally emailed or mailed to each member of the SOCWA Engineering Committee at least 24 hours prior to the scheduled time of the Special Meeting referred to above.

I hereby certify that the foregoing Notice was posted at least 24 hours prior to the time of the above-referenced Engineering Committee meeting at the usual agenda posting location of the South Orange County Wastewater Authority and at www.socwa.com.

Dated this 8th day of September 2020.

B. Burnett

Betty Burnett, General Manager/Secretary
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

DRAFT

MINUTES OF REGULAR MEETING
OF THE
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

Engineering Committee

July 9, 2020

The Regular Meeting of the South Orange County Wastewater Authority (SOCWA) Engineering Committee Meeting was held on July 9, 2020, at 8:30 a.m. at their Administrative Offices located at 34156 Del Obispo Street, Dana Point, California. The following members of the Engineering Committee were present:

MARC SERNA	South Coast Water District
DON BUNTS	Santa Margarita Water District
MIKE MARQUIS	City of San Juan Capistrano
BOBBY YOUNG	El Toro Water District
MIKE DUNBAR	Emerald Bay Service District [arrived 8:37 a.m.]
ROD WOODS	Moulton Niguel Water District
DAVE SHISSLER	City of Laguna Beach
KEVIN BURTON	Irvine Ranch Water District

Absent:

LORRIE LAUSTEN	Trabuco Canyon Water District
DAVE REBENSDORF	City of San Clemente

Staff Present:

BETTY BURNETT	General Manager
JASON MANNING	Director of Engineering
DAVID BARANOWSKI	Senior Engineer
RONI YOUNG	Associate Engineer
AMBER BAYLOR	Director of Environmental Compliance
JIM BURROR	Director of Operations [arrived 8:43 am.]
JEANETTE COTINOLA	Contracts/Procurement Administrator
DANITA HIRSH	Executive Assistant

Also Present:

DENNIS ERDMAN	South Coast Water District
TARYN KJOSLING	South Coast Water District
NEELY SHAHBAKHTI	El Toro Water District

1. Call Meeting to Order

Mr. Manning, Director of Engineering called the meeting to order at 8:31 a.m.

2. Public Comments

None

3. Approval of Minutes

a. Engineering Committee Meeting Minutes of June 11, 2020

ACTION TAKEN
Motion was made by Mr. Woods and seconded by Mr. Bunts to approve the June 11, 2020 Engineering Committee Meeting Minutes as submitted.

Motion Carried:	Aye 5, Nay 0, Abstained 3, Absent 2	
	David Shissler (CLB)	Aye
	Dave Rebensdorf (CSC)	Absent
	Mike Marquis (CSJC)	Aye
	Mike Dunbar (EBSD)	Absent
	Bobby Young (ETWD)	Aye
	Kevin Burton (IRWD)	Abstain
	Rod Woods (MNWD)	Aye
	Marc Serna (SCWD	Aye
	Don Bunts (SMWD)	Aye
	Lorrie Lausten (TCWD)	Absent

4. Operations Status Report

Mr. Burror reported several construction projects are in progress. He noted that efforts are being made for getting invoices into accounting in a timely manner for the ongoing preparations of the Use Audit. He stated staff continues to follow the COVID Exposure Control Plan for practicing social distancing, controlled locker room and breakroom area usage, and assuring employees are wearing the proper PPE when in closed proximity. An open discussion ensued.

Ms. Baylor reiterated from Mr. Burror's report on preparing for the Use Audit. She stated she would be distributing the Use Audit narrative in an Excel format describing the methodology for the flows and solids allocations, and how they are calculated. She continued and explained that member agencies would have three weeks to review and provide comments on the data prior to finalization. An open discussion ensued.

This was an Information item; no action was taken.

5. Capital Improvement Construction Projects Report

Mr. Manning reported the changes and improvements made to the CIP reports. He stated he was expecting the design for the PC-15 Sludge Force Main to be completed around mid-August, and then it would be going out to bid soon after that. He stated the application for extending the Coastal Development permit had been submitted and was expecting approval soon, and that he would notify the committee as soon as the permit was approved. He also stated Lee & Ro would soon finish the design on the PC-17 Aeration upgrade project. An open discussion ensued.

Ms. Young reported there are three change orders to the JBL Package B Project. C/O no. 7 is $7,314 for additional concrete associated with Digester 4; C/O no. 8 is credit of $1,829 to repair the existing electrical box damaged by the contractor (SOCWA paid for the repair and is deducting the cost from the overall contract amount); and C/O 9 is $18,678 to change out 26 telescoping valve boxes from carbon to stainless steel to extend the life particularly of those that are submerged in wastewater. Ms. Young requested approval of said change orders from PC-2 members. An open discussion ensued.

ACTION TAKEN
The PC-2 members concurred to forward change orders 7, 8, and 9 totaling $25,992 to the Board of Directors for approval.

Mr. Baranowski reported on key issues that were unknown or unforeseen conditions at the CTP facility that caused the need for change orders 3 through 7. He noted they were for repairs relating to things that needed to be moved underneath the switchgear building while excavating, there were anchor bolts in the walls of the secondary basin left over from the original sludge collector unit that had to be removed to prevent continual corrosion; there was broken up concrete behind the slide gate needing to be repaired prior to installing the new gate; and thicker wear strips had to be purchased. An open discussion ensued.

The PC-15 members concurred to forward change orders 3 through 7 totaling $39,231 to the Board of Directors for approval.

Mr. Manning reported there were two change orders for the Regional Treatment Plant. One was for the Ductbank Vault size change needed to accommodate the existing utilities and sump to prevent water intrusion. The second change order was for the Energy Building anchor embedment. While drilling, the contractor came across a steel beam that was embedded in the concrete that had to be removed before the hole drilling could continue. An open discussion ensued.

Mr. Young noted ETWD's concerns on the project financial status shown on page 13 of the agenda packet regarding cash flow collected vs. contract amount.

ACTION TAKEN
The PC-17 members concurred to forward change orders 6 and 7 totaling $47,971 to the Board of Directors for approval.

6. San Juan Creek Ocean Outfall Junction Structure Rehabilitation (Project Committee 5) Update

Mr. Manning reported on an RFP that went out for bringing on a contractor to help with the design bid for the project. He stated the draft RFP was sent to the committee last month for review and that the goal was to have proposals available for review for the meeting today. However, the contractors requested more time and time was extended an additional week. He also stated that he would like to hold a PC-5 Engineering meeting within the next week to review and discuss any comments and get feedback on the proposals before going to the PC-5 Board for approval. An open discussion ensued.

Mr. Manning polled the PC-5 members who agreed to set a meeting to review proposals on July 16, 2020, at 2:00 p.m.

ACTION TAKEN
The PC-5 members concurred to meet on July 16, 2020, at 2:00 p.m.

There being no further business, Mr. Manning adjourned the meeting at 9:17 a.m.

I HEREBY CERTIFY that the foregoing Minutes are a true and accurate copy of the Minutes of the Regular Meeting of the South Orange County Wastewater Authority Engineering Committee of July 9, 2020, and approved by the Engineering Committee and received and filed by the Board of Directors of the South Orange County Wastewater Authority.

Betty Burnett, General Manager/Secretary
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

DRAFT

MINUTES OF REGULAR MEETING
OF THE
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

PC-5 Engineering Committee

July 16, 2020

The Special Meeting of the South Orange County Wastewater Authority (SOCWA) PC-5 Engineering Committee Meeting was held on July 16, 2020, at 2:00 p.m. at their Administrative Offices located at 34156 Del Obispo Street, Dana Point, California. The following members of the Engineering Committee were present:

MARC SERNA	South Coast Water District
DON BUNTS	Santa Margarita Water District
MIKE MARQUIS	City of San Juan Capistrano
ROD WOODS	Moulton Niguel Water District

Absent:

DAVE REBENSDORF	City of San Clemente

Staff Present:

JASON MANNING	Director of Engineering
BETTY BURNETT	General Manager
DAVID BARANAWSKI	Senior Engineer
RONI YOUNG	Associate Engineer
JEANETTE COTINOLA	Contracts/Procurement Administrator
DANITA HIRSH	Executive Assistant

Also Present:

LAWRENCE BROTMAN	City of San Clemente

1. Call Meeting to Order

Mr. Manning, Director of Engineering called the meeting to order at 2:03 p.m.

2. Public Comments

None

3. San Juan Creek Ocean Outfall Junction Structure Rehabilitation Constructability Proposal Review

Mr. Manning reported on the San Juan Creek Outfall Rehabilitation project that the RFP for the Phase I, Constructability Review, that the project RFP was distributed to five contractors on June 5, 2020. He stated that, although Pascal & Ludwig, Filanc and Kiewit Infrastructure West were in attendance at the pre-proposal meeting that was held at the site of Doheny State Beach on June 16, 2020, only one proposal was submitted from Filanc. An open discussion ensued.

ACTION TAKEN
The PC-5 members concurred to recommend to the PC-5 Board to award the Rehabilitation Constructability Review, Phase I, contract to Filanc in the amount of $125,048.

Motion Carried:	Aye 4, Nay 0, Abstained 0, Absent 1	
	Dave Rebensdorf (CSC)	Absent
	Mike Marquis (CSJC)	Aye
	Rod Woods (MNWD)	Aye
	Marc Serna (SCWD	Aye
	Don Bunts (SMWD)	Aye

4. <u>San Juan Creek Ocean Outfall Junction Structure Rehabilitation Black and Veatch Design Contract Amendment No. 1</u>

Mr. Manning reported that Black and Veatch was issued a purchase order for completing the design of the SJCOO Junction Structure Rehabilitation Project with a completion date of December 31, 2021. He stated California State Parks issued a notification regarding the future shut down of the Doheny State Beach campsite in November 2020 through March 2021 to perform upgrades to their campsites. This provides an ideal window to complete the Junction Structure work, but the design process would need to be greatly accelerated. SOCWA, Dudek, and Black and Veatch met with the Coastal Commission to obtain an agreement for expediting a Coastal Development Permit that would allow the project to be completed along with the California State Parks project when the campsites are closed. The PC-5 Engineering Committee requested that Task A.3 “Permitting Support (as-Needed Allowance)” for $16,800 be removed from the award total. An open discussion ensued.

<u>ACTION TAKEN</u>
The PC-5 members concurred to recommend to the PC-5 Board to approve amendment to Black and Veatch Design Contract in the amount of $65,300.

Motion Carried:	Aye 4, Nay 0, Abstained 0, Absent 1	
	Dave Rebensdorf (CSC)	Absent
	Mike Marquis (CSJC)	Aye
	Rod Woods (MNWD)	Aye
	Marc Serna (SCWD	Aye
	Don Bunts (SMWD)	Aye

There being no further business, Mr. Manning adjourned the meeting at 2:43 p.m.

I HEREBY CERTIFY that the foregoing Minutes are a true and accurate copy of the Minutes of the Regular Meeting of the South Orange County Wastewater Authority PC-5 Engineering Committee of July 16, 2020, and approved by the Engineering Committee and received and filed by the Board of Directors of the South Orange County Wastewater Authority.

Betty Burnett, General Manager/Secretary
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

DRAFT

MINUTES OF REGULAR MEETING
OF THE
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

Engineering Committee

August 13, 2020

The Regular Meeting of the South Orange County Wastewater Authority (SOCWA) Engineering Committee Meeting was held on August 13, 2020, at 8:30 a.m. at their Administrative Offices located at 34156 Del Obispo Street, Dana Point, California. The following members of the Engineering Committee were present:

MARC SERNA	South Coast Water District
DON BUNTS	Santa Margarita Water District
MIKE MARQUIS	City of San Juan Capistrano
BOBBY YOUNG	El Toro Water District
MIKE DUNBAR	Emerald Bay Service District [exited 9:11 a.m.]
ROD WOODS	Moulton Niguel Water District
HANNAH JOHNSON	City of Laguna Beach
KEVIN BURTON	Irvine Ranch Water District
LORRIE LAUSTEN	Trabuco Canyon Water District
DAVE REBENSDORF	City of San Clemente

Staff Present:

JASON MANNING	Director of Engineering
DAVID BARANOWSKI	Senior Engineer
RONI YOUNG	Associate Engineer
AMBER BAYLOR	Director of Environmental Compliance
JIM BURROR	Director of Operations [arrived 8:43 am.]
JEANETTE COTINOLA	Contracts/Procurement Administrator
DANITA HIRSH	Executive Assistant

Also Present:

DENNIS ERDMAN	South Coast Water District
TARYN KJOSLING	South Coast Water District
JOE McDIVITT	South Coast Water District
DENNIS CAFFERTY	El Toro Water District
NEELY SHAHBAKHTI	El Toro Water District
MATT COLLINGS	Moulton Niguel Water District
JESUS GARIBAY	Moulton Niguel Water District

1. Call Meeting to Order

Mr. Manning, Director of Engineering called the meeting to order at 8:30 a.m.

2. Public Comments

None

3. Operations Status Report

Mr. Burror reported that SOCWA staff is meeting with Moulton Niguel Water District (MNWD next week to discuss the AWT improvements needed due to the delay of the AWT No. 2 Rehabilitation Project. He noted the estimated costs are $200k to $300k, and that the pond valves and gates are also in need of overhaul. He stated they were not shown in the drawings for the AWT No. 2 Rehabilitation Project, and that he would be getting prices for overhaul of the valves and gates for the upcoming AWT meeting with MNWD.

This was an Information item; no action was taken.

4. Use Audit Flow and Solids Methodology - Annual Update FY 19-20 (under separate cover)

[Amber needs to check this section]

Ms. Baylor reported that SOCWA was in its third year of transparency of the Use Audit Methodology. She stated several comments were received from Moulton Niguel and South Coast in relations to PC-12 use vs. production which was detailed in Table 1 on page 2 of the agenda packet. She stated that the primary focus being compliance with the permit and quality control associated with the review of data and that process flow that staff is recommending that the recycled water production data continue in place as the best measure allocation for PC-12 for the fiscal year. An open discussion ensued.

ACTION TAKEN
The Engineering Committee conceded to recommending to the Board of Directors to authorize utilizing the internal recycled water sales records and recycled water interagency transfer data to determine the costs to be collected from or paid to their partner agencies for the use of recycled water. Transition of the SOCWA costs to a use basis of allocation does not alleviate the need for individual member agencies to apportion and collect their own costs of recycled water system deliveries or to determine the rates to charge their neighboring agencies for the sharing of recycled water resources. The determination of metering, customer usage and area usage of recycled water is a retail function best performed at the individual member agency level. Further, SOCWA would need to acquire additional staff to take on this accounting function in a manner that could assure the accuracy of the reported use data. Accuracy would need to involve separate agreements that allowed for functions such as data auditing.

5. Capital Improvement Construction Projects Report

Mr. Manning reported the design of the PC-15 Sludge Force Main should be completed by the end of the month, and then will go out to bid. He stated the Coastal Development Permit (CDP) hearing for the application extension that was schedule for August go pushed out to September, and that once the extension is approved the permit would be issued.

Mr. Manning reviewed the change order reports with the committee and noted there was one change order on the CTP Facility Improvements project for PC-15. Noting that due to the change in the SCE's standards on the type of Transformer Slab Box that could be installed having a cost impact of $4,378. An open discussion ensued.

ACTION TAKEN
The PC-15 members concurred in support for change order 8 totaling $4,378 and recommendation to the Board of Directors for ratification. The Moulton Niguel Water District representative abstained.

6. Innovative Biosolids Update (Project Committee's 2 & 17)

Ms. Baylor reported that SOCWA was in its third year of transparency of the Use Audit Methodology. She stated several comments were received from Moulton Niguel and South Coast Water District as detailed in the emailed responses to member agencies. She stated that the primary focus of actions related to PC12 are efficiencies related to compliance with the permit and quality control associated with the review of data and reporting to the SDRWQCB as the best measure for PC-12 for the fiscal year. An open discussion ensued.

ACTION TAKEN
The Engineering Committee recommended to the Board of Directors to approve the staff recommendations in the Use Audit staff report.

7. San Juan Creek Ocean Outfall Junction Structure Rehabilitation (Project Committee 5) Update

Mr. Manning gave a presentation detailing the status and historical data of the San Juan Creek Ocean Outfall Junction Structure Rehabilitation Project. The presentation is pages 13 through 22 of the agenda packet. An open discussion ensued.

This was an Information item; no action was taken.

There being no further business, Mr. Manning adjourned the meeting at 9:44 a.m.

I HEREBY CERTIFY that the foregoing Minutes are a true and accurate copy of the Minutes of the Regular Meeting of the South Orange County Wastewater Authority Engineering Committee of August 13, 2020, and approved by the Engineering Committee and received and filed by the Board of Directors of the South Orange County Wastewater Authority.

____
Betty Burnett, General Manager/Secretary
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY

PEER-REVIEW REPORT: SCCWRP Implementation of the ROMS/BEC Modeling System for Ocean Acidification/Hypoxia Assessments in the Southern California Bight

Prepared by: Scott A. Jenkins, Ph.D. (Michael Baker International) **6 August 2020**

1) Pedigree and Present State of the ROMS/BEC Modeling System

ROMS/BEC is a multi-disciplinary process-based modeling system consisting of an ocean circulation model, the *Regional Oceanic Modeling System* (ROMS), coupled to a geochemical model that requires forcing to an ichthyoplankton growth model, the *Biogeochemical Elemental Cycling* (BEC) model. The coupled ROMS/BEC modeling system is being constructed by the Southern California Coastal Waters Research Program (SCCWRP), for the expressed purpose of assessing the role of local anthropogenic effects in causing ocean acidification and hypoxia. The ROMS model development was led by Prof. Jim McWilliams at UCLA. As a stand-alone model, the ROMS may be consider a mature coastal circulation simulation tool, with an established pedigree founded on peer-reviewed scientific journal publications specific to the ROMS architecture and algorithms, (cf. Shchepetkin and McWilliams, 2005, 2009, & 2011; Mason, et al., 2010); with several additional peer-reviewed scientific journal publications on ROMS refinements, (cf. Dauhajre, and McWilliams, 2017, 2018, and 2019). On the other hand, the BEC model does not yet have an established pedigree in the peer-reviewed scientific literature. There was an earlier variant of the BEC developed by Prof. Keith Moore at UC Irvine that was validated in low-latitude environments, and has been published in peer-reviewed scientific journals, (cf. Moore, et al., 2002 & 2004); but that is not the same BEC model being used in the coupled ROMS/BEC model system. The particular BEC in the coupled ROMS/BEC being promoted by SCCWRP is under development by a team led by Prof. Curtis Deutsch at the University of Washington, and a manuscript about this model is still under review by the journal, *Progress in Oceanography,* which is published by Elsevier in the United Kingdom, (cf. Deutsch, et al, in review). This manuscript reports on a new variant of the BEC being applied at 4 km resolution in the California Current. *Progress in Oceanography* accepts manuscripts of greater length than the top-flight journals would accept, but it is a sensible choice given the complexity of the BEC and the necessity to detail model architecture, algorithms, validation and predictive kill, particularly in light of the large numbers of free parameters this model is built upon. Among these many details, there appears to be inadequacies in the formulation of *photosynthetically available radiation* (PAR) used in the BEC, based on Prof Deutsch's 2-hour WebEx presentation at the *Validation and Scenarios Subcommittee* held 23 January 2020. Those concerns are detailed below under the Comments Section.

While the stand-alone ROMS and BEC models have either been published or have manuscripts under review, there are no manuscripts available regarding SCCWRP's implementation of a coupled ROMS/BEC modeling system on scales as fine as 300 m. At the 23 January 2020 Validation and Scenarios Subcommittee, Dr. Martha Sutula (SCCWRP project manager) announced those manuscripts will not be completed for at least 3 more months; and given typical journal review cycles, the manuscripts will probably not be in-press for at least another year substantiated by articulation by Dr. Sutula to the science advisory group through email distribution on 7/22/20. Regardless, three such manuscripts are planned for production, including one on architecture, algorithms and computational details of the coupled ROMS/BEC modeling system, cf. McLaughlin et al., (in prep.[1]); another on effects of mesoscale and sub-mesoscale circulation on the nitrogen cycle and biological productivity, cf. Kessouri et al., (in prep.[2],[3]), and one addressing inputs to the ROMS/BEC model from anthropogenic sources, cf. Sutula et al., (in prep[4]). Presumably, the latter manuscript in preparation is aimed at proving SCCWRP's hypothesis that anthropogenic sources are causing ocean acidification and hypoxia in the Southern California Bight. In order for this hypothesis to be considered well proven and suitable to guide regulatory or legislative policy formulation, an extraordinary degree of ROMS/BEC validation must be available. While the title of McLaughlin et al., (in prep.) suggests some degree of validation may be forthcoming, Dr. Martha Sutula described SCCWRP plans to embark on more extensive validation over the next 3 years once these manuscripts have been completed.

2) General Comments:

It appears that SCCWRP's ROMS/BEC development effort is focused on a specific modeling problem, i.e. predicting episodes of excessive growth rates in phytoplankton populations, commonly referred to as *algal blooms*. These blooms are comprised of a variety of phytoplankton species, including diatoms, dinoflagellates, coccolithophorids and micro-flagellates. While blooms can provide abundant food to organisms higher up the food chain, too much phytoplankton can also do harm. A small proportion of the bloom population (principally dinoflagellates) produce highly potent toxins that can be further biomagnified when the bloom populations are consumed by other organisms, especially filter feeders such as clams and mussels. Domoic acid, first identified in 1987 is the lead neurotoxin frequently connected to

[1]McLaughlin et al. Characterizing the Role of Anthropogenic Nutrient Inputs on Coastal Ocean Biogeochemical Cycling in the Southern California Bight, USA, in preparation for submission to *Estuarine and Coastal Shelf Science (ECSS)*

[2] Kessouri et al., General science communication manuscript describing effects of land- and atmospheric nutrients on SCB nearshore productivity and biogeochemistry, ready for submission to *Proceedings of the National Academy of Science (PNAS)*.

[3] Kessouri et al., Validation of an oceanic physical and biogeochemical model to investigate coastal eutrophication, ready for submission to *Journal of Advances in Modeling Earth Systems (JAMES)*

[4] Sutula et al., Fluxes of Terrestrial and Atmospheric Nitrogen, Phosphorus and Carbon to the Southern California Bight, in preparation for submission to *Journal of Earth Systems Data* (describes the terrestrial and atmospheric forcing data set used in the model runs)

harmful algal blooms. Consequently, monitoring bloom episodes has been ongoing for many decades throughout the Southern California Bight to ensure food safety, and SCCWRP has been an important contributor to those monitoring efforts, while conducting basic research into understanding causation algal bloom events. However, research scientists at NOAA (McKibben, et. al 2017) have linked the domoic acid to climatic fluctuations and shellfish potentially indicating a larger driver to harmful algal blooms based on increases to sea surface temperatures.

It has been well known for five decades that phytoplankton population growth becomes especially rapid when nutrient levels rise in the ocean water mass, in particular concentrations of dissolved nitrates, phosphates and iron, (cf. Eppley, et al., 1969; Maclsaac & Dugdale, 1969; Barsanti & Paolo, 2014). The concentrations of these nutrients limit the photosynthetic rates of the phytoplankton, and hence their growth rates. Rising temperatures in coastal waters due to El Nino events or possibly global warming has also been linked to onset and frequency of algal blooms (Moore, et al., 2011). However, SCCWRP has extrapolated these general findings to a provocative hypothesis that discharges of treated wastewater from ocean outfalls are triggering algal blooms, inducing hypoxia and acidification of the nearshore waters of the Southern California Bight despite mass loadings associated with these nutrients decreasing due to decreases in effluent discharges along the Southern California Coast. Not accounted for in the ROMS-BEC model is the significant sources of a number of natural sources of nutrient fluxes into the waters of the Southern California Bight, including upwelling of nutrient rich detrital pools along the continental margin, shelf and submarine canyons, (e.g., Thomas & Brickley, 2006; Mackas, et al., 2006; Bograd et al., 2009); nutrients adsorbed on wash-load sediments discharged by rivers and streams or from non-point source agricultural runoff or bluff over-pour flows during rainfall (e.g., Inman and Jenkins, 2009); dissolved organic matter (DOM) from river discharges or agricultural runoff; scour and resuspension of nutrient rich benthic sediments by waves and currents during ocean storms (e.g., Jenkins, et al, 2007); and airborne fallout of nutrient bearing dust (both dry and wet), particularly iron-rich dust which is abundant in Southern California coastal geology.

In order for the SCCWRP hypothesis to be viable, SCCWRP must prove that the concentrations of dissolved nitrates and ammonia from ocean outfall discharges greatly exceeds that from natural sources over expanses of ocean comparable to the size of an algal bloom footprint. This is a tremendous challenge, not only in terms of achieving sufficient predictive skill and spatial resolution from the ROMS/BEC modeling system, but also in terms of amassing the observational data of natural nutrient fluxes needed to initialize the model over the 1996-2016 period of record that SCCWRP has proposed for model validation (cf. Sutula, 2020). Issues surrounding populating the ROMS/BEC model with continuous time series of natural nutrient fluxes over a 20-year period of record will be examined in greater detail in Section 3 below.

There are four bio-geochemical processes embedded in the SCCWRP hypothesis that ocean outfalls cause acidification and hypoxia. 1) if the ocean outfalls produce excess nutrient loading in nearshore waters, then this excess nutrification will accelerate of photosynthetic rates and growth rates of phytoplankton, leading to algal blooms; 2) oxygen uptake due to respiration by both the phytoplankton and the zooplankton that graze on them begins the onset of hypoxia while releasing CO_2 that is converted by photosynthesis into the organic compounds that comprise the cellular structures of the phytoplankton 3) as the algal blooms die off, decay of the overly-abundant dead phytoplankton and zooplankton further accelerates oxygen depletion while converting the organic carbon of the dead organisms back into dissolved CO_2 ; 4) the dissolved CO_2 then forms carbonic acid H_2CO_3 which disassociates into carbonate CO_3^{2-} or bicarbonate HCO_3^- ions and free hydrogen ions H^+, the latter causing acidification.

Consequently, the net result of the life cycle of an algal bloom is: 1) hypoxia from the consumption of oxygen due to respiration and decay processes, and 2) acidification from the net release of CO_2 , a biproduct of respiration the decay processes. Acidification, however, is a short-lived transient condition due to the carbon dioxide cycle in seawater, as discussed below. In addition to the toxins that are released from the excess dinoflagellate population sub-group, there is also additional collateral harm from the bloom life cycle, namely, mortality of eggs, larvae and other delicate organisms that are sensitive to either the lower pH from acidification or the depleted dissolved oxygen levels from hypoxic effects.

There are several inconsistences between the SCCWRP hypothesis and bloom life cycle behavior, as well as the bio-geochemical processes controlling that behavior. The first is that algal blooms are not persistent, steady-state events, but rather, are episodic occurrences with an accelerated phytoplankton growth period followed by a die off. Blooms tend to occur seasonally, typically in spring and fall, and are frequently correlated with coastal upwelling events, (cf., Thomas & Brickley, 2006; Mackas, et al., 2006; Bograd et al., 2009). If the ocean outfalls were the source of the excess nutrient loading that triggered these blooms, then there would be no die off since ocean outfalls are a continuous source of nutrients; and a perpetual bloom ought to linger continuously throughout the year in the coastal waters of the Southern California Bight as compared to constant nutrient influx into the Mississippi River and resultant algal blooms. Fifty years of monitoring has found no such perpetual bloom exists in the Southern California Bight. The die-off phenomena are best explained by depletion or exhaustion of the excess nutrient loading that triggers accelerated photosynthetic rates and growth rates in the initial phytoplankton population. (Photosynthetic shading by dense blooms will not, by itself, cause a die off, but merely an approximate 10% reduction in maximal photosynthetic rates, cf. McAllister *et al,* 1964; Humphrey, 1975; Parsons *et al,* 1984; and Langdon, 1988). The fact the algal blooms are spawned and die off episodically indicates that ocean outfalls do not provide enough excess nutrification to either provoke or sustain an algal bloom.

Another inconsistency appears to exist between the SCCWRP hypothesis and carbon dioxide chemistry in seawater. The SCCWRP hypothesis has been extrapolated to a notion that the acidification produced during a bloom life cycle is a persistent, long lasting change to the coastal waters of the Southern California Bight. This notion is inconsistent with the fact that carbon dioxide acts as a buffer against sudden changes in the acidity or alkalinity of ocean water. The carbon dioxide cycle though out an algal bloom life cycle can be summarized by the following series of equilibrium reactions:

$$\xrightarrow[+decay]{respiration} CO_2(g) \overset{K_s}{\rightleftharpoons} CO_2(aq) + H_2O \overset{K_0}{\rightleftharpoons} H_2CO_3 \overset{K_1}{\rightleftharpoons} HCO_3^- + H^+ \overset{K_2}{\rightleftharpoons} CO_3^{2-} + 2H^+ \qquad (1)$$

On the planet earth, carbon dioxide only exists in the gaseous or solid phases (Skirrow, 1975). Hence CO_2 is initially released as a gas during the respiration or decay processes of the bloom life cycle and is subsequently dissolved in the surrounding seawater, indicated by $CO_2(g)$ for carbon dioxide in the gaseous phase on the left hand side of equation (1) and by $CO_2(aq)$ for carbon dioxide in aqueous solution. The stoichiometric concentration of dissolved $[CO_2(aq)]$ in seawater is limited by a solubility constant, K_s, that is a function of the fugacity of carbon dioxide $fCO_2(g)$ according to

$$K_s = \frac{[CO_2(aq)]}{fCO_2(g)} \qquad (2)$$

where the fugacity of carbon dioxide is proportional to the partial pressure of carbon dioxide, δp, by the fugacity coefficient, ϕ, or $fCO_2(g) = \phi\delta p$, (cf., Skirrow, 1975). The decisive point here is that the ocean cannot accept and retain unlimited amounts of dissolved CO_2, and any transient local concentration of dissolved CO_2 that exceed $K_s\phi\delta p$ will come out of aqueous solution and gas off into the atmosphere. Thus the solubility of gaseous CO_2 in seawater is the first of a series of reversible reactions triggered the respiration and decay of algal blooms can run either forward or backward depending on the local concentration of the reaction products appearing on the right hand side of each double reverse-arrow in equation (1).

The next reversible reaction in the respiration and decay chain reaction is the association reaction of aqueous CO2 with water molecules to form carbonic acid. As with all reversible reactions, the concentration of carbonic acid products $[H_2CO_3]$ is limited by an association constant, K_0

$$K_0 = \frac{[H_2CO_3]}{[CO_2(aq)]} \qquad (3)$$

But because the association reaction of CO_2 and H_2O is reversible, anytime the concentration of carbonic acid exceeds $K_0[CO_2(aq)]$, the excess carbonic acid will disassociate into dissolved CO_2 and water.

Once carbonic acid has formed, the reversible reaction chain propagated by respiration and decay can evolve into a series of acid-base pair dissociation reactions. These too are equilibrium reactions that can run forward or backward, and the forward (dissociation) reaction acts to reduce the pH of the water mass surrounding the bloom, potentially doing harm to organisms that require a steady pH for their life processes. These dissociation reactions liberate free hydrogen ions H^+ (causing pH to decline) and two base species, bicarbonate (HCO_3^-) and carbonate (CO_3^{2-}). The concentrations of hydrogen ions (which controls the acidity) is limited by the equilibrium constants (K_1, K_2) of these two reversible reactions, written as:

$$K_1 = \frac{[H^+][HCO_3^-]}{[H_2CO_3]} \quad \text{and} \quad K_2 = \frac{[H^+][CO_3^{2-}]}{[HCO_3^-]} \tag{4}$$

If acidification during the bloom life cycle elevates the hydrogen ion concentrations to levels where $[H^+] > K_1[H_2CO_3]$ or $[H^+] > K_2[HCO_3^{2-}]$, then the dissociation reactions on the right side of equation (1) will reverse, and the acid-base pairs will recombine to form carbonic acid, thereby elevating carbonic acid concentrations while raising the pH and suppressing acidification. If this recombination of the acid-base pairs produces excessive carbonic acid concentrations (greater than $K_0[CO_2(aq)]$) the series of reversible reactions will be driven further to the left hand side of equation (1), and the excess carbonic acid will dissociate into dissolved CO_2 and water. In this way the pH of seawater is held within a narrow range of variability by the buffering action of CO_2 chemistry in seawater. Hence, the addition of CO_2 by the respiration and decay processes of a bloom life cycle, (or the removal of CO_2 by photosynthetic activity the phytoplankton the removal of CO_2 by photosynthetic activity during the phytoplankton population explosion phase of an algal bloom), has little effect on the acid-alkaline balance of the seawater, (Dickson, 1984). Therefore, any acidification effects caused by the life cycle of an algal bloom will be short-lived.

Is it worth including Gibbs free energy into the discussion? As I think an important component is the temperature drivers as noted related to the NOAA work referenced above.

3) Detailed Comments

3.1) Spatial and Temporal Resolution:

In order to prove the SCCWRP hypothesis that over-nutrification by ocean outfalls leads to ocean acidification and hypoxia, the coupled ROMS_BEC must have sufficient spatial resolution to distinguish nutrient loading from an ocean outfall versus nutrient loading from coastal upwelling or from coastal rivers, streams and non-point source runoff, in particular, agricultural runoff. SCCWRP has taken the BEC model authored by Deutsch, et al., (in review) that was developed at 4 km resolution and has interpolated that gridding down to Δx = 300 m resolution. NPDES permit dilution studies using the EPA certified outfall dilution models (e.g. Visual Plumes (UM3), CORMIX or Plumes 18b) have shown that the *zone of initial dilution* (ZID) is significantly less than 300 m for most Southern California outfalls (cf. RWQCB, 2010, 2014, 2020). For example, Walker (2016) found that the ZID extends less than 50 m horizontally from the discharge ports of the Hyperion 5-mile outfall, the largest outfall in the Southern California Bight. Shallow outfalls with plume trapping closer to the sea surface, such as the San Juan Creek Ocean Outfall, have ZID's on the order of 100 m. ROMS_BEC horizontal grid resolution of 300 m is simply too large to avoid *spatial aliasing* of the initial dilution of Southern California outfalls, (cf. Yan, et al., 2016). In order to avoid spatial aliasing of the initial dilution and dispersion of an outfall plume it is necessary to have at least 2 grid cells to resolve the smallest horizontal length scale; which means that SCCWRP's coupled ROMS/BEC model must be gridded at 50 m resolution for a shallow outfall, and 25 m resolution for a deep outfall or 6 to 12 times finer resolution than was used in the validation examples SCCWRP showed at the 23 January 2020 Ocean Acidification Validation Subcommittee meeting.

As the model is gridded to finer and finer spatial resolution, computationally challenging problem arises, namely the time steps used by the ROMS/BEC must become shorter intervals. In order for the ROMS/BEC model to produce temporally stable solutions, the longest time step interval that can be used is limited by the *Courant-Friedricks-Lewy* (CFL) *Stability Criteria* (cf. Gallager et al., 1981) according to:

$$\Delta t \leq \frac{\Delta x}{\sqrt{2gh}} \tag{5}$$

where Δx is the grid cell horizontal dimension, h is the depth of the seabed, and g is the acceleration of gravity. For a deep outfall Hyperion, the depth is on the order of $h = 60$ m. With a horizontal grid resolution of $\Delta x = 25$ m to avoid spatial aliasing, the ROMS/BEC would have to run at time steps no longer than $\Delta t \leq 0.73$ sec, while a shallow outfall such as the San Juan Creek Ocean Outfall discharging at a depth of $h = 30.5$ m would require ROMS/BEC simulations at $\Delta t \leq 2.0$ sec time step intervals. No temporal resolution was mentioned at the 23 January 2020 Ocean Acidification Validation Subcommittee meeting and examples shown were merely snapshots. It appears from Chapter IIC of Sutula (2020) that the ROMS_BEC coastal simulations were run at the same time step intervals as the six-hourly reanalysis used for the Climate Forecast System Reanalysis (Saha et al., 2010). While time step intervals of $\Delta t = 6$ hr. may be adequate for modeling seasonal trends at 4 km horizontal resolution in the California Current along the continental margin, six-hourly time steps will not provide adequate temporal resolution for assuring accurate (stable) solutions of outfall and river plume dispersion in the nearshore environment, especially not when discharge rates of rivers and outfalls vary on time scales an order of magnitude smaller than six-hourly intervals.

3.3 Limitations on Photosynthesis and Growth Rates:

In order for the SCCWRP hypotheses to be true, nutrient abundance must be the dominant factor in triggering algal blooms, and ocean outfalls must be the predominant source of nutrients. To begin, even if nutrient abundance was the only causal factor of algal blooms, this hypothesis is not supported by volumetric comparisons between outfall discharge rates and coastal upwelling rates. The historic maximum discharge rate from the Hyperion 5-Mile Outfall (the largest outfall in the Southern California Bight) is $Q_{max} = 435.22$ mgd (19.07 m^3/s). Based on a 40-year wind record (1967-2007), Bograd, et al., (2009) reports the *cumulative upwelling index* (CUI) at a reference site offshore of the Hyperion outfall on edge of the San Pedro Shelf (33^0 50'N, 118^{0}40'W) is CUI = 26,929 m^3/s per 100 m of coastline. The *length of upwelling season index* (LUSI) at this reference site is LUSI = 357 days, so that the average daily upwelling rate is CUI/LUSI = 75.43 m^3/s per 100 m of coastline. The length of coastline comparable to the alongshore length of the Hyperion outfall diffuser is 2,316 m. Therefore the average daily flux from upwelling along a length of San Pedro Shelf comparable to the Hyperion diffuser is

$Q_{upwelling}$ = 174,726 m^3/s, which is 9,162 times greater than the historic maximum discharge of the Hyperion outfall. Furthermore, treatment levels at the Hyperion Wastewater Treatment Plant have removed at least 85% of the nutrified particles from the outfall effluent; whereas the upwelling along the San Pedro Self break is from nutrient detrital pools below the Ekman layer. Thus, nutrient-bearing fluxes from coastal upwelling along lengths of coastlines comparable to outfall diffusers, dwarfs even the historic maximum discharge of the largest ocean outfall in the Southern California Bight.

However, nutrient loading is not the only factor that stimulates or limits phytoplankton growth rates. The explosive growth rates that cause algal blooms require high levels of photosynthesis, which is a function of not only the concentrations of available nutrients; but also depends on the intensity of available light, referred to as irradiance. SCCWRP appears to have completely discounted the importance of irradiance in controlling photosynthetic rates, and therefore in limiting phytoplankton growth rates. In section III.D.3.e of Sutula (2020) it is claimed without proof that: "Light is rarely a limiting factor in the SCB. It could be colimiting with nutrients in the south part of the SCB during fall and winter". This conclusion was drawn from an overly simplistic formulation of irradiance in the BEC.

Photosynthesis, phytoplankton growth rates, and biomass (as measured by the chlorophyll-a proxy concentrations) are critically dependent on the irradiance occurring in a specific portion of the visible light spectra at wave lengths between λ = 400 nm and λ = 700 nm, referred to as PAR (photosynthetically available radiation). Generally irradiance decays exponentially with depth, z, in the water column from a maximum level at the sea surface, $E_{PAR}(0)$, according to

$$E_{PAR} = E_{PAR}(0)\exp\left[-C_d\, z\right] \tag{6}$$

where C_d is the diffuse attenuation coefficient. The concern which arises here from Prof Deutsch's 23 January 2020 WebEx presentation at the *Validation and Scenarios Subcommittee* is that the diffuse attenuation coefficient appears to have been taken as a constant in the stand-alone BEC model. The reality is that C_d is a complex function of both the size and concentration of suspended particulate in the water column (including both inorganic sediment particles, as well as organic particulate such as plankton and detritus), as well as dissolved organic matter (DOM), in particular, colored dissolved organic matter (CDOM). Suspended particulate and DOM can cause abrupt, anisotropic changes to both downwelling and upwelling irradiance through the effects of scattering and absorption of the incident light. Consequently, the more complete representation of the diffuse attenuation coefficient is given by Morel and Loisel (1998) as:

$$C_d = \frac{a}{\cos\Omega}\left[1 + \frac{b}{aB_0}\int_0^{\theta} \beta(N,k,\theta)\,d\theta\right]^{0.5} \tag{7}$$

$$\text{where: } B_0 = \int_0^{\pi} \beta(N_0, k_0, \theta) d\theta \text{ at } z = 0$$

Here, Ω is the angle of down-welling light relative to the unit sea surface normal vector; a is the absorption coefficient; b is the scattering coefficient; and $\beta(k, N, \theta)$ is the volume scattering function normalized to spherical suspended particulate with non-dimensional particle diameter, $k = D / 2\lambda$, where D is the physical particle diameter, and $N = f(D, z)$ is the particle number concentration (numbers of scattering and absorbing particles per unit volume), which is a function of depth and particle diameter; θ is the scattering (solid) angel in steradians; and B_0 is the total volume scattering function at the sea surface, integrated over all possible scattering directions between fully back scattered ($\theta = 0$) and fully forward scattered ($\theta = \pi$). The most efficient scattering and absorbing particles at PAR wave lengths are in the size regime of clay and fine silt particulate, with physical diameters between 0.1 μm $\leq D \leq 10$ μm, for which the particle number concentration varies with particle diameter and depth according to a hyperbolic distribution (Bader, 1970; Kirk, 1983) given by:

$$N = f(D, z) = N_1(z) D^{-\gamma} \text{ where } 0.7 \leq \gamma \leq 6.0 \tag{8}$$

In this hyperbolic distribution, $N_1(z)$ is the particle number concentration in the smallest size decade, which varies with depth, and typically represents particle sizes in the range of 0.1 μm $\leq D \leq 1$ μm; while γ is the slope of the particle size distribution on a logarithmic sale. These tiny particles become increasingly important the closer the modeling grids are extended towards the coastline, where coastal rivers and non-point-source runoff from beach and bluff erosion dump millions of tons of micron-size, fine-grained sediment as wash-load into the Southern California Bight each year (Inman and Jenkins, 1999; Jenkins and Inman, 2006). Not only does clay particulate in wash-load transport significant quantities of adsorbed nutrients into coastal waters, but these tiny particles have remarkably slow settling velocities, in spite of a tendency to flocculate in seawater (cf. Sverdrup, 1942; Mehta & Partheniades, 1975; Aijaz & Jenkins, 1993, 1994). For example, **Table 1** indicates that clay particles smaller than 2 microns settle less than a foot per day. Due to a lower immersed weight, similar sized nano-plankton and detrital particulate settle even more slowly. In either case, the settling velocity of micron-size inorganic and organic particulate is smaller than the *gradient eddy diffusivity velocity* in the mixed layer of the coastal ocean, cf. Armi, (1979). Consequently, the most aggressive PAR scattering and absorbing particulate can remain indefinitely in suspension in coastal waters and will not simply settle out of suspension following major storm and flood events. Once introduced, the only mechanism that removes suspensions of micron-sized particulate from the near-shore waters is advection by coastal current systems.

Table 1: Settling velocity data of quartz sediment in ocean water, after Sverdrup et al., (1942)

	Particle Diameter	Size Parameter	Time to Fall 10cm				Settling Velocity
	(μm)	k_{530} *(μm)*	*(days)*	*(hours)*	*(minutes)*	*(seconds)*	*(m/day)*
clay	0.12	0.11	87	3	19		0.001
	0.25	0.23	21	18	50		0.004
	0.49	0.45	5	10	42		0.018
	0.98	0.91	1	8	41		0.074
	1.95	1.81		8	10		0.3
silt	3.9	3.9		2	2	32	1.2
	7.8	7.2			30	38	4.7
	15.6	14.5			7	40	18.8
	31.2	29			1	55	75.2
	62.5	58				29	301
very fine sand	125	116				8.3	1040
fine sand	250	232				2.7	

The persistence of suspensions of micron-size particulate has a significant impact on PAR in coastal waters. This is not a new finding and was studied in detail for the Office of Naval Research by Hammond et al., (1995) to facilitate the U.S. Navy's counter-mine warfare efforts. **Figure 1** plots the volume scattering function at the mid-PAR band wavelengths (λ = 530 nm) for several size distributions of spherical particles ranging in diameter from 0.1 to 100 microns. These volume scattering functions were based on fitting the Mei scattering algorithms to Petzold's data for coastal waters using the approach of Brown and Gordon (1974). The best fit to Petzold's, $\beta(k,N,\theta)$ measurements was with a slope of γ =2.1 on the logarithmic particle size distribution, cf. equation (8). **Figure 1** demonstrates the shifting of importance of each particle size decade to particular scattering angles. The large particle size decade from 10 μm $\leq k \leq 100$ μm dominates forward scattering of incident PAR-band light ($\pi/2 < \theta \leq \pi$) for all values of γ. In the backscatter region, $0 \leq \theta < \pi/2$, particle sizes of 0.1 μm $\leq k \leq 1$ μm and 1 μm $\leq k \leq$ 10 μm are important at all γ, but increasingly so as γ increases. (Note $k = D/2\lambda \cong D$ at mid-PAR band wavelengths of λ = 530 nm.).

It is the back-scattering particulate that attenuate PAR at depth, because back-scattered light is no longer available to penetrate to deeper depths. Consequently, the small suspended particulates less than 10 μm are most responsible for causing significant light limitations to photosynthesis. The light limiting effects which micron-size particulate exert on photosynthesis increases the closer proximity to shore becomes, since both N_1 and γ increase with decreasing distance from the shoreline (cf. Petzold, 1972). This is not surprising because most clay and fine silt particulate comes from land, where the agencies of mechanical and chemical weathering are much more effective, producing concentrated fluxes of clays and silts from river wash load, shoreline erosion, wind-blown dust, or in more distant places, volcanic activity or glacial melt. Moreover, these particulate fluxes into the coastal ocean carry significant nutrient loading adsorbed by the *electric double-layer* across the surfaces of clay and silt particles, (cf. Aijaz & Jenkins, 1993, 1994). Although surface adsorption of nutrients by clays and silts promotes blooms of algae and phytoplankton, the net result is additional attenuation of PAR through the action of backscatter and absorption at PAR wave lengths, a process referred to as *photosynthetic shading*.

To illustrate how significantly nearshore suspensions of silts and clays can attenuate PAR irradiance, we consider optical measurements conducted offshore of Oceanside CA during the US Navy *Coastal Water Clarity Program* in July 1994. It should be emphasized that these measurements were taken during benign ocean conditions, as the winds were calm while there was a long (12-14 sec) south swell of approximately 1 meter height stimulating bottom resuspension of benthic sediments. No significant river discharges were occurring from either the Santa Margarita or San Luis Rey Rivers. Water samples were collected in nominally 20-meter deep water, approximately one half mile north of the breakwater at Oceanside, California, for subsequent laboratory particle size distribution determinations using a laser particle sizer. *In situ* absorption and total attenuation measurements were made using the WetLabs absorption/attenuation meter. **Figure 2** compares measured spectral absorption and scattering coefficients and the relative contributions from organic and inorganic suspended particulate measured between the surface and bottom listed in **Table 2**. Inspection of **Figure 2** reveals that the scattering coefficient ,*b*, has nearly doubled between the surface and mid depth, while the absorption coefficient, *a*, has increased almost 50%. These depth dependent changes in the scattering and absorption coefficients give rise to a 50 % increase in the total attenuation coefficient, C_d , between the surface and mid-depth in 20 m total water depth (cf. **Figure 3**). This large increase in attenuation coefficient has occurred across the entire PAR band of wavelengths during mild summer weather well above the bottom where the preponderance of suspended particulate is otherwise found. From equation (7) a 50% increase in C_d at a given depth will result in a 64.87% reduction in irradiance at that same depth. Therefore the apparent assumption made in the stand alone BEC that C_d is a constant will lead to large errors in predictions of photosynthetic rates, and hence phytoplankton growth rates; with the consequence that light limitations on growth rates will be overlooked, leading to the false conclusion that nutrient loading is the only significant factor in triggering algal blooms. This oversight, of course, is helpful to the SCCWRP hypothesis, which seeks to implicate ocean outfalls as the cause of algal blooms and the supposed prolonged acidification and hypoxia effects that results from those blooms.

Table 2: Suspended particle number parameters during the Oceanside experiments, 22 July 1994

depth (*m*)	*slope* γ	*particle number > 1μm* N_1	N_s	N_b
2.5	1.9	2930	2422	508
10.0	1.7	7143	6572	571
Bottom	1.3	16190	-----	-----

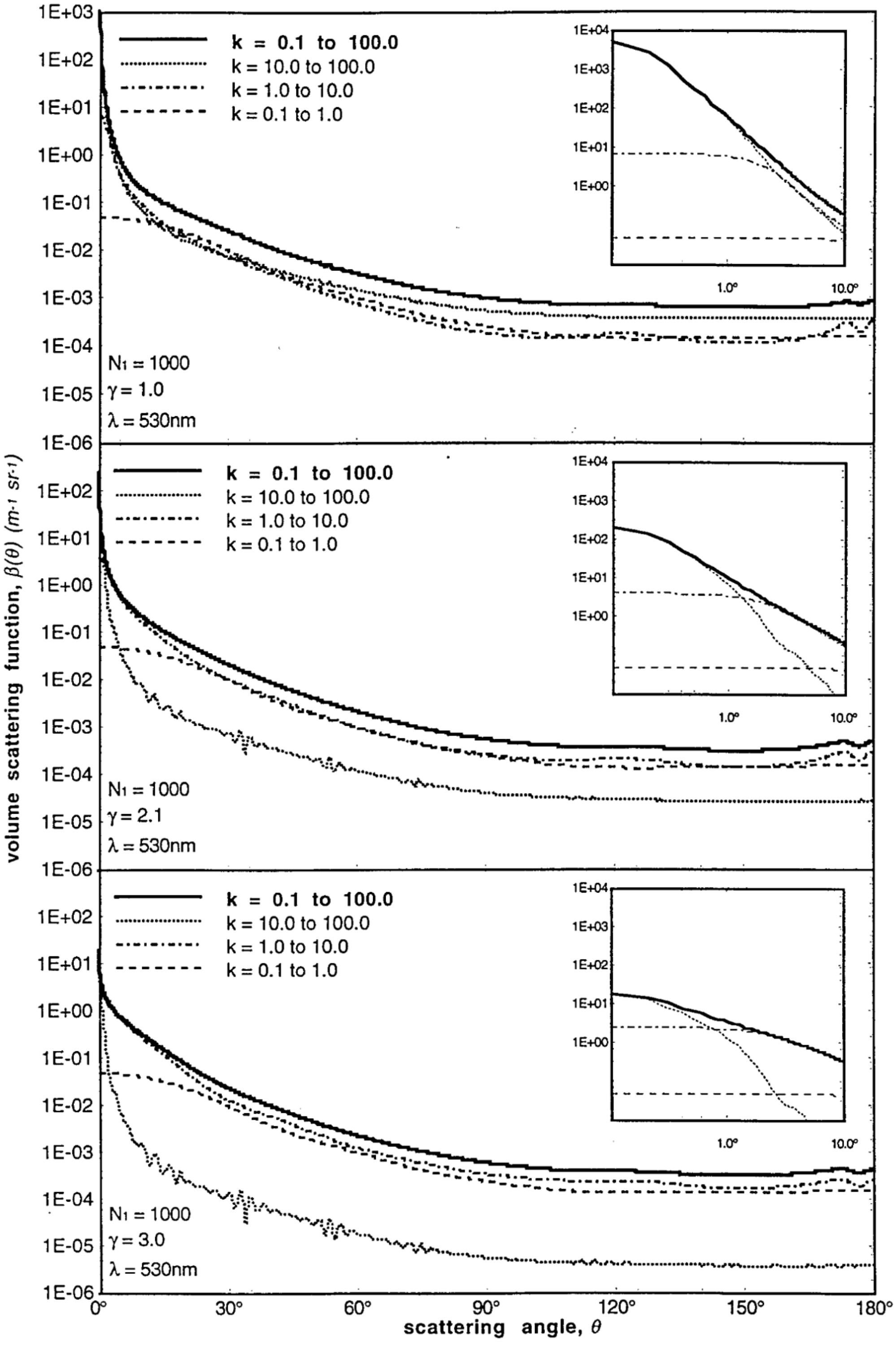

Figure 1: Volume scattering function at mid-PAR band wavelengths (λ = 530 nm) for several size distributions of spherical particles ranging in diameter from about 0.1 to 100 microns, (based on Mei scattering theory fitted to data from Petzold, 1972). Note $k = D/2\lambda \cong D$ at mid-PAR band wavelengths of λ = 530 nm.

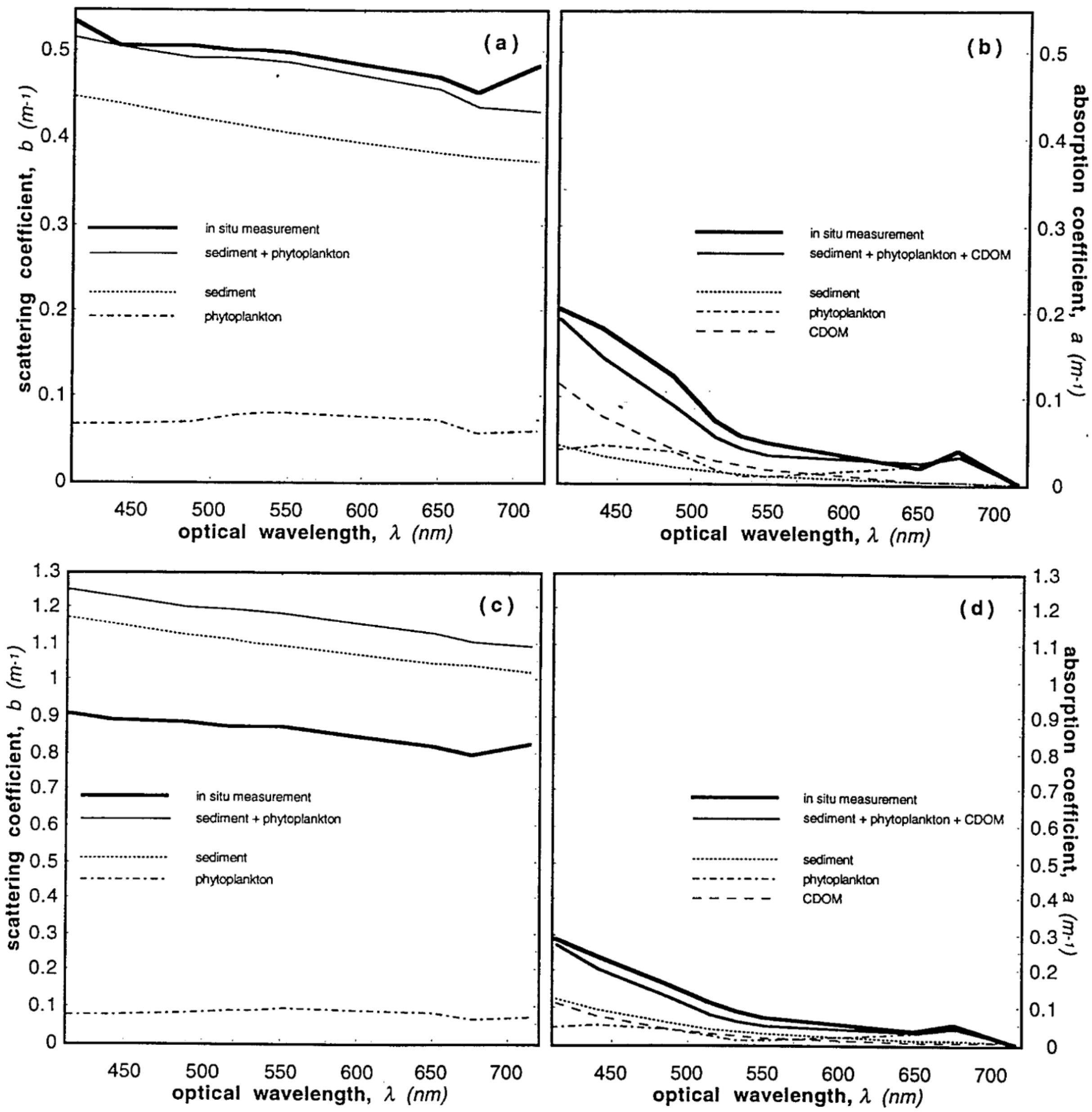

Figure 2: Scattering coefficients (left) and absorption coefficients (right) across PAR band wavelengths (400 nm $\leq \lambda \leq$ 700 nm) for suspensions of sediment and phytoplankton in coastal waters at Oceanside, CA., (from Hammond, et al., 1994). Panels (a) & (b) are results at a depth of 2.5 m below the sea surface while panels (c) & (d) are results at a depth of 10 m. Total water depth is 20 m.

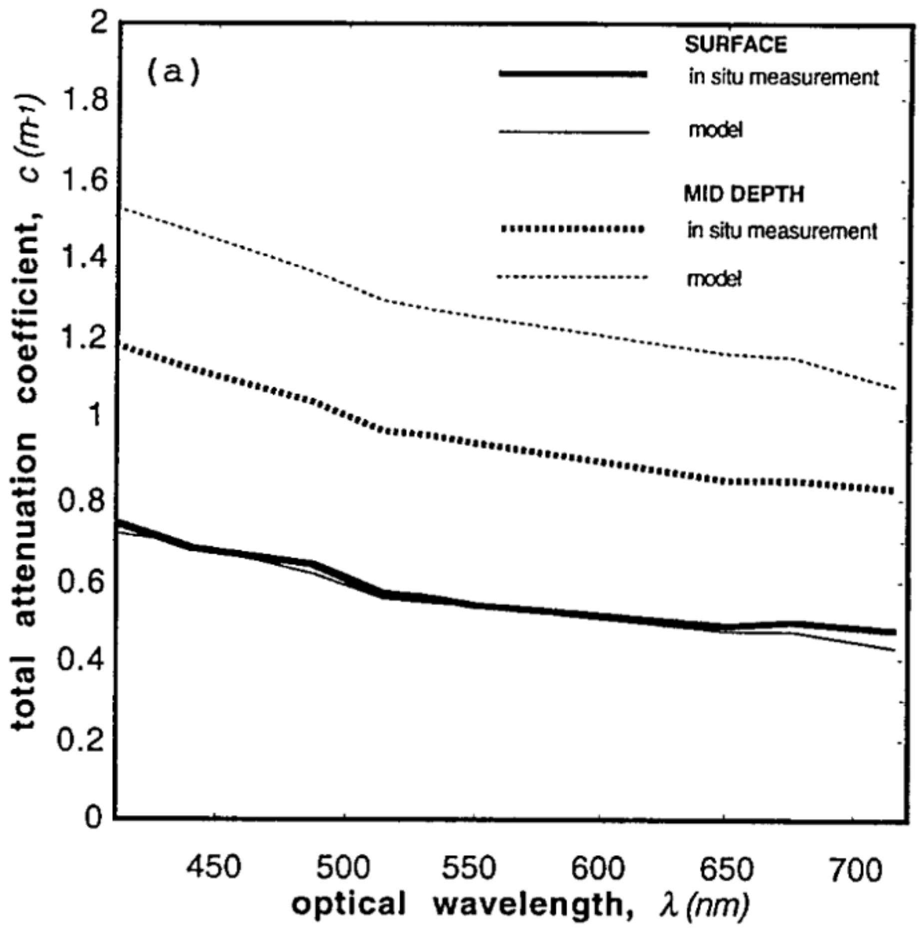

Figure 3: Measured and modeled attenuation coefficients across PAR at the sea surface and at mid depth due to distributions of suspended sediment and phytoplankton offshore of Oceanside along the 20 m isobath, (from Hammond, et al., 1994)

Omitting the effects which suspended particulate and CDOM has on PAR introduces significant error into any attempts to model photosynthesis, phytoplankton growth rates, and biomass in the nearshore. These errors are significant because photosynthetic rates vary exponentially with irradiance in the PAR wave-length band, (cf. **Figure 4**), according to formulations that date back to Platt et al. (1980):

$$P_L(z) = P_{\max}\left\{1 - \exp\left[\frac{-\alpha E_{PAR}(z)}{P_{\max}}\right]\right\}\exp\left[\frac{-\beta E_{PAR}(z)}{P_{\max}}\right] \qquad (9)$$

Here $P_L(z)$ is light-limited photosynthetic rate in units of mg carbon per mg chlorophyll per hour (mg C mg chl^{-1} h^{-1}); $P_{\max}$ is the maximal light-saturated photosynthetic rate, typically in the range of 8.0 to 11.5 mg C mg chl^{-1} h^{-1}; α is the slope of the photosynthetic rate versus irradiance curve, (cf. **Figure 4**), typically in the range of 0.050 to 0.064 (mg C mg chl^{-1} h^{-1})/(μ Einsteins m^{-2}s^{-1}) according to Malone and Neale, (1981); and β is the photoinhibition term, typically ranging 0.00155 to 0.00175 (mg C mg chl^{-1} h^{-1})/(μ Einsteins m^{-2}s^{-1}) after Hood et al., (1991). Note in **Figure 4** that smaller phytoplankton (e.g. nanoplankton) are more sensitive to high irradiance and have higher maximal light-saturated photosynthetic rates, $P_{\max}$, than the larger net-plankton, and exhibit a more rapid increase in photosynthetic rate at low irradiance.

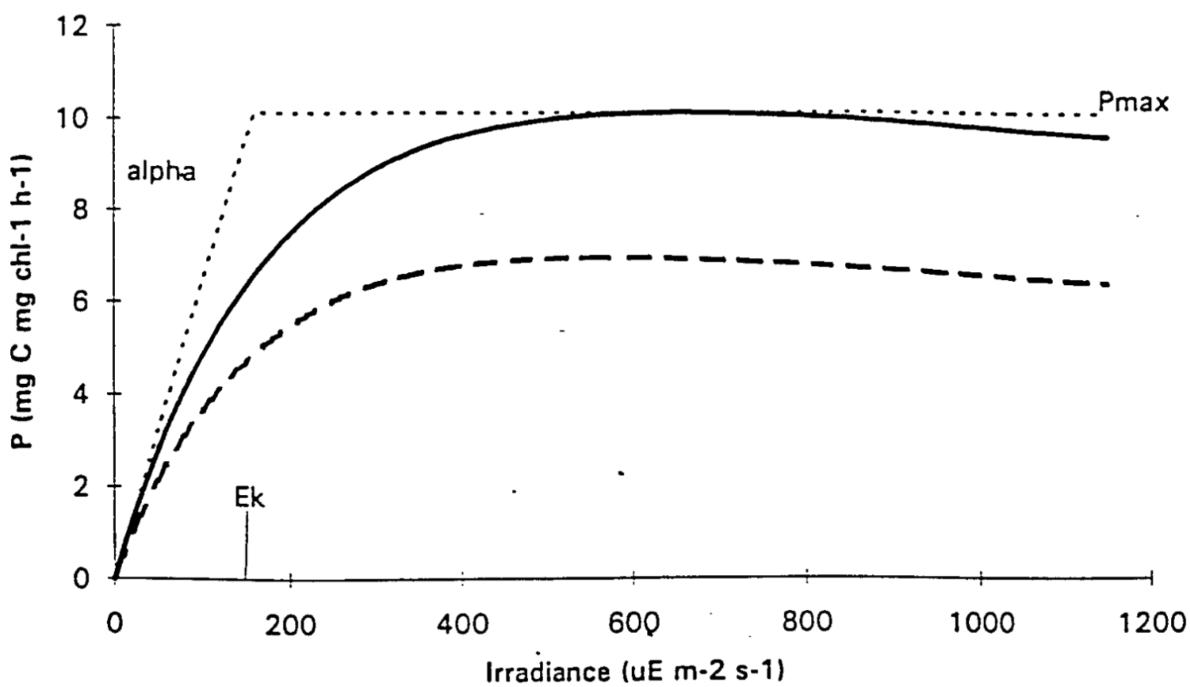

Figure 4: Photosynthesis as a function of irradiance for nanoplankton (solid line) and netplankton (dashed line). Dotted line defines α (light-limited slope of relationship); and $P_{\max}$ (maximal light-saturated photosynthetic rate) at Ek (irradiance at which $P_{\max}$ is reached).

The other major growth limiting factor for phytoplankton populations is the availability of nitrates, which leads us to the center of the present controversy regarding whether the predominant source of that nutrient in the Southern California Bight is coastal upwelling or ocean outfalls. We have argued at the beginning of this section that coastal upwelling is dominating the availability of nitrates based on a volume flux comparison between these two sources. But, if light attenuation from suspended particulate in nearshore waters suppresses phytoplankton growth more severely than nitrate limitations, then the case against ocean outfalls is greatly muted. To explore that possibility, we examine the classical plankton growth models based on nitrate uptake. As far back as Epply et al. (1969) and MacIsaac and Dugdale (1969) nitrate uptake rates of phytoplankton have been formulated based on *Michaelis-Menton kinetics*:

$$V_N(z) = \frac{[N(z)]}{K_N + [N(z)]} \qquad (10)$$

where, $V_N(z)$ is the depth-dependent, non-dimensional nitrate uptake rate, $[N(z)]$ is the depth dependent nitrate concentration, and K_N is the size dependent half-saturation coefficient for nitrate uptake. Nondimensional nitrate uptake as a function of nitrate concentration for both size classes is shown in **Figure 5**. This formulation of nitrate uptake allows application of a nondimensional nitrate limitation term as a reduction to photosynthetic rates initially calculated from irradiance alone, according to:

$$P_N(z) = V_N(z) P_L(z) \qquad (11)$$

where $P_L(z)$ is given by equation (9). The non-dimensional nitrate limitation term, $V_N(z)$, in equation (11) is comparable to a non-dimensional light limitation factor, equal to $P_L(z)/P_{\max}$. When the value for nitrate limitation is significantly less than that for light limitation, $[P_L(z)/P_{\max}] \gg V_N(z)$, nitrate limitation is the predominant growth limiting factor, and phytoplankton growth rates are dictated by equation (11). However, when the value for nitrate limitation is significantly higher than that for light limitation, $[P_L(z)/P_{\max}] \ll V_N(z)$, nitrate limitation is not significant and light attenuation becomes the dominant growth limiting factor, and phytoplankton growth rates are dictated by equation (9). Therefore, in order for the SCCWRP hypothesis to be correct, it must be proven for nearshore waters of the Southern California Bight that:

$$[P_L(z)/P_{\max}] \gg V_N(z) \quad \text{nutrient-limiting criteria} \qquad (12)$$

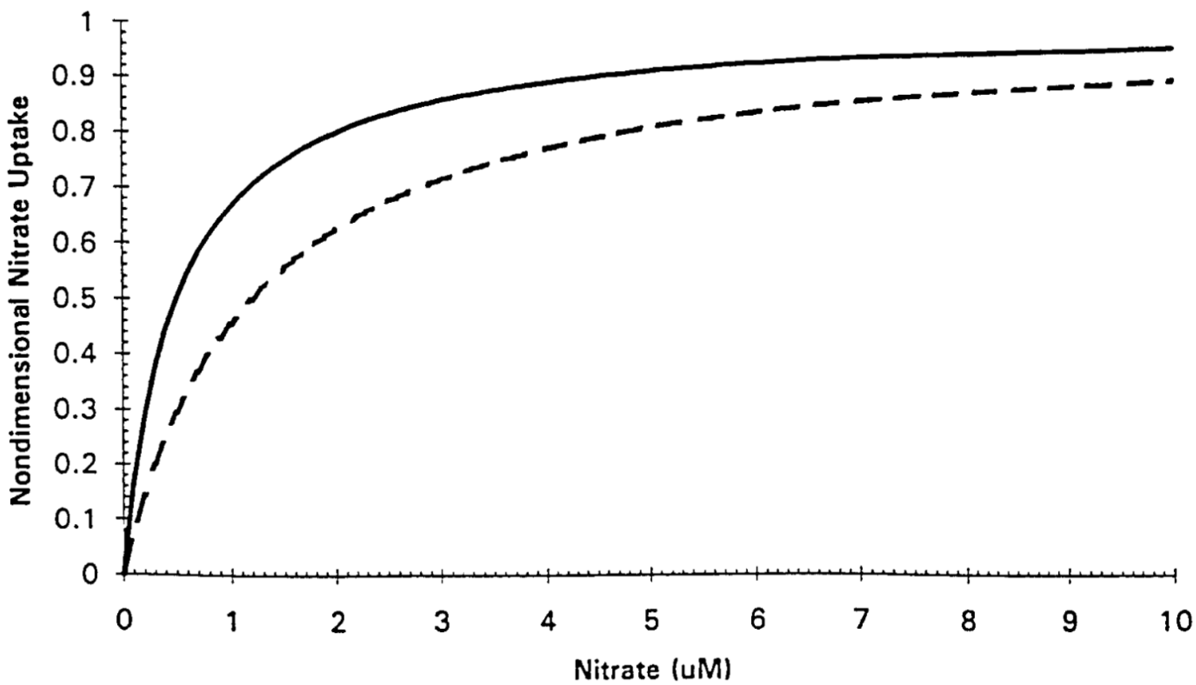

Figure 5: Nondimensional nitrate uptake, modeled from Michaelis-Menten kinetics, for nanoplankton (solid line) and net-plankton (dashed line).

3.4 Implications of Failure to Account for Suspended Particulate:

As discussed in the previous section, the SSCWRP hypothesis (that discharges from ocean outfalls is causing ocean acidification and hypoxia) hinges on the premise that phytoplankton populations in the Southern California Bite are nutrient limited. That premise is conditional on two factors: 1) that nitrate uptake at the Michaelis-Menten saturation level (cf. **Figure 5**) is sufficient to cause algal blooms, and 2) that plankton growth is not light limited, requiring that the non-dimensional light limitation factor, $P_L(z)/P_{\max}$ is large in comparison to the non-dimensional nitrate uptake factor, $V_N(z)$, per equation (12). To satisfy equation (12) requires that the calculation in equation (9) is performed including the effects which suspended particulate has on the diffuse attenuation coefficient and the irradiance at depth in the PAR wavelength band per equations (6) and (7). During his presentation at the *Validation and Scenarios Subcommittee* held 23 January 2020, Prof Deutsch claimed that plankton growth in the Southern California Bight is not light limited. However, no evidence was given that a calculation such as equation (12) was performed in order to support that claim. Moreover, no mention of suspended particulate in the Southern California Bight was even made during his 2 hr. WebEx presentation. Section II E of Sutula et al, (2020) describes a finite element approach to modeling dispersion of river plumes, but no mention was given of the suspended sediment loads of these rivers, even though these are the predominant source of suspended particulate in the waters of the

Southern California Bight. Appendix I of Sutula et al, (2020) gives a listing of rivers claimed to be treated as point sources in the ROMS modeling domain, but only the latitude and longitude of the river mouths were given in this appendix. No sediment transport algorithms can be found anywhere in either Sutula et al, (2020) or discussed during the *Validation and Scenarios Subcommittee* held 23 January 2020. In addition, the last time USGS made detailed measurements of the sediment yield of Southern California Bight rivers was the Sediment Benchmark Program that ended in 1997, which is outside the time frame of the ROMS/BEC simulations. Therefore, we conclude that suspended sediment dispersion from rivers is not a component of the ROMS/BEC, and consequently the light limiting effects which suspended sediment exerts on plankton growth rates are completely overlooked. Consequently, the ROMS/BEC simulations presented to date are missing increases in the total attenuation coefficient on the order 50 % due to suspended particulate around the outfalls and elsewhere on the shelf of the Southern California Bight. Increases in attenuation coefficient of this magnitude will lead to reductions in irradiance on the order of 65% across the entire PAR band of wavelengths, resulting in large reductions of photosynthetic rates and $P_L(z)/P_{\max}$, such that the foundation of the SSCWRP hypothesis (namely that nutrient loading is the only significant factor in triggering algal blooms) becomes seriously questionable.

3.5 Implications of Failure to Account for Initial Dilution of Ocean Outfall Diffusers:

The methodology for modeling dispersion of the plumes of ocean outfalls is unclear, but it appears that initial dilution induced by the high velocity diffusers of those outfalls has not been properly accounted in the ROMS/BEC simulations. Section II E of Sutula et al, (2020) describes a finite element approach adapted to a presumed Gaussian distribution of the resultant effluent concentration field to model dispersion of outfall plumes; whereas an empirical method was described at *Validation and Scenarios Subcommittee* held 23 January 2020. No effort has been made to adapt one of the EPA certified outfall mixing models (Visual Plumes UM3 or CORMIX) to the ROMS/BEC architecture. These models account for initial dilution caused by the processes of *turbulent eddies* and *convective entrainment* as well as the dynamics of the *trapping level* associated with the density stratification of the water column (Frick, et al., 2001). The trapping level refers to the height in the water column above the point of discharge where the buoyant discharge plume ceases to rise further (**Figure 6**). This typically occurs at a density interface in the water column referred to as the *pycnocline*, usually formed between two water masses, namely the warm surface mixed layer and the colder bottom water. The pycnocline forms a *trapping layer*, and the residual turbulent momentum of the plume causes it to spread out horizontally. This behavior is poorly represented by the Gaussian distribution used in the ROMS/BEC.

The most disturbing aspect of the SCCWRP approach is the claim made by the SCCWRP presenter at the *Validation and Scenarios Subcommittee* that continuous discharges into the grid cell in which the outfall is embedded will cause the concentrations of nitrate (and other effluent constituents) to increase above the end-of pipe concentrations, typically 2 ppb.

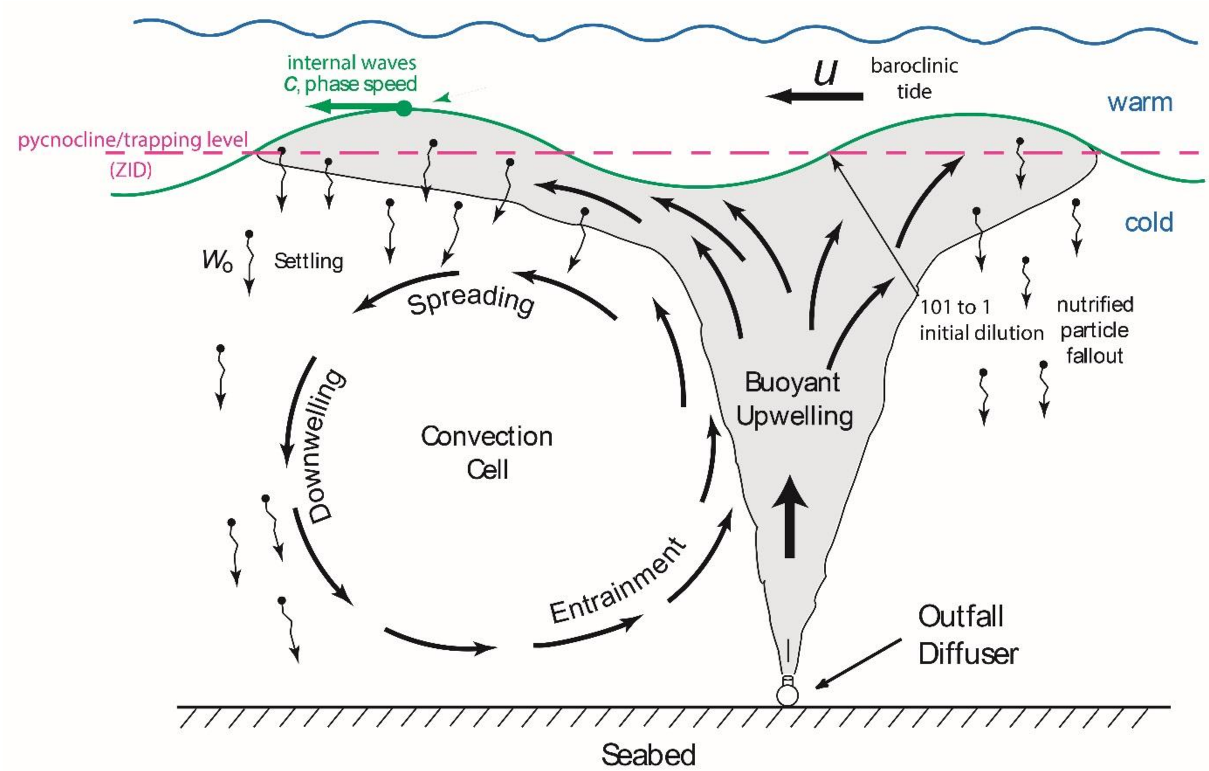

Figure 6: Schematic of a buoyant discharge plume from the SJCOO diffuser.

This result defies the Second Law of Thermodynamics and violates the principle of conservation of mass. The effluent mass that is discharged into the grid cell containing the outfall during any arbitrary time step will be displaced from that grid cell into neighboring grid cells during the following time step. No model that conserves mass can behave any other way with respect to mass exchanges between time steps. For this reason, it is impossible for an outfall to elevate concentrations in the receiving waters above end-of pipe concentrations. On the contrary, the turbulent mixing and entrainment (which is accounted for by the EPA certified mixing models) will generally reduce discharge concentrations by two orders of magnitude with 100 m from the point of discharge. This action is referred to as *initial dilution*, and most outfalls in the Southern California Bight are required to produce at least 100 to 1 initial dilution as a requirement of their respective NPDES discharge permits. Therefore, if nitrate concentrations are typically 2 ppb at end of pipe, those concentrations will fall to 20 parts per trillion within 100 m from the discharge point. It appears insensible that such low concentrations of nitrate emissions into the nearshore currents of the Southern California Bight could possibly provoke an algal bloom. The failure to account for initial dilution by ocean outfalls is probably the single greatest flaw in the present ROMS/BEC architecture.

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Agenda Item 6

Engineering Committee Meeting

Meeting Date: September 17, 2020

TO: Engineering Committee

FROM: Jason Manning, Director of Engineering

SUBJECT: Capital Improvement Construction Projects Report
[Project Committee 15 & 17]

Overview

Active Construction Project Updates:
Attached are the updated CIP reports. Please note that there are two new change order for the CTP Facility Improvements Project and seven new change orders for the RTP Miscellaneous Improvements Project.

As a reminder, change orders within the General Manager's purchasing authority (less than $50,000) and within the project contingency will be presented in this report and then to the Board of Directors. This is an accordance with the current purchasing policy, the change order procedure update provided to Engineering Committee in November 2019 and the contingencies approved by the Board in December 2019.

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-15 Board of Directors to approve Change Orders 9, and 10 totaling $68,291; and that the PC-17 Board of Directors to approve Change Orders 8 through 14 totaling $29,257.

Agenda Item 7

Engineering Committee Meeting

Meeting Date: September 17, 2020

TO: Engineering Committee

FROM: Jason Manning, Director of Engineering

SUBJECT: Dudek Program and Construction Management Services Update [Project Committee 17]

Overview

On October 3, 2019 the Board of Directors approved a contract for Dudek to provide services to assist with temporary support on Capital Improvement Projects. One major part of that support was to provide construction management services for the Regional Treatment Plant Miscellaneous Improvements 2018 Project.

The current contract was intended to end on June 30, 2020 prior to the end of the Miscellaneous Improvements project (initially expected to end in November 2020). The Dudek construction services portion of the contract is expected to be out of money at the end October 2020 and due to change orders in the project, the project is expected to be completed in early February 2021.

The Change Order No. 1 adds four months of construction management services which also includes the project closeout documentation collection and organization, project management fees, and minor costs for geotechnical services.

Table 1 – Contract Details including Change Order No. 1

Project Committee	Task	Program and CM Services	Change Order No. 1	Total
PC 5	3601-000	$93,890	$0	$93,890
PC 5 Total		*$93,890*	*$0*	*$93,890*
PC 17 Liquids	3701-000	$114,687	$50,550	$165,237
PC 17 Solids	3751-000	$22,938	$10,110	$33,048
PC 17 Total		*$137,625*	*$60,660*	*$198,285*
PC 24	3401-000	$24,000	$0	$24,000
PC 24	3480-000	$1,030	$0	$1,030
PC 24 Total		*$25,030*	*$0*	*$25,030*
Grand Total		**$256,545**	**$60,660**	**$317,205**

Table 2
Allocation of Cost to Member Agencies

	PC 17 Liquids 3701-000	PC 17 Solids 3751-000	Total
City of Laguna Beach	$0	$1,134	$1,134
Emerald Bay Service District	$0	$60	$60
El Toro Water District	$0	$2,063	$2,063
Moulton Niguel Water District	$50,550	$5,947	$56,497
South Coast Water District	$0	$906	$906
Total	$50,550	$10,110	$60,660

Both projects 3701-000 (Liquids) and 3751-000 (Solids) are within budget including this change order and no additional cash will need to be collected on either.

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-17 Board of Directs to approve Change Order Number 1 for the Dudek Program and Construction Management Services for $60,660 for a total revised contract amount of $317,205.

September 8, 2020

Mr. Jason Manning
South Orange County Wastewater Authority
34156 Del Obispo Street
Dana Point, CA 92629

Subject: *Amendment No. 1 Fee Request for the Program and Construction Management Services for SOCWA's Fiscal Year 2019/2020 Capital Improvement Program (Regional Treatment Plant Construction Support Services)*

Dear Mr. Manning;

Per South Orange County Wastewater Authority (SOCWA)'s request, we provide this Amendment No. 1 fee increase request to extend our services at the Regional Treatment Plant providing engineering support, coordination, resident engineering and construction observation for construction of improvements being performed by Filanc. SOCWA is processing a changer order for the contractor extending their work schedule from a completion date in October, 2020 to February, 2021. With the extension of the contractor's schedule, SOCWA has requested an amendment request from Dudek to extend our services during construction through the end of the project and to provide project close out and documentation.

The following is a breakdown of our services:

1. Provide an individual to serve as a combined resident engineer/inspector for the construction of improvements identified in the original scope of work. This individual will continue his role to interface between SOCWA staff, general contractor and design engineer. Project management, coordination and construction administration support services will also continue.

a.	Construction Observer/Resident Engineer	336 hrs @ $140/hr =	$47,040
b.	Project Manager	28 hrs @ $290/hr =	$ 8,120
	Subtotal		$55,160

2. Geotechnical testing and consultation (Twining). $ 5,500

TOTAL Amendment #1 Fee Request **$60,660**

We are pleased to have the opportunity to be of service to SOCWA, and look forward to discussing this project with you in the near future. Please feel free to contact me should you have questions or require additional information.

Sincerely,
DUDEK

Bob Ohlund, PE
Vice President
949.373.8313
bohlund@dudek.com

Agenda Item 8

Engineering Committee Meeting

Meeting Date: August 13, 2020

TO: Engineering Committee

FROM: Jason Manning, Director of Engineering

SUBJECT: San Juan Creek Ocean Outfall Junction Structure Rehabilitation Project [Project Committee 5]

Overview

Please see the attached presentation for an update and background on the San Juan Creek Ocean Outfall Junction Structure Rehabilitation Project

Recommended Action: Information Item; no action required.

SOCWA San Juan Creek Ocean Outfall

Junction Structure Project Update and Background

August 13, 2020

South Orange County Wastewater Authority

Current Status

- California Coastal Commission permit was approved on August 31, 2020 (application was accepted as complete on June 2, 2020)
- The ROV inspection was successfully completed on September 2, 2020
  - The ROV was not capable of measuring wall thickness
  - Additional information on the past updates to the Junction Structure (1990) besides the existing as-builts was not available
  - All recent studies have concluded that the 1990 updates did nothing but secure the top of the Junction Structure

Surge Tower Location

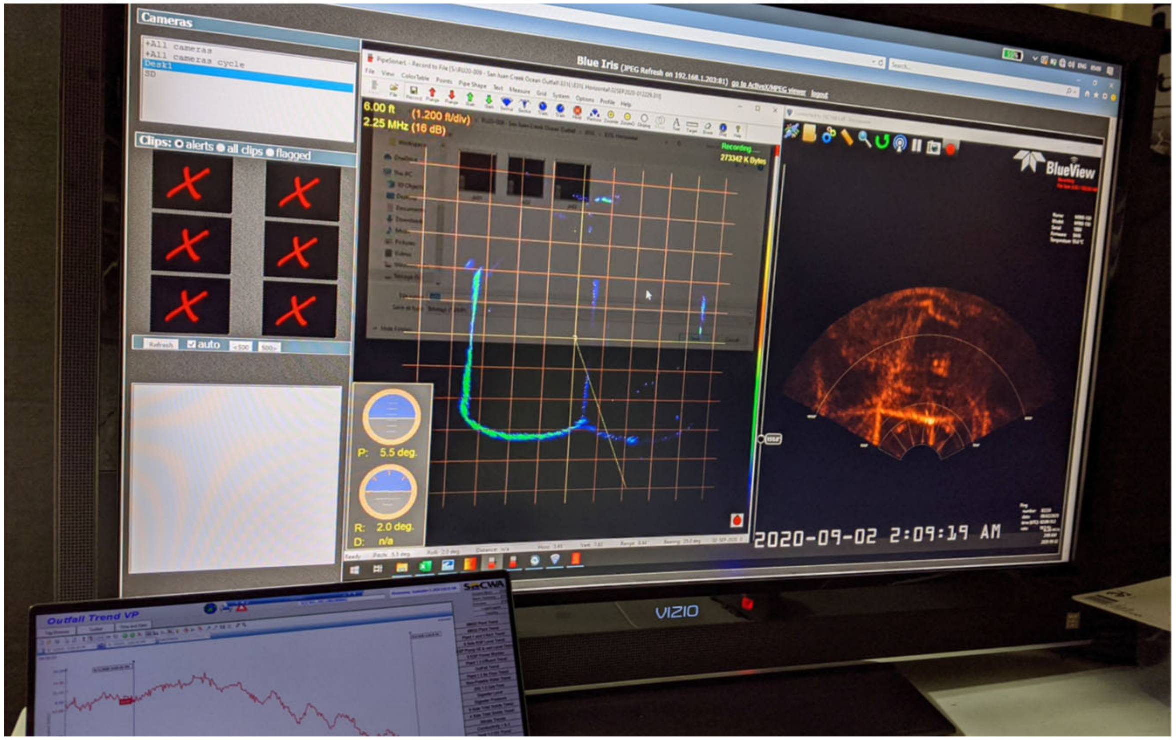
SOCWA
South Orange County Wastewater Authority

Surge ROV Entry

SOCWA
South Orange County Wastewater Authority

Surge ROV Entry

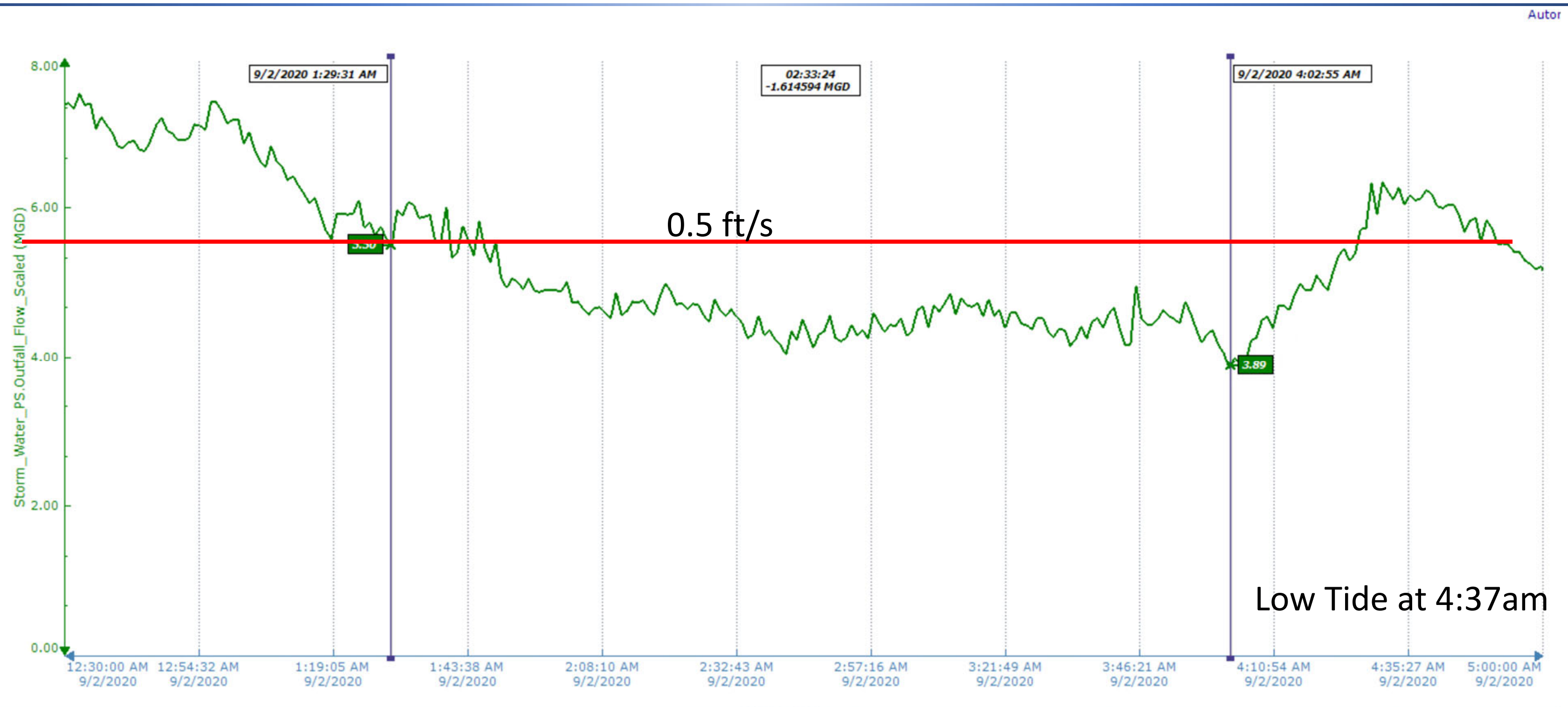
ROV Telemetry



Site Setup and ROV Return

SOCWA
South Orange County Wastewater Authority

Outfall Flow and Tidal Conditions



SOCWA
South Orange County Wastewater Authority

Agenda Item 9

Engineering Committee Meeting	
Meeting Date: September 17, 2020	

TO: Engineering Committee

FROM: Jason Manning, Director of Engineering

SUBJECT: JB Latham Plant 2 Grit Area Rehabilitation Project
[Project Committee 2]

Overview

As part of the Package B work, Plant 2 (4-side) will be offline for approximately 45 days. In anticipation of this work, SOCWA Operations Staff requested to have the Grit Basin relined since it is very rare that Plant 2 is offline. SS Mechanical had recently completed a similar project for Plant 1 and was able to provide a quote for the work at a reasonable cost since there would be no bypassing involved.

When Plant 2 was taken offline, SOCWA staff noticed other areas that were also in need of repair. The baffle was in poor condition and the Grit Overflow Channel which feed the Primary Basins was also in need of rehabilitation.

The initial work on the basin was estimated at $42,100 and the additional work is expected to be no more than $17,900 for a grand total of $60,000 for the Plant 2 Grit Area Rehabilitation. The work is being completed on time and materials and will be billed accordingly.

The funding is recommended to come from PC 2 Liquids project 3254-000 “Additional Package B Liquids Design”, that will be changed to “JB Latham Plant 2 Grit Area Rehabilitation Project.” This project has budget and funds collected and is no longer needed since the Package B Design has been completed.

Table 1
Allocation of Cost to Member Agencies

	PC 2 Liquids 3254-000
City of San Juan Capistrano	$18,461.54
Moulton Niguel Water District	$13,846.15
South Coast Water District	$17,307.69
Santa Margarita Water District	$10,384.62
Total	$60,000.00

Projects 3254-000 is within this budget and no additional cash will need to be collected.

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-2 Board of Directors to approve the SS Mechanical JBL Plant 2 Grit Area Rehabilitation Project in the amount of $60,000.

Agenda Item 10

Engineering Committee Meeting

Meeting Date: September 17, 2020

TO: Engineering Committee

FROM: David Baranowski, Senior Engineering

SUBJECT: CTP Personnel Building Project Update

Overview

The SOCWA engineering team has been working on a design to repair the CTP Personnel Building locker rooms and fix the building drain. Attached is a brief presentation with an update on the CTP Personnel Building Drain Line Repair project.

Recommended Action: Information Item; no action required.

SOCWA Coastal Treatment Plant

Personnel Building Rehabilitation Project Update and Background

September 17, 2020

Personnel Building

South Orange County Wastewater Authority

53 Years of Personnel Building History

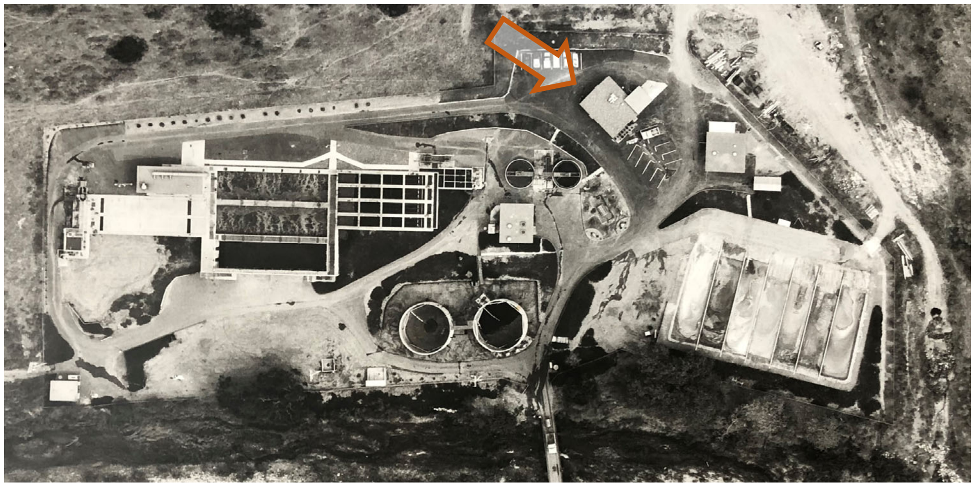


Photo date approx. 1971

Photo date 2012

1967 — 1983 — 2017 — 2020

Constructed
Control room, lab, chlorine storage and chlorinators

Repurposed
Locker rooms, showers, and workshop

Drain Issues
Drains plugged and corroded

3

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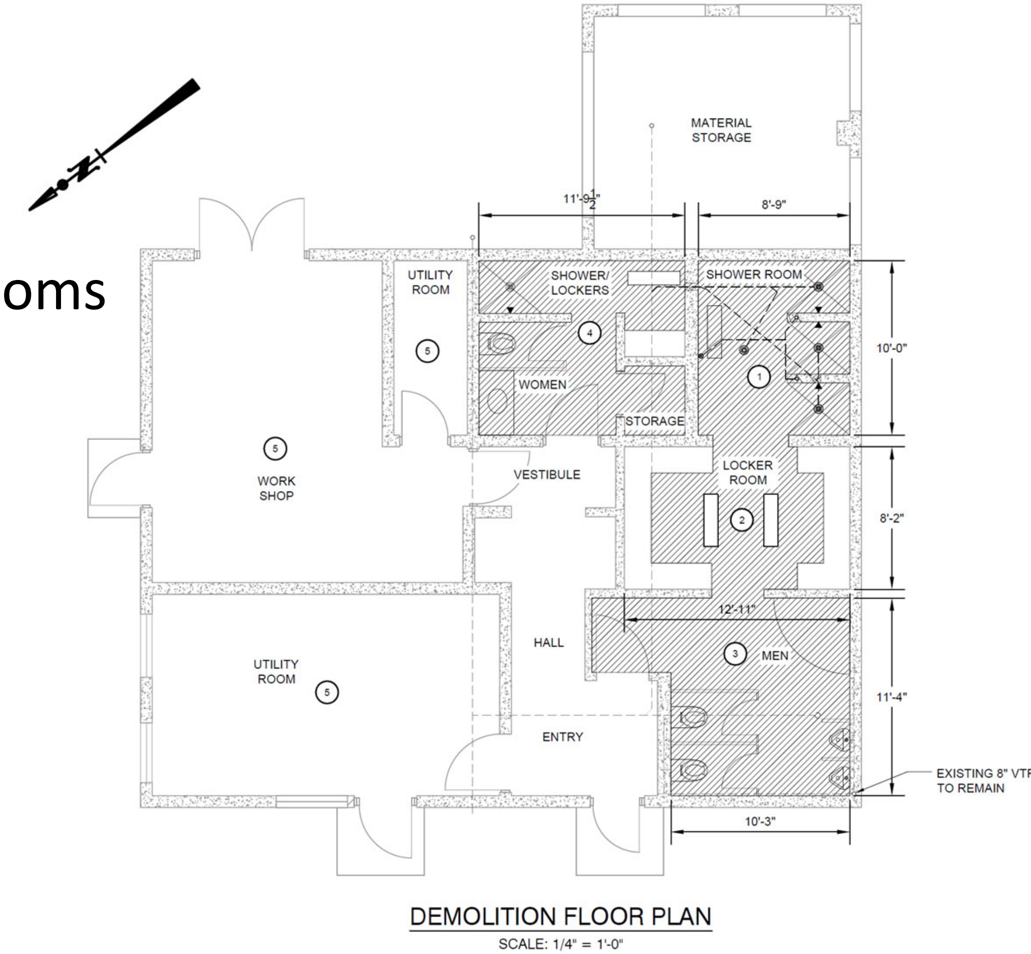
Planned Improvements

- Refurbish locker rooms and bathrooms
- Replace shower drains
- Install new:
  - showers
  - bathroom stalls
  - toilets
  - sinks
  - ceiling tiles
  - lights



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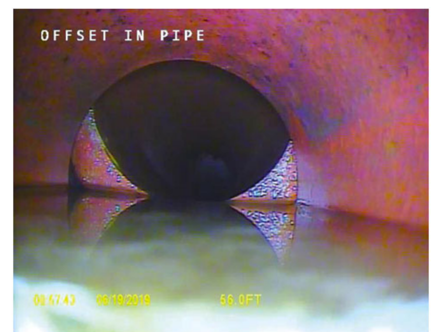
Additional Concerns

- Drains corroded more than expected
- Vent tubes corroded
- Showers backing up frequently
- Unknown shower drain configuration
- Offset joints in main sewer line
- Ceiling tiles falling
- **Planned improvements won't adequately fix all these issues**



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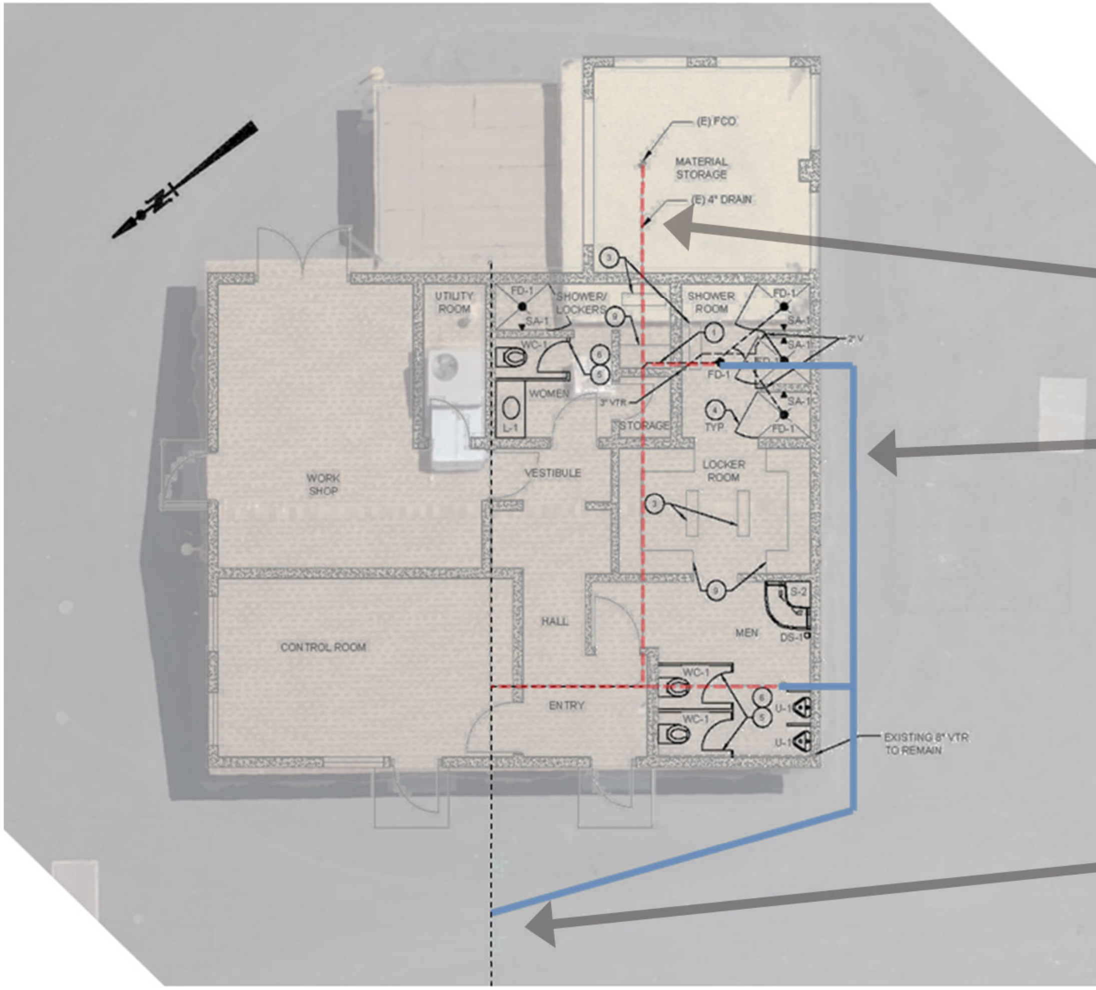

Proposed Solution

- Abandon drain under locker room and bathroom
- Reroute bathroom and locker room drains outside building
  - Investigate proposed alignment prior to construction to identify utility conflicts
- Reconnect to main sewer outside building and fix offset joints

South Orange County Wastewater Authority

Next Steps

Revise Drawings
- Demo and cap drains
- Fix offset joints
- Reroute drains around building

Exploration
- Investigate utilities outside building
- Confirm or adjust alignment

Finalize Design
- Finalize drawings
- Update budget
- **Engineering Committee Update**

Bid and Construct
- Out to bid
- Select contractor
- Begin construction

- Fiscal impacts
  - Original Engineer's estimate = $220,000
  - Estimated additional costs = $50,000 to $110,000
    - Depends on pipe depth and potential conflicts; includes additional design fees
  - Revised estimate = $270,000 to $330,000
  - Cash currently available = $325,000

South Orange County Wastewater Authority

Agenda Item 11

Engineering Committee Meeting

Meeting Date: September 17, 2020

TO: Engineering Committee

FROM: Jason Manning, Director of Engineering

SUBJECT: Coastal Treatment Plant Sludge Force Main Design and Permitting Project Update

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Overview

Approximately 20 years ago, Dudek was awarded the design project for the CTP Sludge Force Main replacement. Over the years, the project has had to navigate a multitude of permitting and regulatory issues that have slowed and sometimes completely stopped progress on the project.

In the June 14, 2018 Engineering Committee meeting, five change orders (Change Orders 13 through 17) were presented to the Committee and approved by the Board of Directors the following month for a total value of $74,025. In both of those presentations, an additional change order for $34,750 was neglected to be presented and approved. SOCWA Engineering inadvertently communicated to Dudek that they had been approved for change orders totaling $108,775 and therefore billed against that total. Routine auditing by the SOCWA Contracts Admin discovered the oversight in obtaining approval for that work.

This change order covers three areas as detailed below. The intention is to complete this portion of work and close out this contract after this work is completed. Additional work coming under separate contracts includes engineering services during bid, engineering services during construction, biological and archeological monitoring, and mitigation site work.

Item 1 – $34,750: After auditing Dudek billings and SOCWA approvals, it was found that $34,750 had not been authorized as a change order but had been communicated to Dudek as available to spend. The cost largely represented the US Fish and Wildlife consultation that was required. The work was completed.

Item 2 (Task 1 in the attached proposal) – $28,110: Engineering services to complete the OC Parks Encroachment Permit, contract documents, construction drawings, construction specifications, and an updated estimated construction cost.

Item 3 (Task 2 in the attached proposal) – $15,240: Permitting services to complete the California Coastal Commission Coastal Development Permit and to update any plans and submittals for permit compliance.

The total change order number 18 request is for $78,100.

Table 1 – Contract Details including Change Order No. 18

Original contract amount	$445,958.00
Net change by previous change orders	$264,830.00
Contract amount prior to this change order	$710,788.00
Net increase due to this change order	$ 78,100.00
New contract amount, including this change order	$788,888.00

Table 2
Allocation of Cost to Member Agencies

	PC 15 Liquids 3534-000
City of Laguna Beach	$29,608.06
Emerald Bay Service District	$ 2,331.34
Moulton Niguel Water District	$22,847.17
South Coast Water District	$23,313.43
Total	$78,100.00

Projects 3534-000 is within budget including this change order and no additional cash will need to be collected.

Recommended Action: Staff recommends that the Engineering Committee recommend to the PC-15 Board of Directors to approve Change Order No.18 for the Dudek Coastal Treatment Plant Sludge Force Main Design and Permitting Project for $78,100 for a total revised contract amount of $788,888.

DUDEK
605 THIRD STREET
ENCINITAS, CALIFORNIA 92024
T 760.942.5147 F 760.632.0164

September 2, 2020 6731

Jason Manning, PE
Director of Engineering
South Orange County Wastewater Authority
34156 Del Obispo Road
Dana Point, California 92629

Subject: *Coastal Treatment Plant Export Sludge Force Main Replacement Project Document Finalization Proposal*

Dear Mr. Manning:

As we have discussed, permit acquisition for the Coastal Treatment Plant Export Sludge Force Main Replacement Project (Project) has been an ongoing challenge for South Orange County Wastewater Authority (SOCWA) for several years. In summary, the following permits have been acquired relative to the Project:

- Clean Water Act Section 401 Water Quality Certification No. R9-2015-0033, January 2016
- Clean Water Act Section 401 Water Quality Certification No. R9-2015-0033, Amendment #1, October 2018
- California Department of Fish and Wildlife Streambed Alteration Agreement, September 2016
- US Army Corps of Engineers Provisional Nationwide Permit, October 2018
- US Fish and Wildlife Service Informal Section 7 Consultation, September 2018

The above permits represent the majority of required permits, and were completed prior to October 2018. The remaining permits to begin construction include the California Coastal Commission (CCC) Coastal Development Permit Amendment (CDPA) and the Orange County (OC) Parks Encroachment Permit. The Project team pursued these final permits in parallel with the above referenced permits, with these two remaining. The status of the remaining permits is as follows:

- OC Parks Encroachment Permit: The information for issuance of this permit was previously provided to OC Parks, with the exception of the CCC permit. Once we acquire the CCC permit, we will transmit it to OC Parks and it is our understanding that the encroachment permit will be issued. OC Parks is a co-applicant on the CCC permit, thereby requiring the CCC permit to be finalized prior to encroachment permit issuance.

- CCC Coastal Development Permit Amendment: On June 8, 2016 the CCC approved CDPA No. 5-15-1670-A1 (amending CDP No. P-78-4365), subject to special conditions. The permittee, SOCWA, signed the Notice of Intent (NOI) to Issue the CDPA on July 7, 2016, acknowledging the CCC's action and agreeing to the conditions imposed. The NOI provides that the CDPA will not be issued until the Special Conditions are fulfilled. Special conditions (SCs) required by the CCC include a Public Access Plan (SC17), Revised Habitat Mitigation & Monitoring Plan (SC18), Creek Bank Stabilization Final Design Plans (SC21), and Area of Potential Archeological Significance (SC22).

  The Project team prepared several submittals regarding these SCs. The most challenging effort was SC17, complicated by the fact that Park access is not totally within the control of SOCWA. It is a long-term goal of the CCC to establish a public access trail through the Aliso and Wood Canyon Wilderness Park (Park), allowing full access of pedestrians, cyclists and equestrian. Special Condition 17 requires the Public Access

Plan (PAP) to be submitted for review and approval of the Executive Director of the Commission within 180 days of Coastal Commission action, or within such additional time as granted by the Executive Director for good cause. The first SC17 submittal was provided in February 2017, including a technical memorandum and sign/gate plan. CCC comments were extensive, necessitating significant additional effort. The Project was required to request an extension of the permitting period, which was granted by the CCC to 2018.

Following substantial additional studies, the Project team provided additional submittals in 2018. The Project team provided four additional submittals in 2019, followed by the latest two submittals in 2020. In addition to responding to the CCC staff comments, the Project team also was required to prepare and submit additional application extensions to 2019 and 2020 to avoid having to restart the entire permitting process. Each submittal and extension request took time for CCC staff to address and respond, followed by scheduling of extension requests at the CCC Board Meetings. The extension requests also allow public input, requiring the Project team to address any public comments requiring additional effort before the extension was placed on the CCC agenda. Depending on the CCC agenda, the extension requests were postponed to later CCC meetings. Each SC17 submittal from the CCC identified new comments and requirements, necessitating resubmittal of the SC17 response package.

The last SC17 submittal was provided in August 2020, addressing CCC staff remaining questions and requirements. Also, in accordance with CCC requirements, the start of construction must fall within the permitting period, so an additional extension was submitted in May 2020 to accommodate this requirement. The extension is scheduled to be addressed by the CCC Board at its September 8 meeting. The Project team also prepared responses to public comment for this extension request. It is our understanding that the CCC will issue the permit following approval of the extension by the CCC Board. However, if three Commissioners object to the extension on the grounds that there may be circumstances that affect the Project's consistency with the Coastal Act, the Executive Director is required to schedule the extension for a public hearing in accordance with Section 13169(d) of Title 14 of the California Code of Regulations. The level of uncertainty that exists in matters involving the CCC prevent accurate projection of future approvals. However, based on the wording in the CCC staff letter, we believe that the extension will be approved and the permit issued following that approval.

The Project team is aware that SOCWA has issued multiple contract amendments for this Project, and it is our intent that the above summary provide rationale for those requests. Permitting of the Project incorporates significant effort to address the series of comments and requirements from each permitting agency. The Project team anticipates the requirements of the reviewing agencies. However, depending on the criticality of the Project, permit review comments are not always predictable. If the Project team failed to respond or file needed time extensions, the permitting process may have been stopped by the agency, and SOCWA would be forced to restart the entire permitting process from the beginning. Every effort is made to address comments efficiently, while maintaining consistent and constant contact with each agency.

From a Project design standpoint, each permitting agency requirement superimposes its own specific requirements on the Project. These requirements generally involve actions to be taken by the Project owner (SOCWA) prior to construction, actions required by SOCWA during construction, and actions required to be taken by the Contractor during construction. The 100-percent export sludge force main plans and specifications were prepared in December 2017. The remaining design effort includes incorporation of the various permitting requirements. As such, finalizing the plans, specifications and cost opinion is necessary prior to advertisement for construction. Finalizing the documents could not be completed until permitting agencies completed their permitting processes.

This proposal represents the final efforts prior to Project advertisement and bidding. This proposal includes three cost components. Including:

1. SOCWA and Dudek staff have recently completed any evaluation of Project funding to date. From that audit, it was determined that $34,750 of previously approved project funding failed to receive Board approval. As such, these funds are included for Board action, as the funds have been authorized, invoiced and paid under the Project.

2. Ongoing coordination and response to CCC staff related to finalizing acquisition of the CDPA is included. The Project team has maintained contact with CCC staff to resolve SC17 comments and questions. Specifically, CCC staff required investigation of various existing gates throughout the Park. CCC staff required an extensive sign and gate plan, as well as removal or redesign of gates within the Park to encourage access to Park patrons. Revision of these gates required multiple submittals, as well as OC Parks approval. As stated, our understanding is that the CDPA will be issued following the September 8 CCC meeting. The proposal includes $15,240 for these efforts in finalizing the CDPA.

3. Having the final requirements of the permitting agencies, The Project team must incorporate these specific requirements of each permit into the Contract Documents. These efforts include final issuance of the OC Parks encroachment permit, as well as revision of the plans, specifications and cost opinions. Dudek will prepare a specific specification section to summarize permitting requirements. Additionally, plans will be developed for Park access requirements based on the various permit requirements. Finalization of the plans, specifications and cost opinions is $28,110.

The proposed scope for Items 2 and 3 are provided in Attachment A. The proposed fee for Item 1 is $34,750, and Items 2 and 3 is $43,350. We are pleased to continue supporting SOCWA with this important project. If you have any questions, or require any additional information, please do not hesitate to call me at 760.479.4111, or email me at mmetts@dudek.com.

Respectfully Submitted,
DUDEK

D. Michael Metts, P.E.
Principal, Engineering Services

Attachment A

Scope of Services

Finalization of Construction Documents & Permits

Finalization of Construction Documents & Permits

Prior to advertisement of the subject project, Dudek engineering staff need to finalize the engineering documents to incorporate the environmental and California Coastal Commission (CCC) permit requirements. In addition, upon issuance of the CCC permit, the completed permit coordinated with OC Parks for issuance of the OC Parks encroachment permit. Dudek proposes to provide the following services to SOCWA for finalization of the contract documents for bidding.

Task 1: Engineering Services. Dudek completed the plans, specifications and cost opinion in July 2017. Since that time, several environmental and CCC permits were finalized. The following tasks are required to finalize the plans, specifications and cost opinion for project advertisement and subsequent construction.

- Task 1.1 – OC Parks Encroachment Permit. To date, SOCWA has obtained the necessary environmental permits for project construction. OC Parks has received the necessary documentation to issue an encroachment permit, with exception of the CCC permit (Task 2). Upon receipt of the CCC permit, Dudek will coordinate with OC Parks to acquire the encroachment permit.

- Task 1.2 – Contract Documents. The Contract Documents (i.e. front-end documents) were prepared in July 2017. Dudek will finalize the Contract Documents, in cooperation with SOCWA staff, to assure they are updated to incorporate information that may be required.

- Task 1.3 – Construction Drawings. Since completion in July 2017, various permitted and negotiated changes to the proposed construction plans have been identified. For this reason, Dudek will finalize the construction drawings to incorporate and/or remove information as required. For example, as part of the CCC permitting, a Public Access Plan is required and must be incorporated into the plan set. Similarly, a construction site access plan is required to direct the Contractor relative to roadway uses, park patron challenges, and areas that must be avoided. Dudek will bring the drawing set up to date, ready for SOCWA advertisement and construction.

- Task 1.4 – Construction Specifications. Similar to the drawings, the project specifications were completed in July 2017. Since that time, various environmental, CCC and other permit information has been determined, each requiring additions to the previously prepared specifications. Dudek will prepare a separate specification section to convey permitting requirements to the prospective bidders. Technical specifications will be created to address work required by project permits, including but not limited to the Public Access Plan, the Site Access Plan, and similar work. Notes will be added to the drawings as appropriate to clarify direction to the prospective bidders.

- Task 1.5 – Opinion of Probable Construction Cost. The Opinion of Probable Construction Cost will be updated to include current pricing of materials and labor, as well as incorporate the requirements of the various permitting documents.

Task 2: CCC Permit Acquisition. Dudek has assisted SOCWA on a consistent basis to address ongoing CCC comments regarding acquisition of the Coastal Development Permit Amendment (CDPA) by addressing the Special Conditions by CCC staff. Currently, the final special condition has been resolved and the CCC is addressing a permit extension on September 8, 2020. All indications are that the CDPA will be issued soon. The following tasks are necessary to complete efforts necessary for per acquisition.

- Task 2.1 - Coastal Development Permit Amendment Extension Application Support. On May 26, 2020, Dudek submitted the Coastal Development Permit Amendment (CDPA) extension application package to the CCC. Dudek will continue to coordinate with SOCWA and CCC staff throughout the CDPA extension application process, and review any additional CCC requests for information. Dudek assumes that CCC will determine the CDPA extension application to qualify as an immaterial extension, as CCC determined for the last extension application submitted in July 2019. When CCC publishes its decision in the South Coast District Deputy Director's Report for Orange County during an upcoming CCC hearing, Dudek will review the CCC's determination and communicate the outcomes to SOCWA.

  Because the project has previously received objection letters from community members, the proposed scope assumes one memo response will be needed again, addressing potential coastal resources concerns. As needed, Dudek will coordinate with CCC staff on potential objection letters and develop the staff recommendation.

  Considering uncertainty in matters involving the CCC, additional work authorization may be required and would be discussed through separate scope and fees, if necessary. For example, if three CCC Commissioners object to the current extension request on grounds that there may be circumstances that affect consistency with the Coastal Act, the Executive Director will schedule the extension request for a public hearing in accordance with Section 13169(d) of Title 14 of the California Code of Regulations. This scope does not anticipate this requirement, and therefore does not include budget for those services. If required, additional budget and scope amendment will be discussed.

- Task 2.2 - Condition Compliance. Dudek will help SOCWA compile the materials needed to satisfy the last special condition of the CDPA permit, which includes submittal of the Public Access Plan (PAP) per Special Condition #17. Work needed to complete the PAP includes:
  - Coordinating internally to finalize PAP draft to incorporate CCC's recommended revisions
  - Reviewing and organizing PAP submittal package (in both electronic and hard-copy form)
  - Emailing and mailing PAP submittal package to CCC
  - Coordinating with CCC to incorporate one (1) round of follow-up comments, as needed, for CCC to determine that the PAP is complete

Dudek will coordinate with SOCWA and CCC, as necessary, to communicate receipt of the permit and answer any final questions.

Cost for Engineering Services	***$28,110.00***
Cost for CCC Permitting Services	***$15,240.00***