Appendix D4
Ocean Plan Compliance Assessment

Ocean Plan Compliance Assessment for the Monterey Peninsula Water Supply Project and Project Variant

Technical Memorandum

March 2015

Prepared for:

MRWPCA

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Technical Memorandum

Pure Water Monterey
A Groundwater Replenishment Project

March 2015

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1 Introduction

In response to State Water Resources Control Board (SWRCB) Water Rights Orders WR 95-10 and WR 2009-0060, two proposed projects are in development on the Monterey Peninsula to provide potable water to offset pending reductions of Carmel River water diversions: (1) a seawater desalination project known as the **Monterey Peninsula Water Supply Project ("MPWSP")**, and (2) a groundwater replenishment project known as the **Pure Water Monterey Groundwater Replenishment Project ("GWR Project")**. The capacity of the MPWSP is dependent on whether the GWR Project is ultimately constructed. For the MPWSP, California American Water ("CalAm") would build a seawater desalination facility capable of producing 9.6 million gallons per day (mgd) of drinking water. In a variation of that project, known as the **Monterey Peninsula Water Supply Project Variant ("Variant")**, CalAm would build a smaller desalination facility capable of producing 6.4 mgd of drinking water, and a partnership between the Monterey Peninsula Water Management District ("MPWMD") and the Monterey Regional Water Pollution Control Agency ("MRWPCA") would build an advanced water treatment facility ("AWT Facility") capable of producing up to 3,700 acre-feet per year (AFY) (3.3 mgd)[1] of highly purified recycled water to enable CalAm to extract 3,500 AFY (3.1 mgd) from the Seaside Groundwater Basin for delivery to their customers. The AWT Facility would purify secondary-treated wastewater (*i.e.*, secondary effluent) from MRWPCA's Regional Treatment Plant ("RTP"), and this highly purified recycled water would be injected into the Seaside Groundwater Basin and later extracted for municipal water supplies. Both the proposed desalination facility and the proposed AWT Facility would employ reverse osmosis (RO) membranes to purify the waters, and as a result, both projects would produce RO concentrate waste streams that would be disposed through the existing MRWPCA ocean outfall: the brine concentrate from the desalination facility ("Desal Brine"), and the RO concentrate from the AWT Facility ("GWR Concentrate").

The goal of this technical memorandum is to analyze whether the discharges from the proposed projects to the ocean through the existing outfall would impact marine water quality, and thus, human health, marine biological resources, or beneficial uses of the receiving waters. A similar assessment of the GWR Project on its own was previously performed (Trussell Tech, 2015, see Appendix B), and thus this document is focused on the MPWSP and the Variant projects.

1.1 Treatment through the Proposed CalAm Desalination Facility

This section describes the proposed treatment train for the MPWSP desalination facility. Seawater from the Monterey Bay would be extracted through subsurface slant wells beneath the ocean floor and piped to a new CalAm-owned desalination facility. This facility would consist of granular media pressure filters, cartridge filters, a two-pass RO membrane system, RO product-water stabilization (for corrosion control), and disinfection (Figure 1). The RO process is expected to recover 42 percent of the influent seawater flow as product water, while the remainder of the concentrated influent water becomes the Desal Brine. The MPWSP product

[1] One million gallons per day is equal to 1,121 acre-feet per year. The AWT Facility would be capable of producing up to 4 mgd of highly-purified recycled water on a daily basis, but production would fluctuate throughout the year, such that the average annual production would be 3.3 mgd (3,700 AFY) in a non-drought year.

water (desalinated water) would be used for municipal drinking water, while the Desal Brine would be blended with available RTP secondary effluent, brine that is trucked and stored at the RTP, and GWR Concentrate (for the Variant project only), before it is discharged to the ocean through the existing MRWPCA ocean outfall. The volume of Desal Brine is dependent on the project size: 13.98 and 8.99 mgd for the MPWSP and Variant projects, respectively.

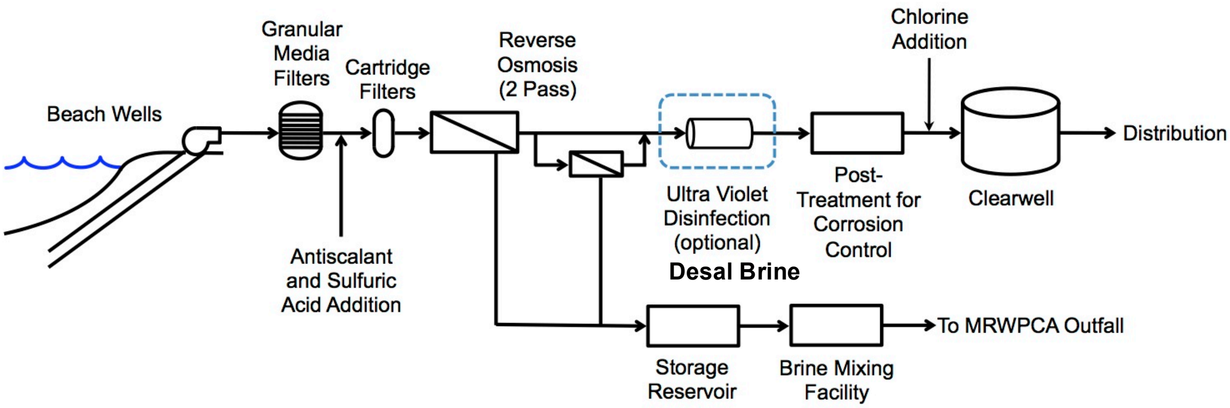

Figure 1 – Simplified diagram of CalAm desalination facilities

1.2 Treatment through the RTP and Proposed AWT Facilities

The existing MRWPCA RTP treatment process includes screening, primary sedimentation, secondary biological treatment through trickling filters, followed by a solids contactor (*i.e.*, bio-flocculation), and then clarification (Figure 2). Much of the secondary effluent undergoes tertiary treatment (granular media filtration and disinfection) to produce recycled water used for agricultural irrigation. The unused secondary effluent is discharged to the Monterey Bay through the MRWPCA outfall. MRWPCA also accepts trucked brine waste for ocean disposal ("hauled brine"), which is stored in a pond and mixed with secondary effluent for disposal.

The proposed AWT Facility would include several advanced treatment technologies for purifying the secondary effluent: ozone (O_3), biologically active filtration (BAF) (this is an optional unit process), membrane filtration (MF), RO, and an advanced oxidation process (AOP) using UV-hydrogen peroxide. MRWPCA and the MPWMD conducted a pilot-scale study of the ozone, MF, and RO elements of the AWT Facility from December 2013 through July 2014, successfully demonstrating the ability of the various treatment processes to produce highly-purified recycled water that complies with the California Groundwater Replenishment Using Recycled Water Regulations (Groundwater Replenishment Regulations),[2] the State Water Resource Control Board's Anti-degradation and Recycled Water Policies,[3] and Central Coast Water Quality Control Plan (Basin Plan)[4] standards, objectives and guidelines for groundwater. Monitoring of the concentrate from the RO was also conducted during the pilot-scale study.

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[2] SWRCB (2014) Water Recycling Criteria. Title 22, Division 4, Chapter 3, California Code of Regulations.

[3] See http://www.swrcb.ca.gov/plans_policies/

[4] See http://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/docs/basin_plan_2011.pdf

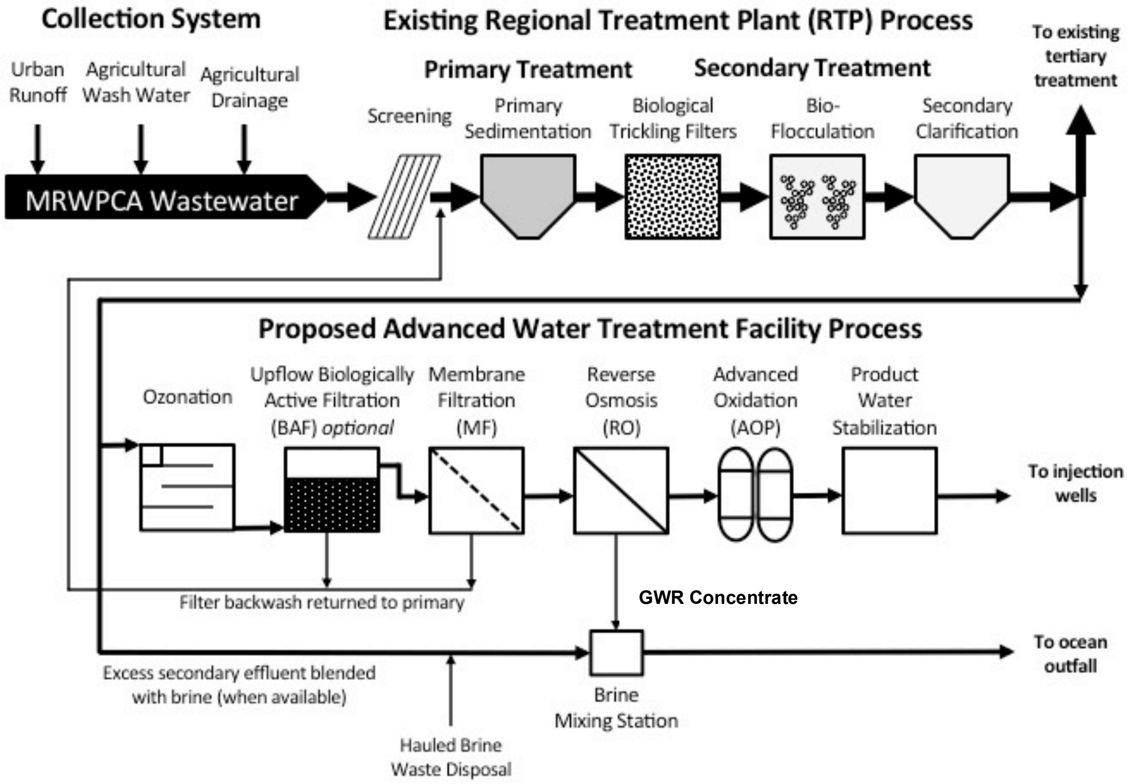

Figure 2 – Simplified diagram of existing MRWPCA RTP and proposed AWT Facility treatment

1.3 California Ocean Plan

The State Water Resources Control Board 2012 Ocean Plan ("Ocean Plan") sets forth water quality objectives for ocean discharges with the intent of preserving the quality of the ocean water for beneficial uses, including the protection of both human and aquatic ecosystem health (SWRCB, 2012). When municipal wastewater flows are released from an outfall, the wastewater and ocean water undergo rapid mixing due to the momentum and buoyancy of the discharge.[5] The mixing occurring in the rising plume is affected by the buoyancy and momentum of the discharge, a process referred to as initial dilution (NRC, 1993). For rising plumes, the Ocean Plan defines the initial dilution as complete when "the diluting wastewater ceases to rise in the water column and first begins to spread horizontally." For more saline discharges, a sinking plume can form when the mixture of seawater and discharge is denser than the ambient water (also known as a negatively buoyant plume). In the case of negatively buoyant plumes, the Ocean Plan defines the initial dilution as complete when "the momentum induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed

[5] Municipal wastewater effluent, being effectively fresh water, is less dense than seawater and thus rises (due to buoyancy) while it mixes with ocean water. GWR Concentrate whether by itself or mixed with municipal wastewater effluent is less dense than seawater and also rises (due to buoyancy) while it mixes with ocean water.

distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution."

The Ocean Plan objectives are to be met after the initial dilution of the discharge into the ocean. The initial dilution occurs in an area known as the zone of initial dilution (ZID). The extent of dilution in the ZID is quantified and referred to as the minimum probable initial dilution (D_m). The water quality objectives established in the Ocean Plan are adjusted by the D_m to derive the National Pollutant Discharge Elimination System (NPDES) permit limits for a wastewater discharge prior to ocean dilution.

The current MRWPCA wastewater discharge is governed by NPDES permit R3-2014-0013 issued by the Central Coast Regional Water Quality Control Board ("RWQCB"). Because the existing NPDES permit for the MRWPCA ocean outfall must be amended to discharge Desal Brine, comparing future discharge concentrations to the current NPDES permit limits would not be an appropriate metric or threshold for determining whether the proposed projects would have a significant impact on marine water quality. Instead, compliance with the Ocean Plan objectives was selected as an appropriate threshold for determining whether or not the proposed projects would result in a significant impact requiring mitigation. FlowScience, Inc. ("FlowScience") conducted modeling of the ocean discharge for various discharge scenarios involving the proposed projects to determine D_m values for the various discharge scenarios. These ocean modeling results were combined with projected discharge water quality to assess compliance with the Ocean Plan.

1.4 Future Ocean Discharges

A summary schematic of the MPWSP and Variant projects is presented in Figure 3. For the MPWSP, 23.58 mgd of ocean water (design capacity) would be treated in the desalination facility; an RO recovery of 42% would lead to an MPWSP Desal Brine flow of 13.98 mgd that would be discharged through the outfall. Secondary effluent from the RTP would also be discharged through the outfall, although the flow would be variable depending on both the influent flow and the proportion being processed through the tertiary treatment system at the Salinas Valley Reclamation Project (SVRP) to produce recycled water for agricultural irrigation. The final discharge component is hauled brine that is trucked to the RTP and blended with secondary effluent prior to being discharged. The maximum anticipated flow of this stream is 0.1 mgd (blend of brine and secondary effluent). These three discharge components (Desal Brine, secondary effluent, and hauled brine) would be mixed at the proposed Brine Mixing Facility prior to ocean discharge.

For the Variant project, 15.93 mgd of ocean water (design capacity) would be pumped to the desalination facility, and an RO recovery of 42% would result in a Variant Desal Brine flow of 8.99 mgd. The Variant would include the GWR Project, which involves the addition of new source waters to the RTP, which could alter the water quality of the secondary effluent produced by the RTP. The secondary effluent in the Variant is referred to as "Variant secondary effluent," and would be different in quality from the MPWSP secondary effluent. Under the GWR Project, a portion of the secondary effluent would be fed to the AWT Facility, and the resultant GWR Concentrate (maximum 0.94 mgd) would be discharged through the outfall. The hauled brine received at the RTP would continue to be blended with secondary effluent prior to discharge, the quality of the blended brine and secondary effluent will change as a result of the change in secondary effluent quality; the hauled brine for the Variant is referred to as "Variant hauled brine."

1.5 Objective of Technical Memorandum

Trussell Tech estimated worst-case in-pipe water quality for the various ocean discharge scenarios (*i.e.*, prior to dilution through ocean mixing) for the proposed projects. FlowScience ocean discharge modeling and the results of the water quality analysis were then used to provide an assessment of whether the proposed projects would consistently meet Ocean Plan water quality objectives. The objective of this technical memorandum is to summarize the assumptions, methodology, results and conclusions of the Ocean Plan compliance assessment for the MPWSP and Variant projects.

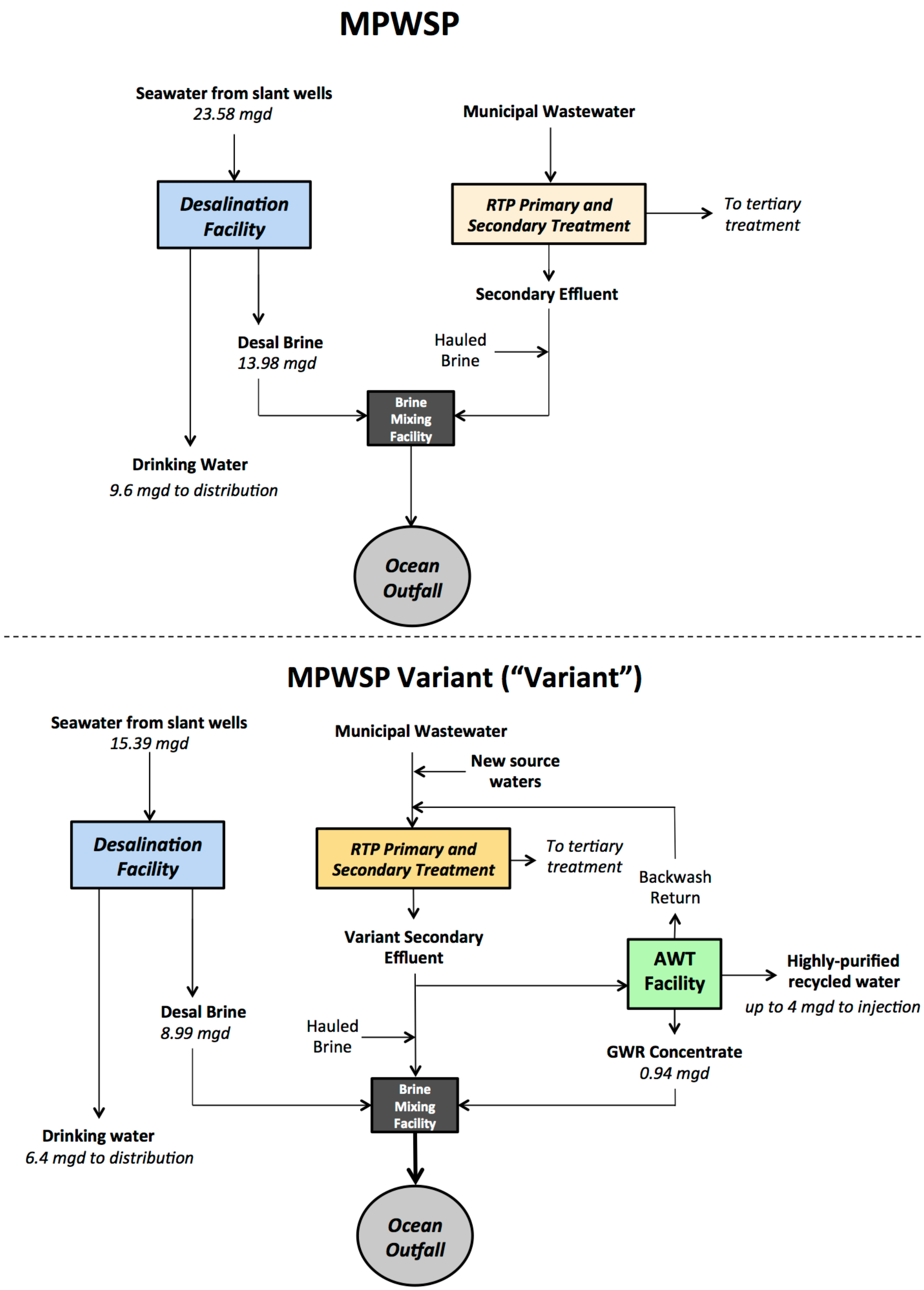

Figure 3 – Simplified flow schematics for the MPWSP and Variant projects (specified flow rates are at design capacity)

2 Methodology for Ocean Plan Compliance

Water quality data from various sources for the different treatment process influent and waste streams were compiled. Trussell Tech combined these data for different flow scenarios and used ocean modeling results to assess compliance of the different discharge scenarios with the Ocean Plan objectives. This section documents the data sources and provides further detail on the methodology used to perform this analysis. A summary of the methodology is presented in Figure 4.

2.1 Methodology for Determination of Discharge Water Quality

As previously discussed, the amounts and combinations of various wastewaters that would be disposed through the MRWPCA Outfall will vary depending on the capacity, seasonal and daily flow characteristics, and extent and timing of implementation of the proposed projects. The discharge components for the MPWSP and Variant are summarized in Table 1.

Table 1 – Discharge waters Included in each analysis

Project	Desal Brine	Secondary Effluent	Variant Secondary Effluent	Hauled Brine	Variant Hauled Brine [a]	GWR Concentrate
MPWSP	✓	✓		✓		
Variant	✓		✓		✓	✓

[a]This is placed in a separate category because it contains some Variant secondary effluent.

Detailed discussions about the methods used to determine the discharge water qualities related to the GWR Project were previously discussed and can be found in Appendix B. This previous analysis included water quality estimates of the secondary effluent and Variant secondary effluent, the hauled brine and Variant hauled brine, and the GWR Concentrate (*i.e.,* all of the discharges except for the Desal Brine). In the previous analysis, Trussell Tech assumed that the highest observed values for the various Ocean Plan constituents within each type of water flowing to and treated at the RTP, including the AWT Facility as applicable, to be the worst-case water quality[6], and these same data were used in the analysis described in this memorandum. Use of these worst-case water quality concentrations ensure that the analysis in both the Appendix B Ocean Plan compliance technical memorandum and this memorandum are conservative related to the Ocean Plan compliance assessment (and thus, the impact analysis for the projects' environmental review processes).

To determine the impact of the MPWSP and Variant Projects, the worst-case water quality of the Desal Brine was estimated using available data for ocean water quality (discussed further below). In all cases, the highest observed concentrations from all data sources were used for the analysis.

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[6] The exception to this statement is cyanide. In mid-2011, Monterey Bay Analytical Service (MBAS) began performing the cyanide analysis on the RTP secondary effluent, at which time the reported values increased by an order of magnitude. Because no operational or source water composition changes took place at this time that would result in such an increase, it is reasonable to conclude the increase is an artifact of the change in analysis method and therefore the results were questionable. Therefore, although the cyanide concentrations reported by MBAS are presented, they are not used in the analysis for evaluating compliance with the Ocean Plan objectives for the EIR.

The methodology for determining the water quality of the Desal Brine and secondary effluent is further described in this section (the methodology for all other discharge waters can be found in Appendix B). A summary of which discharge waters are considered for both the MPWSP and Variant, and which data sources were used in the determination of the water quality for each discharge stream is shown in Figure 4.

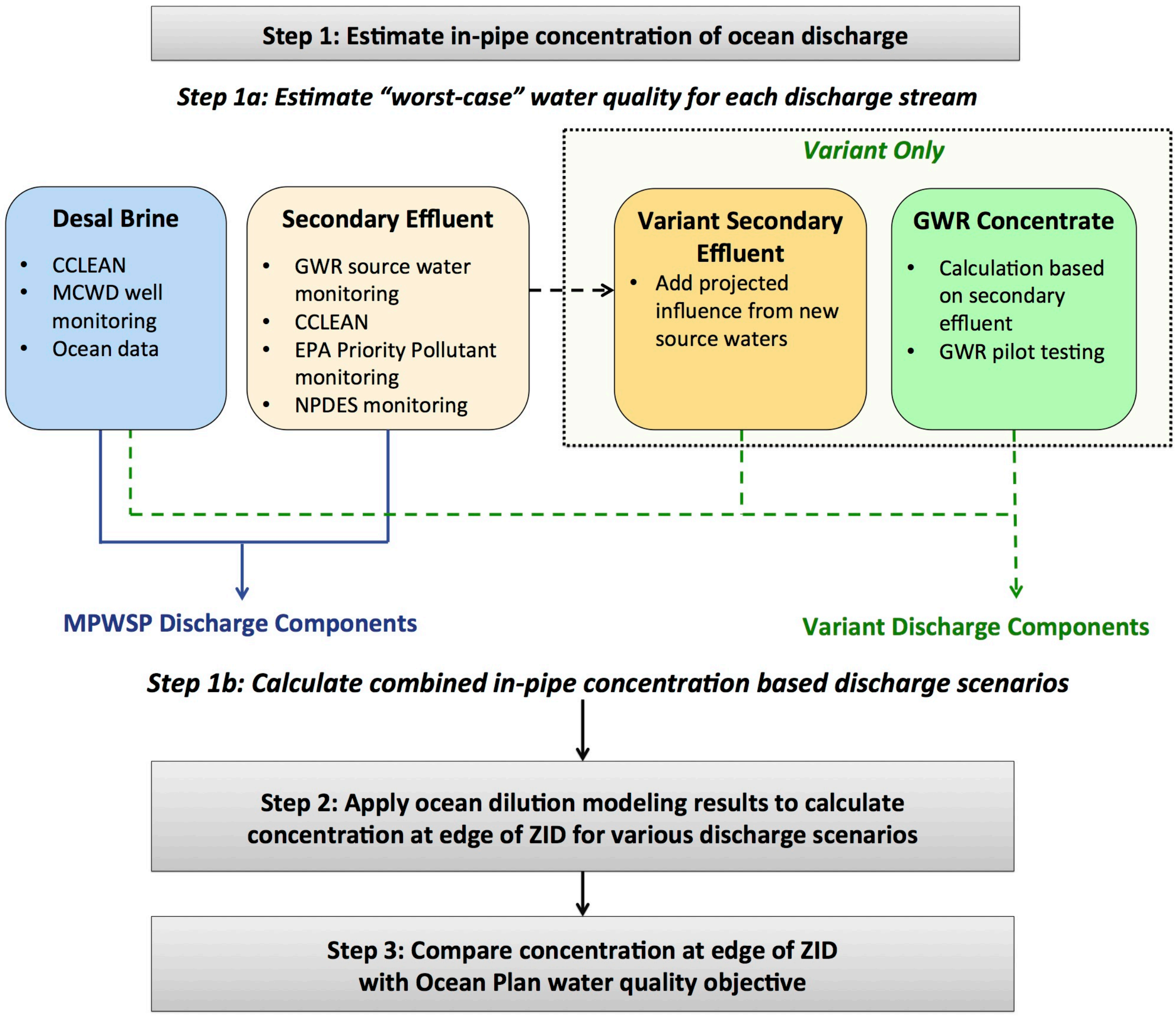

Figure 4 – Logic flow chart for determination of MPWSP and Variant compliance with Ocean Plan objectives.

2.1.1 Secondary Effluent

For the MPWSP Project, the discharged secondary effluent would not be impacted by additional source waters that would be brought in for the Variant project; therefore, the existing secondary effluent quality was used in the analysis. The following sources of data were considered for selecting an existing secondary effluent concentration for each constituent in the analysis:

- Secondary effluent water quality monitoring conducted for the GWR Project from July 2013 through June 2014
- Historical NPDES compliance data collected semi-annually by MRWPCA (2005-2014)

- Historical Priority Pollutant data collected annually by MRWPCA (2004-2014)
- Data collected by the Central Coast Long-Term Environmental Assessment Network (CCLEAN) (2008-2013)

The existing secondary effluent concentration for each constituent selected for the analysis was the maximum reported value from the above sources. In cases where the analysis of a constituent could not be quantified or it was not detected, the result is reported as less than the Method Reporting Limit (<MRL).[7] Because the actual concentration could be any value equal to or less than the MRL, the conservative approach is to use the value of the MRL in the flow-weighting calculations. In some cases, constituents were not detected ("ND") in any of the source waters; in this case, the values are reported as ND(<X), where X is the MRL. For some non-detected constituents, the MRL exceeds the Ocean Plan objective, and thus no compliance determination can be made[8]. A detailed discussion of the cases where a constituent was reported as less than the MRL is included in the previous technical memorandum in Appendix B.

2.1.2 Desal Brine

Only limited data were available for characterizing the Desal Brine water quality. Trussell Tech used the following three sources of data for the Desal Brine water quality assessment:

- Data generated by the CCLEAN program (2008-2013) for samples collected in the Monterey Bay (provided by Asavari Devadiga of ESA via e-mail on November 12, 2014).
- Water quality data collected quarterly in 2009 from a Marina Coast Water District (MCWD) monitoring well (DMW-2)
- Ocean monitoring data for copper and silver from outside the Golden Gate Bridge, collected sporadically from 1993 to 2013, and provided by Dane Hardin of Applied Marine Sciences (transmitted via e-mail on December 29, 2014).

With the exception of copper and silver, the maximum value observed in any of the data sources was assumed to be the "worst-case" water quality for the raw seawater feeding the desalination facility. For copper and silver, each was detected in one sample in the MCWD monitoring well data at an uncharacteristically high concentration (all other samples for the MCWD monitoring program were below detection), and issues related to well sampling technique are suspected (*e.g.*, inadequate flushing). Thus, the ocean monitoring data provided by Dane Hardin was used instead of the MCWD data, as it was considered to be more representative. A Desal Brine concentration was conservatively estimated for each constituent by using a concentration factor

[7] The lowest amount of an analyte in a sample that can be quantitatively determined with stated, acceptable precision and accuracy under stated analytical conditions (*i.e.*, the lower limit of quantitation). Therefore, acceptable quality control and quality assurance procedures are calibrated to the MRL, or lower. To take into account day-to-day fluctuations in instrument sensitivity, analyst performance, and other factors, the MRL is established at three times the Method Detection Limit (or greater). The Method Detection Limit is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. (40 Code of Federal Regulations Section136 Appendix B).

[8] This phenomenon is common in the implementation of the Ocean Plan where for some constituents, suitable analytical methods are not capable of measuring low enough to quantify the minimum toxicologically relevant concentrations. For these constituents, a discharge is considered compliant if the monitoring results are less than the MRL.

of 1.73, which was calculated assuming complete constituent rejection and a 42 percent recovery through the seawater RO membranes.

Data limitations were such that no data were available for several Ocean Plan constituents. For constituents that lacked Desal Brine data, a concentration of zero was assumed for the analysis, such that the partial influence of the other discharge streams could still be assessed. Thus, a complete "worst-case" assessment for these constituents was not possible. A list of Ocean Plan constituents for which no Desal Brine or seawater data were available is provided in Appendix A, Table A1.

2.1.3 Combined Ocean Discharge Concentrations

Having calculated the worst-case future concentrations for each of the possible discharge components, the combined concentration prior to discharge was determined as a flow-weighted average of the contributions of each of the discharge components appropriate for the MPWSP and Variant (see Figure 4).

2.2 Ocean Modeling Methodology

In order to determine Ocean Plan compliance, Trussell Tech used the following information: (1) the in-pipe (*i.e.*, pre-ocean dilution) concentration of a constituent ($C_{\text{in-pipe}}$) that was developed as discussed in the previous section, (2) the minimum probable dilution for the ocean mixing (D_m) for the discharge flow scenarios that were modeled by FlowScience (FlowScience, 2014a and 2014b), and (3) the background concentration of the constituent in the ocean ($C_{\text{Background}}$) that is specified in the Table 3 of the Ocean Plan (SWRCB, 2012). With this information the concentration at the edge of the zone of initial dilution (C_{ZID}) was calculated using the following equation:

$$C_{ZID} = \frac{C_{In-pipe} + D_m * C_{Background}}{1 + D_m} \qquad (1)$$

The C_{ZID} was then compared to the Ocean Plan water quality objectives[9] in Table 1 of the Ocean Plan (SWRCB, 2012). For each discharge scenario, if the C_{ZID} was below the Ocean Plan objective, then it was assumed that the discharge would comply with the Ocean Plan. However, if the C_{ZID} exceeds the Ocean Plan objective, then it was concluded that the discharge scenario could violate the Ocean Plan objective. Note that this approach could not be applied for some constituents (*e.g.*, acute toxicity, chronic toxicity, and radioactivity[10]).

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[9] Note that the Ocean Plan (see Ocean Plan Table 2) also defines effluent limitations for oil and grease, suspended solids, settable solids, turbidity, and pH; however, it was not necessary to evaluate these parameters in this assessment. If necessary, the pH of the water would be adjusted to be within acceptable limits prior to discharge. Oil and grease, suspended solids, settable solids, and turbidity do not need to be considered in this analysis as the GWR Concentrate would be significantly better than the secondary effluent with regards to these parameters. Prior to the AWT Facility RO treatment process, the process flow would be treated by MF, which will reduce these parameters, and the waste stream from the MF will be returned to RTP headworks.

[10] Calculating flow-weighted averages for toxicity (acute and chronic) and radioactivity (gross beta and gross alpha) is not appropriate based the nature of the constituent. These constituents were measured individually for the secondary effluent and GWR Concentrate, and these individual concentrations would comply with the Ocean Plan

FlowScience performed modeling of a limited number of discharge scenarios for the MPWSP and Variant that include combinations of Desal Brine, secondary effluent, GWR Concentrate, and hauled brine (FlowScience, 2014a and 2014b). All scenarios assume the maximum flow rates for the GWR Concentrate, Desal Brine and hauled brine, which is a conservative assumption in terms of constituent loading and minimum dilution.

2.2.1 Ocean Modeling Scenarios

The modeled scenarios are summarized in Tables 2 and 3 for the MPWSP and the Variant projects, respectively. The Variant discharge scenarios that have no Desal Brine (*i.e.* Scenarios 5 through 9) have already been analyzed and found to comply with the Ocean Plan (Trussell Tech 2015, see Appendix B); these scenarios are shown in Table 3 for completeness, but for simplicity, the analysis of these scenarios is not repeated in Section 3.

Table 2 - Modeled flow scenarios for the MPWSP

No.	Discharge Scenario (Ocean Condition)	Discharge flows (mgd)		
		Secondary effluent	Desal Brine	Hauled brine [a]
1	RTP design capacity without Desal Brine	29.6	0	0.1
2	Desal Brine with no secondary effluent	0	13.98	0.1
3	Desal Brine with low secondary effluent	2	13.98	0.1
4	Desal Brine with high secondary effluent [b]	19.68	13.98	0.1

[a] Hauled brine was not included in the modeling of MPWSP flow scenarios; however, the change in both flow and TDS from the addition of hauled brine is less then 1% and thus is expected to have a negligible impact on the modeled D_m.
[b] Note that RTP wastewater flows have been declining in recent years as a result of water conservation; while 19.68 mgd is higher than current RTP wastewater flows, this is expected to be a conservative scenario with respect to ocean modeling, compared to using the current wastewater flows of 16 to 18 mgd.

MPWSP Flow Scenarios:

(1) **RTP design capacity without Desal Brine**: Design flow for the RTP, with no discharge of Desal Brine. This scenario could occur if the RTP facility was operated at the peak dry weather flow and the desalination facility was offline. This scenario is similar to discharge conditions used as the basis for the current MRWPCA NPDES discharge permit.

(2) **Desal Brine with no secondary effluent:** The maximum influence of the Desal Brine on the overall discharge (*i.e.*, no secondary effluent discharged). This scenario would be representative of conditions when demand for recycled water is highest (*e.g.*, during summer months), and all of the RTP secondary effluent is recycled through the SVRP for agricultural irrigation.

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objectives. No radioactivity or toxicity data were available for the seawater, and thus no determination could be made for these parameters for scenarios involving the Desal Brine.

(3) **Desal Brine with low secondary effluent:** Desal Brine discharged with a relatively low amount of secondary effluent, resulting in a negatively buoyant plume. This scenario represents times when demand for recycled water is high, but there is excess secondary effluent that is discharged to the ocean.

(4) **Desal Brine with high secondary effluent:** Desal Brine discharged with a relatively high amount of secondary effluent, resulting in a positively buoyant plume. This scenario would be representative of conditions when demand for recycled water is lowest (*e.g.*, during winter months), and the SVRP is not operational.

Table 3 – Modeled flow scenarios for the Variant project

No.	Discharge Scenario (Ocean Condition)	Discharge Flows (mgd)			
		Secondary Effluent	Desal Brine	GWR Concentrate	Hauled Brine [a]
1	Desal Brine only	0	8.99	0	0.1
2	Desal Brine with high secondary effluent [b]	19.68	8.99	0	0.1
3	Desal Brine with GWR Concentrate and high secondary effluent	15.92	8.99	0.94[c]	0.1
4	Desal Brine with GWR Concentrate and no secondary effluent	0	8.99	0.94[c]	0.1
5	RTP design capacity with GWR Concentrate [d]	24.7	0	0.94	0.1
6	RTP capacity with GWR Concentrate with current port configuration [d]	23.7	0	0.94	0.1
7	Minimum secondary effluent flow with GWR Concentrate [d]	0	0	0.94	0.1
8	Minimum secondary effluent flow with GWR Concentrate during Davidson oceanic conditions [d]	0.4	0	0.94	0.1
9	Moderate secondary effluent flow with GWR concentrate [d]	3	0	0.94	0.1

[a] Hauled brine was not included in the modeling of Variant scenarios involving discharge of desalination brine. However, the change in both flow and TDS from the addition of hauled brine is less than 1% and thus is expected to have a negligible impact on the modeled D_m.
[b] Note that RTP wastewater flows are have been declining in recent years as a result of conservation; while 19.68 mgd is higher than current RTP wastewater flows, this is expected to be a conservative scenario with respect to ocean modeling, compared to using the current wastewater flows of 16 to 18 mgd.
[c] The actual modeled GWR Concentrate flow was 0.73 mgd (based on an older design for the AWT Facility). This change is not expected to have a significant impact on the modeled D_m. Future updates to modeling results would include the updated GWR Concentrate flow of 0.94 mgd.
[d] Scenarios 5 through 9 were analyzed as part of a previous analysis (see Appendix B), and based on the documented assumptions, the GWR Concentrate would comply with the Ocean Plan objectives; therefore, these scenarios are not discussed further in this memorandum.

Variant Project Flow Scenarios:

(1) **Desal Brine only:** Desal Brine discharged without secondary effluent or GWR Concentrate. This scenario would be representative of conditions when the smaller (6.4 mgd) desalination facility is in operation, but the AWT Facility is not operating

(*e.g.*, offline for maintenance), and all of the secondary effluent is recycled through the SVRP (*e.g.*, during high irrigation water demand summer months).

(2) **Desal Brine with high secondary effluent:** Desal Brine discharged with a relatively high flow of secondary effluent, resulting in a positively buoyant plume. This scenario would be representative of conditions when demand for recycled water is lowest (*e.g.*, during winter months), and neither the SVRP nor the AWT Facility are operational.

(3) **Desal Brine with GWR Concentrate and high secondary effluent:** Desal Brine discharged with GWR Concentrate and a relatively high flow of secondary effluent. The reduction of secondary effluent flow between Scenario 2 and this scenario is a result of the AWT Facility operation. This would be a typical discharge scenario when there is no demand for tertiary recycled water (*e.g.*, during winter months).

(4) **Desal Brine with GWR Concentrate and no secondary effluent:** Desal Brine discharge with GWR Concentrate and no secondary effluent. This scenario would be representative of the condition where both the desalination facility and the AWT Facility are in operation, and there is the highest demand for recycled water through the SVRP (*e.g.*, during summer months).

(5-9) **Variant conditions with no Desal Brine contribution**: These scenarios represent a range of conditions that would exist when the CalAm desalination facilities were offline for any reason. These conditions were previously evaluated (Trussell Tech, 2015) and thus are not discussed further in this technical memorandum.

The discharge scenarios presented in Tables 2 and 3 are the most representative scenarios that have been modeled for the proposed projects, however, it should be noted that some key discharge scenarios have yet to be modeled. Specifically, a discharge scenario where a moderate secondary effluent flow (*e.g.*, between 4 and 10 mgd) is discharged along with the Desal Brine, such that the combined discharge still results in a negatively buoyant plume[11]. Therefore, the results presented in Section 3 should be viewed as partial findings. A separate technical memorandum is in the process of being prepared to amend the work in this report to include the analysis recommended in this paragraph. It is anticipated for completion by late March 2015.

2.2.2 Ocean Modeling Assumptions

FlowScience documented the modeling assumptions and results in two technical memoranda (FlowScience, 2014a and 2014b). The modeling assumptions were specific to the oceanic condition: Davidson (November to March), Upwelling (April to August), and Oceanic (September to October)[12]. In order to conservatively demonstrate Ocean Plan compliance, the

[11] This scenario has the potential to be the "worst-case" discharge scenario, because it represents the case where there is a confluence of higher contaminant loading from the secondary effluent with the lower ocean mixing dilution that results from negatively buoyant discharge plumes. For cases where there is little or no secondary effluent discharged along with the Desal Brine, the ocean mixing is still low but, in general, there is a lower contaminant load. Conversely, in cases where there is a relatively high secondary effluent discharge flow, the contaminant loading is higher, but the Desal Brine salinity is diluted to the point that the discharge plume is positively buoyant and greater mixing is achieved within the ZID.

[12] Note that these ranges assign the transitional months to the ocean condition that is typically more restrictive at relevant discharge flows.

lowest D_m from the applicable ocean conditions was used for each flow scenario. It should also be noted that for all scenarios except one[13], the ocean modeling was performed assuming 120 of the 172 diffuser ports were open. After the modeling was performed, it was discovered that there are actually 130 open ports. An increase in the number of ports decreases the port discharge velocity, which would tend to increase the dilution; however, this is not always the case[14]. Ocean modeling using 130 open ports will be included in the aforementioned analysis that is anticipated for completion by late March 2015.

For negatively buoyant plumes, FlowScience modeled the ocean mixing using two methods: (1) a Semi-Empirical Analysis method, and (2) EPA's Visual Plume method. While results were provided from both methods, FlowScience indicated that there is greater confidence in Semi-Empirical Analysis results for negatively buoyant plumes. Thus, the Semi-Empirical Analysis results were used in this analysis for the discharges with a negatively buoyant plume.

3 Ocean Plan Compliance Results

3.1 Water Quality of Combined Discharge

As described above, the first step in the Ocean Plan compliance analysis was to estimate the worst-case water quality for the future wastewater discharge components (*i.e.,* Desal Brine, Secondary Effluent, Hauled Brine and GWR Concentrate). The estimated water quality for each type of discharge is provided in Table 4. Specific assumptions and data sources for each constituent are documented in the Table 4 footnotes.

Table 4 – Estimated worst-case water quality for the various discharge waters

Constituent	Units	Desal Brine	Secondary Effluent		Hauled Brine		GWR Concentrate	Footnotes
			MPWSP	*Variant*	*MPWSP*	*Variant*		
Objectives for protection of marine aquatic life								
Arsenic	µg/L	37.9	45	45	45	45	12	2,6,16,21
Cadmium	µg/L	7.9	1	1.2	1	1.2	6.4	1,7,15,21
Chromium (Hexavalent)	µg/L	–	ND(<2)	2.7	130	130	14	3,7,15,24
Copper	µg/L	3.07	10	25.9	39	39	136	1,7,15,22
Lead	µg/L	6.4	ND(<0.5)	0.82	0.76	0.82	4.3	1,3,7,15,21
Mercury	µg/L	ND(<0.3)	0.019	0.089	0.044	0.089	0.510	1,10,16,21
Nickel	µg/L	ND(<8.6)	5.2	13.1	5.2	13.1	69	1,7,15,21
Selenium	µg/L	55.2	3	6.5	75	75	34	2,7,15,21
Silver	µg/L	0.064	ND(<0.19)	ND(<1.59)	ND(<0.19)	ND(<1.59)	ND(<0.19)	3,9,18,22
Zinc	µg/L	ND(<35)	20	48.4	20	48.4	255	1,7,15,21
Cyanide (MBAS data)	µg/L	ND(<8.6)	81	89.5	81	89.5	143	1,7,16,17,20,21
Cyanide	µg/L	ND(<8.6)	7.2	7.2	46	46	38	1,11,15,20,21
Total Chlorine Residual	µg/L	ND(<200)	ND(<200)	ND(<200)	ND(<200)	ND(<200)	ND(<200)	5
Ammonia (as N)	µg/L	ND(<86.2)	36,400	36,400	36,400	36,400	191,579	1,6,15,21
Ammonia (as N)	µg/L	ND(<86.2)	49,000	49,000	49,000	49,000	257,895	1,6,15,21
Acute Toxicity	TUa	–	2.3	2.3	2.3	2.3	0.77	1,12,16,17,24
Chronic Toxicity	TUc	–	40	40	80	40	100	1,12,16,17,24
Phenolic Compounds (non-chlorinated)	µg/L	–	69	69	69	69	363	1,6,14,15,24
Chlorinated Phenolics	µg/L	–	*ND(<20)*	*ND(<20)*	*ND(<20)*	*ND(<20)*	ND(<20)	3,9,18,24
Endosulfan	µg/L	6.7E-05	0.015	0.048	0.015	0.048	0.25	1,10,14,15,23

13 In MPWSP Scenario 1 (RTP design capacity), the ocean modeling was performed with all discharge ports open.

14 For some Desal Brine dominated discharges, a decrease in dilution was observed as the discharge flow decreased.

Constituent	Units	Desal Brine	Secondary Effluent MPWSP	Secondary Effluent Variant	Hauled Brine MPWSP	Hauled Brine Variant	GWR Concentrate	Footnotes
Endrin	µg/L	2.8E-05	0.000079	0.000079	0.000079	0.000079	0.00	4,8,15,23
HCH (Hexachlorocyclohexane)	µg/L	0.00068	0.034	0.060	0.034	0.060	0.314	1,15,23
Radioactivity (Gross Beta)	pCi/L	–	32	32	307	307	34.8	1,6,12,16,17,24
Radioactivity (Gross Alpha)	pCi/L	–	18	18	457	457	14.4	1,6,12,16,17,24
Objectives for protection of human health – non carcinogens								
Acrolein	µg/L	–	*ND(<5)*	9.0	*ND(<5)*	9.0	47	3,7,15,24
Antimony	µg/L	16.6	0.65	0.79	0.65	0.79	4	1,6,15,21
Bis (2-chloroethoxy) methane	µg/L	–	*ND(<0.5)*	*ND(<4.2)*	*ND(<0.5)*	*ND(<4.2)*	*ND(<1)*	3,9,18,24
Bis (2-chloroisopropyl) ether	µg/L	–	*ND(<0.5)*	*ND(<4.2)*	*ND(<0.5)*	*ND(<4.2)*	*ND(<1)*	3,9,18,24
Chlorobenzene	µg/L	–	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,24
Chromium (III)	µg/L	106.9	3.0	7.3	87	87	38	2,6,15,21
Di-n-butyl phthalate	µg/L	–	*ND(<5)*	*ND(<7)*	*ND(<5)*	ND(<7)	*ND(<1)*	3,9,18,24
Dichlorobenzenes	µg/L	–	*1.6*	*1.6*	*1.6*	*1.6*	*8*	1,6,15,24
Diethyl phthalate	µg/L	–	*ND(<5)*	*ND(<5)*	*ND(<5)*	*ND(<5)*	*ND(<1)*	3,9,18,24
Dimethyl phthalate	µg/L	–	*ND(<2)*	*ND(<2)*	*ND(<2)*	*ND(<2)*	*ND(<0.5)*	3,9,18,24
4,6-dinitro-2-methylphenol	µg/L	–	*ND(<0.5)*	*ND(<20)*	*ND(<0.5)*	*ND(<20)*	*ND(<5)*	3,9,18,24
2,4-dinitrophenol	µg/L	–	*ND(<0.5)*	*ND(<13)*	*ND(<0.5)*	*ND(<13)*	*ND(<5)*	3,9,18,24
Ethylbenzene	µg/L	–	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,24
Fluoranthene	µg/L	0.0019	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.1)*	3,9,18,23
Hexachlorocyclopentadiene	µg/L	–	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	ND(<0.05)	3,9,18,24
Nitrobenzene	µg/L	–	*ND(<0.5)*	*ND(<2.3)*	*ND(<0.5)*	*ND(<2.3)*	*ND(<1)*	3,9,18,24
Thallium	µg/L	ND(<1.7)	*ND(<0.5)*	0.69	*ND(<0.5)*	0.69	3.7	3,7,15,21
Toluene	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21
Tributyltin	µg/L	–	*ND(<0.05)*	*ND(<0.05)*	*ND(<0.05)*	*ND(<0.05)*	*ND(<0.02)*	3,13,18,24
1,1,1-trichloroethane	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21
Objectives for protection of human health - carcinogens								
Acrylonitrile	µg/L	–	*ND(<2)*	2.5	*ND(<2)*	2.5	13	3,7,15,24
Aldrin	µg/L	–	*ND(<0.05)*	*ND(<0.007)*	*ND(<0.05)*	*ND(<0.007)*	*ND(<0.01)*	3,9,18,23
Benzene	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21
Benzidine	µg/L	–	*ND(<0.5)*	ND(<19.8)	*ND(<0.5)*	*ND(<19.8)*	*ND(<0.05)*	3,9,18,24
Beryllium	µg/L	ND(<1.7)	*ND(<0.5)*	ND(<0.69)	0.0052	0.0052	*ND(<0.5)*	3,9,18,21
Bis(2-chloroethyl)ether	µg/L	–	*ND(<0.5)*	ND(<4.2)	*ND(<0.5)*	*ND(<4.2)*	*ND(<1)*	3,9,18,24
Bis(2-ethyl-hexyl)phthalate	µg/L	ND(<1.0)	78	78	78	78	411	2,6,15,21
Carbon tetrachloride	µg/L	ND(<0.5)	*ND(<0.5)*	0.50	*ND(<0.5)*	0.50	2.66	3,7,15,21
Chlordane	µg/L	0.0002	0.00074	0.00074	0.00074	0.00074	0.0039	4,8,14,15,23
Chlorodibromomethane	µg/L	–	*ND(<0.5)*	2.4	*ND(<0.5)*	2.4	13	3,7,15,24
Chloroform	µg/L	–	2	39	2	39	204	2,7,15,24
DDT	µg/L	0.00055	0.001	0.001	0.001	0.022	0.035	4,7,14,15,19,23
1,4-dichlorobenzene	µg/L	ND(<0.9)	1.6	1.6	1.6	1.6	8.4	1,6,15,21
3,3-dichlorobenzidine	µg/L	–	*ND(<0.025)*	*ND(<19)*	*ND(<0.025)*	*ND(<19)*	*ND(<2)*	3,9,18,24
1,2-dichloroethane	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21
1,1-dichloroethylene	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*0.5*	*0.5*	*ND(<0.5)*	3,9,18,21
Dichlorobromomethane	µg/L	–	*ND(<0.5)*	2.6	ND(<0.5)	2.6	14	3,7,15,24
Dichloromethane	µg/L	ND(<0.9)	0.55	0.64	0.55	0.64	3.4	1,7,15,21
1,3-dichloropropene	µg/L	ND(<0.9)	*ND(<0.5)*	0.56	ND(<0.5)	0.56	3.0	3,7,15,21
Dieldrin	µg/L	8.8E-05	0.0006	0.0006	0.0006	0.0056	0.0029	4,7,15,19,23
2,4-dinitrotoluene	µg/L	–	*ND(<2)*	*ND(<2)*	*ND(<2)*	*ND(<2)*	*ND(<0.1)*	3,9,18,24
1,2-diphenylhydrazine	µg/L	–	*ND(<0.5)*	*ND(<4.2)*	*ND(<0.5)*	*ND(<4.2)*	*ND(<1)*	3,9,18,24
Halomethanes	µg/L	–	0.54	1.4	0.73	1.4	7.5	2,7,14,15,24
Heptachlor	µg/L	8.6E-06	*ND(<0.01)*	*ND(<0.01)*	*ND(<0.01)*	*ND(<0.01)*	*ND(<0.01)*	3,9,18,23
Heptachlor epoxide	µg/L	ND(<0.02)	0.000059	0.000059	0.000059	0.000059	0.000311	4,8,15,21
Hexachlorobenzene	µg/L	ND(<0.09)	0.000078	0.000078	0.000078	0.000078	0.000411	4,8,15,21
Hexachlorobutadiene	µg/L	–	0.000009	0.000009	0.000009	0.000009	0.000047	4,8,15,24
Hexachloroethane	µg/L	–	*ND(<0.5)*	*ND(<2.3)*	*ND(<0.5)*	*ND(<2.3)*	*ND(<0.5)*	3,9,18,24
Isophorone	µg/L	–	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,24
N-Nitrosodimethylamine	µg/L	ND(<0.003)	0.017	0.096	0.017	0.096	0.150	2,7,16,17,21
N-Nitrosodi-N-Propylamine	µg/L	ND(<0.003)	0.076	0.076	0.076	0.076	0.019	2,6,16,17,21
N-Nitrosodiphenylamine	µg/L	–	*ND(<0.5)*	*ND(<2.3)*	*ND(<0.5)*	*ND(<2.3)*	ND(<1)	3,9,18,24
PAHs	µg/L	0.012	0.05	0.05	0.05	0.05	0.28	4,8,14,15,23
PCBs	µg/L	0.002	0.00068	0.00068	0.00068	0.00068	0.00357	4,8,14,15,23
TCDD Equivalents	µg/L	–	0.00000015	0.00000015	0.00000015	0.00000015	0.00000081	4,13,14,15,24
1,1,2,2-tetrachloroethane	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21
Tetrachloroethylene	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21
Toxaphene	µg/L	ND(<0.0013)	0.0071	0.0071	0.0071	0.0071	0.0373	4,8,15,23

Constituent	Units	Desal Brine	Secondary Effluent		Hauled Brine		GWR Concentrate	Footnotes
			MPWSP	*Variant*	*MPWSP*	*Variant*		
Trichloroethylene	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21
1,1,2-trichloroethane	µg/L	ND(<0.9)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21
2,4,6-trichlorophenol	µg/L	–	*ND(<0.5)*	*ND(<2.3)*	*ND(<0.5)*	*ND(<2.3)*	*ND(<1)*	3,9,18,24
Vinyl chloride	µg/L	ND(<0.5)	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	*ND(<0.5)*	3,9,18,21

Table 4 Footnotes:

MPWSP Secondary Effluent and Hauled Brine

[1] The value reported is based on MRWPCA historical data.
[2] The value reported is based on secondary effluent data collected during the GWR Project source water monitoring programs (not impacted by the proposed new source waters), and are representative of future water quality under the MPWSP scenario.
[3] The MRL provided represents the limit from NPDES monitoring data for secondary effluent and hauled waste. In cases where constituents had varying MRLs, where in general, the lowest MRL is reported.
[4] RTP effluent value presented based on CCLEAN data.

Total Chlorine Residual

[5] For all waters, it is assumed that dechlorination will be provided such that the total chlorine residual will be below detection.

Variant Secondary Effluent and Hauled Brine

[6] Existing RTP effluent exceeds concentrations observed in other proposed source waters; the value reported is the existing secondary effluent value.
[7] The proposed new source waters may increase the secondary effluent concentration; the value reported is based on predicted source water blends.
[8] RTP effluent value is based on CCLEAN data; no other source waters were considered due to MRL differences.
[9] MRL provided represents the maximum flow-weighted MRL based on the blend of source waters.
[10] The only water with a detected concentration was the RTP effluent, however the flow-weighted concentration increases due to higher MRLs for the proposed new source waters.
[11] Additional source water data are not available; the reported value is for RTP effluent.
[12] Calculation of the flow-weighted concentration was not feasible due to constituent and the maximum observed value reported.
[13] Agricultural Wash Water data are based on an aerated sample, instead of a raw water sample.
[14] This value in the Ocean Plan is an aggregate of several congeners or compounds. Per the approach described in the Ocean Plan, for cases where the individual congeners/compounds were less than the MRL, a value of 0 is assumed in calculating the aggregate value, as the MRLs span different orders of magnitude.

GWR Concentrate Data

[15] The value presented represents a calculated value assuming no removal prior to RO, complete rejection through RO membrane, and an 81% RO recovery.
[16] The value represents the maximum value observed during the pilot testing study.
[17] The calculated value for the AWT Facility data (described in note 15) was not used in the analysis because it was not considered representative. It is expected that the value would increase as a result of treatment through the AWT Facility (*e.g.* formation of N-Nitrosodimethylamine as a disinfection by-product), or that it will not concentrate linearly through the RO (*e.g.* toxicity and radioactivity).
[18] The MRL provided represents the limit from the source water and pilot testing monitoring programs.
[19] The value presented represents a calculated value assuming 20% removal through primary and secondary treatment, 70% and 90% removal through ozone for DDT and dieldrin, respectively (based on Oram, 2008), complete rejection through the RO membrane, and an 81% RO recovery. The assumed RTP concentrations for Dieldrin and DDT do not include contributions from the agricultural drainage waters. This is because in all but one flow scenario (Scenario 4, described later), either the agricultural drainage waters are not being brought into the RTP because there is sufficient water from other sources (*e.g.* during wet and normal precipitation years), or the RTP effluent is not being discharged to the outfall (*e.g.,* summer months). In this one scenario (Scenario 4), there is a minimal discharge of secondary effluent to the ocean during a drought year under Davidson ocean conditions; for

this flow scenario only, different concentrations are assumed for the RTP effluent. DDT and dieldrin concentrations of 0.022 µg/L and 0.0056 µg/L were used for Scenario 4 in the analysis.

Cyanide Data

[20] In mid-2011, MBAS began performing the cyanide analysis on the RTP effluent, at which time the reported values increased by an order of magnitude. Because no operational or source water composition changes took place at this time that would result in such an increase, it is reasonable to conclude the increase is an artifact of the change in analysis method and therefore questionable. Therefore, the cyanide values as measured by MBAS are listed separately from other cyanide values, and the MBAS data were not be used in the analysis for evaluating compliance with the Ocean Plan objectives for the EIR.

Desal Brine Data

[21] Reported Desal Brine value is based on data from 2009 monitoring data from a Marina Coast Water District monitoring well, adjusted by assuming completed contaminant rejection through the seawater RO membranes with an overall 42% recovery.

[22] Reported Desal Brine value is based on data ocean data from the Golden Gate area provided by Dane Hardin (transmitted via e-mail on December 29, 2014).

[23] Reported Desal Brine value presented based on CCLEAN data.

[24] No data were available to estimate the Desal Brine concentration.

3.2 Ocean Modeling Results

The predicted minimum probable dilution (D_m) for each discharge scenario is presented in Tables 5 and 6. For discharge scenarios that were modeled with more than one oceanic condition, the lowest D_m (*i.e.*, most conservative) is reported in the tables below. For the MPWSP, the flow scenarios in which little or no secondary effluent was discharged (Scenarios 2 and 3) resulted in lowest D_m values as a result of the discharge plume being negatively buoyant. At higher secondary effluent flows, the discharge plume would be positively buoyant, resulting in an increased D_m, as evidenced in Scenario 4. The same trend was observed for Variant scenarios.

Table 5 – Flow scenarios and modeled D_m values used for Ocean Plan compliance analysis for MPWSP

No.	Discharge Scenario (Ocean Condition)	Flows (mgd)			D_m
		Secondary Effluent	Desal Brine	Hauled Brine [a]	
1	RTP design capacity without Desal Brine	29.6	0	0.1	145
2	Desal Brine with no secondary effluent	0	13.98	0.1	16
3	Desal Brine with low secondary effluent	2	13.98	0.1	19
4	Desal Brine with high secondary effluent	19.68	13.98	0.1	68

[a] Hauled brine was not included in the modeling of MPWSP flow scenarios; however, the change in both flow and TDS from the addition of hauled brine is less than 1% and thus is expected to have a negligible impact on the modeled D_m.

Table 6 – Flow scenarios and modeled D_m values used for Ocean Plan compliance analysis for Variant

No.	Discharge Scenario (Ocean Condition)	Flows (mgd)				D_m
		Variant Secondary Effluent	Desal Brine	GWR Concentrate	Variant Hauled Brine[a]	
1	Desal Brine only	0	8.99	0	0.1	15
2	Desal Brine with high secondary effluent	19.68	8.99	0	0.1	84
3	Desal Brine with GWR concentrate and high secondary effluent	15.92	8.99	0.94 [b]	0.1	82
4	Desal Brine with GWR concentrate and no secondary effluent	0	8.99	0.94 [b]	0.1	17

[a] Hauled brine was not included in the modeling of Variant scenarios involving discharge of desalination brine. However, the change in both flow and TDS from the addition of hauled brine is less than 1% and thus is expected to have a negligible impact on the modeled D_m.
[b] The actual modeled GWR Concentrate flow was 0.73 mgd (based on an older design for the AWT Facility). This change is not expected to have a significant impact on the modeled D_m. Updated modeling results will include the correct GWR Concentrate flow of 0.94 mgd.

3.3 Ocean Plan Compliance Results

The flow-weighted in-pipe concentration for each constituent was calculated for each modeled discharge scenario using the water quality presented in Table 4 and the discharge flows presented in Tables 2 and 3. The in-pipe concentration was then used to calculate the concentration at the edge of the ZID using the D_m values presented in Tables 5 and 6. The resulting concentrations for each constituent in each scenario were compared to the Ocean Plan objective to assess compliance. The estimated concentrations for the eight flow scenarios (four each for the MPWSP and Variant projects) for all constituents are presented as concentrations at the edge of the ZID (Appendix A, Table A2) and as a percentage of the Ocean Plan objective (Appendix A, Table A3). It was identified that some constituents are estimated to exceed the Ocean Plan objective for some discharge scenarios. A list of the constituents that may be an issue[15] are shown as predicted concentration at the edge of the ZID in Table 7, and as the concentration at the edge of the ZID as a percentage of the Ocean Plan objective in Table 8.

The first issue that was identified is related to polychlorinated biphenyls (PCBs). The maximum concentration of PCBs observed in the ocean water through the CCLEAN program, 1.21 nanograms per liter (ng/L), is already greater than the Ocean Plan objective of 0.019 ng/L (CCLEAN, 2014). Assuming a concentration factor of 1.73 through the desalination facility, a Desal Brine PCB concentration of 2.09 ng/L was calculated. This concentration of Desal Brine PCB would result in Ocean Plan exceedances under several of the MPSWP and Variant scenarios. However, if one puts these data in the context of the existing ambient seawater

[15] Note that aldrin, benzidine, beryllium, 3,3-dichlorobenzidine, heptachlor, heptachlor epoxide, and hexachlorobenzene had high MRLs, such that no compliance conclusions could be drawn for these constituents. This is a typical occurrence for ocean discharges since the MRL is often higher than the ocean plan objective for some constituents.

conditions, the worst-case increase of PCBs for the scenarios described in this memorandum would be a 4.6% increase at the edge of the ZID compared to ambient ocean conditions (*i.e.*, a concentration at the ZID of 1.27 ng/L compared to the ambient levels of 1.21 ng/L). Further, if the median ocean water PCB concentration from CCLEAN was used instead (0.043 ng/L), the assumed Desal Brine concentration would be 0.074 ng/L, and then the only expected scenario with a PCB Ocean Plan exceedance would be for Variant Scenario 4.

Table 7 – Predicted concentrations at the edge of the ZID for Ocean Plan constituents of concern in the MPWSP and Variant projects

Constituent	Units	Ocean Plan Objective	Estimated Concentration at Edge of ZID by Scenario							
			MPWSP Project				Variant			
			1	2	3	4	1	2	3	4
Objectives for protection of marine aquatic life										
Copper	ug/L	3	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.8
Ammonia (as N) – 6-mo median	ug/L	600	249	20	241	310	30	295	355	1022
Objectives for protection of human health - carcinogens										
Chlordane	ug/L	2.3E-05	5.0E-06	1.2E-05	1.3E-05	7.4E-06	1.3E-05	6.7E-06	8.0E-06	3.0E-05
DDT	ug/L	1.7E-04	7.5E-06	3.3E-05	3.1E-05	1.3E-05	4.9E-05	1.2E-05	2.6E-05	2.2E-04
PCBs	ug/L	1.9E-05	4.7E-06	1.2E-04	9.5E-05	1.8E-05	1.3E-04	1.3E-05	1.5E-05	1.2E-04
TCDD Equivalents	ug/L	3.9E-09	1.0E-09	6.4E-11	9.9E-10	1.3E-09	1.1E-10	1.2E-09	1.5E-09	4.3E-09
Toxaphene	ug/L	2.1E-04	4.9E-05	7.9E-05	1.0E-04	6.8E-05	8.5E-05	6.2E-05	7.4E-05	2.6E-04

[a] Shading indicates constituent is expected to be greater than 80 percent (orange shading) or exceed (red shading) the ocean plan objective for that discharge scenario.

Table 8 – Predicted concentrations at the edge of the ZID expressed as percentage of Ocean Plan Objective for constituents of in the MPWSP and Variant projects [a]

Constituent	Units	Ocean Plan Objective	Est. Percentage of Ocean Plan objective at Edge of ZID by Scenario							
			MPWSP Project				Variant			
			1	2	3	4	1	2	3	4
Objectives for protection of marine aquatic life										
Copper	ug/L	3	69%	69%	70%	69%	70%	73%	75%	92%
Ammonia (as N) – 6-mo median	ug/L	600	42%	3%	40%	52%	5%	49%	59%	170%
Objectives for protection of human health - carcinogens										
Chlordane	ug/L	2.3E-05	22%	51%	58%	32%	55%	29%	35%	132%
DDT	ug/L	1.7E-04	4%	19%	18%	7%	29%	7%	16%	129%
PCBs	ug/L	1.9E-05	24%	645%	502%	96%	683%	69%	81%	648%
TCDD Equivalents	ug/L	3.9E-09	27%	2%	25%	33%	3%	32%	38%	110%
Toxaphene	ug/L	2.1E-04	23%	38%	49%	32%	41%	30%	35%	125%

[a] Shading indicates constituent is expected to be greater than 80 percent (orange shading) or exceed (red shading) the ocean plan objective for that discharge scenario.

The second issue identified is for one specific scenario, Variant Scenario 4. Variant Scenario 4 involves the discharge of Desal Brine and GWR concentrate only. The constituents of interest related to this scenario are copper, ammonia, chlordane, DDT, PCBs, TCDD equivalents, and toxaphene. Other than the previously discussed PCBs, ammonia is expected to be the constituent with the highest exceedance, being 1.7 times than the Ocean Plan objective. This scenario is problematic because constituents that have relatively high loadings in the secondary effluent are concentrated in the GWR Concentrate. This scenario assumes the GWR Concentrate flow is much smaller than the Desal Brine flow, such that the resulting discharge plume is negatively buoyant and achieves poor ocean mixing. It is likely that some mitigation strategy would be needed to address these constituents when operating under this discharge scenario. One potential mitigation strategy that has been identified to address this impact is Desal Brine storage. Desal Brine could be stored and released in batches, to take advantage of two phenomena: (1) when the Desal Brine is being stored, there would be an increase in ocean mixing due to the increased buoyancy of the discharge (*i.e.*, the Desal Brine discharge would need to be reduced to the point that the overall discharge is positively buoyant), and (2) when the Desal Brine batch is being released, there would be greater in-pipe dilution of copper, ammonia, chlordane, DDT, TCDD equivalents, and toxaphene (*i.e.* sufficient Desal Brine would need to be released to provide adequate dilution of the constituents of interest).

4 Conclusions

The purpose of this analysis was to assess the ability of the MPWSP and Variant Projects to comply with the Ocean Plan objectives. Trussell Tech used a conservative approach to estimate the water qualities of the secondary effluent, GWR Concentrate, Desal Brine and hauled brine for these projects. These water quality data were then combined for various discharge scenarios, and a concentration at the edge of the ZID was calculated for each constituent and scenario. Compliance assessments could not be made for selected constituents, as noted, due to analytical limitations, but this is a typical occurrence for these Ocean Plan constituents. Further, the results presented in this document should be viewed as partial findings, as certain key discharge scenarios were not included in the ocean modeling. Additional analyses are planned for the future to complete this analysis.

Based on the data, assumptions, modeling, and analytical methodology presented in this technical memorandum, the MPWSP and Variant Projects would require mitigation strategies to comply with the Ocean Plan objectives under some discharge scenarios. Specifically, two types of potential issues were identified: (1) PCBs, which are relatively high in the worst-case ocean water samples and were predicted to exceed the Ocean Plan objectives in several scenarios for both the MPWSP and Variant projects, and (2) the Variant discharge scenario where Desal Brine and GWR Concentrate are discharged without secondary effluent were predicted to exceed multiple Ocean Plan objectives, specifically those for ammonia, chlordane, DDT, PCBs, TCDD equivalents, and toxaphene.

5 References

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Appendix A

Additional Tables

Table A1 – List of Ocean Plan parameters for which no Desal Brine or seawater data were available

Ocean Plan constituents that lack Desal Brine data	
Chromium (hexavalent)	Nitrobenzene
Acute toxicity	Tributyltin
Chronic toxicity	Acrylonitrile
Phenolic compounds (non-chlorinated)	Benzidine
Chlorinated phenolics	Bis(2-chloroethyl) ether
Radioactivity (gross beta)	Chlorodibromomethane
Radioactivity (gross alpha)	Chloroform
Acrolein	3,3-dichlorobenzidine
Bis (2-chloroethoxy) methane	Dichlorobromomethane
Bis (2-chloroisopropyl) ether	2,4-dinitrotoluene
Chlorobenzene	1,2-diphenylhydrazine (azobenzene)
Di-n-butyl phthalate	Halomethanes
Dichlorobenzenes	Hexachlorobutadiene
Diethyl phthalate	Hexachloroethane
Dimethyl phthalate	Isophorone
4,6-dinitro-2-methylphenol	N-Nitrosodiphenylamine
2,4-dinitrophenol	TCDD equivalents
Ethylbenzene	2,4,6-trichlorophenol
Hexachlorocyclopentadiene	

Table A2 – Complete list of predicted concentrations of Ocean Plan constituents at the edge of the ZID

Constituent	Units	Ocean Plan Objective	Estimated Concentration at Edge of ZID by Scenario							
			MPWSP Project				Variant			
			1	2	3	4	1	2	3	4
Objectives for protection of marine aquatic life										
Arsenic	ug/L	8	3.3	5.1	4.8	3.6	5.2	3.5	3.5	4.8
Cadmium	ug/L	1	0.0	0.5	0.4	0.1	0.5	0.0	0.0	0.4
Chromium (Hexavalent)	ug/L	2	0.0	0.1	0.1	0.0	0.09	0.03	0.03	0.14
Copper	ug/L	3	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.8
Lead	ug/L	2	0.0	0.4	0.3	0.0	0.4	0.0	0.0	0.3
Mercury	ug/L	0.04	0.005	0.022	0.018	0.007	0.023	0.007	0.007	0.022
Nickel	ug/L	5	0.0	0.5	0.4	0.1	0.5	0.1	0.2	0.8
Selenium	ug/L	15	0.0	3.3	2.4	0.4	3.5	0.3	0.3	3.0
Silver	ug/L	0.7	<0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Zinc	ug/L	20	8.1	9.6	9.3	8.3	9.7	8.4	8.5	10.7
Cyanide	ug/L	1	0.1	0.5	0.4	0.1	0.6	0.1	0.1	0.7
Total Chlorine Residual	ug/L	2	<1.4	<11.8	<10.0	<2.9	<12.5	<2.4	<2.4	<11.1
Ammonia (as N) - 6-mo median	ug/L	600	249	20.2	241	310	30	295	355	1022
Ammonia (as N) - Daily Max	ug/L	2,400	336	25.5	324	417	39	397	477	1374
Acute Toxicity[a]	TUa	0.3								
Chronic Toxicity[a]	TUc	1								
Phenolic Compounds (non-chlorinated)	ug/L	30	0.5	0.0	0.5	0.6	0.0	0.6	0.7	1.9
Chlorinated Phenolics	ug/L	1	<0.1	<0.0	<0.1	<0.2	<0.0	<0.2	<0.2	<0.1
Endosulfan	ug/L	0.009	1.0E-04	1.0E-05	1.0E-04	1.3E-04	3.7E-05	3.9E-04	4.7E-04	1.4E-03

Constituent	Units	Ocean Plan Objective	Estimated Concentration at Edge of ZID by Scenario							
			MPWSP Project				Variant			
			1	2	3	4	1	2	3	4
Endrin	ug/L	0.002	5.4E-07	1.6E-06	1.7E-06	8.4E-07	1.8E-06	7.4E-07	8.8E-07	3.6E-06
HCH (Hexachlorocyclohexane)	ug/L	0.004	0.0002	0.0001	0.0003	0.0003	0.0001	0.0005	0.0006	0.0017
Radioactivity (Gross Beta)[a]	pci/L	0.0								
Radioactivity (Gross Alpha)[a]	pci/L	0.0								
Objectives for protection of human health – non carcinogens										
Acrolein	ug/L	220	<0.034	<0.0021	<0.033	<0.042	0.01	0.1	0.1	0.3
Antimony	ug/L	1200	0.0045	0.97	0.72	0.10	1.02	0.07	0.08	0.85
Bis (2-chloroethoxy) methane	ug/L	4.4	<0.0034	<0.00021	<0.0033	<0.0042	<0.003	<0.034	<0.032	<0.008
Bis (2-chloroisopropyl) ether	ug/L	1200	<0.0034	<0.00021	<0.0033	<0.0042	<0.003	<0.034	<0.032	<0.008
Chlorobenzene	ug/L	570	<0.0034	<0.00021	<0.0033	<0.0042	<0.0003	<0.004	<0.004	<0.003
Chromium (III)	ug/L	190000	0.022	6.3	4.7	0.67	6.7	0.46	0.52	5.6
Di-n-butyl phthalate	ug/L	3500	<0.034	<0.0021	<0.037	<0.042	<0.005	<0.057	<0.052	<0.009
Dichlorobenzenes	ug/L	5100	0.011	0.0007	0.010	0.014	0.0014	0.013	0.016	0.045
Diethyl phthalate	ug/L	33000	<0.034	<0.002	<0.033	<0.042	<0.003	<0.040	<0.038	<0.008
Dimethyl phthalate	ug/L	820000	<0.014	<0.0008	<0.013	<0.017	<0.001	<0.016	<0.015	<0.004
4,6-dinitro-2-methylphenol	ug/L	220	<0.0034	<0.00021	<0.0033	<0.0042	<0.01	<0.2	<0.2	<0.04
2,4-Dinitrophenol	ug/L	4.0	<0.0034	<0.00021	<0.0033	<0.0042	<0.01	<0.1	<0.10	<0.03
Ethylbenzene	ug/L	4100	<0.0034	<0.00021	<0.0033	<0.0042	<0.0003	<0.004	<0.004	<0.003
Fluoranthene	ug/L	15	<3.4E-03	1.1E-04	8.1E-05	1.1E-05	1.2E-04	6.8E-06	7.8E-06	9.3E-05
Hexachlorocyclopentadiene	ug/L	58	<0.0034	<0.00021	<0.0033	<0.0042	<0.0003	<0.004	<0.004	<0.001
Nitrobenzene	ug/L	4.9	<0.0034	<0.00021	<0.0033	<0.0042	<0.002	<0.019	<0.018	<0.006
Thallium	ug/L	2	<0.0034	<0.1	<0.077	<0.014	0.1	0.012	0.014	0.1
Toluene	ug/L	85000	<0.0034	<0.053	<0.042	<0.010	<0.06	<0.01	<0.01	<0.05
Tributyltin	ug/L	0.0014	<3.4E-04	<2.1E-05	<3.3E-04	<4.3E-04	<3.4E-05	<4.0E-04	<3.8E-04	<1.3E-04
1,1,1-Trichloroethane	ug/L	540000	<0.003	<0.053	<0.042	<0.010	<0.06	<0.01	<0.01	<0.05
Objectives for protection of human health - carcinogens										
Acrylonitrile	ug/L	0.10	<0.014	<0.001	<0.013	<0.017	0.002	0.021	0.025	0.071
Aldrin[b]	ug/L	0.000022	<3.4E-04	<2.1E-05	<3.3E-04	<4.3E-04	<4.8E-06	<5.7E-05	<5.6E-05	<5.6E-05
Benzene	ug/L	5.9	<0.003	<0.053	<0.042	<0.010	<0.056	<0.007	<0.008	<0.048
Benzidine[b]	ug/L	0.000069	<0.003	<0.000	<0.003	<0.004	<0.014	<0.160	<0.147	<0.011
Beryllium	ug/L	0.033	3.4E-03	2.2E-06	3.1E-03	4.2E-03	3.6E-06	2.1E-07	2.2E-04	2.6E-03
Bis(2-chloroethyl)ether	ug/L	0.045	<0.0034	<0.0002	<0.0033	<0.0042	<0.003	<0.034	<0.03	<0.01
Bis(2-ethyl-hexyl)phthalate	ug/L	3.5	0.53	0.09	0.55	0.67	0.1	0.6	0.8	2.2
Carbon tetrachloride	ug/L	0.90	<0.003	<0.029	<0.025	<0.007	0.031	0.006	0.007	0.039
Chlordane	ug/L	0.000023	5.0E-06	1.2E-05	1.3E-05	7.4E-06	1.3E-05	6.7E-06	8.0E-06	3.0E-05
Chlorodibromomethane	ug/L	8.6	<0.003	<0.0002	<0.003	<0.004	0.002	0.020	0.024	0.068
Chloroform	ug/L	130	0.014	0.001	0.013	0.017	0.03	0.3	0.4	1.1
DDT	ug/L	0.00017	7.5E-06	3.3E-05	3.1E-05	1.3E-05	4.9E-05	1.2E-05	2.7E-05	2.2E-04
1,4-Dichlorobenzene	ug/L	18	0.011	0.05	0.050	0.019	0.06	0.0162	0.02	0.09
3,3-Dichlorobenzidine[b]	ug/L	0.0081	<1.7E-04	<1.0E-05	<1.6E-04	<2.1E-04	<0.01	<0.15	<0.14	<0.02
1,2-Dichloroethane	ug/L	28	<0.003	<0.053	<0.042	<0.010	<0.06	<0.01	<0.01	<0.05
1,1-Dichloroethylene	ug/L	0.9	0.003	0.053	0.042	0.010	0.06	0.01	0.01	0.05
Dichlorobromomethane	ug/L	6.2	<0.003	<0.0002	<0.0033	<0.0042	0.00	0.02	0.03	0.07
Dichloromethane	ug/L	450	0.0038	0.053	0.043	0.010	0.06	0.01	0.01	0.06
1,3-dichloropropene	ug/L	8.9	<0.003	<0.053	<0.042	<0.010	0.06	0.01	0.01	0.06
Dieldrin	ug/L	0.00004	3.4E-06	5.3E-06	7.1E-06	4.8E-06	9.3E-06	4.6E-06	5.6E-06	2.3E-05
2,4-Dinitrotoluene	ug/L	2.6	<0.014	<0.001	<0.013	<0.017	<0.001	<0.016	<0.015	<0.002
1,2-Diphenylhydrazine	ug/L	0.16	<0.0034	<0.0002	<0.0033	<0.0042	<0.003	<0.034	<0.032	<0.008
Halomethanes	ug/L	130	0.0037	0.0003	0.0036	0.0046	0.001	0.012	0.014	0.040
Heptachlor[b]	ug/L	0.00005	<6.8E-05	5.0E-07	3.7E-07	5.2E-08	5.3E-07	3.2E-08	3.6E-08	4.3E-07
Heptachlor Epoxide	ug/L	0.00002	4.0E-07	2.5E-08	3.9E-07	5.0E-07	4.1E-08	4.8E-07	5.7E-07	1.6E-06
Hexachlorobenzene	ug/L	0.00021	5.3E-07	3.3E-08	5.1E-07	6.6E-07	5.4E-08	6.3E-07	7.6E-07	2.2E-06
Hexachlorobutadiene	ug/L	14	6.2E-08	3.8E-09	5.9E-08	7.6E-08	6.2E-09	7.3E-08	8.8E-08	2.5E-07
Hexachloroethane	ug/L	2.5	<0.0034	<0.0002	<0.0033	<0.0042	<0.002	<0.019	<0.017	<0.004

Constituent	Units	Ocean Plan Objective	Estimated Concentration at Edge of ZID by Scenario							
			MPWSP Project				Variant			
			1	2	3	4	1	2	3	4
Isophorone	ug/L	730	<0.0034	<0.0002	<0.0033	<0.0042	<0.0003	<0.004	<0.004	<0.003
N-Nitrosodimethylamine	ug/L	7.3	0.0001	0.0002	0.0002	0.0002	0.0003	0.001	0.001	0.001
N-Nitrosodi-N-Propylamine	ug/L	0.38	0.0005	0.0002	0.0006	0.0007	0.0002	0.001	0.001	0.0003
N-Nitrosodiphenylamine	ug/L	2.5	<0.0034	<0.0002	<0.0033	<0.0042	<0.002	<0.019	<0.018	<0.006
PAHs	ug/L	0.0088	3.6E-04	7.2E-04	8.6E-04	5.2E-04	7.7E-04	4.7E-04	5.6E-04	2.1E-03
PCBs	ug/L	0.000019	4.7E-06	1.2E-04	9.5E-05	1.8E-05	1.3E-04	1.3E-05	1.5E-05	1.2E-04
TCDD Equivalents	ug/L	3.9E-09	1.0E-09	6.4E-11	9.9E-10	1.3E-09	1.1E-10	1.3E-09	1.5E-09	4.3E-09
1,1,2,2-Tetrachloroethane	ug/L	2.3	<0.003	<0.053	<0.042	<0.010	<0.056	<0.007	<0.008	<0.048
Tetrachloroethylene	ug/L	2.0	<0.003	<0.053	<0.042	<0.010	<0.056	<0.007	<0.008	<0.048
Toxaphene	ug/L	2.1E-04	4.9E-05	7.9E-05	1.0E-04	6.8E-05	8.5E-05	6.2E-05	7.4E-05	2.6E-04
Trichloroethylene	ug/L	27	<0.003	<0.053	<0.042	<0.010	<0.056	<0.007	<0.008	<0.048
1,1,2-Trichloroethane	ug/L	9.4	<0.003	<0.053	<0.042	<0.010	<0.056	<0.007	<0.008	<0.048
2,4,6-Trichlorophenol	ug/L	0.29	<0.003	<0.0002	<0.0033	<0.0042	<0.002	<0.019	<0.018	<0.006
Vinyl chloride	ug/L	36	<0.003	<0.029	<0.025	<0.007	<0.031	<0.006	<0.006	<0.028

[a] Calculating flow-weighted averages for toxicity (acute and chronic) and radioactivity (gross beta and gross alpha) is not appropriate based the nature of the constituent. These constituents were measured individually for the secondary effluent and GWR concentrate, and these individual concentrations would comply with the Ocean Plan objectives.

[b] All observed values from all data sources were below the MRL, and the flow-weighted average of the MRLs is higher than the Ocean Plan objective. No compliance conclusions can be drawn for these constituents.

Table A3 – Complete list of predicted concentrations at the edge of the ZID expressed as a percentage of Ocean Plan[a]

Constituent	Units	Ocean Plan Objective	Est. Percentage of Ocean Plan objective at Edge of ZID by Scenario							
			MPWSP Project				Variant			
			1	2	3	4	1	2	3	4
Objectives for protection of marine aquatic life										
Arsenic	ug/L	8	41%	63%	60%	45%	65%	43%	43%	60%
Cadmium	ug/L	1	1%	46%	35%	6%	49%	4%	4%	43%
Chromium (Hexavalent)	ug/L	2	1%	3%	3%	1%	4%	1%	2%	7%
Copper	ug/L	3	69%	69%	70%	69%	70%	73%	75%	92%
Lead	ug/L	2	0.2%	19%	14%	2%	20%	2%	2%	17%
Mercury	ug/L	0.04	13%	56%	45%	17%	58%	17%	18%	56%
Nickel	ug/L	5	1%	10%	8%	2%	11%	3%	3%	16%
Selenium	ug/L	15	0.1%	22%	16%	2%	23%	2%	2%	20%
Silver	ug/L	0.7	<23%	<22%	<22%	<23%	<22%	<24%	<24%	<22%
Zinc	ug/L	20	40%	48%	46%	41%	48%	42%	43%	53%
Cyanide	ug/L	1	5%	52%	43%	11%	56%	9%	11%	65%
Total Chlorine Residual	ug/L	2	--	--	--	--	--	--	--	--
Ammonia (as N) - 6-mo median	ug/L	600	42%	3%	40%	52%	5%	49%	59%	170%
Ammonia (as N) - Daily Max	ug/L	2,400	14%	1%	13%	17%	2%	17%	20%	57%
Acute Toxicity[b]	TUa	0.3								
Chronic Toxicity[b]	TUc	1								
Phenolic Compounds (non-chlorinated)	ug/L	30	2%	0.1%	2%	2%	0.2%	2%	2%	6%
Chlorinated Phenolics	ug/L	1	<14%	<1%	<13%	<17%	<1%	<16%	<16%	<12%
Endosulfan	ug/L	0.009	1%	0.1%	1%	1%	0.4%	4%	5%	15%
Endrin	ug/L	0.002	0.03%	0.08%	0.09%	0.04%	0.09%	0.04%	0.04%	0.2%

Constituent	Units	Ocean Plan Objective	Est. Percentage of Ocean Plan objective at Edge of ZID by Scenario							
			MPWSP Project				Variant			
			1	2	3	4	1	2	3	4
HCH (Hexachlorocyclohexane)	ug/L	0.004	6%	1%	6%	7%	2%	12%	15%	43%
Radioactivity (Gross Beta)[b]	pci/L	0.0								
Radioactivity (Gross Alpha)[b]	pci/L	0.0								
Objectives for protection of human health – non carcinogens										
Acrolein	ug/L	220	<0.02%	<0.01%	<0.01%	<0.02%	<0.01%	0.03%	0.04%	0.1%
Antimony	ug/L	1200	<0.01%	0.1%	0.1%	0.01%	0.1%	0.01%	0.01%	0.1%
Bis (2-chloroethoxy) methane	ug/L	4.4	<0.08%	<0.01%	<0.07%	<0.10%	<0.07%	<0.77%	<0.72%	<0.17%
Bis (2-chloroisopropyl) ether	ug/L	1200	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Chlorobenzene	ug/L	570	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Chromium (III)	ug/L	190000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Di-n-butyl phthalate	ug/L	3500	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Dichlorobenzenes	ug/L	5100	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Diethyl phthalate	ug/L	33000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Dimethyl phthalate	ug/L	820000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
4,6-dinitro-2-methylphenol	ug/L	220	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.1%	<0.1%	<0.02%
2,4-Dinitrophenol	ug/L	4.0	<0.09%	<0.01%	<0.08%	<0.1%	<0.2%	<2.6%	<2.5%	<0.8%
Ethylbenzene	ug/L	4100	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Fluoranthene	ug/L	15	<0.02%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Hexachlorocyclopentadiene	ug/L	58	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Nitrobenzene	ug/L	4.9	<0.07%	<0.01%	<0.07%	<0.09%	<0.03%	<0.4%	<0.4%	<0.1%
Thallium	ug/L	2	<0.2%	<5.0%	<3.9%	<0.7%	5.3%	0.6%	0.7%	5.2%
Toluene	ug/L	85000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Tributyltin	ug/L	0.0014	<24%	<1.5%	<23%	<30%	<2.5%	<29%	<27%	<9.4%
1,1,1-Trichloroethane	ug/L	540000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Objectives for protection of human health - carcinogens										
Acrylonitrile	ug/L	0.10	<14%	<1%	<13%	<17%	2%	21%	25%	71%
Aldrin[c]	ug/L	0.000022	--	--	--	--	<22%	--	--	--
Benzene	ug/L	5.9	<0.1%	<1%	<1%	<0.2%	<1%	<0.1%	<0.1%	<1%
Benzidine[c]	ug/L	0.000069	--	--	--	--	--	--	--	--
Beryllium[c]	ug/L	0.033	10%	<0.01%	9%	13%	0.01%	<0.01%	0.7%	8%
Bis(2-chloroethyl)ether	ug/L	0.045	<8%	<0.01%	<7%	<9%	<6%	<75%	<70%	<17%
Bis(2-ethyl-hexyl)phthalate	ug/L	3.5	15%	3%	16%	19%	3%	18%	22%	64%
Carbon tetrachloride	ug/L	0.90	<0.4%	<3%	<3%	<1%	3%	1%	1%	4%
Chlordane	ug/L	0.000023	22%	51%	58%	32%	55%	29%	35%	132%
Chlorodibromomethane	ug/L	8.6	<0.04%	<0.01%	<0.04%	<0.05%	0.02%	0.2%	0.3%	0.8%
Chloroform	ug/L	130	0.01%	<0.01%	0.01%	0.01%	0.02%	0.2%	0.3%	0.8%
DDT	ug/L	0.00017	4%	19%	18%	7%	29%	7%	16%	129%
1,4-Dichlorobenzene	ug/L	18	0.1%	0.3%	0.3%	0.1%	0.3%	0.1%	0.1%	0.5%
3,3-Dichlorobenzidine[c]	ug/L	0.0081	<2%	<0.1%	<2%	<3%	--	--	--	--
1,2-Dichloroethane	ug/L	28	<0.01%	<0.2%	<0.2%	<0.03%	<0.2%	<0.03%	<0.03%	<0.2%
1,1-Dichloroethylene	ug/L	0.9	0.4%	6%	5%	1%	6%	1%	1%	5%
Dichlorobromomethane	ug/L	6.2	<0.1%	<0.01%	<0.1%	<0.1%	0.03%	0.3%	0.4%	1.2%
Dichloromethane	ug/L	450	<0.01%	0.01%	0.01%	<0.01%	0.01%	<0.01%	<0.01%	0.01%
1,3-dichloropropene	ug/L	8.9	<0.04%	<0.6%	<0.5%	<0.1%	0.6%	0.1%	0.1%	0.7%
Dieldrin	ug/L	0.00004	9%	13%	18%	12%	23%	12%	14%	57%
2,4-Dinitrotoluene	ug/L	2.6	<1%	<0.03%	<1%	<1%	<1%	<1%	<1%	<0.06%
1,2-Diphenylhydrazine	ug/L	0.16	<2%	<0.1%	<2%	<3%	<2%	<21%	<20%	<5%
Halomethanes	ug/L	130	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.01%	0.01%	0.03%
Heptachlor	ug/L	0.00005	--	1.0%	0.7%	0.1%	1.1%	0.06%	0.07%	0.9%
Heptachlor Epoxide[c]	ug/L	0.00002	0.2%	0.1%	2%	3%	0.2%	2%	3%	8%
Hexachlorobenzene[c]	ug/L	0.00021	0.3%	0.02%	0.2%	0.3%	0.03%	0.3%	0.4%	1%

Constituent	Units	Ocean Plan Objective	Est. Percentage of Ocean Plan objective at Edge of ZID by Scenario							
			MPWSP Project				Variant			
			1	2	3	4	1	2	3	4
Hexachlorobutadiene	ug/L	14	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Hexachloroethane	ug/L	2.5	<0.1%	<0.01%	<0.1%	<0.2%	<0.06%	<0.7%	<0.7%	<0.2%
Isophorone	ug/L	730	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
N-Nitrosodimethylamine	ug/L	7.3	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
N-Nitrosodi-N-Propylamine	ug/L	0.38	0.1%	0.1%	0.2%	0.2%	0.1%	0.2%	0.2%	0.1%
N-Nitrosodiphenylamine	ug/L	2.5	<0.1%	<0.01%	<0.1%	<0.2%	<0.1%	<0.7%	<0.7%	<0.3%
PAHs	ug/L	0.0088	4%	8 %	10%	6%	9%	5 %	6 %	24%
PCBs	ug/L	0.000019	24%	645%	502 %	96%	683%	69%	81%	648 %
TCDD Equivalents	ug/L	3.9E-09	27%	2%	25 %	33%	3%	32%	38%	110%
1,1,2,2-Tetrachloroethane	ug/L	2.3	<0.2%	<2.3%	<1.8%	<0.4%	<2.4%	<0.3%	<0.3%	<2.0%
Tetrachloroethylene	ug/L	2.0	<0.2%	<3%	<2%	<0.5%	<3%	<0.4%	<0.4%	<2.4%
Toxaphene	ug/L	2.1E-04	23%	38%	49%	32%	41%	30%	35%	125%
Trichloroethylene	ug/L	27	<0.01%	<0.2%	<0.2%	<0.04%	<0.2%	<0.03%	<0.03%	<0.2%
1,1,2-Trichloroethane	ug/L	9.4	<0.04%	<0.6%	<0.5%	<0.1%	<0.6%	<0.1%	<0.1%	<0.5%
2,4,6-Trichlorophenol	ug/L	0.29	<1%	<0.07%	<1%	<1%	<1%	<6%	<6%	<2%
Vinyl chloride	ug/L	36	<0.01%	<0.1%	<0.1%	<0.02%	<0.1%	<0.02%	<0.02%	<0.1%

[a] Note that if the percentage as determined by using the MRL was less than 0.01 percent, then a minimum value is shown as "<0.01%" (*e.g.*, if the MRL indicated the value was <0.000001%, for simplicity, it is displayed as <0.01%). Also, shading indicates constituent is expected to be greater than 80 percent (orange shading) or exceed (red shading) the ocean plan objective for that discharge scenario.

[b] Calculating flow-weighted averages for toxicity (acute and chronic) and radioactivity (gross beta and gross alpha) is not appropriate based the nature of the constituent. These constituents were measured individually for the secondary effluent and GWR concentrate, and these individual concentrations would comply with the Ocean Plan objectives.

[c] All observed values from all data sources were below the MRL, and the flow-weighted average of the MRLs is higher than the Ocean Plan objective. No compliance conclusions can be drawn for these constituents.

Appendix B

Trussell Technologies, Inc (Trussell Tech), 2015. "Ocean Plan Compliance Assessment for the Pure Water Monterey Groundwater Replenishment Project." *Technical Memorandum prepared for MRWPCA and MPWMD*. Feb.

Update to Ocean Plan Compliance Assessment Reports

***DRAFT* Addendum Report**

April 2015

Prepared for:

MRWPCA

Trussell
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Ocean Plan Compliance Assessment for the Monterey Peninsula Water Supply Project and Project Variant

DRAFT Addendum Report

April 2015

Prepared By:

Trussell Technologies, Inc.
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1 Introduction

Trussell Technologies, Inc. (Trussell Tech) previously prepared two Technical Memoranda to assess the compliance of the following three proposed projects with the California Ocean Plan (SWRCB, 2012):

1. **Monterey Peninsula Water Supply Project ("MPWSP")**, which would include a seawater desalination plant capable of producing 9.6 million gallons per day (mgd) of drinking water (Ocean Plan compliance assessment described in Trussell Tech, 2015b).
2. **Pure Water Monterey Groundwater Replenishment Project ("GWR Project"),** which would include an Advanced Water Treatment facility ("AWT Facility") capable of producing an average flow of 3.3 mgd of highly purified recycled water for injection into the Seaside Groundwater Basin (Ocean Plan compliance assessment described in Trussell Tech, 2015a). The AWT Facility source water would be secondary treated water from the Monterey Regional Water Pollution Control Agency's (MRWPCA's) Regional Treatment Plant (RTP).
3. **Monterey Peninsula Water Supply Project Variant or "Variant Project"**, which would be a combination of a smaller seawater desalination plant capable of producing 6.4 mgd of drinking water with the GWR Project (Ocean Plan compliance assessment described in Trussell Tech, 2015b).

Both the proposed desalination facility and the proposed AWT Facility would employ reverse osmosis (RO) membranes to purify the waters, and as a result, both projects would produce RO concentrate waste streams that would be disposed through the existing MRWPCA ocean outfall: the brine concentrate from the desalination facility ("Desal Brine"), and the RO concentrate from the AWT Facility ("GWR Concentrate"). Additional details with regard to the project backgrounds, assessment methodologies, results, and conclusions for discharge of these waste streams are described in the previous Technical Memoranda (Trussell Tech, 2015a and 2015b).

The Ocean Plan objectives are to be met after the initial dilution of the discharge into the ocean. The initial dilution occurs in an area known as the zone of initial dilution (ZID). The extent of dilution in the ZID is quantified and referred to as the minimum probable initial dilution (D_m). The water quality objectives established in the Ocean Plan are adjusted by the D_m to derive the National Pollutant Discharge Elimination System (NPDES) permit limits for a wastewater discharge prior to ocean dilution.

Part of the methodology for estimating the concentration of a constituent on the Ocean Plan is estimating the D_m based on Ocean Modeling. FlowScience, Inc. ("FlowScience") conducted modeling of the ocean mixing for various discharge scenarios involving the proposed projects to determine D_m values for the key scenarios. Recently, additional modeling by FlowScience was performed to (1) update the number of currently open discharge ports in the MRWPCA ocean outfall from 120 to 130 open ports, (2) update the GWR Concentrate flow from 0.73 to 0.94 mgd for certain Desal Brine containing discharge flows and account for the hauled brine[1], and (3)

[1] The hauled brine is waste that is trucked to the RTP and blended with secondary effluent prior to being discharged. The maximum anticipated flow of this stream is 0.1 mgd (blend of brine and secondary effluent).

model additional key discharge scenarios that were missing from the initial ocean modeling for the MPWSP and Variant Project.

The purpose of this Addendum Report is to provide an understanding of the impact of the updated ocean discharge modeling to the previous Ocean Plan compliance assessments for the various proposed projects.

2 Modeling Update Results

FlowScience performed additional ocean discharge modeling for key discharge scenarios and Trussell Tech used these modeling results to perform an updated analysis of Ocean Plan compliance for the various proposed projects. The results from these analyses are presented in the following subsections: the MPWSP in Section 2.1; the Variant Project in Section 2.2 for the Variant Project; and the GWR Project in Section 2.3. Note that the results for the GWR Project in Section 2.3 are also applicable to the Variant Project. Not all previously modeled scenarios were repeated; the scenarios selected for updating were chosen to sufficiently demonstrate the impact of the updated model input parameters (*i.e.*, number of open ports and GWR Concentration flow). In addition, some new scenarios were added to ensure that the worst-case discharge conditions were considered for all of the proposed projects.

2.1 Updated Results for the MPWSP

The following discharge scenarios related to the MPWSP were modeled using 130 open ports for the MRWPCA ocean outfall:

1. **Desal Brine with no wastewater effluent (*updated scenario*):** The maximum influence of the Desal Brine on the overall discharge (*i.e.*, no secondary effluent discharged). This scenario would be representative of conditions when demand for recycled water is highest (*e.g.*, during summer months), and all of the RTP secondary effluent is recycled through the SVRP for agricultural irrigation. The hauled waste is also included in this discharge scenario.
2. **Desal Brine with moderate wastewater flow (*new scenario*):** Desal Brine discharged with a relatively moderate secondary effluent flow that results in a plume with slightly negative buoyancy. This scenario represents times when demand for recycled water is low or the wastewater flow is low, and there is excess secondary effluent that is discharged to the ocean.

The updated D_m values for these two discharge scenarios are provided in Table 1. The net impact of using 130 open ports and including the hauled waste was a slight increase (approximately 6%) in the amount of dilution associated with the ocean mixing. This confirms that previously modeled MPWSP discharge scenarios with Desal Brine included in Trussell 2015b were conservative.

Table 1 – Updated minimum probable dilution (Dm) values for select MPWSP discharge scenarios

No.	Discharge Scenario (Ocean Condition)	Discharge flows (mgd)			Previously Reported D_m (120 ports)[a]	Updated D_m (130 ports)
		Secondary effluent	Hauled Waste	Desal Brine		
1	Desal Brine with no wastewater flow (Davidson)	0	0.1	13.98	16	17
2	Desal Brine with moderate wastewater flow (Davidson)	9	0.1	13.98	n/a [b]	22

[a] The previously reported D_m was used in the analysis presented in Trussell 2015b, and was determined with the assumption that 120 ports on the outfall were open and did not consider the hauled waste flow.
[b] Not applicable, as Discharge Scenario 2, consisting of Desal Brine and a moderate wastewater flow, was not previously modeled.

The D_m values reported in Table 1 were used to assess the Ocean Plan compliance for MPWSP Scenarios 1 and 2 using the same methodology and water quality assumptions previously described (Trussell, 2015b). The estimated concentrations at the edge of the ZID for constituents that are expected to exceed the Ocean Plan objective are provided in Table 2. A new exceedance for the MPWSP was identified for MPWSP Scenario 2, where the ammonia concentration at the edge of the ZID was predicted to exceed the 6-month median Ocean Plan objective. A list of estimated concentrations for these two scenarios for all Ocean Plan constituents is provided in the Appendix (Table A1).

Table 2 - Predicted concentration at the edge of the ZID expressed for constituents of interest in the MPWSP as both a concentration and percentage of Ocean Plan Objective [a]

Constituent	Units	Ocean Plan Objective	MPWSP Ocean Discharge Scenario			
			Estimated Concentration at Edge of ZID		Estimated Percentage of Ocean Plan objective at Edge of ZID	
			1	2	1	2
Ammonia (as N) – 6-mo median	ug/L	600	19	626	3%	104%
PCBs	ug/L	1.9E-05	1.2E-04	6.7E-05	609%	351%

[a] Red shading indicates constituent is expected to exceed the ocean plan objective for that discharge scenario.

2.2 Updated Results for the Variant Project

The following discharge scenarios related to the Variant Project were modeled using 130 open ports for the MRWPCA ocean outfall:

1. **Desal Brine without wastewater or GWR Concentrate (*updated scenario*):** Desal Brine discharged without secondary effluent or GWR Concentrate. This scenario would be representative of conditions when the smaller (6.4 mgd) desalination facility is in operation, but the AWT Facility is not operating (*e.g.*, offline for maintenance), and all of the secondary effluent is recycled through the SVRP (*e.g.*, during high irrigation water demand summer months). The hauled waste is also included in this discharge scenario.
2. **Desal Brine with moderate wastewater flow and no GWR concentrate (*new scenario*):** Desal Brine discharged with a relatively moderate secondary effluent flow, but no GWR Concentrate, that results in a plume with slightly negative buoyancy. This

scenario represents times when demand for recycled water is low or the wastewater flow is low, and there is excess secondary effluent that is discharged to the ocean.

3. **Desal Brine with GWR Concentrate and no secondary effluent (*updated scenario*):** Desal Brine discharge with GWR Concentrate and no secondary effluent. This scenario would be representative of the condition where both the desalination facility and the AWT Facility are in operation, and there is the highest demand for recycled water through the SVRP (*e.g.*, during summer months).
4. **Desal Brine with GWR Concentrate and a moderate wastewater flow (*new scenario*):** Desal Brine discharged with GWR Concentrate and a relatively moderate secondary effluent flow that results in a plume with slightly negative buoyancy. This scenario represents times when both the desalination facility and the AWT Facility are operating, but demand for recycled water is low and there is excess secondary effluent that is discharged to the ocean.

- **Variant conditions with no Desal Brine contribution**: All scenarios described for the GWR Project are also applicable to the Variant Project. See Section 2.3 for these additional scenarios.

The updated D_m values for these two discharge scenarios are provided in Table 3. Similar to the MPWSP modeling, the net impact of using 130 open ports, including the hauled waste, and using a GWR concentrate flow of 0.94 mgd (instead of 0.73 mgd) was a slight increase in the amount of dilution associated with the ocean mixing for the Variant Project discharge scenarios. This confirms that previously modeled Variant discharge scenarios with Desal Brine included in Trussell 2015b were conservative.

Table 3 – Updated minimum probable dilution (D_m) values for select MPWSP discharge scenarios

No.	Discharge Scenario (Ocean Condition)	Discharge flows (mgd)				Previously Reported D_m (120 ports)[a]	Updated D_m (130 ports)
		Secondary effluent	Hauled Waste	GWR Concentrate	Desal Brine		
1	Desal Brine with no wastewater and no GWR Conc. (Upwelling)	0	0.1	0	8.99	15	16
2	Desal Brine with moderate wastewater flow and no GWR Conc.(Davidson)	5.8	0.1	0	8.99	n/a [b]	22
3	Desal Brine and GWR Conc. with no wastewater (Upwelling)	0	0.1	0.94	8.99	17	18
4	Desal Brine and GWR Conc. with moderate wastewater (Upwelling)	5.3	0.1	0.94	8.99	n/a [b]	24

[a] The previously reported D_m was used in the analysis presented in Trussell 2015b, and was performed with 120 open ports on the outfall, did not consider the hauled waste flow, and assumed a GWR Concentrate flow of 0.73 instead of 0.94 mgd.
[b] Not applicable, as Discharge Scenarios 2 and 4, with moderate wastewater flows, were not previously modeled.

The D_m values reported in Table 3 were used to assess the Ocean Plan compliance for Variant Project Scenarios 1 through 4 using the same methodology and water quality assumptions previously described (Trussell, 2015b). The estimated concentrations at the edge of the ZID for constituents that are expected to exceed the Ocean Plan objective are provided in Table 4. For the updated scenarios (Variant Project Scenarios 1 and 3), the changes to the underlying modeling parameters increased the amount of dilution in the ocean mixing, thus the resulting ZID concentrations decreased slightly. For the new scenarios (Variant Project Scenarios 2 and 4), no new exceedances were identified; however, ammonia was identified as an exceedance in Variant Scenario 2, where there is no GWR Concentrate in the combined discharge. This had not been shown in the previous analysis. A list of estimated concentrations for these four scenarios for all Ocean Plan constituents is provided in the Appendix (Table A2).

Table 4 - Predicted concentration at the edge of the ZID expressed for constituents of interest in the MPWSP as both a concentration and percentage of Ocean Plan Objective [a]

Constituent	Units	Ocean Plan Objective	Variant Project Ocean Discharge Scenario							
			Estimated Concentration at Edge of ZID				Estimated Percentage of Ocean Plan objective at Edge of ZID			
			1	2	3	4	1	2	3	4
Objectives for protection of marine aquatic life										
Copper	ug/L	3	2.1	2.4	2.7	2.7	70%	81%	91%	90%
Ammonia (as N) – 6-mo median	ug/L	600	29	629	968	985	4.8%	105%	161%	164%
Objectives for protection of human health - carcinogens										
Chlordane	ug/L	2.3E-05	1.2E-05	1.8E-05	2.9E-05	2.4E-05	52%	77%	125%	106%
DDT	ug/L	1.7E-04	4.6E-05	3.9E-05	2.1E-04	1.2E-04	27%	23%	122%	70%
PCBs	ug/L	1.9E-05	1.2E-04	6.7E-05	1.2E-04	6.7E-05	643%	351%	614%	355%
TCDD Equivalents	ug/L	3.9E-09	1.0E-10	2.7E-09	4.1E-09	4.2E-09	2.6%	68%	104%	107%
Toxaphene	ug/L	2.1E-04	8.0E-05	1.6E-04	2.5E-04	2.2E-04	38%	74%	119%	106%

[a] Shading indicates constituent is expected to be greater than 80 percent (orange shading) or exceed (red shading) the Ocean Plan objective for that discharge scenario.

2.3 Updated Results for the GWR Project

The proposed Variant Project is inclusive of the proposed GWR Project, such that the analysis in this section is also part of the Variant Project. The following discharge scenarios related to the GWR Project were modeled using 130 open ports for the MRWPCA ocean outfall:

1. **Maximum Flow under Current Port Configuration (*updated scenario*):** the maximum flow that can be discharged with the current port configuration (130 of the 172 ports open). The Oceanic ocean condition was used as it represents the worst-case dilution for this flow scenario. This scenario was chosen because represents the maximum wastewater flow under the existing diffuser conditions.
2. **Minimum Wastewater Flow - Oceanic/Upwelling (*updated scenario*):** the maximum influence of the GWR Concentrate on the ocean discharge under Oceanic/Upwelling ocean conditions (*i.e.*, no secondary effluent discharged). The Oceanic ocean condition was used as it represents the worst-case dilution for this flow scenario.
3. **Minimum Wastewater Flow – Davidson (*updated scenario*):** the maximum influence of the GWR Concentrate on the ocean discharge under Davidson ocean condition (*i.e.*, the minimum wastewater flow). Observed historic wastewater flows generally exceed 0.4 mgd during Davidson oceanic conditions. Additional source waters would be brought into the RTP if necessary to maintain the 0.4 mgd minimum.

4. **Low Wastewater Flow (*updated scenario*):** conditions with a relatively low wastewater flow of 3 mgd when the GWR Concentrate has a greater influence on the water quality than in Scenarios 1, but where the D_m is reduced due to the higher overall discharge flow (*i.e.*, compared to Scenarios 2 and 3). The Davidson ocean condition was used as it represents the worst-case dilution for this flow scenario.
5. **Moderate Wastewater Flow (*new scenario*):** conditions with a relatively moderate wastewater flow of 8 mgd when the GWR Concentrate has a greater influence on the water quality than in Scenarios 1, but where the ocean dilution (D_m) is reduced due to the higher overall discharge flow (*i.e.*, compared to Scenarios 2 through 4). The Davidson ocean condition was used as it represents the worst-case dilution for this flow scenario.

The updated D_m values for these five discharge scenarios are provided in Table 5. Similar to the modeling for the MPWSP and Variant Project, the impact of using 130 open ports was a slight increase in the amount of dilution associated with the ocean mixing for the GWR Project discharge scenarios. This confirms that previously modeled GWR Project discharge scenarios included in Trussell 2015a were conservative.

Table 5 – Updated minimum probable dilution (D_m) values for select MPWSP discharge scenarios

No.	Discharge Scenario (Ocean Condition)	Discharge flows (mgd)			Previously Reported D_m (120 ports)[a]	Updated D_m (130 ports)
		Secondary effluent	Hauled Waste	GWR Concentrate		
1	Maximum flow with GWR Concentrate with current port configuration (Oceanic)	23.7	0.1	0.94	137	142
2	GWR Concentrate with no wastewater (Oceanic)	0	0.1	0.94	523	540
3	GWR Concentrate with minimum wastewater flow (Davidson)	0.4	0.1	0.94	285	295
4	GWR Concentrate with low wastewater flow (Davidson)	3	0.1	0.94	201	208
5	GWR Concentrate with moderate wastewater flow (Davidson)	8	0.1	0.94	n/a [b]	228

[a] The previously reported D_m was used in the analysis presented in Trussell 2015a, and was performed with 120 open ports on the outfall.
[b] Not applicable, as Discharge Scenarios 5, with 8 mgd of wastewater flow, was not previously modeled.

The D_m values reported in Table 5 were used to assess the Ocean Plan compliance for GWR Project Scenarios 1 through 5 using the same methodology and water quality assumptions previously described (Trussell, 2015a). For the updated scenarios (GWR Project Scenarios 1 through 4), the changes to the underlying modeling parameters increased the amount of dilution from ocean mixing. Thus, as previously been shown, none of the GWR Project scenarios resulted in an estimated exceedance of the Ocean Plan objectives.. For the new scenario (GWR Project Scenario 5), it was estimated that none of the Ocean Plan objectives would be exceeded. Tables with the estimated concentrations at the edge of the ZID of all of the Ocean Plan constituents for the GWR Project discharge Scenarios 1 through 5 are provided in the Appendix as concentrations (Table A3) and as a percentage of the Ocean Plan objective (Table A4).

3 Conclusions

Additional modeling of the ocean discharges of various scenarios for the MPWSP, Variant Project, and GWR project were performed, including updating previous modeling to reflect changes in the baseline modeling assumptions and new discharge scenarios that were missing from the previous analyses. Two primary conclusions can be drawn from these efforts: (1) all conclusions from the previously modeled discharge conditions remain the same, and (2) ammonia was identified as a potential exceedance for both the MPWSP and the Variant Project when the Desal Brine is discharged with a moderate flow of secondary effluent.

For the updated scenarios, three changes were made with respect to modeling of the ocean discharge: (1) there are currently 130 open discharge ports, which is more than the 120 ports used in the previous analysis; (2) for the MPWSP and Variant Project scenarios, the hauled waste flow was added; and (3) for the Variant Project scenarios, a GWR Concentrate flow 0.94 mgd was used instead of 0.73. In all cases, the impact of making these changes to the ocean mixing was minor and resulted in slightly greater dilution of the ocean discharges and thus slightly lower concentrations of constituents at the edge of the ZID. These changes were minimal and do not alter the previous conclusions.

The results from the new scenarios that were modeled have implications with respect to Ocean Plan compliance. Previously, there were two types of exceedances identified: (1) exceedance of PCBs for discharges with a high fraction of Desal Brine flow, and (2) exceedance or near exceedance of several parameters (ammonia, copper, chlordane, DDT, PCBs, TCDD equivalents, and toxaphene) when discharging Desal Brine and GWR Concentrate with little or no secondary effluent. In this most recent analysis, a third type of exceedance was identified: when the discharge contains both the Desal Brine and a moderate wastewater flow, there may be an exceedance of the Ocean Plan 6-month median objective for ammonia. This type of exceedance was shown for both the MPWSP (Scenario 2) and the Variant Projects (Scenarios 2 and 4) and is a result of the combination of having high ammonia in the wastewater with the high salinity in the Desal Brine.

As previously shown, ammonia is not an issue when discharging secondary effluent and GWR Concentrate without Desal Brine, or when the dense Desal Brine[2] is discharged with sufficient secondary effluent, such that the combined discharge results in a rising plume with relatively high ocean mixing in the ZID. This potential Ocean Plan exceedance emerges when there is *not* sufficient secondary effluent to dilute the Desal Brine, and thus the combined discharge is more dense than the ambient seawater, sinks, and experiences relatively low ocean mixing in the ZID. Similarly, as previously shown, ammonia is not an issue when the Desal Brine is discharged with a low secondary effluent flow, where even though there is relatively low ocean mixing in the ZID, the ammonia concentration in the discharge is less because the wastewater is a smaller fraction of the overall combined discharge. The worst-case occurs near the point where the Desal Brine is discharged with the highest flow of wastewater that still results in a sinking

[2] Compared to the ambient seawater (~34,000 mg/L of TDS), the Desal Brine is relatively dense (~57,400 mg/L of TDS) and when discharged on its own would sink, whereas the secondary effluent (~1,000 mg/L of TDS) and GWR Concentrate (~5,000 mg/L) are relatively light and would rise when discharged.

plume. This wastewater flow ends up being a moderate flow: approximately 9 mgd when combined with the Desal Brine from the MPWSP or 5.3 mgd of Desal Brine in the case of the Variant Project.

It should be noted that ammonia was already identified as a potential exceedance (along with several other constituents) when the Desal Brine is discharged with the GWR Concentrate with little or no secondary effluent; however, as illustrated by the Variant Scenario 4, these exceedances also apply to when there is a moderate flow of secondary effluent (approximately 5.3 mgd).

4 References

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Appendix A

Table A1 – MPWSP complete list of Ocean Plan constituents at the edge of the ZID as estimated concentration and as a percentage of the Ocean Plan objective [a]

Constituent	Units	Ocean Plan Objective	MPWSP Ocean Discharge Scenario: Estimated Concentration at Edge of ZID 1	Estimated Concentration at Edge of ZID 2	Estimated Percentage of Ocean Plan objective at Edge of ZID 1	Estimated Percentage of Ocean Plan objective at Edge of ZID 2
Objectives for protection of marine aquatic life						
Arsenic	ug/L	8	4.9	4.6	62%	58%
Cadmium	ug/L	1	0.44	0.23	44%	23%
Chromium (Hexavalent)	ug/L	2	0.051	0.058	2.6%	2.9%
Copper	ug/L	3	2.1	2.2	69%	72%
Lead	ug/L	2	0.35	0.18	18%	8.8%
Mercury	ug/L	0.04	0.021	0.013	53%	33%
Nickel	ug/L	5	0.48	0.32	10%	6.3%
Selenium	ug/L	15	3.1	1.5	20%	10%
Silver	ug/L	0.7	0.15	0.16	22%	23%
Zinc	ug/L	20	9.5	8.9	47%	45%
Cyanide	ug/L	1	0.49	0.36	49%	36%
Total Chlorine Residual [d]	ug/L	2	--	--	–	–
Ammonia (as N) - 6-mo median	ug/L	600	19	626	3.2%	104%
Ammonia (as N) - Daily Max	ug/L	2,400	24	842	1.0%	35%
Acute Toxicity [b]	TUa	0.3				
Chronic Toxicity [b]	TUc	1				
Phenolic Compounds (non-chlorinated)	ug/L	30	0.027	1.2	0.09%	3.9%
Chlorinated Phenolics	ug/L	1	<0.0079	<0.34	<0.8%	<34%
Endosulfan	ug/L	0.009	9.6E-06	2.6E-04	0.1%	2.9%
Endrin	ug/L	0.002	1.6E-06	2.1E-06	0.08%	0.1%
HCH (Hexachlorocyclohexane)	ug/L	0.004	5.1E-05	6.0E-04	1.3%	15%
Radioactivity (Gross Beta) [b]	pci/L	–				
Radioactivity (Gross Alpha) [b]	pci/L	–				
Objectives for protection of human health – non carcinogens						
Acrolein	ug/L	220	<0.0020	<0.086	<0.01%	<0.04%
Antimony	ug/L	1200	0.91	0.45	0.08%	0.04%
Bis (2-chloroethoxy) methane	ug/L	4.4	<2.0E-04	<0.0086	<0.01%	<0.2%
Bis (2-chloroisopropyl) ether	ug/L	1200	<2.0E-04	<0.0086	<0.01%	<0.01%
Chlorobenzene	ug/L	570	<2.0E-04	<0.0086	<0.01%	<0.01%
Chromium (III)	ug/L	190000	5.9	2.9	<0.01%	<0.01%
Di-n-butyl phthalate	ug/L	3500	<0.0020	<0.086	<0.01%	<0.01%
Dichlorobenzenes	ug/L	5100	6.3E-04	0.027	<0.01%	<0.01%
Diethyl phthalate	ug/L	33000	<0.0020	<0.086	<0.01%	<0.01%
Dimethyl phthalate	ug/L	820000	<7.9E-04	<0.034	<0.01%	<0.01%
4,6-dinitro-2-methylphenol	ug/L	220	<2.0E-04	<0.0086	<0.01%	<0.01%
2,4-Dinitrophenol	ug/L	4.0	<2.0E-04	<0.0086	<0.01%	<0.2%
Ethylbenzene	ug/L	4100	<2.0E-04	<0.0086	<0.01%	<0.01%
Fluoranthene	ug/L	15	1.0E-04	4.9E-05	<0.01%	0.00%
Hexachlorocyclopentadiene	ug/L	58	<2.0E-04	<0.0086	<0.01%	<0.01%
Nitrobenzene	ug/L	4.9	<2.0E-04	<0.0086	<0.01%	<0.2%
Thallium	ug/L	2	<0.094	<0.053	<4.7%	<2.7%
Toluene	ug/L	85000	<0.050	<0.032	<0.01%	<0.0%
Tributyltin	ug/L	0.0014	<2.0E-05	<8.6E-04	<1.4%	<61%
1,1,1-Trichloroethane	ug/L	540000	<0.050	<0.032	<0.01%	<0.01%
Objectives for protection of human health - carcinogens						
Acrylonitrile	ug/L	0.10	<7.9E-04	<0.034	<0.8%	<34%
Aldrin [c]	ug/L	0.000022	<2.0E-05	<8.6E-04	–	–
Benzene	ug/L	5.9	<0.050	<0.032	<0.8%	<0.5%

Constituent	Units	Ocean Plan Objective	MPWSP Ocean Discharge Scenario			
			Estimated Concentration at Edge of ZID		Estimated Percentage of Ocean Plan objective at Edge of ZID	
			1	2	1	2
Benzidine [c]	ug/L	0.000069	<2.0E-04	<0.0086	–	–
Beryllium	ug/L	0.033	2.1E-06	0.0085	<0.01%	26%
Bis(2-chloroethyl)ether	ug/L	0.045	<2.0E-04	<0.0086	<0.4%	<19%
Bis(2-ethyl-hexyl)phthalate	ug/L	3.5	0.086	1.4	2.5%	39%
Carbon tetrachloride	ug/L	0.90	<0.028	<0.022	<3.1%	<2.4%
Chlordane	ug/L	0.000023	1.1E-05	1.8E-05	48%	77%
Chlorodibromomethane	ug/L	8.6	<2.0E-04	<0.0086	<0.01%	<0.10%
Chloroform	ug/L	130	7.9E-04	0.034	<0.01%	0.03%
DDT	ug/L	0.00017	3.1E-05	3.3E-05	18%	20%
1,4-Dichlorobenzene	ug/L	18	0.050	0.051	0.3%	0.3%
3,3-Dichlorobenzidine	ug/L	0.0081	<9.9E-06	<4.3E-04	<0.1%	<5.3%
1,2-Dichloroethane	ug/L	28	<0.050	<0.032	<0.2%	<0.1%
1,1-Dichloroethylene	ug/L	0.9	0.050	0.032	5.5%	3.6%
Dichlorobromomethane	ug/L	6.2	<2.0E-04	<0.0086	<0.01%	<0.1%
Dichloromethane	ug/L	450	0.050	0.033	0.01%	<0.01%
1,3-dichloropropene	ug/L	8.9	<0.050	<0.032	<0.6%	<0.4%
Dieldrin	ug/L	0.00004	5.0E-06	1.1E-05	13%	27%
2,4-Dinitrotoluene	ug/L	2.6	<7.9E-04	<0.034	<0.03%	<1.3%
1,2-Diphenylhydrazine (azobenzene)	ug/L	0.16	<2.0E-04	<0.0086	<0.1%	<5.4%
Halomethanes	ug/L	130	2.9E-04	0.0093	<0.01%	<0.01%
Heptachlor	ug/L	0.00005	4.8E-07	2.3E-07	1.0%	0.5%
Heptachlor Epoxide	ug/L	0.00002	2.3E-08	1.0E-06	0.1%	5.1%
Hexachlorobenzene	ug/L	0.00021	3.1E-08	1.3E-06	0.01%	0.6%
Hexachlorobutadiene	ug/L	14	3.6E-09	1.5E-07	<0.01%	<0.01%
Hexachloroethane	ug/L	2.5	<2.0E-04	<0.0086	<0.01%	<0.3%
Isophorone	ug/L	730	<2.0E-04	<0.0086	<0.01%	<0.01%
N-Nitrosodimethylamine	ug/L	7.3	1.7E-04	3.7E-04	<0.01%	<0.01%
N-Nitrosodi-N-Propylamine	ug/L	0.38	2.0E-04	0.0014	0.05%	0.4%
N-Nitrosodiphenylamine	ug/L	2.5	<2.0E-04	<0.0086	<0.01%	<0.3%
PAHs	ug/L	0.0088	6.8E-04	0.0012	7.7%	14%
PCBs	ug/L	0.000019	1.2E-04	6.7E-05	609%	351%
TCDD Equivalents	ug/L	3.9E-09	6.0E-11	2.6E-09	1.5%	67%
1,1,2,2-Tetrachloroethane	ug/L	2.3	<0.050	<0.032	<2.2%	<1.4%
Tetrachloroethylene	ug/L	2.0	<0.050	<0.032	<2.5%	<1.6%
Toxaphene	ug/L	2.1E-04	7.5E-05	1.6E-04	35%	74%
Trichloroethylene	ug/L	27	<0.050	<0.032	<0.2%	<0.1%
1,1,2-Trichloroethane	ug/L	9.4	<0.050	<0.032	<0.5%	<0.3%
2,4,6-Trichlorophenol	ug/L	0.29	<2.0E-04	<0.0086	<0.07%	<3.0%
Vinyl chloride	ug/L	36	<0.028	<0.022	<0.08%	<0.06%

[a] Note that if the percentage as determined by using the MRL was less than 0.01 percent, then a minimum value is shown as "<0.01%" (*e.g.*, if the MRL indicated the value was <0.000001%, for simplicity, it is displayed as <0.01%). Also, shading indicates constituent is expected to be greater than 80 percent (orange shading) or exceed (red shading) the ocean plan objective for that discharge scenario.

[b] Calculating flow-weighted averages for toxicity (acute and chronic) and radioactivity (gross beta and gross alpha) is not appropriate based on the nature of the constituent. These constituents were measured for the secondary effluent and those concentrations would comply with the Ocean Plan objectives.

[c] All observed values from all data sources were below the MRL, and the flow-weighted average of the MRLs is higher than the Ocean Plan objective. No compliance conclusions can be drawn for these constituents.

[d] For total chlorine residual, any waste streams containing a free-chlorine residual would be dechlorinated prior to discharge.

Table A2 – Variant Project list of predicted concentrations of Ocean Plan constituents at the edge of the ZID as a concentration and as a percentage of the Ocean Plan objective [a]

Constituent	Units	Ocean Plan Objective	Variant Project Ocean Discharge Scenario							
			Estimated Concentration at Edge of ZID				Estimated Percentage of Ocean Plan objective at Edge of ZID			
			1	2	3	4	1	2	3	4
Objectives for protection of marine aquatic life										
Arsenic	ug/L	8	5.1	4.6	4.7	4.4	63%	58%	59%	55%
Cadmium	ug/L	1	0.46	0.23	0.41	0.22	46%	23%	41%	22%
Chromium (Hexavalent)	ug/L	2	0.084	0.083	0.14	0.11	4.2%	4.2%	6.9%	5.3%
Copper	ug/L	3	2.1	2.4	2.7	2.7	70%	81%	91%	90%
Lead	ug/L	2	0.37	0.18	0.32	0.17	19%	9.1%	16%	8.6%
Mercury	ug/L	0.04	0.022	0.014	0.021	0.014	56%	35%	54%	36%
Nickel	ug/L	5	0.51	0.45	0.75	0.56	10%	9.0%	15%	11%
Selenium	ug/L	15	3.3	1.6	2.8	1.5	22%	10.5%	19%	10%
Silver	ug/L	0.7	0.16	0.18	0.16	0.18	22%	26%	22%	25%
Zinc	ug/L	20	9.6	9.4	10.5	9.8	48%	47%	53%	49%
Cyanide	ug/L	1	0.53	0.36	0.62	0.41	53%	36%	62%	41%
Total Chlorine Residual [d]	ug/L	2	--	--	--	--	--	--	–	–
Ammonia (as N); 6-mo median	ug/L	600	29	629	968	985	4.8%	105%	161%	164%
Ammonia (as N); Daily Max	ug/L	2,400	37	846	1302	1325	1.5%	35%	54%	55%
Acute Toxicity [b]	TUa	0.3								
Chronic Toxicity [b]	TUc	1								
Phenolic Compounds (non-chlorinated)	ug/L	30	0.045	1.2	1.8	1.9	0.1%	4.0%	6.1%	6.2%
Chlorinated Phenolics	ug/L	1	<0.013	<0.34	<0.11	<0.33	<1.3%	<34%	<11%	<33%
Endosulfan	ug/L	0.009	3.5E-05	8.3E-04	0.0013	0.0013	0.4%	9.2%	14%	14%
Endrin	ug/L	0.002	1.7E-06	2.1E-06	3.4E-06	2.8E-06	0.08%	0.10%	0.2%	0.1%
HCH (Hexachlorocyclohexane)	ug/L	0.004	7.8E-05	0.0010	0.0016	0.0016	2.0%	26%	40%	41%
Radioactivity (Gross Beta) [b]	pci/L	–	5.1	4.6	4.7	4.4	63%	58%	59%	55%
Radioactivity (Gross Alpha) [b]	pci/L	–	0.46	0.23	0.41	0.22	46%	23%	41%	22%
Objectives for protection of human health – non carcinogens										
Acrolein	ug/L	220	0.0058	0.16	0.24	0.24	<0.01%	0.07%	0.1%	0.1%
Antimony	ug/L	1200	0.96	0.45	0.80	0.41	0.08%	0.04%	0.07%	0.03%
Bis (2-chloroethoxy) methane	ug/L	4.4	<0.0027	<0.072	<0.0071	<0.062	<0.06%	<1.64%	<0.2%	<1.40%
Bis (2-chloroisopropyl) ether	ug/L	1200	<0.0027	<0.072	<0.0071	<0.062	<0.01%	<0.01%	<0.01%	<0.01%
Chlorobenzene	ug/L	570	<3.2E-04	<0.0086	<0.0027	<0.0083	<0.01%	<0.01%	<0.01%	<0.01%
Chromium (III)	ug/L	190000	6.3	3.0	5.3	2.7	<0.01%	<0.01%	<0.01%	<0.01%
Di-n-butyl phthalate	ug/L	3500	<0.0045	<0.12	<0.0086	<0.10	<0.01%	<0.01%	<0.01%	<0.01%
Dichlorobenzenes	ug/L	5100	0.0010	0.028	0.042	0.043	<0.01%	<0.01%	<0.01%	<0.01%
Diethyl phthalate	ug/L	33000	<0.0032	<0.086	<0.0076	<0.073	<0.01%	<0.01%	<0.01%	<0.01%
Dimethyl phthalate	ug/L	820000	<0.0013	<0.034	<0.0035	<0.029	<0.01%	<0.01%	<0.01%	<0.01%
4,6-dinitro-2-methylphenol	ug/L	220	<0.013	<0.34	<0.035	<0.29	<0.01%	<0.2%	<0.02%	<0.1%
2,4-Dinitrophenol	ug/L	4.0	<0.0084	<0.22	<0.031	<0.20	<0.2%	<5.6%	<0.8%	<4.9%
Ethylbenzene	ug/L	4100	<3.2E-04	<0.0086	<0.0027	<0.0083	<0.01%	<0.01%	<0.01%	<0.01%
Fluoranthene	ug/L	15	1.1E-04	4.9E-05	5.8E-04	2.9E-04	<0.01%	<0.01%	<0.01%	0.05%
Hexachlorocyclopentadiene	ug/L	58	<3.2E-04	<0.0086	<5.1E-04	<0.0072	<0.01%	<0.01%	<0.01%	<0.01%
Nitrobenzene	ug/L	4.9	<0.0015	<0.040	<0.0061	<0.035	<0.03%	<0.8%	<0.1%	<0.7%
Thallium	ug/L	2	0.10	0.057	0.10	0.059	5.0%	2.8%	4.9%	2.9%
Toluene	ug/L	85000	<0.053	<0.032	<0.045	<0.029	<0.01%	<0.01%	<0.01%	<0.01%
Tributyltin	ug/L	0.0014	<3.2E-05	<8.6E-04	<1.2E-04	<7.5E-04	<2.3%	<62%	<8.9%	<54%
1,1,1-Trichloroethane	ug/L	540000	<0.053	<0.032	<0.045	<0.029	<0.01%	<0.01%	<0.01%	<0.01%
Objectives for protection of human health - carcinogens										
Acrylonitrile	ug/L	0.10	0.0016	0.044	0.067	0.069	1.6%	44%	67%	69%
Aldrin [c]	ug/L	0.000022	<4.5E-06	<1.2E-04	<5.3E-05	<1.2E-04	<21%	–	–	–
Benzene	ug/L	5.9	<0.053	<0.032	<0.045	<0.029	<0.9%	<0.5%	<0.8%	<0.5%
Benzidine [c]	ug/L	0.000069	<0.013	<0.34	<0.011	<0.28	–	–	–	–
Beryllium	ug/L	0.033	3.4E-06	1.5E-06	0.0025	0.0012	0.01%	<0.0%	7.5%	3.7%
Bis(2-chloroethyl)ether [c]	ug/L	0.045	<0.0027	<0.072	<0.0071	<0.062	<6.0%	–	<16%	–

Constituent	Units	Ocean Plan Objective	Variant Project Ocean Discharge Scenario							
			Estimated Concentration at Edge of ZID				Estimated Percentage of Ocean Plan objective at Edge of ZID			
			1	2	3	4	1	2	3	4
Bis(2-ethyl-hexyl)phthalate	ug/L	3.5	0.11	1.4	2.1	2.1	3.1%	39%	60%	61%
Carbon tetrachloride	ug/L	0.90	0.029	0.022	0.037	0.025	3.3%	2.4%	4.1%	2.8%
Chlordane	ug/L	0.000023	1.2E-05	1.8E-05	2.9E-05	2.4E-05	52%	77%	125%	106%
Chlorodibromomethane	ug/L	8.6	0.0016	0.042	0.065	0.066	0.02%	0.5%	0.8%	0.8%
Chloroform	ug/L	130	0.025	0.67	1.0	1.0	0.02%	0.5%	0.8%	0.8%
DDT	ug/L	0.00017	4.6E-05	3.9E-05	2.1E-04	1.2E-04	27%	23%	122%	70%
1,4-Dichlorobenzene	ug/L	18	0.053	0.051	0.085	0.064	0.3%	0.3%	0.5%	0.4%
3,3-Dichlorobenzidine [c]	ug/L	0.0081	<0.012	<0.33	<0.020	<0.27	–	–	–	–
1,2-Dichloroethane	ug/L	28	<0.053	<0.032	<0.045	<0.029	<0.2%	<0.1%	<0.2%	<0.1%
1,1-Dichloroethylene	ug/L	0.9	0.053	0.032	0.045	0.029	5.9%	3.6%	5.0%	3.3%
Dichlorobromomethane	ug/L	6.2	0.0017	0.045	0.069	0.071	0.03%	0.7%	1.1%	1.1%
Dichloromethane	ug/L	450	0.053	0.035	0.060	0.038	0.01%	<0.0%	0.01%	<0.01%
1,3-dichloropropene	ug/L	8.9	0.053	0.033	0.057	0.036	0.6%	0.4%	0.6%	0.4%
Dieldrin	ug/L	0.00004	8.7E-06	1.2E-05	2.2E-05	1.8E-05	22%	31%	54%	44%
2,4-Dinitrotoluene	ug/L	2.6	<0.0013	<0.034	<0.0015	<0.028	<0.05%	<1.3%	<0.06%	<1.1%
1,2-Diphenylhydrazine	ug/L	0.16	<0.0027	<0.072	<0.0071	<0.062	<1.7%	<45%	<4.5%	<39%
Halomethanes	ug/L	130	9.2E-04	0.025	0.038	0.038	<0.01%	0.02%	0.03%	0.03%
Heptachlor	ug/L	0.00005	5.0E-07	2.3E-07	4.1E-07	2.0E-07	1.0%	0.5%	0.8%	0.4%
Heptachlor Epoxide	ug/L	0.00002	3.8E-08	1.0E-06	1.6E-06	1.6E-06	0.2%	5.1%	7.8%	8.0%
Hexachlorobenzene	ug/L	0.00021	5.0E-08	1.3E-06	2.1E-06	2.1E-06	0.02%	0.6%	1.0%	1.0%
Hexachlorobutadiene	ug/L	14	5.8E-09	1.6E-07	2.4E-07	2.4E-07	<0.01%	<0.01%	<0.01%	<0.01%
Hexachloroethane	ug/L	2.5	<0.0015	<0.040	<0.0037	<0.034	<0.06%	<1.6%	<0.1%	<1.3%
Isophorone	ug/L	730	<3.2E-04	<0.0086	<0.0027	<0.0083	<0.01%	<0.01%	<0.01%	<0.01%
N-Nitrosodimethylamine	ug/L	7.3	2.4E-04	0.0017	9.3E-04	0.0018	<0.01%	0.02%	0.01%	0.02%
N-Nitrosodi-N-Propylamine	ug/L	0.38	2.2E-04	0.0014	2.8E-04	0.0012	0.06%	0.4%	0.07%	0.3%
N-Nitrosodiphenylamine	ug/L	2.5	<0.0015	<0.040	<0.0061	<0.035	<0.06%	<1.6%	<0.2%	<1.4%
PAHs	ug/L	0.0088	7.3E-04	0.0012	0.0020	0.0017	8.3%	14%	22%	19%
PCBs	ug/L	0.000019	1.2E-04	6.7E-05	1.2E-04	6.7E-05	643%	351%	614%	355%
TCDD Equivalents	ug/L	3.9E-09	1.0E-10	2.7E-09	4.1E-09	4.2E-09	2.6%	68%	104%	107%
1,1,2,2-Tetrachloroethane	ug/L	2.3	<0.053	<0.032	<0.045	<0.029	<2.3%	<1.4%	<2.0%	<1.3%
Tetrachloroethylene	ug/L	2.0	<0.053	<0.032	<0.045	<0.029	<2.6%	<1.6%	<2.3%	<1.5%
Toxaphene	ug/L	2.1E-04	8.0E-05	1.6E-04	2.5E-04	2.2E-04	38%	74%	119%	106%
Trichloroethylene	ug/L	27	<0.053	<0.032	<0.045	<0.029	<0.2%	<0.1%	<0.2%	<0.1%
1,1,2-Trichloroethane	ug/L	9.4	<0.053	<0.032	<0.045	<0.029	<0.6%	<0.3%	<0.5%	<0.3%
2,4,6-Trichlorophenol	ug/L	0.29	<0.0015	<0.040	<0.0061	<0.035	<0.5%	<14%	<2.1%	<12%
Vinyl chloride	ug/L	36	<0.029	<0.022	<0.026	<0.020	<0.08%	<0.06%	<0.07%	<0.06%

[a] Note that if the percentage as determined by using the MRL was less than 0.01 percent, then a minimum value is shown as "<0.01%" (*e.g.*, if the MRL indicated the value was <0.000001%, for simplicity, it is displayed as <0.01%). Also, Shading indicates constituent is expected to be greater than 80 percent (orange shading) or exceed (red shading) the ocean plan objective for that discharge scenario.

[b] Calculating flow-weighted averages for toxicity (acute and chronic) and radioactivity (gross beta and gross alpha) is not appropriate based on the nature of the constituent. These constituents were measured individually for the secondary effluent and GWR concentrate, and these individual concentrations would comply with the Ocean Plan objectives.

[c] All observed values from all data sources were below the MRL, and the flow-weighted average of the MRLs is higher than the Ocean Plan objective. No compliance conclusions can be drawn for these constituents.

[d] For total chlorine residual, any waste streams containing a free-chlorine residual would be dechlorinated prior to discharge.

Table A3 – GWR Project complete list of predicted concentrations of Ocean Plan constituents at the edge of the ZID for updated scenarios

Constituent	Units	Ocean Plan Objective	Estimated Concentration at Edge of ZID by Discharge Scenario				
			1	2	3	4	5
Objectives for protection of marine aquatic life							
Arsenic	ug/L	8	3.3	3.0	3.1	3.2	3.2
Cadmium	ug/L	1	0.010	0.011	0.016	0.012	0.0077
Chromium (Hexavalent)	ug/L	2	0.025	0.046	0.064	0.040	0.023
Copper	ug/L	3	2.2	2.2	2.3	2.2	2.2
Lead	ug/L	2	0.0066	0.0073	0.010	0.0078	0.0051
Mercury	ug/L	0.04	0.0057	0.0059	0.0062	0.0059	0.0056
Nickel	ug/L	5	0.11	0.12	0.17	0.12	0.083
Selenium	ug/L	15	0.055	0.071	0.10	0.070	0.045
Silver	ug/L	0.7	<0.17	<0.16	<0.16	<0.17	<0.17
Zinc	ug/L	20	8.3	8.4	8.6	8.4	8.3
Cyanide	ug/L	1	0.060	0.072	0.10	0.073	0.047
Total Chlorine Residual [c]	ug/L	2	–	–	–	–	–
Ammonia (as N) - 6-mo median	ug/L	600	295	326	465	346	230
Ammonia (as N) - Daily Max	ug/L	2,400	398	439	626	466	309
Acute Toxicity [a]	TUa	0.3					
Chronic Toxicity [a]	TUc	1					
Phenolic Compounds (non-chlorinated)	ug/L	30	0.56	0.62	0.88	0.66	0.44
Chlorinated Phenolics	ug/L	1	<0.14	<0.037	<0.068	<0.10	<0.087
Endosulfan	ug/L	0.009	3.9E-04	4.3E-04	6.1E-04	4.6E-04	3.0E-04
Endrin	ug/L	0.002	6.4E-07	7.1E-07	1.0E-06	7.5E-07	5.0E-07
HCH (Hexachlorocyclohexane)	ug/L	0.004	4.8E-04	5.4E-04	7.6E-04	5.7E-04	3.8E-04
Radioactivity (Gross Beta) [a]	pci/L	–					
Radioactivity (Gross Alpha) [a]	pci/L	–					
Objectives for protection of human health – non-carcinogens							
Acrolein	ug/L	220	0.073	0.081	0.12	0.086	0.057
Antimony	ug/L	1200	0.0064	0.0071	0.010	0.0075	0.0050
Bis (2-chloroethoxy) methane	ug/L	4.4	<0.028	<0.0024	<0.0071	<0.017	<0.017
Bis (2-chloroisopropyl) ether	ug/L	1200	<0.028	<0.0024	<0.0071	<0.017	<0.017
Chlorobenzene	ug/L	570	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
Chromium (III)	ug/L	190000	0.061	0.079	0.11	0.079	0.050
Di-n-butyl phthalate	ug/L	3500	<0.047	<0.0029	<0.010	<0.027	<0.028
Dichlorobenzenes	ug/L	5100	0.013	0.014	0.020	0.015	0.010
Diethyl phthalate	ug/L	33000	<0.034	<0.0026	<0.0081	<0.019	<0.020
Dimethyl phthalate	ug/L	820000	<0.014	<0.0012	<0.0034	<0.0079	<0.0081
4,6-dinitro-2-methylphenol	ug/L	220	<0.14	<0.012	<0.034	<0.079	<0.081
2,4-Dinitrophenol	ug/L	4.0	<0.089	<0.011	<0.026	<0.053	<0.053
Ethylbenzene	ug/L	4100	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
Fluoranthene	ug/L	15	<0.0034	<2.6E-04	<8.1E-04	<0.002	<0.002
Hexachlorocyclopentadiene	ug/L	58	<0.0034	<1.7E-04	<7.0E-04	<0.0019	<0.0020
Nitrobenzene	ug/L	4.9	<0.016	<0.0021	<0.0049	<0.010	<0.0095
Thallium	ug/L	2	0.0056	0.0062	0.0089	0.0066	0.0044
Toluene	ug/L	85000	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
Tributyltin	ug/L	0.0014	<3.4E-04	<4.2E-05	<1.0E-04	<2.1E-04	<2.0E-04
1,1,1-Trichloroethane	ug/L	540000	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
Objectives for protection of human health - carcinogens							
Acrylonitrile	ug/L	0.10	0.021	0.023	0.033	0.024	0.016
Aldrin [b]	ug/L	0.000022	<5.0E-05	<1.8E-05	<3.0E-05	<3.7E-05	<3.2E-05
Benzene	ug/L	5.9	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
Benzidine [b]	ug/L	0.000069	<0.13	<0.0036	<0.023	<0.073	<0.078
Beryllium	ug/L	0.033	0.0047	8.4E-04	0.0018	0.0030	0.0029
Bis(2-chloroethyl)ether	ug/L	0.045	<0.028	<0.0024	<0.0071	<0.017	<0.017

Constituent	Units	Ocean Plan Objective	Estimated Concentration at Edge of ZID by Discharge Scenario				
			1	2	3	4	5
Bis(2-ethyl-hexyl)phthalate	ug/L	3.5	0.63	0.70	1.0	0.74	0.49
Carbon tetrachloride	ug/L	0.90	0.0041	0.0045	0.0064	0.0048	0.0032
Chlordane	ug/L	0.000023	6.0E-06	6.6E-06	9.4E-06	7.0E-06	4.6E-06
Chlorodibromomethane	ug/L	8.6	0.020	0.022	0.031	0.023	0.015
Chloroform	ug/L	130	0.31	0.35	0.50	0.37	0.24
DDT	ug/L	0.00017	1.7E-05	6.2E-05	8.2E-05	4.5E-05	2.1E-05
1,4-Dichlorobenzene	ug/L	18	0.013	0.014	0.020	0.015	0.010
3,3-Dichlorobenzidine [b]	ug/L	0.0081	<0.13	<0.0067	<0.027	<0.072	<0.075
1,2-Dichloroethane	ug/L	28	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
1,1-Dichloroethylene	ug/L	0.9	0.0035	9.2E-04	0.0017	0.0024	0.0022
Dichlorobromomethane	ug/L	6.2	0.021	0.023	0.033	0.025	0.017
Dichloromethane	ug/L	450	0.0052	0.0058	0.0082	0.0061	0.0041
1,3-dichloropropene	ug/L	8.9	0.0046	0.0050	0.0072	0.0053	0.0035
Dieldrin	ug/L	0.00004	4.3E-06	5.9E-06	8.2E-06	5.7E-06	3.5E-06
2,4-Dinitrotoluene	ug/L	2.6	<0.013	<5.2E-04	<0.0026	<0.0074	<0.0079
1,2-Diphenylhydrazine	ug/L	0.16	<0.028	<0.0024	<0.0071	<0.017	<0.017
Halomethanes	ug/L	130	0.012	0.013	0.018	0.014	0.0090
Heptachlor [b]	ug/L	0.00005	<7.0E-05	<1.8E-05	<3.4E-05	<4.8E-05	<4.4E-05
Heptachlor Epoxide	ug/L	0.00002	4.8E-07	5.3E-07	7.5E-07	5.6E-07	3.7E-07
Hexachlorobenzene	ug/L	0.00021	6.3E-07	7.0E-07	1.0E-06	7.4E-07	4.9E-07
Hexachlorobutadiene	ug/L	14	7.3E-08	8.1E-08	1.2E-07	8.6E-08	5.7E-08
Hexachloroethane	ug/L	2.5	<0.016	<0.0012	<0.0038	<0.0090	<0.0092
Isophorone	ug/L	730	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
N-Nitrosodimethylamine	ug/L	7.3	6.9E-04	2.7E-04	4.4E-04	5.2E-04	4.5E-04
N-Nitrosodi-N-Propylamine	ug/L	0.38	5.2E-04	4.5E-05	1.3E-04	3.0E-04	3.1E-04
N-Nitrosodiphenylamine	ug/L	2.5	<0.016	<0.0021	<0.0049	<0.010	<0.0095
PAHs	ug/L	0.0088	4.3E-04	4.7E-04	6.8E-04	5.0E-04	3.3E-04
PCBs	ug/L	0.000019	5.5E-06	6.1E-06	8.7E-06	6.5E-06	4.3E-06
TCDD Equivalents	ug/L	3.9E-09	1.2E-09	1.4E-09	2.0E-09	1.5E-09	9.7E-10
1,1,2,2-Tetrachloroethane	ug/L	2.3	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
Tetrachloroethylene	ug/L	2.0	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
Toxaphene	ug/L	2.1E-04	5.8E-05	6.4E-05	9.1E-05	6.7E-05	4.5E-05
Trichloroethylene	ug/L	27	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
1,1,2-Trichloroethane	ug/L	9.4	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022
2,4,6-Trichlorophenol	ug/L	0.29	<0.016	<0.0021	<0.0049	<0.010	<0.0095
Vinyl chloride	ug/L	36	<0.0035	<9.2E-04	<0.0017	<0.0024	<0.0022

[a] Calculating flow-weighted averages for toxicity (acute and chronic) and radioactivity (gross beta and gross alpha) is not appropriate based on the nature of these constituents. These constituents were measured individually for the secondary effluent and RO concentrate, and these individual concentrations would comply with the Ocean Plan objectives.

[b] All observed values from all data sources were below the MRL, and the flow-weighted average of the MRLs is higher than the Ocean Plan objective. No compliance conclusions can be drawn for these constituents.

[c] For total chlorine residual, any waste streams containing a free-chlorine residual would be dechlorinated prior to discharge.

Table A4 – GWR Project complete list of predicted concentrations of Ocean Plan constituents at the edge of the ZID as a percentage of the Ocean Plan objective for updated scenarios [a]

Constituent	Units	Ocean Plan Objective	Estimated Concentration at Edge of ZID by Discharge Scenario				
			1	2	3	4	5
Objectives for protection of marine aquatic life							
Arsenic	ug/L	8	41%	38%	38%	40%	40%
Cadmium	ug/L	1	1.0%	1.1%	1.6%	1.2%	0.8%
Chromium (Hexavalent)	ug/L	2	1.3%	2.3%	3.2%	2.0%	1.1%
Copper	ug/L	3	73%	74%	78%	75%	72%
Lead	ug/L	2	0.3%	0.4%	0.5%	0.4%	0.3%
Mercury	ug/L	0.04	14%	15%	16%	15%	14%
Nickel	ug/L	5	2.1%	2.4%	3.3%	2.5%	1.7%
Selenium	ug/L	15	0.4%	0.5%	1%	0.5%	0.3%
Silver	ug/L	0.7	<24%	<23%	<23%	<24%	<24%
Zinc	ug/L	20	42%	42%	43%	42%	41%
Cyanide	ug/L	1	6.0%	7.2%	10%	7.3%	4.7%
Total Chlorine Residual [d]	ug/L	2	–	–	–	–	–
Ammonia (as N) - 6-mo median	ug/L	600	49%	54%	78%	58%	38%
Ammonia (as N) - Daily Max	ug/L	2,400	17%	18%	26%	19%	13%
Acute Toxicity [b]	TUa	0.3					
Chronic Toxicity [b]	TUc	1					
Phenolic Compounds (non-chlorinated)	ug/L	30	1.9%	2.1%	2.9%	2.2%	1.5%
Chlorinated Phenolics	ug/L	1	<14%	<3.7%	<6.8%	<9.6%	<8.7%
Endosulfan	ug/L	0.009	4.3%	4.8%	6.8%	5.1%	3.4%
Endrin	ug/L	0.002	0.03%	0.04%	0.05%	0.04%	0.02%
HCH (Hexachlorocyclohexane)	ug/L	0.004	12%	13%	19%	14%	9%
Radioactivity (Gross Beta) [b]	pci/L	–					
Radioactivity (Gross Alpha) [b]	pci/L	–					
Objectives for protection of human health – non-carcinogens							
Acrolein	ug/L	220	0.03%	0.04%	0.05%	0.04%	0.03%
Antimony	ug/L	1200	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Bis (2-chloroethoxy) methane	ug/L	4.4	<0.6%	<0.05%	<0.2%	<0.4%	<0.4%
Bis (2-chloroisopropyl) ether	ug/L	1200	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Chlorobenzene	ug/L	570	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Chromium (III)	ug/L	190000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Di-n-butyl phthalate	ug/L	3500	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Dichlorobenzenes	ug/L	5100	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Diethyl phthalate	ug/L	33000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Dimethyl phthalate	ug/L	820000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
4,6-dinitro-2-methylphenol	ug/L	220	<0.06%	<0.01%	<0.02%	<0.04%	<0.04%
2,4-Dinitrophenol	ug/L	4.0	<2.2%	<0.3%	<0.7%	<1.3%	<1.3%
Ethylbenzene	ug/L	4100	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Fluoranthene	ug/L	15	<0.02%	<0.01%	<0.01%	<0.01%	<0.01%
Hexachlorocyclopentadiene	ug/L	58	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Nitrobenzene	ug/L	4.9	<0.3%	<0.04%	<0.1%	<0.2%	<0.2%
Thallium	ug/L	2	0.3%	0.3%	0.4%	0.3%	0.2%
Toluene	ug/L	85000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Tributyltin	ug/L	0.0014	<24%	<3.0%	<7.3%	<15%	<15%
1,1,1-Trichloroethane	ug/L	540000	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Objectives for protection of human health - carcinogens							
Acrylonitrile	ug/L	0.10	21%	23%	33%	24%	16%
Aldrin [c]	ug/L	0.000022	–	–	–	–	–
Benzene	ug/L	5.9	<0.06%	<0.02%	<0.03%	<0.04%	<0.04%
Benzidine [c]	ug/L	0.000069	–	–	–	–	–
Beryllium	ug/L	0.033	0.4%	2.5%	3.3%	1.7%	0.7%
Bis(2-chloroethyl)ether	ug/L	0.045	<63%	<5.4%	<16%	<37%	<38%
Bis(2-ethyl-hexyl)phthalate	ug/L	3.5	18%	20%	28%	21%	14%

Constituent	Units	Ocean Plan Objective	Estimated Concentration at Edge of ZID by Discharge Scenario				
			1	2	3	4	5
Carbon tetrachloride	ug/L	0.90	0.5%	0.5%	0.7%	0.5%	0.4%
Chlordane	ug/L	0.000023	26%	29%	41%	30%	20%
Chlorodibromomethane	ug/L	8.6	0.2%	0.3%	0.4%	0.3%	0.2%
Chloroform	ug/L	130	0.2%	0.3%	0.4%	0.3%	0.2%
DDT	ug/L	0.00017	10%	36%	49%	26%	12%
1,4-Dichlorobenzene	ug/L	18	0.07%	0.08%	0.1%	0.08%	0.06%
3,3-Dichlorobenzidine [c]	ug/L	0.0081	–	–	–	–	–
1,2-Dichloroethane	ug/L	28	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
1,1-Dichloroethylene	ug/L	0.9	0.4%	0.1%	0.2%	0.3%	0.2%
Dichlorobromomethane	ug/L	6.2	0.3%	0.4%	0.5%	0.4%	0.3%
Dichloromethane	ug/L	450	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
1,3-dichloropropene	ug/L	8.9	0.05%	0.06%	0.08%	0.06%	0.04%
Dieldrin	ug/L	0.00004	11%	15%	21%	14%	8.9%
2,4-Dinitrotoluene	ug/L	2.6	<0.5%	<0.02%	<0.10%	<0.3%	<0.3%
1,2-Diphenylhydrazine	ug/L	0.16	<18%	<1.5%	<4.5%	<10%	<11%
Halomethanes	ug/L	130	<0.01%	<0.01%	0.01%	0.01%	<0.01%
Heptachlor [c]	ug/L	0.00005	–	<37%	<68%	–	–
Heptachlor Epoxide	ug/L	0.00002	2.4%	2.6%	3.8%	2.8%	1.9%
Hexachlorobenzene	ug/L	0.00021	0.3%	0.3%	0.5%	0.4%	0.2%
Hexachlorobutadiene	ug/L	14	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Hexachloroethane	ug/L	2.5	<0.6%	<0.05%	<0.2%	<0.4%	<0.4%
Isophorone	ug/L	730	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
N-Nitrosodimethylamine	ug/L	7.3	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
N-Nitrosodi-N-Propylamine	ug/L	0.38	0.1%	0.01%	0.03%	0.08%	0.08%
N-Nitrosodiphenylamine	ug/L	2.5	<0.6%	<0.08%	<0.2%	<0.4%	<0.4%
PAHs	ug/L	0.0088	4.9%	5.4%	7.7%	5.7%	3.8%
PCBs	ug/L	0.000019	29%	32%	46%	34%	23%
TCDD Equivalents	ug/L	3.9E-09	32%	35%	50%	38%	25%
1,1,2,2-Tetrachloroethane	ug/L	2.3	<0.2%	<0.04%	<0.07%	<0.1%	<0.09%
Tetrachloroethylene	ug/L	2.0	<0.2%	<0.05%	<0.08%	<0.1%	<0.1%
Toxaphene	ug/L	2.1E-04	27%	30%	43%	32%	21%
Trichloroethylene	ug/L	27	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
1,1,2-Trichloroethane	ug/L	9.4	<0.04%	<0.01%	<0.02%	<0.03%	<0.02%
2,4,6-Trichlorophenol	ug/L	0.29	<5.4%	<0.7%	<1.7%	<3.3%	<3.3%
Vinyl chloride	ug/L	36	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%

[a] Note that if the percentage as determined by using the MRL was less than 0.01 percent, then a minimum value is shown as "<0.01%" (*e.g.*, if the MRL indicated the value was <0.000001%, for simplicity, it is displayed as <0.01%).

[b] Calculating flow-weighted averages for toxicity (acute and chronic) and radioactivity (gross beta and gross alpha) is not appropriate based on the nature of these constituents. These constituents were measured individually for the secondary effluent and RO concentrate, and these individual concentrations would comply with the Ocean Plan objectives.

[c] All observed values from all data sources were below the MRL, and the flow-weighted average of the MRLs is higher than the Ocean Plan objective. No compliance conclusions can be drawn for these constituents.

[d] For total chlorine residual, any waste streams containing a free-chlorine residual would be dechlorinated prior to discharge.