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BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

In the Matter of SFPP, L.P.'s, Petition for Review of Action by the San Diego Regional Water Quality Control Board's Denial of Request to Rescind or Modify Time Schedule Order Time Schedule Order No. R9-2011-0052.	**PETITION FOR REVIEW OF ACTION BY CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, SAN DIEGO REGION; REQUEST FOR STAY; PRELIMINARY POINTS AND AUTHORITIES IN SUPPORT OF PETITION FOR REVIEW; AND REQUEST FOR EVIDENTIARY HEARING**

In accordance with section 13320 of the Water Code, Petitioner SFPP, L.P., an operating partnership of Kinder Morgan Energy Partners, L.P. (Kinder Morgan) requests review of the San Diego Regional Water Quality Control Board's (Regional Board's) November 26, 2014 denial of Kinder Morgan's April 15, 2014 request for termination of ongoing and prospective requirements of Time Schedule Order No. R9-2011-0052 (the TSO), and the Regional Board's rejection of key conclusions of the supporting April 15, 2014 Demonstration of Compliance by ARCADIS U.S., Inc. ("ARCADIS").

A summary of the basis for Kinder Morgan's Petition and a preliminary statement of points and authorities are set forth in this Petition for Review in accordance with Title 23, California Code of Regulations ("C.C.R.") section 2050(a). Kinder Morgan reserves the right to file supplemental points and authorities in support of the Petition for Review once the

administrative record becomes available. Kinder Morgan also reserves the right to submit additional arguments and evidence responsive to the Regional Board's or other interested parties' responses to Kinder Morgan's Petition for Review, to be filed in accordance with 23 C.C.R. § 2050.5.

1. NAME, ADDRESS, TELEPHONE NUMBER, AND EMAIL ADDRESS OF THE PETITIONER:

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All materials and documents generated in connection with this Petition for Review should also be provided to the counsel of record for Kinder Morgan at the following addresses:

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2. THE SPECIFIC ACTION OF THE REGIONAL BOARD WHICH THE STATE WATER BOARD IS REQUESTED TO REVIEW:

Kinder Morgan requests review of the San Diego Regional Water Quality Control Board (Regional Board) November 26, 2014 denial of Kinder Morgan's April 15, 2014 request for termination of ongoing and prospective requirements of Time Schedule Order No. R9-2011-0052 (the TSO). Kinder Morgan also requests review of the Regional Board's rejection in its November 26, 2014 letter of the conclusions of the April 15, 2014 Demonstration of Compliance and Status Report by licensed professional consultant ARCADIS (Demonstration of Compliance), that the remedial discharge does not cause or contribute to in-stream excursion of the water

quality objective for total dissolved solids ("TDS").

The Regional Board issued the TSO in 2011 to address whether and how TDS levels associated with the groundwater extraction and treatment system affect compliance with the NPDES permit covering discharges of treated groundwater at the Mission Valley Terminal, the *General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters within the San Diego Region except for San Diego Bay*, Order No. R9-2008-0002 (the Permit). The TSO required Kinder Morgan to assess the potential for TDS, which are naturally high in the groundwater discharge, to cause or contribute to an in-stream excursion above the Basin Plan surface water quality objective of 1,500 mg/l, and to assess any impact of the discharge on downstream beneficial uses.

Kinder Morgan operates its groundwater extraction and treatment system in compliance with Amendment No. 5 to Cleanup and Abatement Order No. 92-01 (the CAO) governing remediation of petroleum-related compounds at the site. The discharged groundwater, though extensively treated, carries TDS intrinsic to shallow groundwater across the San Diego Basin and hydrologically linked through direct, natural seepage to the same receiving waters. The discharge is not causing exceedances of the receiving water objective, alone or in conjunction with other discharges. The Demonstration of Compliance shows that the discharge does not have detectible impacts on TDS levels in the San Diego River, actually slightly reduces concentrations downstream of the discharge in Murphy Canyon Creek, and the remedial system and discharge do not result in a net TDS loading to receiving waters. Yet, the Regional Board has rejected these findings without explanation, effectively changing the requirements and intent of the TSO by finding that the discharge contributes to exceedance of water quality objectives for TDS based solely on end-of–pipe measurements of TDS in the discharge which were known at the time the TSO was issued.

3. THE DATE ON WHICH THE REGIONAL BOARD ACTED:

The Regional Board acted on November 26, 2014, the date of correspondence from

Executive Officer David Gibson to Scott Martin of Kinder Morgan (letter attached as **Attachment 1)**. The November 26, 2014 Regional Board letter specifies that action taken in the letter is subject to petition at the State Water Resources Control Board (State Water Board). A copy of the April 15, 2014, Kinder Morgan submission and request acted upon by the Regional Board, including an enclosed Demonstration of Compliance and Status Report of the same date by licensed professional consultant ARCADIS (Demonstration of Compliance), is attached as **Attachment 2**.

4. A FULL AND COMPLETE STATEMENT OF REASONS THE ACTION OR FAILURE TO ACT WAS INAPPROPRIATE OR IMPROPER:

The groundwater extraction, treatment, and discharge system regulated under the Permit is a critical component of the remediation project conducted by Kinder Morgan at the Mission Valley Terminal, and adjacent off-Terminal areas. The Regional Board action threatens the remediation project with the loss of effective and compliant remedial alternatives, imposing extensive, technically and legally unjustified expense to treat TDS ubiquitous in the watershed, without corresponding significant benefit to water quality. The discharge is already intensively treated by processes including particulate filtration, manganese and iron removal, carbon absorption, denitrification and oxygenation. Despite requiring in the TSO extensive reports and studies to assess any impacts of the TDS in the discharge and whether it causes or contributes to in-stream excursions of TDS water quality objectives – and despite finding submissions completed under the TSO to comply with the TSO – the Regional Board disregarded the evidence in the studies, and acted based only on brief, unsupported conclusions.

A. <u>The Regional Board's conclusion that the discharge is causing or contributing to the exceedance of TDS water quality objectives is contrary to the evidence in this case, including detailed results of receiving water monitoring called for in the TSO.</u>

The TSO required that Kinder Morgan submit a plan for receiving water monitoring to "assess the compliance of the discharge with Discharge Prohibition IV.C and the impact of the discharge on the downstream beneficial uses." *See* TSO Compliance Schedule, p. 5. The plan was required to include specific elements listed in the TSO "and any other monitoring measures necessary" to perform

the assessment. The specific monitoring elements listed in the TSO included the following receiving water monitoring activities:

1. Monthly upstream receiving water and treatment system monitoring (Directive No. 2), initiated on September 20, 2011.

2. Biweekly receiving water monitoring of water quality parameters (Directives No. 3a and 3b), initiated on January 9, 2012 and then expanded in September 2013.

3. Semiannual receiving water bioassessment monitoring (Directive No. 3c), first performed in June 2012.

Kinder Morgan was to report the results of the study "*to evaluate the potential for discharge to cause, or contribute to an in-stream excursion above the Basin Plan's Water Quality Objective for TDS as required by Order No. R9-2008-0002, Discharge Prohibition IV.C and Receiving Water Limitations VI.A.8.*" This requirement clearly contemplated a detailed study and analysis that could result *either* in demonstration of compliance, or demonstration of non-compliance with receiving water limitations.

Kinder Morgan first submitted the results of monitoring in a Technical Summary Report dated June 28, 2013, assessing all data collected through January 14, 2013 (approximately one full year of data collection). The report concluded that the data indicated *no observable changes in physical and chemical conditions, including TDS concentrations and bioassessment scores, in the San Diego River* along the reach where Murphy Canyon Creek discharges into the River. It proposed expanded monitoring to more specifically address the effect of the discharge on Murphy Canyon Creek TDS concentrations, as well as impacts of the groundwater extraction and treatment system on net groundwater inputs to the receiving waters and on TDS loading to receiving waters.

The outcome of the additional analysis and further monitoring through early 2014 are presented in the Demonstration of Compliance, which concluded that multiple lines of evidence support the following conclusions:

1) The water quality of Murphy Canyon Creek and San Diego River is not affected by the discharge of treated groundwater at Murphy Canyon Creek, and

2) The remedial activity at Mission Valley Terminal imparts no net addition of TDS to the receiving water.

The monitoring data demonstrates *a **decrease** in observed receiving water TDS*

concentrations at the monitoring point downstream of Kinder Morgan's discharge (WQ-07). See Demonstration of Compliance, p. 15.[1]

The Demonstration of Compliance reported that hydraulic modeling of the site's surface water and groundwater for the site supports the conceptual model that the net discharge of groundwater to surface water is the most significant contributor of TDS loading to the receiving waters, and the remediation activities induce no net increase of TDS loading. *See* Demonstration of Compliance at 1, 28.

Conclusions based on monitoring results through 2013 and the hydraulic model were further substantiated by observations of TDS concentrations in receiving water before and after a **six-fold reduction at the end of 2013 in the volume of treated groundwater being discharged**. Completion of major off-Terminal remedial activities, which had produced a large part of the extracted groundwater flow, provided the unique opportunity to directly observe impacts of the discharge as its volume dropped. Based on an analysis of resulting data, the Demonstration of Compliance concluded: "*A reduction in the discharge by a factor of 6 at the start of the year has resulted in no decrease in Murphy Canyon Creek's downstream TDS concentrations*."

The results of the extensive water quality monitoring program therefore support the determination that the discharge of treated groundwater does not "cause or contribute" to an in-stream excursion above the water quality objective for TDS, and does not "separately or jointly with any other discharge, cause violations" of the Basin Plan's WQO for TDS in surface water."

B. <u>The Regional Board's action improperly interprets the Permit's narrative receiving water limitations as numeric effluent limitations</u>.

While it is difficult to determine the exact basis of the Regional Board action, it appears to conclude that the Permit's receiving water limitations would not allow, *under any circumstances*,

[1] The TDS levels in Murphy Canyon Creek then remain fairly consistent at the original, further downstream point, WQ-02. Monitoring pursuant to the TSO through January 14, 2014, also showed little difference between TDS measured at the original upstream sampling point WQ-01 and the furthest downstream point WQ-02, with the median insignificantly higher at WQ-02 by only 10 mg/l, and the maximum reading 40 mg/l *<u>lower</u>* at WQ-02 than WQ-01 (WQ-01 showing a median of 1,825 and a maximum of 2,320, and WQ-02 a median of 1,835 and maximum of 2280 mg/l).

TDS concentrations in the treated groundwater discharge, i.e. TDS measured "at the end-of-pipe," to exceed the TDS water quality objective for Murphy Canyon Creek and the San Diego River (1,500 mg/l). As expressly noted in the TSO, there is no numeric effluent limit for TDS in the Permit, which has extensive numeric effluent limits for well over 100 constituents. *See*, Permit at 20-30. A narrative requirement that the discharge not cause or contribute to a receiving water's exceedance of water quality objectives does not impose a strict numeric requirement at the end of the discharge pipe. Evidence of causation, either solely by the discharger or combined with multiple discharges, is required to determine compliance with the narrative limit. In keeping with this principle, the Receiving Water Limitations section of the Permit mandates that, "*The discharge of groundwater extraction waste from any site shall not, separately or jointly with any other discharge, cause violations of the following water quality objectives*," then specifying 1,500 mg/l as the relevant water quality objective for the Mission San Diego Hydrologic Unit (907.11).[2] Thus the element of causation is clearly written into the receiving water limitations.

Total dissolved solids in the discharge from the groundwater treatment system are and were at the time of the TSO's issuance known to exceed 1,500 mg/l, as were monitored levels in Murphy Canyon Creek *upstream* as well as downstream of the discharge. (*See*, TSO Finding 6 reciting the discharge's mean TDS as 2,071 mg/l and maximum concentration as 2,300 mg/l.) However, consistent with the requirement to determine causation in evaluating receiving water limit compliance, the TSO required Kinder Morgan to perform detailed studies *to determine whether the discharge is causing or contributing to TDS water quality objective exceedances in Murphy Canyon Creek and the San Diego River*. This made sense particularly because the monitored TDS levels in receiving waters were recognized as strongly and directly influenced by groundwater via seeps and springs.[3] Groundwater water quality objectives were increased in

[2] The Basin Plan describes the water quality objectives for TDS as designed to protect municipal uses and the agricultural beneficial use (San Diego Basin Plan p. 3-31). As shown on Table 2-2 of the Basin Plan, and acknowledged in the TSO, the receiving waters in this case are expressly excepted from the municipal (drinking water) beneficial use (San Diego Basin Plan, p. 2-42). Thus, the beneficial use in question here is agricultural use, which actually appears not to be a current use in the highly urbanized reach of Murphy Canyon Creek and the San Diego River reach to which it flows.

[3] *See*, Demonstration of Compliance, pp. 7, 8; *see also*, Regional Board Resolution R9-2012-0045 (June 13, 2012), §9, p. 3, in which the Regional Board stated as follows: "The San Diego Water Board's Order No. R9-2011-0052

1984 to 3,000 mg/l, to reflect known, higher background levels of TDS. *See*, *e.g.*, Regional Board , Technical Report on Proposed Modification of Basin Plan Objectives in the Mission San Diego Hydrographic Subarea, June 1984.

There is no numeric effluent limit for TDS in the Permit, and no support is provided in the Permit or Fact Sheet for any such numeric limit. Reports submitted pursuant to the TSO provided multiple lines of evidence showing the discharge is not causing or contributing to in-stream excursions of TDS concentrations in Murphy Canyon Creek or the San Diego River. Nonetheless, the Regional Board now appears to find all the causation analysis irrelevant to Permit compliance. The Regional Board has erred in interpreting the receiving water limitation improperly as a numeric effluent limit equal to the water quality objective.

C. The result of the Regional Board's action is inconsistent with the TSO and is unreasonable in forcing costly treatment by reverse osmosis, which is not justified by actual impacts of the discharge and will have negative environmental impacts.

As required in the TSO, for three years Kinder Morgan has diligently pursued extensive studies which have demonstrated that the discharge, which contains TDS at historically consistent concentrations, complies with the relevant receiving water limits and Prohibition IV.C of the Permit. As explained in detail above, the water quality of Murphy Canyon Creek and San Diego River is not affected by the discharge of treated groundwater, and the remedial activity at the Mission Valley Terminal imparts no net addition of TDS load to the receiving waters.

The TSO Compliance Schedule also required that by September 30, 2013, Kinder Morgan must,

> Submit a workplan that provides a detailed schedule of specific actions and *options*, including at least one *option* for additional treatment of the discharge, that Kinder Morgan will take to address compliance with Discharge Prohibition IV.C Order [*sic*] for TDS concentrations in the discharge.

See, TSO at 5 (*emphasis supplied*). In satisfaction of this task, Kinder Morgan submitted

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(Time Schedule Order) prescribes a time schedule for Kinder Morgan to assess the potential for the total dissolve solids (TDS), which are naturally high in the groundwater discharge to cause, or contribute to, an in-stream excursion above the Basin Plan surface water quality objective of 1500 mg/L and to assess any impact of the discharge on the downstream beneficial uses."

its workplan on September 27, 2013 (September 2013 Workplan). This detailed plan listed nine options for *either* demonstrating compliance, without TDS reduction by treatment or other means, *or*, reducing TDS loading. Option 3.4 in the September 2013 Workplan specifically described the option of demonstrating compliance as was later addressed in the April 15, 2014 Demonstration of Compliance.[4] The Regional Board gave no indication it would not accept this option. The November 26, 2014 Letter expressly found all of Kinder Morgan's submissions satisfactory under the TSO.

Yet, this Regional Board action will ***force*** Kinder Morgan to immediately proceed to design and construct extremely costly reverse osmosis treatment, selecting a contractor by January 30, 2015, commencing construction by April 30, 2015, and completing construction by September 30, 2015. The system will be used only during the life of the remediation project. A reverse osmosis treatment system would require significant consumption of energy, and create a concentrated brine waste product requiring careful and costly disposal. This is an unjustified waste of remediation expenditures, and an unreasonable burden on a very stringently regulated and successful remediation project.

Kinder Morgan has submitted extensive technical reports by licensed professional consultants based on the premise that evaluation of receiving water conditions, hydrological conditions in the watershed, in conjunction with the discharge, could demonstrate that existing TDS levels in the discharge were in compliance with the Permit and satisfy TSO requirements. The Regional Board posed no objection to this approach, and provided no negative technical comments, over more than a year, in response to any of these reports addressing the evaluation of *whether* treatment for TDS would be required based on further assessment of compliance with the Permit. In fact, the November 26, 2014 letter finds that submissions under the TSO to that date complied with the TSO. These submissions included the following:

[4] The September 2013 Workplan provided that Kinder Morgan would analyze the treatment and TDS load reduction options simultaneously with the option of demonstrating compliance, given the TSO schedule. Two other required documents submitted by Kinder Morgan on June 30, 2014 then referred to the fact that proceeding with the other options would be inappropriate, given the fact compliance had been demonstrated.

- Receiving Water Monitoring Plan for Time Schedule Order No. R9-2011-0052, submitted November 29, 2011 supplemented by an Addendum filed January 9, 2012.

- Technical Summary Report for Time Schedule Order (TSO) No. R9-2011-0052, submitted June 28, 2013 assessing all data collected over approximately a full year, finding the discharge has no impact on the San Diego River, and noting that monitoring would be expanded in order to improve analysis of impacts on Murphy Canyon Creek.

- TDS Loading Mitigation Options Work Plan submitted September 27, 2013 (clearly listing the option of demonstrating compliance through monitoring and evaluation as an alternative to TDS treatment or reduction)

- Total Dissolved Solids Treatment Feasibility and Evaluation, submitted March 28, 2014.

- Demonstration of Compliance and Status Report, submitted to the RWQCB on April 15, 2014 (discussed in detail herein).

- Total Dissolved Solids Mitigation Plan submitted on June 30, 2014 (listing options which included demonstration of compliance without treatment or other system changes, which has already been submitted, noting that, "while Kinder Morgan has continued to comply with the requirements of the Compliance Schedule, it is now difficult to justify proceeding with the next significant steps in light of the request before the RWQCB to terminate the TSO… .").

- The Preliminary Design and Process for Potential Reverse Osmosis Treatment Solution was submitted to the RWQCB on June 30, 2014 (including the same note regarding the absence of justification to proceed as stated in the TDS Mitigation Plan of the same date).

- Representatives of Kinder Morgan and ARCADIS met with representatives of the Board staff at their offices on July 8, 2014 to discuss status of the TSO Compliance Schedule and review of the Demonstration of Compliance report.

- Semiannual Progress Report under the TSO submitted October 10, 2014, (requesting that receiving water monitoring be deemed complete, and asking the Regional Board's concurrence in discontinuing TSO monitoring based on the Demonstration of Compliance submitted April 15, 2014).

It was unreasonable, and inconsistent with the TSO, for the Regional Board to announce an unsupported contrary position on November 26, 2014, negating both the premise and the findings of these reports, just two months before the TSO would require measures to implement reverse osmosis treatment if Permit compliance had not been demonstrated.

Costs and Environmental Impacts of Treatment

The cost of constructing and operating a reverse osmosis system will be significant. The estimated future costs that would be incurred by Kinder Morgan by continuing to pursue the alternative of reverse osmosis treatment are summarized in the ARCADIS technical letter dated

December 23, 2014, which is **Exhibit A** to the Affidavit of Marcelo A. Garbiero P.E., attached as **Attachment 3** to this Petition. The letter estimates total capital costs *of nearly $2.5 million, which would be incurred in the next nine months*.

Continuing the additional receiving water monitoring performed under TSO work plans will also be expensive, costing $58,000 over the 270 day period following this filing, according to the ARCADIS letter, Exhibit A to Attachment 3. Operating costs for the reverse osmosis system are estimated at $180,000 per year.

Energy consumption by the reverse osmosis treatment system would be substantial, at 300 thousand kilowatt hours per year, adding greenhouse gas and other impacts of electricity generation and delivery. Approximately 16.5 million gallons of brine would be generated and require disposal annually.

There is some possibility that Kinder Morgan would have an alternative option for disposal of the treated groundwater, in the form of reinjection to the aquifer, subject to the requirements of the Waste Discharge Requirements of San Diego Regional Board's Order No. R9-2008-0138. Even if feasible, this option, like reverse osmosis treatment, should not be necessary given the existing demonstration of compliance. At this time, the feasibility of this option, i.e. total elimination of the discharge to surface waters, has not been demonstrated.

A long term reinjection pilot study is continuing. Kinder Morgan should, by February 15, 2015, have a better understanding of whether reinjection is technically feasible and the cost of reinjection. In Exhibit A to Attachment 3 to this Petition, ARCADIS provides a preliminary, general *estimate of $1.1 million to complete the long term reinjection pilot study as well as for full-scale design and construction of the reinjection system.*

In short, reverse osmosis and/or reinjection costs are excessive and unnecessary.

D. The Presence of TDS over 1,500 mg/l in both Receiving Waters without the Discharge and in the Discharge Itself Represents Background Groundwater TDS; the TDS should not be Considered Discharge of a Pollutant

The receiving water limitations and Prohibition IV.C in the Permit apply to discharges of *pollutants* from the point source subject to the Permit. Whether constituents in a discharge are

"pollutants" should be considered based on whether they are "waste," derived from commercial activity, and have actual detrimental, significant impacts on use of the receiving waterway. In our case, the State Water Board should consider the specific circumstances of this discharge of treated groundwater, where the TDS in question is naturally present throughout the shallow hydrologic system, and has not been shown to have any deleterious impacts on receiving waters or downstream uses.

Neither the Permit nor the Fact Sheet refers to ambient groundwater minerals, despite the fact that background salinity and minerals in groundwater in the region is well recognized. Monitoring and effluent limits address petroleum constituents and potential pollutants from soil disturbance. The Permit neither requires monitoring for TDS nor discusses the development of water quality limitations for minerals or salinity passed through from background groundwater. In short, there is no indication the Permit intended to restrict TDS from ambient groundwater.

The discharge of groundwater here does not involve unwanted and useless byproducts of commercial activity, or chemical or biological waste, and does not cause negative impacts on receiving water beneficial uses. Rather, it consists of local groundwater cleansed of the hydrocarbon compounds that required remediation, which is actually somewhat lower in TDS than the upstream receiving water to which it is discharged. There have been no negative unintended effects of the remedial discharge to Murphy Canyon Creek or the San Diego River, and no impacts to beneficial uses of those waters. Restrictive requirements that TDS be stripped from the groundwater at tremendous expense are not necessary or appropriate, and are not required to address discharges of *pollutants*.

Further legal discussion of this issue is provided in the Points and Authorities section of this Petition.

E. <u>The reason for the Regional Board's action is not explained or supported in the November 26, 2014, letter, which therefore fails to support the action with findings based on evidence in the record</u>.

The only basis given for the Regional Board's action appears in two basically identical, conclusory general statements: (1) that Kinder Morgan's discharge contributes to exceedance of

the water quality objective for TDS in the receiving water; and (2) that the water monitoring data provided in the Demonstration of Compliance shows that the TDS concentrations in the treated groundwater discharge exceeds the receiving water limitation for TDS. These general statements contradict the fundamental findings of the substantial, technical detail in the Demonstration of Compliance and earlier reports and work plans under the TSO, and relevant terms of the Permit, which has no numeric limit for TDS. The Regional Board provided no findings based on evidence to support its rejection of Kinder Morgan's request. This absence of findings, as well as the timing of this Regional Board action, denies Kinder Morgan due process of law, making administrative review effectively unavailable.

5. THE MANNER IN WHICH THE PETITIONER IS AGGRIEVED:

Kinder Morgan has aggressively pursued cleanup of the impacted aquifer for the past decade at great cost, and remains committed to completing the cleanup effort in an accelerated time frame. As described above, the Regional Board action imposes a wasteful, unnecessary additional economic burden upon Kinder Morgan's remedial project at the Mission Valley Terminal. It unjustifiably increases the environmental impacts of the project with no benefit to water quality. In addition, the Regional Board action effectively amends the requirements and intent of the TSO and the Permit without opportunity for notice and comment.

6. THE SPECIFIC ACTION BY THE STATE OR REGIONAL BOARD WHICH PETITIONER REQUESTS:

Kinder Morgan requests that the State Water Board issue an order finding, or directing the Regional Board to find, that Kinder Morgan has demonstrated that the discharge as described in in the Demonstration of Compliance does not violate receiving water limits and Prohibition IV.C of the Permit. Kinder Morgan further requests that the State Water Board find that Kinder Morgan has therefore achieved full compliance with the requirements of the TSO Compliance Schedule, and that the Regional Board's action forcing Kinder Morgan to begin implementing costly treatment for TDS was in error.

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7. A STATEMENT OF POINTS AND AUTHORITIES IN SUPPORT OF LEGAL ISSUES RAISED IN THE PETITION:

The Regional Board November 26, 2014 letter correctly describes the background at the site. The discharge of treated groundwater is associated with groundwater remediation conducted in accordance with a separate San Diego Regional Board Cleanup and Abatement Order. The Water Quality Control Plan for the San Diego Region establishes a water quality objective of 1,500 mg/l for TDS for receiving waters into which the extracted groundwater discharges. Kinder Morgan already employs multiple treatment processes, including particulate filtration, manganese and iron removal, petroleum hydrocarbon removal, denitrification and oxygenation.

After having successfully achieved remediation of off-Terminal areas in 2013, remediation of the final on-Terminal areas is underway and is expected to be similarly effective. After extraction of groundwater for more than 15 years without negative impacts on receiving water, requiring treatment of TDS which derives from the very same hydrologic systems to which it is being returned is an unwarranted burden on the project and would result in wasteful expenditure of valuable resources and environmental impacts. Given the conclusions above, there could be no clearer indication that the discharge does not cause or contribute to an exceedance of a water quality objective and does not contribute to impairment of a beneficial use. Further, the reduction of TDS in the discharge will result in no observable improvement in the surface water quality.

A. <u>The Regional Board's Action is Fundamentally Inconsistent with the Policies and Directives of the Porter Cologne Water Quality Act and State Board Resolution 92-49</u>

Water Code section 13000 requires coordination among water quality control activities of the State, which in this case mandates balancing the benefits of control of water quality against the unsubstantiated and hypothetical benefits of putting remediation resources into removal of ambient groundwater TDS from the discharge. The Regional Board action violates the broad mandate of section 13000 that waters "shall be regulated to attain the highest water quality which is *reasonable,* considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible."

In keeping with the broad policy in Water Code Section 13000, The California Legislature recognized the importance of ensuring prompt and cost-effective remediation of hazardous substances in Water Code section 13307, which requires the State Board to establish consistent policies and procedures for such remediation activities. These include:

> (3) Procedures for identifying and utilizing the most cost-effective methods for detecting contamination or pollution and cleaning up or abating the effects of contamination or pollution;
>
> (4) Policies for determining reasonable schedules for investigation and cleanup, abatement, or other remedial action at a site. The policies shall recognize the danger to public health and the waters of the state posed by an unauthorized discharge and the need to mitigate those dangers while at the same time taking into account, to the extent possible, the resources, both financial and technical, available to the person responsible for the discharge; . . . .

Cal. Water Code § 13307. The State Board adopted Resolution 92-49 to carry out this mandate. Resolution 92-49 addresses the need for *cost-effective* remedial actions. Res. 92-49 at § III. It provides that remedial actions should conform to the provisions of Resolution No. 68-16 of the State Water Board (the Antidegradation Policy) and the Water Quality Control Plans of the State and Regional Water Boards, provided that *under no circumstances should those provisions "be interpreted to require cleanup and abatement which achieves water quality conditions that are better than background conditions.*" *Id.*

B. The Regional Board's Action is Inconsistent with the Permit and the TSO, in Effect Altering Requirements of those Orders without the Legal Process Required in State and Federal Law

Treating the Permit's narrative receiving water limits as numeric effluent limits violates the language and intent of the Permit, which makes causation, independent or together with discharges by other parties, a prerequisite to violation of a receiving water limit. An NPDES permit issued by the Regional Board may not be amended without the procedures called for in federal regulations under the Clean Water Act, 40 C.F.R. Part 122-125, including public notice and comment. Under the California Porter Cologne Water Quality Control Act, not only is public notice and comment required, but issuance or amendment of such a permit requires action by the Regional Board itself, which cannot delegate that function to the Executive Officer under Water

Code § 13223. *See* Water Code §§13167.5, 13263, 13372.

Revising a Time Schedule Order issued under California Water Code Section 13300 also requires public notice and comment. *See* Water Code §13167.5. As a matter of law and good policy, the Regional Board must act consistent with the terms of the Permit and TSO.

Finally, the Regional Board expressly found in its November 26, 2014, letter that Kinder Morgan has complied with all tasks with deadlines in the TSO to that date. These tasks included two major submissions, the first more than a year ago, in September 2013, which set forth options of demonstrating compliance with Prohibition IV.C by conducting detailed studies and analyses which may demonstrate compliance. Clearly, those studies and analyses were to go well beyond mere comparison of discharge TDS to the surface water quality objective of 1,500 mg/l.

Yet, only two months before TSO deadlines for beginning implementation of a substantial new treatment system, and seven months after the Demonstration of Compliance submittal, the Regional Board issues a late finding foreclosing the option of avoiding treatment by demonstrating compliance, and making administrative review infeasible. The nature and timing of the Regional Board action deprives Kinder Morgan of due process of law, and effectively amends a previously issued Regional Board Time Schedule Order without appropriate legal process, including prior notice and opportunity for comment. It does so by eliminating compliance options recognized in the TSO, and in submissions expressly found by the Regional Board to comply with the TSO.

C. Constituents Merely Passing Through from Ambient Groundwater Should Not be Regulated as "Pollutants" under the Clean Water Act

It is inappropriate for the Regional Board to require treatment of TDS derived from the ambient groundwater which merely passes through Kinder Morgan's groundwater treatment system and does not degrade receiving water. These constituents are not "pollutants" within the definition of the Clean Water Act ("CWA"), and thus are not subject to Permit restrictions on discharges of pollutants.

An NPDES permit is required for a discharge when five elements are present: (1) a pollutant must be (2) added (3) to navigable waters (4) from (5) a point source. 33 U.S.C. §

1342(b). Kinder Morgan does not dispute that its treated groundwater outfall would be a point source; it has not argued that an NPDES permit should not be issued. However, under the circumstances of this operation, the ambient groundwater TDS in the treated groundwater is not a "pollutant" under the Permit.

CWA section 502(6) defines "pollutant" as follows:

> The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharged into water.

33 U.S.C. § 1362(6). The ambient constituents passing through the groundwater treatment system from the groundwater do not fall into any of the listed items contained in the definition of "pollutant."

In *Association to Protect Hammersly, Eld & Totten Inlets v. Taylor Resources*, 299 F.3d 1007 (9th Cir. 2002) ("*Taylor Resources*"), the Ninth Circuit Court of Appeals found that "the more specific items in the illustrative list of pollutants … support an understanding of the more general statutory term[s] … as waste material of a human or industrial process." *Id.* at 1017.

Here, the TDS naturally occurs in the groundwater, and surface receiving water naturally receives influx of the same groundwater. The TDS is not a waste product created by human or industrial processes.[5] The character of this groundwater discharge distinguishes this case from that addressed by the Ninth Circuit in *Northern Plains Resource Council v. Fidelity Exploration & Development Co.*, 325 F.3d 1155 (2003). In *Northern Plains*, Fidelity Exploration & Development Company discharged to the Tongue River produced water *with salt content fully 40 to 60 times that of the river*. *Id*. at 4815. The Ninth Circuit addressed whether the discharge

[5] The 2004 Supreme Court case of *South Florida Water Management District v. Miccosukee Tribe of Indians*, 124 S.Ct. 1537, 541 U.S. 96, does not conflict with this position. In that case, the discharger actively pumped surface water known to carry phosphorus pollutants from identified human farming activities, which then disrupted the downstream ecosystem by stimulating the growth of algae. In *South Florida Water Management District* there was no contention that the phosphorus constituents were not "pollutants." The Court simply found that the pump in that case was a "point source" of the identified pollutants from farming activities, despite the fact that the pump itself it did not add them. 124 S.Ct. at 1543. The Court remanded the case for consideration of whether the upstream and downstream waters were distinct in order to confirm whether this point source added the acknowledged "pollutants" into distinct and separate waters of the United States. The decision never addressed the question of whether particular constituents were pollutants, as this question was not raised below.

water is a "pollutant" within the meaning of the CWA, and held "that the unaltered groundwater produced in association with methane gas extraction, and discharged into the river, is a pollutant within the meaning of the CWA." *Id*. at 4814.[6] While it rejected the Fidelity's argument that, by definition, unaltered groundwater could *never* be a pollutant, the Ninth Circuit *did not find that all unaltered groundwater discharged to surface water is a pollutant*, or, certainly, that every constituent in unaltered groundwater is a pollutant.

The Ninth Circuit gave three specific reasons why *coal bed methane water* ("CBM water") was a pollutant and required an NPDES permit. First, it specifically found CBM water to be an "industrial waste," which it defined as "any useless byproduct derived from the commercial production and sale of goods and services." *Id*. at 4819-20. Fidelity was engaged in production of methane gas for commercial sale, and CBM water was an unwanted byproduct of its gas extraction process. *Id*. at 4820. Second, the Court noted that CBM water was "produced water," which EPA regulates under NPDES effluent guidelines promulgated under the Clean Water Act. *Id*., citing 40 C.F.R. §§ 435.41(bb), 435.11(bb) (defining "produced water" as "water (brine) brought up from the hydrocarbon-bearing strata during the extraction of oil and gas, [including] formation water, injection water, and any chemical added downhole or during the oil/water separation process").

Third, the Court found that calling CBM water a pollutant is "consistent with the CWA's definition of 'pollution.'" *Id*. at 4821. The Court noted that the Montana Department of Environmental Quality had expressly cautioned, in an environmental impact statement, that the alteration of waterways by CBM water may seriously degrade waterways, and threatens to make the water unfit for irrigation. The Court specifically found that coal bed methane water ("CBM water") with saltiness 40 to 60 times that of the river, "is distinctly different from the Tongue River to which it is added,"[7] and noted the serious impact of the extreme saltiness of the water on

[6] The *Northern Plains* decision addressed only whether the discharge as a whole required an NPDES permit, which is not at issue here. The Court did not address the question of whether each constituent in the groundwater required control and application of effluent limits.

[7] It cited the Montana Department of Environmental Quality's Final Environmental Impact Statement's caution that unregulated discharge of CBM water would cause "[s]urface water quality in some watersheds [to] be slightly to

soil permeability. The Court reasoned,

> Were we to conclude otherwise, and hold that the massive pumping of salty, industrial waste water into protected waters *does not involve discharge of a "pollutant,"* even though it would degrade the receiving waters to the detriment of farmers and ranchers, we would improperly "undermine the integrity of [the CWA's] prohibitions."

Id. at 4822, citing *Taylor Resources*, 299 F.3d at 1016.

In sum, case precedent shows that determining whether constituents in a discharge are "pollutants" should be considered based on whether they are "waste," derived from commercial activity, and have detrimental, significant impacts on use of the receiving waterway.[8] The TDS in Kinder Morgan's treated groundwater are not pollutants.

D. Findings Based on the Evidence Must be Included to Support Permit Requirements

Orders not supported by the findings, or findings not supported by the evidence, constitute an abuse of discretion. *Topanga Association for a Scenic Community v. County of Los Angeles*, 11 Cal.3d 506, 515; *California Edison v. SWRCB*, 116 Cal. App.3d 751, 761 (4th Dt. 1981); *see also In the Matter of the Petition of City and County of San Francisco, et al.*, State Board Order No. WQ-95-4 at 10 (Sept. 21, 1995). In this case, as described herein, the Regional Board has not supported its November 26, 2014 action with findings, and the general finding and conclusion in the action are not supported by evidence.

8. A STATEMENT THAT THE PETITION HAS BEEN SENT TO THE REGIONAL BOARD AND TO THE DISCHARGER, IF NOT THE PETITIONER:

A true and correct copy of this Petition was sent on December 23 2014 to the Regional Board at the following address:

---

severely degraded, resulting in restricted downstream use of some waters," because the saltiness of the water precluded its use for irrigation without mixing, treatment or addition of soil amendments. *Id. (Emphasis supplied.)*

[8] The Ninth Circuit's decision in the *Fairhurst* case similarly demonstrates the Court's focus on particular circumstances of a discharge. *See Fairhurst v. Hagener*, 422 F.3d 1146 (9th Cir. 2005). The Court observed in *Fairhurst* that "sometimes a particular kind of matter is a pollutant in one circumstance, and not in another ... ." *Fairhurst v. Hagener*, *Id*. at 1150.

Mr. David W. Gibson, Executive Officer
California Regional Water Quality Control Board
San Diego Region
2375 Northside Drive, Suite 100
San Diego, California 92108-2700

The Petitioner in this case is the discharger; therefore, the regulations do not require the Petitioner to confirm transmission of this Petition to any other party.

9. A STATEMENT THAT THE SUBSTANTIVE ISSUES OR OBJECTIONS RAISED IN THE PETITIONWERE RAISED BEFORE THE REGIONAL BOARD:

No hearing, or opportunity for comment, was provided by the Regional Board in this action.

10. REQUEST FOR STAY:

Kinder Morgan requests that the State Water Board issue a stay of the Regional Board action pending the State Water Board's full review of this matter. A stay is necessary to prevent the consequences of the Regional Board's action from being irreversible, harming both Kinder Morgan and the environment.

There will be no remedy for the wrongful action of the Regional Board if while awaiting review, Kinder Morgan must proceed to comply with deadlines for constructing the costly reverse osmosis treatment system at the site. Once constructed, operation of the system will add burdens on the environment as well as on Kinder Morgan due to its consumption of energy and production of the concentrated brine from the system. The additional treatment will provide no discernible benefit to the environment, to beneficial uses of the receiving waters, or to the completion of remediation at the site.

The wording of the April 30, 2015 deadline in the TSO acknowledges that options other than treatment were to be considered by Kinder Morgan in its September 30, 2013 Work Plan. Options in the September 30, 2013 Work Plan included a demonstration of compliance based on mandated additional monitoring and technical analysis. However, the November 26, 2014 action

of the Regional Board would now, too late in the process, foreclose consideration of any option other than treatment, by forcing Kinder Morgan to proceed to finalize the reverse osmosis treatment system design and select a contractor by January 30, 2015, to commence construction of the treatment system by April 30, 2015, and to complete construction by September 30, 2015. The State Water Board is directed by law to act within 270 days from acceptance of this Petition, which would be approximately the time construction of the system would have to be completed.

a. There will be substantial harm to the petitioner or to the public interest if a stay is not granted.

The Regional Board action forces Kinder Morgan to proceed with major expenditures for potentially unnecessary treatment systems before the State Water Board's decision on the merits would be issued. The attached Affidavit of Marcelo Garbiero of ARCADIS details the cost implications of Kinder Morgan's actions required if the Regional Board action stands during the 270 day period provided by law for the State Water Board's review. In fact, the TSO would require Kinder Morgan to complete construction of the treatment system on approximately the same date as expiration of the 270 day review period, after having commenced construction, and fabrication of custom equipment for the project, months earlier. Without a stay, the remedy available from the State Water Board in this matter would be severely compromised.

Forcing Kinder Morgan to proceed with treatment not legally required under the TSO or the Permit, without administrative and judicial review of the Regional Board action, would deprive Kinder Morgan of due process of law.

The estimated future costs that would be incurred by Kinder Morgan by continuing to pursue the alternative of reverse osmosis treatment are summarized in the technical letter dated December 23, 2014, from ARCADIS, Attachment 3 to this Petition. They total nearly $2.5 million in capital costs, *which would be incurred in the next nine months*. ARCADIS summarizes the timing of these capital expenditures estimated as follows:

> It is estimated that approximately $814,000 would be committed by the April 30, 2015 deadline to begin construction. This includes 100 percent of permit fees and a 50 percent down payment for equipment procurement tasks. Subsequently, it is reasonable to expect 20% of the construction phase costs, or approximately $290,000, will be committed in the

first 30 days of construction, between April and May 2015, in order to mobilize construction contractors to the site for the construction phase. The balance of these costs, $1.31M, would then be distributed through the construction phase, from April 2015 through September 2015, as equipment is delivered and phases of construction are completed, in accordance with contracting terms yet to be negotiated. It is expected that all of these costs would be committed ahead of the September 30, 2015 deadline since all of the permitting, procurement, and construction would need to be fully executed to comply with the deadline.

In addition, continuing the additional receiving water monitoring performed under TSO work plans will cost $58,000 during first 270 days following this filing, according to the ARCADIS letter, Exhibit A to Attachment 3.

There is a possibility that Kinder Morgan would have an alternative option for disposal of the treated groundwater, in the form of reinjection. Even if feasible, this option, again, would only be required if the Regional Board's finding and action remain in place. At this time, the feasibility of this option has not yet been demonstrated. A long term reinjection pilot study is continuing, and would result in conclusions as to its feasibility, and firmer estimation of its costs, by the end of February 2015. As shown in Exhibit A to the Attachment 3, ARCADIS provided a preliminary, general estimate to complete the long term reinjection pilot study, and for full scale design and construction for the reinjection alternative at about $1.1 million.

As these estimates show, millions of dollars of expense will be incurred by Kinder Morgan during the period in which the State Water Board may review this Petition, due to the Regional Board action, if the effect of the action is not stayed.

b. There will be no substantial harm to other interested persons and to the public interest if a stay is granted

Evidence presented in the Demonstration of Compliance and other reports cited above shows that the discharge is not impairing beneficial uses of receiving waters, and the groundwater treatment system is not increasing, and may actually slightly be decreasing, TDS in the receiving waters. Any delay in constructing the treatment system will therefore, not harm other persons or the public interest.

//

c. The Petition presents substantial questions of law and fact regarding the disputed act.

The first important legal question is whether compliance with narrative receiving water limits in the Permit could be demonstrated by any means other than by reduction of the concentrations in the discharge below the water quality objective. In other words, does a requirement that the discharge not cause, alone or in combination with other discharges, in-stream exceedance of specified water quality objective, effectively create a numeric effluent limit at the water quality objective (here, TDS at 1,500 mg/l)?

The second question of fact and law is whether the Regional Board properly rejected the Demonstration of Compliance's reliance on studies showing that naturally occurring and regional TDS levels in a closely linked groundwater and surface water watershed can be considered in determining compliance with a surface water quality objective by a discharge that simply moves TDS within that system without increasing the net load of TDS. This is critical to the feasibility of groundwater remediation throughout the State.

Third, the Regional Board's action on the eve of deadlines for actions, disregarding and contrary to findings in the very evaluations submitted in satisfaction of its own order, and effectively changing TSO requirements without following legal procedures for doing so, is of serious concern as a matter of policy and procedures required of the Water Boards to afford due process to regulated parties and the public.

Note regarding Simultaneous Request for Regional Board Reconsideration -

Consistent with Kinder Morgan's cooperative approach with the Regional Board, and particularly in light of the fact the Regional Board has not yet provided any detailed response, or any technical objections at all, to the submitted studies, Kinder Morgan is separately requesting that the Regional Board reconsider its November 26, 2014 action and conclusions. However, the deadlines in the TSO impose immediate requirements on Kinder Morgan that will not allow for revision of the action in time to avoid moving ahead with construction of the treatment system. The November 26, 2014 Regional Board letter specifies that action taken in the letter is subject to

petition at the State Water Board, i.e. this is its final action. Kinder Morgan therefore has no choice but to request intervention by the State Water Board immediately, in parallel with attempting resolution with the Regional Board.

11. PETITIONER'S REQUEST FOR EVIDENTIARY HEARING:

For the reasons set forth above, Kinder Morgan requests that the State Board conduct a full evidentiary hearing to consider this Petition along with supporting evidence in accordance with Title 23, California Code of Regulations, Section 2052.

Respectfully Submitted,

DATED: December 23, 2014 By: 

KATHARINE E. WAGNER

Attorney for Petitioner
SFPP, L.P., an operating partnership of Kinder Morgan Energy Partners, LP

CALIFORNIA Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

California Regional Water Quality Control Board, San Diego Region

November 26, 2014

Mr. Scott Martin
Kinder Morgan Energy Partners, L.P.
1100 Town & Country Road
Orange, CA 92608
MartinS@kindermorgan.com

In reply refer to / attn:
240988: bneill

Subject: DEMONSTRATION OF COMPLIANCE AND STATUS REPORT FOR TIME SCHEDULE ORDER NO. R9-2011-0052

Mr. Martin:

Kinder Morgan Energy Partners, L.P. (KMEP) is discharging treated groundwater generated by a project to cleanup soil and groundwater contamination downgradient of the Mission Valley Terminal Aboveground Fuel Tank Farm (Facility), located at 9950 and 9966 San Diego Mission Road, San Diego, California. The cleanup is being conducted in accordance with San Diego Water Board Order No. 92-01 directing the cleanup and abatement of petroleum hydrocarbons and associated compounds at the site. The discharge of treated groundwater from the Facility to Murphy Canyon Creek is pursuant to Order No. R9-2008-0002, *General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters within the San Diego Region Except for San Diego Bay* (General Groundwater Extraction Permit).

KMEP previously reported that the groundwater that it extracts, treats, and discharges is high in total dissolved solids (TDS) concentrations (typically over 2000 milligrams per liter [mg/L]) in excess of the applicable water quality objective for TDS of 1500 mg/L established in the San Diego Water Board's *Water Quality Control Plan for the San Diego Region* (Basin Plan). KMEP further reported that the various treatment processes currently employed (oil/water separation, particulate filtration, manganese and iron removal, carbon absorption, denitrification, and oxygenation) do not result in significant changes in the overall TDS of the treated groundwater.

To give KMEP time to identify, obtain permits for, and construct a permanent solution to comply with the General Groundwater Extraction Permit's requirements regarding TDS, the San Diego Water Board adopted Time Schedule Order (TSO) Order No. R9-2011-0052, on September 14, 2011 (Attachment 1). The TSO established interim effluent limitations for TDS and specific milestones that KMEP must meet to ensure sufficient progress is maintained towards a permanent solution to comply with the General Groundwater Extraction Permit. To date, KMEP has complied with the interim effluent limitations and all identified milestones contained in the TSO.

On April 15, 2014, KMEP submitted a written request that the San Diego Water Board rescind the TSO, based on findings made in a report prepared by ARCADIS on KMEP's behalf. The report, entitled *Demonstration of Compliance and Status Report for Time Schedule Order (TSO) No. R9-2011-0052* (Attachment 2), concluded that because the background concentration of TDS in Murphy Canyon Creek and in the groundwater that naturally influxes to Murphy Canyon Creek exceeds the receiving water limitations contained in the General Groundwater Extraction Permit, the remedial discharge from the Facility does not cause, have a reasonable potential to cause, or contribute to an in-stream excursion above the Basin Plan's water quality objective for TDS.

The San Diego Water Board disagrees with the report's conclusion. In fact, the water monitoring data provided in the report shows that the TDS concentrations in the treated groundwater discharged exceeds the receiving water limitation for TDS contained in the General Groundwater Extraction Permit (see Table 1 of the attached report). The General Groundwater Extraction Permit, Prohibition IV.C, states, "The discharge shall not cause, or contribute to an in-stream excursion above any applicable criterion promulgated by USEPA pursuant to section 303 of the CWA (federal Clean Water Act), or water quality objectives established by the State or Regional Boards." Based on these considerations, the San Diego Water Board concludes that KMEP's discharge *contributes* to exceedance of the water quality objective for TDS in the receiving water.

For these reasons, the San Diego Water Board is unable to grant KMEP's request to rescind all ongoing and prospective requirements of the TSO. All terms, conditions, and requirements specified in the June 23, 2009 enrollment letter, as amended; the General Groundwater Extraction Permit; and the TSO remain in effect. Any person aggrieved by this action of the San Diego Water Board may petition the State Water Resources Control Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this letter. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request."

For questions or comments regarding this decision, please feel free to contact Mr. Ben Neill by phone at (619) 521-3376 or by email at bneill@waterboards.ca.gov. In the subject line of any response, please include the reference number 240988: bneill.

Respectfully,

David W. [illegible]

David Gibson
Executive Officer

DG:JGS:dtb:bno:bin

Attachments provided via e-mail only

1. Time Schedule Order No. R9-2011-0052
2. April 15, 2014, Demonstration of Compliance and Status for Time Schedule Order No. R9-2011-0052.

Cc w/attachments: Nancy Van Burgel, KMEP, Nancy_VanBurgel@kindermorgan.com
Marcelo Garbiero, Arcadis U.S. Inc., Marcelo.Garbiero@arcadis-us.com
Jennifer Rothman, Arcadis U.S. Inc, Jennifer.Rothman@arcadis-us.com
Drew Kleis, City of San Diego Storm Water Pollution Prevention Division, AKleis@sandiego.gov
Marsi Steirer, City of San Diego Water Department, MSteirer@sandiego.gov
Heather Stroud, City of San Diego Office of the City Attorney, HStroud@sandiego.gov
Richard Opper, Opper & Varco LLP, ropper@envirolawyer.com

Tech Staff Info & Use	
Order No.	R9-2008-0002
Party (CIWQS) ID	24287
WDID	9 000000506
NPDES No.	CAG919002
Reg. Measure ID	381533
Place ID	240988
Person ID	130581

ATTACHMENT 2

KINDER MORGAN
ENERGY PARTNERS, L.P.
SFPP, L.P.

SFPP, L.P.
Operating Partnership

April 15, 2014

Mr. Ben Neill, P.E.
Water Resource Control Engineer
Core Regulatory Unit
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

Subject: Demonstration of Compliance and Status Report
Mission Valley Terminal, 9950 San Diego Mission Road, San Diego, California
Time Schedule Order No. R9-2011-0052

Dear Mr. Neil:

The attached Demonstration of Compliance and Status Report has been prepared pursuant to TSO No. R9-2011-0052 for the Mission Valley Terminal (MVT). Kinder Morgan believes the attached evaluation demonstrates that the discharge does not "cause or contribute to an in-stream excursion or violation of the Basin Plan" and requests that all ongoing and future requirements included in the TSO be rescinded. Furthermore, Kinder Morgan encourages the RWQCB to elevate the importance of evaluating the TDS WQO as has been called for by numerous stakeholders in the San Diego Basin for more than a decade and to not unduly penalize minor dischargers or discharges that do not meaningfully affect TDS conditions while repeatedly deferring consideration of the underlying issues.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in the subject document and all attachments and that, based on my knowledge and on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Kinder Morgan requests the opportunity to meet with RWQCB staff to discuss the results presented in the attached document. If you have any questions please contact Marcelo Garbiero (ARCADIS) at (562) 496-3023 or you may contact me at (714) 560-4775.

Sincerely,

Scott E. Martin, P.G.
Manager – EHS/Remediation

1100 Town & Country Road, Orange, California 92868 P: (714) 560-3000 F: (714) 560-4601

ARCADIS
Infrastructure · Water · Environment · Buildings

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ENVIRONMENT

Mr. Ben Neill, P.E.
Water Resource Control Engineer
Source Control Unit
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, California 92108

Subject:
Demonstration of Compliance and Status for TSO No. R9-2011-0052
Mission Valley Terminal, San Diego, California

Date:
April 15, 2014

Contact:
Marcelo Garbiero, P.E.

Phone:
562.496.3000

Email:
marcelo.garbiero@arcadis-us.com

Our ref:
CM010143.0156

Dear Mr. Neill:

ARCADIS U.S., Inc. (ARCADIS) has prepared this Demonstration of Compliance and Status for Time Schedule Order No. R9-2011-0052 on behalf of SFPP, L.P., operating partner of Kinder Morgan Energy Partners, L.P. (Kinder Morgan), pursuant to TSO No. R9-2011-0052 issued by the California Regional Water Quality Control Board, San Diego Region (RWCQB).

Kinder Morgan's Mission Valley Terminal (MVT), located at 9950 and 9960 San Diego Mission Road, San Diego, California (Figure 1), is enrolled under Order No. R9-2008-0002, National Pollutant Discharge Elimination System General Permit No. CAG919002 for discharge of treated groundwater to Murphy Canyon Creek. The discharge to Murphy Canyon Creek is a result of groundwater extraction and treatment conducted as part of the ongoing remediation activities conducted at MVT in accordance with Addendum No. 5 to Cleanup and Abatement Order No. 92-01.

This report presents supporting lines of evidence which demonstrate that the discharge of treated groundwater (remedial discharge) to Murphy Canyon Creek and the San Diego River does not violate Prohibition IV.C of Order No. R9-2008-0002, National Pollutant Discharge Elimination System General Permit No. CAG919002 (General Permit), (RWQCB 2008).

ARCADIS

Mr. Ben Neill
April 15, 2014

If you have questions regarding the material presented in this report, please contact me at 562.496.3000.

Sincerely,

ARCADIS U.S., Inc.

Marcelo A. Garbiero, P.E.
Principal Civil Engineer

Enclosure

Copies:
Scott Martin, KMEP
Nancy Van Burgel, KMEP
Sean McClain, RWQCB
G. Lowenberg, City of San Diego

ATTACHMENT 2

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Imagine the result

SFPP, L.P., an operating partnership of
Kinder Morgan Energy Partners, L.P.

Demonstration of Compliance and Status for Time Schedule Order (TSO) No. R9-2011-0052

Mission Valley Terminal, San Diego, California

April 15, 2014

ARCADIS

Marcelo A. Garbiero, P.E.
Principal Engineer

C. Fredrik Ahlers, P.E.
Principal Civil Engineer
Project Technical Director

Demonstration of Compliance and Status for Time Schedule Order (TSO) No. R9-2011-0052

Mission Valley Terminal
San Diego, California

Prepared for:
SFPP, L.P., an operating partnership of Kinder Morgan Energy Partners, L.P.

Prepared by:
ARCADIS U.S., Inc.
3750 Schaufele Avenue
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California 90808
Tel 562 496 3000
Fax 582 429 2452

Our Ref.:
CM010143.0152

Date:
April 15, 2014

ARCADIS

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Acronyms and Abbreviations

ARCADIS	ARCADIS U.S., Inc.
CAO	Cleanup and Abatement Order
CWC	California Water Code
DO	dissolved oxygen
ft	foot/feet
gpm	gallons per minute
GWTS	combined groundwater treatment systems
Kinder Morgan	Kinder Morgan Energy Partners, L.P.
lbs	pounds
LNAPL	light non-aqueous phase liquid
MGD	million gallons per day
mg/L	milligrams per liter
mS/cm	millisiemens per centimeter
MVT	Mission Valley Terminal
NOE	Notice of Enrollment
NOI	Notice of Intent
POTW	Publicly Owned Treatment Works
RWQCB	California Regional Water Quality Control Board, San Diego Region
RWM Plan	Receiving Water Monitoring Plan
TDS	total dissolved solids
TSO	Time Schedule Order
USEPA	United States Environmental Protection Agency
WQO	Water Quality Objective

ARCADIS

1. Executive Summary

This report presents supporting lines of evidence which demonstrate that the discharge of treated groundwater (remedial discharge) to Murphy Canyon Creek and the San Diego River does not violate Prohibition IV.C of Order No. R9-2008-0002, National Pollutant Discharge Elimination System General Permit No. CAG919002 (General Permit) (RWQCB 2008). The information presented herein supports the following conclusions in direct response to the requirements of the General Permit and State Water Resources Control Board (SWRCB) Resolution Nos. 68-16 (SWRCB 1968) and 92-49 (SWRCB 1996) :

The remedial discharge:

- does not **"*cause or contribute* to an in-stream excursion"** above the water quality objective (WQO) for total dissolved solids (TDS) established in the Water Quality Control Plan for the San Diego Basin ("Basin Plan", RWQCB 2011) [emphasis added],
- does not **"separately or jointly with any other discharge, *cause* violations of the"** Basin Plan WQO for TDS [emphasis added],
- is **"consistent with maximum benefit to the people of the state"** through meaningful environmental improvement brought by groundwater cleanup of waters of the State,
- does **"not unreasonably affect present and anticipated beneficial use"** of the water, and
- does **"not *result* in water quality less than that prescribed"** in the Basin Plan [emphasis added].

The primary lines of evidence demonstrating compliance are as follows:

1. The receiving water monitoring program results support that the remedial discharge has no direct impact on conditions, in particular TDS concentrations, in the receiving waters.

2. Hydraulic modeling of the groundwater and surface water system supports the conceptual model that the natural discharge of groundwater to surface water is the most significant contribution of TDS loading to the receiving waters, and that the remedial activities induce no net increase of TDS loading.

This report also provides status of the various options presented in the *TDS Loading Mitigation Options Work Plan* (ARCADIS 2013f), which are discussed in Section 5.

This report requests that the Regional Board staff recognize that the remedial discharge is in compliance with Prohibition IV.C of Order No. R9-2008-0002.

2. Introduction and Background

ARCADIS U.S., Inc. (ARCADIS) has prepared this Demonstration of Compliance and Status for Time Schedule Order No. R9-2011-0052 (the TSO) on behalf of SFPP, L.P., operating partnership of Kinder Morgan Energy Partners, L.P. (Kinder Morgan, "the discharger"), pursuant to TSO No. R9-2011-0052 issued by the California Regional Water Quality Control Board, San Diego Region (RWQCB).

Kinder Morgan's Mission Valley Terminal (MVT), which is located at 9950 and 9960 San Diego Mission Road, San Diego, California (Figure 1), is enrolled under Order No. R9-2008-0002, National Pollutant Discharge Elimination System General Permit No. CAG919002 (the General Permit) for discharge of treated groundwater to Murphy Canyon Creek. The remedial discharge to Murphy Canyon Creek is a result of groundwater extraction and treatment conducted as part of the ongoing remediation and resource protection activities at MVT in accordance with Addendum No. 5 to Cleanup and Abatement Order No. 92-01 (the CAO).

The TSO was adopted by the RWQCB on September 14, 2011. As stated in the TSO, the discharger was to implement a "monitoring plan for Murphy Canyon Creek and San Diego River at various predetermined points during the increased discharge flow rate to observe any effects that the flows are having on the chemical, physical, and biological environment in the receiving waters (Receiving Water Limitations, Water Quality Objectives, and Beneficial Uses)". The discharger immediately implemented the monitoring and reporting program described in Directives 2 through 4 of the TSO

and the submitted Receiving Water Monitoring (RWM) plans (ARCADIS 2011a, ARCADIS 2012a) to assess compliance with Prohibition IV.C.

Approximately 16 months of monitoring was completed, during which semiannual status reports were submitted. The results of the monitoring were synthesized in the *Technical Summary Report for Time Schedule Order (TSO) No. R9-2011-0052* (Technical Summary Report) that was submitted on June 28, 2013 (ARCADIS 2013d). This report concluded that the overall condition of Murphy Canyon Creek and San Diego River are "primarily driven by pre-existing upstream conditions" and when a "change in condition has been observed between the upstream and downstream locations, the degree to which the observed changes can be attributed to the remedial discharge alone cannot be determined due to the multiple inputs" along the studied reach of Murphy Canyon Creek". In response to these conclusions, the discharger implemented an expanded monitoring program that included additional water quality monitoring locations closer to the identified point sources as noted in the *TDS Loading Mitigation Options Work Plan* submitted on September 27, 2013 (ARCADIS 2013f) in accordance with the TSO Compliance Schedule. Evaluation of this expanded monitoring program is presented in this report.

2.1 Site Setting

MVT is located on a 67-acre property in San Diego, California; the property includes 10.5 acres of aboveground storage tank facilities within the Mission San Diego Hydrologic Subarea (907.11), located within the Lower San Diego Hydrologic Area, which is the most downstream of four hydrologic areas located within the San Diego River Watershed (Figure 1). The terminal occupies the western side of Murphy Canyon, a narrow canyon with a roughly north-south orientation. The eastern side of Murphy Canyon, which adjoins the terminal, is occupied by Murphy Canyon Creek and Interstate 15 and is adjacent to areas of residential, commercial, and light industrial development. The terminal property extends southward to San Diego Mission Road, where Murphy Canyon opens into the larger east-west trending Mission Valley.

Kinder Morgan has conducted groundwater extraction within the eastern portion of Mission Valley since May 1994 as part of a larger remedial strategy to address historical releases of petroleum to soil and groundwater. This system has undergone multiple expansions since that time and the RWQCB has amended the discharger's enrollment in the General Permit on a few occasions. The RWQCB most recently

amended the discharger's Notice of Enrollment (NOE) "to increase the daily average discharge flow limitation to 1.26 million gallons per day (MGD) [875 gallons per minute (gpm)] to Murphy Canyon Creek in order to increase the rate of groundwater extraction in support of groundwater remediation at the Mission Valley Terminal Site".

Treated groundwater is discharged into Murphy Canyon Creek at a point approximately 2,800 feet (ft) upstream from the confluence with the San Diego River. Murphy Canyon Creek is a low-gradient stream that flows south along the western side of Interstate 15 through Murphy Canyon. Immediately north of MVT, Murphy Canyon Creek flows southward from an unlined channel to a 500-ft open concrete channel before entering a 1,800-ft covered concrete box culvert. Murphy Canyon Creek then exits into a 1,280-ft open concrete channel, into which the MVT groundwater treatment systems (GWTS) discharge (the discharge). Murphy Canyon Creek then returns to an unlined channel for another 1,700 ft before discharging to the San Diego River (Figure 2). The San Diego River within the area of study also occupies an unlined channel.

Numerous surface and elevated roadways parallel and pass over Murphy Canyon Creek and the San Diego River within the study area, including San Diego Mission Road, Friars Road, Interstate 15 and Interstate 8. Numerous drainage ditches, culverts, and off-street drains associated with these roads drain runoff water to both waterways as shown on Figure 3. Storm drains serving these areas collect runoff and drain into the San Diego River and Murphy Canyon Creek at various points along the study area.

2.2 Geology and Hydrogeology

The geology and hydrogeology of the TSO study area have previously been described by LFR (2004, 2005a, 2005b) and ARCADIS (2014b). The following discussion has been summarized from these sources.

<u>On-Terminal Area: Murphy Canyon</u>

The floor of the canyon is underlain by a mixture of unconsolidated clay, silt, sand, and gravel deposited by the creek. In the central part of the canyon, these unconsolidated sediments gradually increase in thickness from approximately 30 feet at the northern end of the Terminal to approximately 55 ft at the southern end of the Terminal adjacent to San Diego Mission Road where Murphy Canyon opens into Mission Valley. The sediments tend to become coarser, with more sand and gravel, as depth increases.

Groundwater currently occurs within these unconsolidated sediments at depths of approximately 10 to 20 feet below the ground surface.

The eastern and western walls of the canyon are composed of consolidated sedimentary rocks, particularly the Eocene age Friars Formation, but also the Eocene age Stadium Conglomerate and Mission Valley Formation. These rocks are relatively impermeable, and so they restrict the flow of surface water and groundwater to the east and west. Due to these restrictions, both surface water and groundwater within Murphy Canyon generally flow from north to south. The unconsolidated sediments unconformably overlie the Friars Formation, where the bedrock acts as an aquitard, restricting the flow of groundwater in the downward direction.

Murphy Canyon Creek has been engineered with a relatively narrow and shallow channel. For reaches occurring north of the MVT and alongside the northern portion of the Terminal; surface water within the channel tends to occur at elevations lower than local groundwater. From the central portion of MVT to its confluence with the San Diego River, surface water within this reach of the channel tends to occur at higher elevations than the local groundwater.

Off-Terminal Area: Mission Valley

The southern end of Murphy Canyon opens into Mission Valley, a much larger valley with a roughly east-west orientation. Mission Valley is drained by the San Diego River. Murphy Canyon Creek is a tributary of the San Diego River; it joins the river on the southern side of Mission Valley, about 2,000 feet south of the Terminal.

The unconsolidated sediments in Mission Valley, as in Murphy Canyon, are generally alluvial and slope wash deposits of clay, silt, sand, and gravel. In Mission Valley, these deposits may reach thicknesses up to approximately 75 or 80 feet. These sediments generally become coarser at greater depths; the lowest parts commonly contain sandy gravel, with cobbles up to about 4 inches in diameter. Groundwater currently occurs within these sediments at depths ranging from close to the ground surface where groundwater discharges to the San Diego River to greater than approximately 40 feet below the ground surface.

The unconsolidated sediments in Mission Valley, like those in Murphy Canyon, unconformably overlie the relatively impermeable bedrock which also forms the

southern and northern slopes of the valley. The general direction of surface water and groundwater flow within Mission Valley is from east to west. The Friars Formation bedrock acts as an aquitard, which restricts the downward movement of groundwater into the underlying bedrock. Observations of groundwater made in the USGS "Aquiculture" well on the south side of Mission Valley south of the stadium show that the vertical gradient of groundwater head is upward out of the bedrock into the unconsolidated sediments[1].

The San Diego River channel has been constructed to be relatively wide and deep, and the lowest parts are lower in elevation than the local groundwater.

2.3 Remedial Cleanup

The discharge of treated groundwater to Murphy Canyon Creek and the San Diego River is a result of groundwater extraction and treatment conducted as part of the ongoing remediation and resource protection activities at MVT in accordance with Addendum No. 5 to the CAO issued by the RWQCB on April 13, 2005. The groundwater extraction serves two main functions.

First, Addendum No. 5 to the CAO ordered the cleanup of off-property (off-Terminal) and on-property (on-Terminal) residual light non-aqueous phase liquid (LNAPL) in soil and dissolved phase petroleum hydrocarbons in groundwater (Directive Nos. 2, 3, and 5). These requirements have been addressed through the implementation of a remedial strategy using the following measures, as described in the *Site Conceptual Model and On-Terminal Corrective Action Plan* (LFR 2005a), the *Site Conceptual Model and Off-Terminal Corrective Action Plan* (LFR 2005b), and the *Evaluation of Remedial Progress in the Off-Terminal LNAPL Zone* (LFR 2007):

- SVE and bioventing supported by water table lowering in the off-Terminal LNAPL zone,
- hydraulic containment of on-Terminal contamination, and

[1] http://ca.water.usgs.gov/sandiego/

- Extraction and treatment of dissolved phase petroleum hydrocarbons in groundwater.

Second, Addendum No. 5 states: "The Dischargers shall, as soon as practicable and no later than July 29, 2005, implement measures to prevent petroleum hydrocarbon waste constituents in soil and groundwater at the MVT property from migrating beyond the property limits of MVT" (Directive No. 4). This requirement for protection of the off-property resource has been addressed through the implementation of a hydraulic barrier located at the southern downgradient MVT property boundary, which depends on continuous groundwater extraction from select wells to maintain capture of affected groundwater that would otherwise migrate toward off-Terminal areas.

The off-Terminal remediation program ended on December 31, 2013, and confirmation of off-Terminal remedial compliance is on-going, consistent with the *Schedule for December 31, 2013 Off-Terminal Remedial Compliance* (ARCADIS 2013c) and associated documents (ARCADIS 2013g, ARCADIS 2013i, ARCADIS 2014e). The extensive on-Terminal remediation infrastructure, including the soil gas and groundwater treatment systems, 93 existing SVE wells, five existing groundwater extraction wells, and more than 21,000 linear feet of underground vapor and water conveyance piping are currently operating to clean up the on-Terminal areas in compliance with Directive No. 5 of Addendum No. 5.

2.4 Water Quality

Surface water and groundwater in the San Diego Watershed generally contain elevated TDS levels ranging from 500 mg/L to greater than 3,000 mg/L. TDS concentrations in groundwater are generally higher than those found in surface waters, though concentrations observed in surface water are highly dependent on timing of sampling relative to precipitation events and often approach levels observed in groundwater, which is the source of base flow during the dominant dry periods. The County of San Diego prepared "An Analysis of Total Dissolved Solids in San Diego County" (CSD, 2003) that provided a comprehensive evaluation of TDS conditions in San Diego County. This report concluded through assessment of multiple sources of water quality data that "groundwater seeps and springs are the primary source of TDS in the surface waters" in San Diego County and that much of the "dissolved solids are derived from using imported water in agricultural and other applications within the

basins." Those data reviewed indicated TDS concentrations specifically in the Lower San Diego River ranged from approximately 1,000 mg/L to 3,000 mg/L.

TDS concentrations observed in all the shallow groundwater monitoring wells sampled in the fourth quarter of 2013 ranged from 266 mg/L to 5,299 mg/L with a median value of 2,026 mg/L[2] (ARCADIS 2014a). Groundwater TDS concentrations are persistently above the Basin Plan's surface water WQO of 1,500 mg/L with 82% of shallow wells sampled ranging between this level and 3,000 mg/L, the Basin Plan's groundwater WQO. Background TDS concentrations observed in receiving water represented by upstream conditions within the TSO study area (Figure 2) are also regularly above the surface water WQO of 1,500 mg/L as summarized in the table below.

Sample Location	Observed TDS Concentration (mg/L) January 8, 2012 through March 4, 2014		
	Location	Range	Median
WQ-01	2,650 ft upstream of MVT Discharge	475 – 2,770	1,900
WQ-05*	2,200 ft upstream of MVT Discharge	1,460 – 2,990	2,300
WQ-06**	300 ft upstream of MVT Discharge	670 – 2,400	2,070
WQ-03 San Diego River	San Diego River, 900 ft upstream from Murphy Canyon Creek	460 – 2,590	1,630

Notes:

* = Data observations started September 4, 2013, sample location added to original monitoring program.

** = Data observations started September 18, 2013, sample location added to original monitoring program.

TDS = Total dissolved solids

mg/L = Milligrams per liter

[2] TDS concentrations for 85 shallow ("AS" or less than 30 feet below ground surface) groundwater monitoring wells were estimated from conductivity measurements by multiplying values by a conversion factor of 0.64 (uS/cm) / (mg/L TDS).

ARCADIS

2.5 Regulatory Background

The United States Environmental Protection Agency (EPA) has established that the water quality objectives included in the San Diego Basin Plan are federal water quality standards that are not to be exceeded. This determination came after the Basin Plan surface water quality objectives were originally established in 1975. At that time, a "surface water TDS objective of 500 mg/L was assigned to virtually all sub-basins within the San Diego Region" to avoid potential issues with water taste (secondary drinking water standard) and salinity related impacts to vegetation and crops (CSD 2003). The WQO's were not set to protect specific existing or future beneficial uses. Instead, "the water quality objectives were selected to represent *desirable* water quality goals" (CSD 2003). [emphasis added]

Through a series of Basin Plan modifications initiated in 1989 by the Padre Dam Municipal Water District and approved by the RWQCB and EPA in the early 1990s, the WQO for TDS was modified to 1,500 mg/L for the portion of the San Diego River downstream of Santee Lakes known as the Mission San Diego HSA (907.11).

During these Basin Plan modifications, data were presented to RWQCB and EPA documenting that surface water TDS concentration would continue to consistently exceed the modified TDS concentration objectives. The contemplated recycled water stream discharges would lessen the degree to which the objectives would be exceeded. The fact that receiving water TDS concentrations would continue to exceed the modified TDS objectives was cited by RWQCB staff as representing a rational approach to protecting beneficial uses while allowing meaningful environmental enhancement through recycled water stream discharge (CSD 2003).

As noted in the TSO (Finding 5), the Basin Plan lists the following beneficial uses for Murphy Canyon Creek and the San Diego River: agricultural supply, industrial process supply, contact water recreation, non-contact water recreation, warm freshwater habitat, wildlife habitat, and rare, threatened, or endangered species. Surface waters in the Lower San Diego River Hydrological Unit, including Murphy Canyon Creek, are excepted from the municipal drinking water supply beneficial use (RWQCB 2011).

While the Lower San Diego River is listed on the State's 303(d) List for Total Dissolved Solids, Murphy Canyon Creek is not. The linked Lines of Evidence for the 2002 decision for that listing indicate the relevant beneficial use is agricultural water use.

(Decision ID 6522; Lines of Evidence 4722); the listed target date for the related Total Maximum Daily Load is 2019.[3]

As indicated in Table 3-2 of the Basin Plan, the WQO for TDS in the Mission San Diego Hydrologic Sub-Unit 907.11 is currently listed at 1,500 milligrams per liter (mg/L) of TDS. This WQO is not a numerical discharge limit enforceable under the General Permit, however the General Permit does state under Prohibition IV.C that "The discharge shall *not cause, have a reasonable potential to cause, or contribute to an in-stream excursion* above any applicable criterion promulgated by USEPA pursuant to section 303 of the CWA, or water quality objective adopted by the State or Regional Boards" [emphasis added]. Further, the General Permit states under Receiving Water Limitation VI.A, "Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this WDR. The discharge of groundwater extraction waste[4] from any *site shall not, separately or jointly with any other discharge, cause violations of the following water quality objectives*. These limitations apply unless more stringent provisions exist in either the Basin Plan, or an applicable State plan. The more stringent limitation shall apply." [emphasis added]

Resolution No. 68-16 adopted policy for antidegradation, similar to federal antidegradation policies (40 CFR Section 131.12) with the exception that it also applies to groundwater whereas the federal policy only applies to surface water. This resolution emphasizes that water with quality "higher than that established by the adopted policies" shall be maintained. Further, any activity that "produces … a waste or increased volume or concentration of waste and which discharges … to existing high

[3] http://www.waterboards.ca.gov/rwqcb9/water_issues/programs/303d_list/ref_reports/01623.shtml#6522 .

[4] "Waste" is very broadly defined in California Water Code section 13050(d) and includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

quality waters" will be required to meet requirements for control to prevent "pollution[5] or nuisance[6]" and to maintain the "highest water quality consistent with maximum benefit to the people of the State" (SWRCB 1968). "High quality waters" are described as "waters with existing background quality of better quality than that necessary to protect beneficial uses" (SWRCB, 1994).

Resolution No. 92-49 adopted policy associated with investigation and cleanup and abatement of discharges under CWC Section 13000, in particular with regard to selection of cleanup goals and requires cleanup and abatement that "promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored, "considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible" (SWRCB 1996).

The General Permit is consistent with SWRCB Resolution Nos. 68-16 and 92-49, as stated in the respective documents. Both resolutions emphasize that all discharges to high quality water, or cleanup and abatement of discharges that have affected waters such that they deviate from background water quality must:

- Be consistent with maximum benefit to the people of the state,

[5] "Pollution" is defined in Water Code section 13050(k.2) as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects either of the following: (A) The waters for beneficial uses, (B) Facilities which serve these beneficial uses." Pollution" may include "contamination."

[6] "Nuisance" is defined in Water Code section 13050(m) "… anything which: (1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, and (2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal, and (3) occurs during or as a result of the treatment or disposal of wastes."

- Not unreasonably affect present and anticipated beneficial use of such water, and

- Will not *result* in water quality less than that prescribed in the Basin Plan.

The TSO includes several of these regulatory requirements in its findings. In particular, the TSO cites excerpts and requirements from the General Permit (Finding 1, 3, 4a – 4c), the Basin Plan (Finding 5), SWRCB Resolutions 68-16 and 92-49 (Finding 8), the State's 303d list of impaired water bodies (Finding 4e), and the CWC (Finding 7, 9). The TSO established a Compliance Schedule "to ensure that the discharge does not cause, have a reasonable potential to cause, or contribute to an in-stream excursion above the Basin Plan's Water Quality Objective for TDS". The Compliance Schedule provided three primary paths, with overlapping schedules, to ultimately achieve compliance with the TSO as summarized below:

1. **Demonstration of Compliance (Items 2 through 4):** Implement a receiving water monitoring and reporting program "to assess the compliance of the discharge with Discharge Prohibition IV.C and the impact of the discharge on the downstream beneficial uses" and "to evaluate the potential for discharge to cause, or contribute to an in-stream excursion above the" WQO. The results of this assessment and evaluation would either:

    - conclude the discharge <u>is</u> impacting beneficial uses or contributing to an in-stream excursion,

    - be inconclusive on the discharge's impacts and contribution, or

    - conclude the discharge <u>is not</u> impacting beneficial uses or contributing to an in-stream excursion.

    If compliance could be demonstrated, then mitigation measures or treatment would not be required. Otherwise, completion of one of the measures below would be required.

2. **TDS Loading Mitigation Plan (Item 7):** "Develop, implement and submit … a mitigation plan to compensate for TDS loading by the effluent discharger in excess of the Basin Plan's WQO within the San Diego Watershed."

3. **TDS Treatment System (Items 5, 6, 8 through 11):** Evaluate, design, and install an "appropriate treatment option" if other options "identified in workplan and pursed by the Discharger are ineffective in demonstrating compliance with Discharge Prohibition IV.C. While progress on this option would be ongoing, it would only be completed if the options above were unable to demonstrate compliance or mitigation.

3. Receiving Water Monitoring Program

The TSO called for the following monitoring activities:

1. Monthly upstream receiving water and treatment system monitoring (Directive No. 2), initiated on September 20, 2011.

2. Biweekly receiving water monitoring of water quality parameters (Directives No. 3a and 3b), initiated on January 9, 2012 and then expanded in September 2013.

3. Semiannual receiving water bioassessment monitoring (Directives No. 3c), first performed in June 2012.

As required in Directive No. 1 of the TSO, semiannual progress reports have been submitted in accordance with the monitoring and reporting program schedule (ARCADIS 2011a, ARCADIS 2012a), which include details of these monitoring programs (ARCADIS 2014b). The intent of this monitoring and reporting program is as stated in the TSO Compliance Schedule, to "assess the compliance of the discharge with Discharge Prohibition IV.C and the impact of the discharge on the downstream beneficial uses." This objective was first assessed in the Technical Summary Report, submitted on June 28, 2013 in accordance with TSO Compliance Schedule, which assessed all data collected through January 14, 2013 (approximately one full year of data collection).

The Technical Summary Report concluded that "the overall condition of Murphy Canyon Creek and San Diego River are primarily driven by pre-existing upstream conditions." More specifically, the report reached this conclusion for the San Diego River because the data indicated no observable changes in physical and chemical conditions, including TDS concentrations, or bioassessment scores along the studied

reach where Murphy Canyon Creek discharges into the San Diego River (ARCADIS, 2013d). This conclusion is supported by the data that was subsequently collected between January 2013 and March 2014. These data for TDS concentrations are shown on Figure 4, and clearly show that downstream TDS concentrations (WQ-04a and WQ-04b) are driven by conditions occurring upstream (WQ-03) of the confluence of Murphy Canyon Creek.

With regard to Murphy Canyon Creek, the report concluded that statistically significant[7] differences in TDS concentrations were observed between the distant upstream and downstream monitoring locations, WQ-01 and WQ-02, however the degree to which the observed changes could be attributed to the treated groundwater discharge alone could not be determined due to the multiple contributing sources over the 5,100-ft section of Murphy Canyon Creek. To address this unknown, additional monitoring locations were added to the monitoring program to further evaluate the sources of the water quality changes observed in Murphy Canyon Creek.. In particular, these new monitoring locations were meant to provide monitoring to better discern the effects of the discharge from the upstream open concrete storm channel, the remediation discharge, and the combination of groundwater and storm culverts along the southern unlined section of Murphy Canyon Creek. These additional monitoring locations and tributary inputs are depicted on Figure 3 and labeled WQ-05 through WQ-07. Approximately 14 biweekly monitoring events were completed since these new monitoring locations were added through March 4, 2014. While these monitoring events have been completed during the wet season, the ongoing drought conditions and lower-than-average precipitation levels during this period have not created persistent wet season high flow conditions.

3.1 Expanded Monitoring Program Results

The expanded water quality monitoring program, as described above, was performed to observe any effects that the remedial discharge has on the chemical, physical, and

[7] A two-tailed, paired t-test was performed on data in order to assess the probability that random chance could account for differences observed between the two data populations (e.g., upstream and downstream data groups). (ARCADIS 2013c)

biological environment in the receiving waters. The data collected included temperature, pH, salinity, dissolved oxygen (DO), conductivity and visual observations of color, turbidity, sedimentation and erosion. All these data are presented in Table 2. This evaluation focuses on TDS concentrations in Murphy Canyon Creek, which is the driving parameter in this matter, and these results are summarized below.

Sample Location*	Distance from MVT Discharge	Observed TDS Concentration (mg/L) Sept. 4, 2013 through Mar. 4, 2014	
		Range	Median
WQ-01	2,650 ft upstream	475 – 2,320	1,825
WQ-05	2,200 ft upstream	1,460 – 2,990	2,300
WQ-06	300 ft upstream	670 – 2,400	2,070
WQ-07	150 ft downstream	1,310 – 2,320	1,820
WQ-02	2,575 ft downstream	1,140 – 2,280	1,835

Effects of North Storm Drain Channel

Comparison of TDS concentrations between WQ-01 and WQ-05 provides a basis for evaluating the potential influence that the concrete-lined storm channel discharge has on TDS concentrations observed in Murphy Canyon Creek. The TDS concentration at the upstream monitoring location (WQ-01) is generally greater than the Basin Plan WQO of 1,500 mg/L. This is true for 10 of 14 monitoring events since September 2013 and in 49 of 68 monitoring events since January 2012), indicating that other sources are elevating TDS concentrations above WQOs in in Murphy Canyon Creek prior to and not emanating from the remedial discharge point.

The data summarized in the table above indicate a distinct increase of TDS concentrations in Murphy Canyon Creek across the storm drain channel input with a difference in the median values of 475 mg/L of TDS. This storm channel likely collects and discharges municipal, recreational, and residential irrigation run off from development to the west and north. This variable but statistically significant increase of

TDS concentrations observed from upstream to downstream locations is shown on Figure 5.

Effects of Treated Groundwater Discharge

Comparison of TDS concentrations between WQ-06 and WQ-07 provides a basis for evaluating the potential influence, if any, that the remedial discharge and one storm drain culvert has on TDS concentrations observed in Murphy Canyon Creek. Due to accessibility constraints near the monitoring locations, the reach between them includes a storm drain culvert in addition to the MVT discharge. In general, TDS concentrations at the downstream location (WQ-07) were within range of those at the upstream location (WQ-06) with the median value of the downstream location 250 mg/L of TDS *lower* than the median value of the upstream location. This variable but significant *decrease* of TDS concentrations observed from upstream to downstream locations is shown on Figure 6.

Effects of Unlined South Reach

Comparison of TDS concentrations between WQ-07 and WQ-02 provides a basis for evaluating the influence that the combination of groundwater and storm culverts along the southern unlined section of Murphy Canyon Creek has on TDS concentrations observed in Murphy Canyon Creek. In general, TDS concentrations at WQ-02 were within range of those at WQ-07 with the median value of the downstream location 15 mg/L of TDS higher than the median value of the upstream location. This insignificant increase of TDS concentrations observed from upstream to downstream locations is shown on Figure 7.

3.2 Effects of Recent Decrease in Discharge

The discharger significantly reduced the remedial discharge rate of treated groundwater between the close of December 2013 and February 2014 as the project entered a new remedial phase. Addendum No. 5 to Cleanup and Abatement Order No. 92-01 required the discharger to “no later than December 31, 2013, reduce concentrations of dissolved phase petroleum hydrocarbons waste constituents in the off-property pollution area” to reach cleanup goals (RWQCB 2005). The off-Terminal cleanup ended on December 31, 2013 and entered a remedial compliance monitoring phase (ARCADIS 2013c). Off-Terminal groundwater pumping was shut down in two

phases: distal pumping was shut down on December 31, 2013 and off-Terminal LNAPL zone dewatering was shut down on January 28, 2014. The instantaneous rate of discharge decreased from an average of 693 gpm in 2013 to approximately 123 gpm in February of 2014 (ARCADIS 2013a, 2013e, 2013h, 2014a).

The reduction in discharge rate results in a decrease of TDS loading to Murphy Canyon Creek originating from the discharge point. As shown on Figure 7 (WQ-02 and WQ-07), there is no observable decrease in TDS concentrations downstream of the treated groundwater discharge after the discharge was reduced by nearly a factor of 6 at the start of the year. This is to be expected, understanding that the TDS concentrations observed in Murphy Canyon Creek and the San Diego River are primarily driven by upstream conditions and natural groundwater discharge.

4. Hydraulic Modeling

Hydraulic modeling was performed as a supporting line of evidence to confirm the observed TDS measurements and further validate the site conceptual model describing the surface water and shallow groundwater as interconnected components of a single hydrogeologic unit (LFR 2009b and LFR 2009c). The site conceptual indicates the remedial activity should have no net impact on watershed TDS loading and surface water quality.

As described in the background on site geology and hydrogeology, there is continuous and ongoing interaction of water between the surface water systems and the neighboring groundwater. Recognizing that the remedial activity of pumping induces hydraulic effects on both groundwater and surface water, an evaluation was performed using the calibrated groundwater flow model (ARCADIS 2011b) to better understand and quantify these effects. Further, these results were then used in conjunction with observed TDS concentrations in the aquifer and receiving waters to evaluate the impact on TDS loading. These evaluations were performed in part to consider the question of TDS mass balance, recognizing that the TDS present in the remedial discharge is not generated or caused by the remedial activity.

4.1 Modeled Conditions

The existing calibrated groundwater flow model (ARCADIS 2011b) was used to evaluate the interaction between groundwater and receiving surface water at the site,

specifically the groundwater discharge to or recharge from Murphy Canyon Creek and San Diego River within the hydraulic model area (Figure 8). Model conditions were simulated by converting to steady-state boundary conditions representing current and future conditions, including limiting the simulated pumping to selected on-Terminal and hydraulic containment wells to provide ongoing dewatering for on-Terminal remediation and hydraulic containment of on-Terminal groundwater.

Boundary Conditions for Future Predictions

In the existing model, average future conditions have been simulated via two alternating conditions, including an annual dry season based on an assumed average dry condition, and an annual wet season based on average precipitation and streamflow.

For simplicity in this simulation, steady-state boundary conditions are specified that are the annual average equivalent of the seasonally varying boundary conditions. Effective averages that preserve the overall water balance in the model were calculated for boundary conditions including aerial and mesa front recharge (precipitation), streamflow rates and stages of Murphy Creek and the San Diego River, and specified head boundaries. Time-weighted, effective averages for these boundary conditions were calculated using the general equation below:

$$BC_{eff.ave} = \frac{\left(BC_{wet} \times days_{wet} + BC_{dry} \times days_{dry}\right)}{365 days}$$

Where:

$BC_{eff.ave}$ = effective average of boundary condition (head, elevation, flow rate, or precipitation rate)

BC_{wet} = boundary condition during wet period in the existing average conditions future model

BC_{dry} = boundary condition during dry period in the existing average conditions future model

$days_{dry}$ = Number of days in the dry period within a year (184 days; May 1st through Oct 31st)

$days_{wet}$ = Number of days in the wet period within a year (181 days; Nov 1st through Apr 30th)

Recovery Well Extraction Rates

Two models were simulated for comparison, including (1) "no-pumping condition" and (2) "remedial pumping condition". In the remedial pumping condition, groundwater extraction rates were assigned to represent the pumping conditions when groundwater extraction is performed for on-Terminal dewatering and hydraulic containment. Extraction rates at individual wells are based on extraction necessary for property boundary hydraulic containment and on-Terminal remediation:

Well	Extraction Rate (gpm)
RW-35	34.5
RW-36	34.5
RW-37	37.2
RW-301	33
RW-302	27.7
Total Extraction	**171**

Surface Water Stream Boundary Condition

Murphy Canyon Creek and San Diego River were divided into defined reaches, which allows for water flow accounting along each reach. The reaches were based on the stream properties (e.g., hydraulic conductivity, roughness, and stream slope), and are shown on Figure 8. Reach 1 through 4 are located along Murphy Canyon Creek, while Reach 5 through 12 are along the San Diego River. Reach 3 on Murphy Canyon Creek represents the concrete-lined portion of the channel for which it is assumed there is no interaction between groundwater and surface water, and it receives discharge from the extraction wells under the remedial pumping condition. All other reaches are unlined and allow interaction between groundwater and surface water in the river/creek.

4.2 Modeling Results

Modeling results of groundwater and surface water interaction are presented in Table 3. Negative exchange flow values indicate a losing stream condition, where surface water recharges to the adjacent groundwater; while positive exchange flow values

indicate a gaining stream where the stream receives water from the adjacent groundwater.

Murphy Canyon Creek has a lined portion at Reach 3 that assumes no interaction between groundwater and receiving surface water. Reaches 1 and 2 gain between 12 to 17.6 gpm of water under the no-pumping condition and between 2 to 15.1 gpm under the remedial pumping condition. Reach 4, representing the unlined south section of Murphy Canyon Creek, is losing 2.3 gpm under the no-pumping condition and 67.3 gpm under remedial pumping condition.

Along the San Diego River channel, the river is gaining over Reaches 5, 6 and 8 through 12 with flows of between 29.3 to 302 gpm under the no-pumping condition; and between 21.2 to 301 gpm under the remedial pumping condition. Reach 7 appears to be a losing segment, losing flows of approximately 19.4 gpm under the no-pumping condition, and 41.5 gpm under the remedial pumping condition.

Overall, the net discharge of groundwater to Murphy Canyon Creek and the San Diego River in the modeled area is approximately 792 gpm under the no-pumping condition and 624 gpm under the remedial pumping condition. This represents a 167 gpm reduction in groundwater discharge to the receiving water during remedial pumping conditions. The reduction in groundwater discharge to the receiving water is equivalent to the 171 gpm of treated groundwater discharge to the creek.

These modeled results support that groundwater pumping and discharge to surface water does not result in a net increase of groundwater and TDS discharge to the receiving water. This conclusion is in direct alignment with the general understanding of groundwater to surface water interaction in the San Diego region (CSD 2003). The potential effect on TDS discharge is further evaluated below.

4.3 TDS Loading Evaluation

The results of the groundwater flow model were also used as another line of evidence to evaluate the significance of TDS loading from groundwater to receiving water at the site. This evaluation assessed whether variations in observed TDS concentrations in groundwater and surface water would create a significant difference in TDS loading under remedial pumping versus no-pumping conditions. This assessment used the

modeled groundwater surface-water interaction flow rates and TDS concentrations selected from water quality monitoring locations sampled in the fourth quarter of 2013.

The concrete-lined portion of Murphy Canyon Creek (Reach 3) assumes no interaction between groundwater and receiving water and is the location of the treated groundwater discharge, which is the only modeled contribution of TDS along this reach. In the no-pumping condition, there is no contribution of TDS from groundwater or remedial discharge at this location. In the remedial pumping condition, the TDS concentration of the remedial discharge was selected as the median of the TDS concentrations observed in the GWTS effluent during the fourth quarter of 2013 (GWTS-EFF, Table 1).

At Reach 4 and Reach 7, where water flows from the receiving water to groundwater under both no-pumping and remedial pumping conditions, the TDS concentrations were selected using the median TDS concentrations observed during the fourth quarter of 2013 at the upstream receiving water quality monitoring locations. The median TDS concentrations at WQ-07 and WQ-03 were used to represent TDS concentrations along Reach 4 and Reach 7, respectively (Table 2).

For Reaches 1, 2, 5, 6, and 8 through 12, where water is being gained from the groundwater to the receiving water under both no-pumping and remedial pumping conditions, the TDS concentrations were selected using the median TDS concentrations observed during the fourth quarter of 2013 in shallow groundwater wells[8] adjacent to each reach (ARCADIS 2014a). For reaches where several shallow monitoring wells were nearby, the median TDS concentration at all nearby locations was used. In cases where a directly neighboring or upgradient monitoring well was not available, as was the case for Reach 1 and Reach 2, the median TDS concentration from the three nearest downstream wells was used.

[8] TDS concentrations for select shallow (AS or less than 30 feet deep) groundwater monitoring wells converted from conductivity measurements by multiplying values by 0.64 (µS/cm) / (mg/L TDS) conversion factor.

TDS loading estimates were calculated using these assumptions at each reach under no-pumping and remedial pumping conditions and are summarized in Table 3. The combined TDS loading due to subsurface discharge to Murphy Canyon Creek and San Diego River in the modeled area are estimated at approximately 15,396 lbs TDS/day 11,669 lbs TDS/day under the no-pumping condition and remedial pumping condition, respectively. This represents a 3,727 lbs TDS/day reduction in subsurface TDS loading to the receiving water during remedial pumping conditions. This reduction in subsurface TDS loading to the receiving water is equivalent to the estimated 3,824 lbs TDS/day of remedial discharge to the creek. This is consistent with the conceptual model of no net difference in TDS loading under remedial pumping vs. no-pumping conditions. This observation is supported by the general understanding that "groundwater seeps and springs are the primary source of high TDS in the surface waters" within the region (CSD 2003).

The results of this modeling and estimation exercise directly support the following points.

- The remedial activity "**compensates for TDS loading by the effluent discharge in excess of the Basin Plan's WQO within the San Diego River watershed**" as called for under Item 7 of the TSO Compliance Schedule.

- The streams are not receiving additional TDS due to the remedial activities.

- The remedial activity does not produce or increase the volume, mass, or concentration of TDS into the receiving water.

5. TDS Loading Mitigation Options Status

The following sections provide a general status of the *TDS Loading Mitigation Options Work Plan* (ARCADIS 2013f).

5.1 Petition to Rescind Time Schedule Order

This option proposed to evaluate the federal and state regulations, the pending TMDL for TDS, and the TSO to assess whether it is appropriate for the RWQCB to single out the discharger from the other numerous contributors within the watershed and implicitly

assign a numerical discharge limit equal to the Basin Plan WQO when a pending TMDL is meant to address this. The proposed schedule for submitting this voluntary petition was previously anticipated to be no later than March 31, 2014. The discharger has opted to delay submission of a request for termination of the TSO while the RWQCB considers the recommendations presented in this report.

5.2 Petition for Basin Plan Revision

This option proposed exploration of the requirements and appropriateness of a revision to the Basin Plan for dissolved solids requirements in the Mission San Diego Hydrologic Unit. The proposed schedule for submitting this voluntary petition was previously anticipated to be no later than March 31, 2014. The discharger has opted to delay submission of a request for termination of the TSO while the RWQCB considers the recommendations presented in this report.

5.3 Petition for Exception under State Implementation Policy

This option proposed exploration of the requirements and appropriateness of a petition to the SWRCB requesting an exception to the implied discharge limit for TDS in compliance with Discharge Prohibition IV.C. The proposed schedule for submitting this voluntary petition was previously anticipated to be no later than March 31, 2014. The discharger has opted to not pursue submission of such a petition at this time because it is highly unlikely that a resolution could be reached with the SWRCB within the timeline provided under the TSO.

5.4 Demonstration of Compliance with Discharge Prohibition IV.C.

This option proposed development of supporting lines of evidence to demonstrate that conditions in the San Diego River are driven by upstream conditions as well as the naturally occurring local discharge of groundwater and is unaffected by the remedial discharge. This option is addressed by this report submittal. However, the scope of this option has expanded as a result of the expanded monitoring program and additional evaluation of regulatory requirements as noted elsewhere in this report.

5.5 Reduced TDS Loading to Receiving Water through Modification of Pumping Strategy

This option proposed to explore the pumping strategy options available for the planned on-Terminal remedial efforts to determine whether further reductions of the discharge rate and/or discharge period are feasible. The discharger will also evaluate the variability of TDS concentrations in the areas of groundwater pumping to determine if any additional reduction is likely due to future shifts in areas being pumped. It is anticipated that the discharger will include the results of this assessment in a mitigation plan to be submitted to the RWQCB, in accordance with the TSO Compliance Schedule, on or before June 30, 2014.

5.6 Relocation of Discharge Point to San Diego River

This option proposed to explore the feasibility of relocating the point of discharge of treated groundwater to the San Diego River. This option was based on the conclusion that there is no observable effect to the water quality or the biological health of the San Diego River due to the input of flows from its tributary, Murphy Canyon Creek, which includes the current MVT discharge. The discharger has initiated this feasibility study to utilize existing underground infrastructure and storm drain systems to relocate the discharge point. However, the results of the expanded monitoring program implemented after this option was initially proposed (as documented in this report) indicate that there is also no observable effect to the water quality or biological health of Murphy Canyon Creek, suggesting that there would be no net improvement created by relocation of the discharge point. It is anticipated that the discharger will include the results of this assessment in the mitigation plan to be submitted to the RWQCB, in accordance with the TSO Compliance Schedule, on or before June 30, 2014.

5.7 Alternate Disposal Options

This option, which has been initiated, is exploring the feasibility of alternative means of disposing of extracted groundwater, specifically through the following options: reinjection into the aquifer, discharge to Publicly Owned Treatment Works (POTW) or to a water reclamation facility, and land application. It is anticipated that the discharger will include the results of these actions and this assessment in the mitigation plan to be submitted to the RWQCB, in accordance with the TSO Compliance Schedule, on or before June 30, 2014.

5.8 Reduced TDS Concentration/Loading to Receiving Water through TDS Reduction Treatment

The discharger has completed a feasibility study to evaluate the viability of each available technology for TDS removal in the *Total Dissolved Solids Treatment Feasibility Study and Evaluation* (ARCADIS 2014f). As indicated in that submittal, the most feasible treatment technology option is reverse osmosis treatment of a portion of the existing treated groundwater flow.

In accordance with the TSO Compliance Schedule, the discharger is conducting activities to complete the preliminary design by June 30, 2014.

5.9 Alternate Remedial and Containment Strategy

This option will explore the implications of and process for modifying the current remedial strategy for containment and cleanup of the on-property areas. It is anticipated that the discharger will include the results of this assessment in the mitigation plan to be submitted to the RWQCB, in accordance with the TSO Compliance Schedule, on or before June 30, 2014.

6. Conclusions

6.1 Remedial Cleanup and Disposal Alternatives

The discharge of treated groundwater to Murphy Canyon Creek and the San Diego River is from the groundwater extraction and treatment system that operates as part of the ongoing remediation and resource protection activities at MVT in accordance with Addendum No. 5 to the CAO issued by the RWQCB on April 13, 2005. The discharger has consistently met the requirements set forth in the CAO Addendum, most recently completing the off-Terminal remedial cleanup before the end of 2013 (ARCADIS 2014e).

The extensive existing remediation infrastructure, including the soil gas and groundwater treatment systems, 93 existing SVE wells, five existing groundwater extraction wells, and more than 21,000 linear feet of vapor and water conveyance piping are now being utilized to clean up the on-Terminal areas in accordance with Addendum No. 5 to the CAO.

The remedial strategy ongoing at the Mission Valley Terminal is a carefully considered technical remedy for affected soil and groundwater and has been based on numerous extensive evaluations of remedial alternatives (LFR 2004b, LFR 2005a, LFR 2005b). This strategy has sought to achieve clean up goals in the most expedient and reliable manner. Additionally, the discharger has undertaken evaluation of alternate discharge options on multiple previous occasions, including as part of the most recent Notice of Intent (NOI) for enrollment in the General Permit (LFR 2009a), which evaluated aquifer re-injection, discharge to POTW, and discharge to a water reclamation facility. While the feasibility of alternate discharge options is currently being evaluated once again as part of this TSO, a viable alternative that would provide a reliable means of continuous discharge to support the remediation and resource protection activities has not yet been confirmed.

The off-Terminal remediation program has ended and appears to have met the prescribed goals in compliance with an exceptional regulatory deadline, and remains protected from recontamination through the application of thoroughly tested technologies that depend on a reliable means of groundwater extraction, treatment, and discharge. Continued application of these technologies using the extensive remedial infrastructure already constructed will result in:

- the most expedient achievement of cleanup goals in the on-Terminal area, and
- the most reliable protection of groundwater in the off-Terminal areas.

While not considered policy, the SWRCB has clearly stated that "**the need for remedial action would be a factor favoring the discharge**" in its explanation to what is meant by "**maximum benefit to the people of the State**" (Section III.6., SWRCB 1994).The continuation of the planned remedial strategy is "**consistent with maximum benefit to the people of the state**" as required by SWRCB Resolution Nos. 68-16 and 92-49 by providing meaningful environmental improvement brought by the remedial cleanup while not adversely impacting the receiving water or downstream beneficial uses.

6.2 Water Quality and Hydrogeology

The TSO required the discharger to implement a receiving water monitoring plan to "assess the compliance of the discharge with Discharge Prohibition IV.C and the

impact of the discharge on the downstream beneficial uses." The results of this monitoring program, initiated in January 2012 and expanded in September 2013, support the following conclusions:

- Surface water and groundwater in the San Diego Watershed and within the TSO study area generally contain elevated TDS concentrations in excess of the Basin Plan's surface water WQO of 1,500 mg/L.

- Background TDS concentrations observed in all the shallow groundwater monitoring wells sampled in the fourth quarter of 2013 had a median value of 2,026 mg/L with TDS concentrations in 82% of the wells observed between the 1,500 mg/L surface water WQO and the 3,000 mg/L groundwater WQO.

- Background TDS concentrations observed in the receiving water represented by upstream conditions within the TSO study area are normally above the surface water WQO of 1,500 mg/L.

- Conditions in the San Diego River are primarily driven by pre-existing upstream conditions, with no observable changes in physical, chemical, or biological conditions, particularly TDS concentrations, along the studied reach where Murphy Canyon Creek discharges into the San Diego River.

- While statistically significant differences in TDS concentrations have, in earlier studies, been observed between the distant upstream and downstream monitoring locations of Murphy Canyon Creek, the expanded monitoring program implemented in September 2013 has shown:

    - a distinct increase of TDS concentrations in Murphy Canyon Creek across the concrete storm drain channel input, with a difference in the median values observed at WQ-01 and WQ-05 of 475 mg/L of TDS,

    - a variable but significant *decrease* of TDS concentrations observed between upstream (WQ-06) and downstream (WQ-07) of the point of discharge of treated groundwater effluent, with the median value

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of the downstream location 250 mg/L of TDS *lower* than the median value of the upstream location, and

- an insignificant increase of TDS concentrations across the lower reach of Murphy Canyon Creek, with upstream (WQ-07) and downstream (WQ-02) locations having median difference of 15 mg/L of TDS.

- A reduction of the treated groundwater discharge by a factor of 6 at the start of the year has resulted in no decrease in Murphy Canyon Creek's downstream TDS concentrations.

Additionally, evaluation of the hydraulic model, which includes the TSO study area, provides a supporting line of evidence that:

- the remedial groundwater extraction and discharge does not result in an increase of groundwater and TDS discharge to the receiving water.

These multiple lines of evidence support two primary elements of the hydrogeologic conceptual model:

1) Water quality of Murphy Canyon Creek and San Diego River are not affected by the discharge of treated groundwater at Murphy Canyon Creek, and

2) The remedial activity at MVT imparts no net addition of TDS to the receiving water.

The results of the extensive water quality monitoring program support that the discharge of treated groundwater does not **"cause or contribute to an in-stream excursion"** above the WQO for TDS established in the Basin Plan and does not **"separately or jointly with any other discharge, cause violations"** of the Basin Plan's WQO for TDS in surface water. A conclusion that the remedial discharge causes or contributes to a change in TDS concentration or violation of the Basin Plan WQO is not supported by the monitoring data, nor by the practical understanding of the TSO study area hydrogeology and geochemistry.

The conceptual model discussed here and supported by these results is not unique to this site. This mirrors the conceptual model commonly described for much of the region, in that surface water systems and shallow groundwater are interconnected and must be considered as part of one hydrogeologic unit. The elevated basin-wide TDS conditions are the result of urbanization, legacy agricultural uses, and the importation of water. The remedial activity at MVT does not create a new source of TDS within the TSO study area, and induces no hydraulic and TDS loading impact to surface water.

6.3 Regulatory Compliance

SWRCB Resolution 68-16 and 92-49

The remedial activities and discharge are consistent/or in accordance with anti-degradation policy as stated in SWRCB Resolution 68-16. That policy states that water with quality "higher than that established by the adopted policies" shall be maintained and that any activity that "produces … a waste or increased volume or concentration of waste and which discharges … to existing high quality waters[9]" will be required to meet requirements for control to prevent "pollution or nuisance" and to maintain the "highest water quality consistent with maximum benefit to the people of the State". The remedial activities and discharge are consistent with policy set forth in SWRCB Resolution 92-49. This policy discusses selection of cleanup goals and requires cleanup and abatement that "promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored" with consideration for demands made to the waters and the total values involved.

The evaluation presented herein demonstrates that the remedial discharge has no effect on background (upstream) water quality. Additionally:

[9] "High quality waters" are described as "waters with existing background quality of better quality than that necessary to protect beneficial uses" (SWRCB, 1994).

- the remedial activity does not produce or increase the volume or concentration of a waste that would unreasonably affect present and anticipated downstream beneficial uses,

- the receiving waters are impaired and cannot be designated as "high quality waters" with respect to TDS,

- as shown through the lack of observable impact on receiving water quality or noticeable improvement as a result of the significant decrease in the remedial discharge rate, the remedial activity does not "result" in water quality less than that prescribed in the Basin Plan, and

- the remedial activity is "consistent with the maximum benefit to the people of the State" by providing improvement of the groundwater resource while not diminishing the quality of the surface water.

SWRCB 303(d) List for Total Dissolved Solids

The remedial activities of pumping and discharge within the TSO study area do not impose any additional loading of TDS to the surface water system and therefore is not calling for the surface water bodies to assimilate an additional TDS load. The TSO states that "Murphy Canyon Creek has limited, if any, assimilative capacity for additional TDS loading. Murphy Canyon Creek is on the Clean Water Act Section 303(d) list of water quality limited waterbodies for TDS" (Finding 4.e). While the Lower San Diego River is listed as such, Murphy Canyon Creek is not, which normally suggests that an evaluation has not been completed to assess the assimilative capacity of the water body. While the data presented in this report supports that TDS concentrations are elevated in both receiving water bodies, the remedial activity and discharge induces no observable net difference from naturally occurring conditions.

Discharge Prohibition IV.C and Receiving Water Limitation VI.A.8

The TSO was issued on the basis that "the discharge of groundwater … has a reasonable potential to contribute to an in-stream excursion above [the WQO] for [TDS] established in the [Basin Plan] which would be in violation of Discharge Prohibition IV.C and Receiving Water Limitation VI.A.8" (Finding 4). As detailed in the section on Regulatory Background, the TSO was structured to achieve compliance either by

demonstrating current compliance, implementing a TDS loading mitigation plan, or implementing a TDS treatment system.

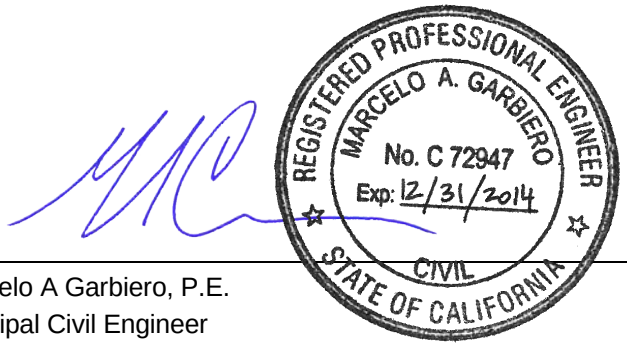
The information presented in this report demonstrates current compliance and more specifically that the remedial discharge does not "**cause or contribute to an in-stream excursion**". The condition of the receiving waters is determined by background conditions in the surface water and groundwater, these are interconnected components of the same hydrogeologic system, and is unaffected by the remedial discharge as is further supported by the surface water monitoring program results.

Time Schedule Order No. R9-2011-0052

As supported by the lines of evidence referenced in this report, this evaluation demonstrates that the existing remedial discharge of treated groundwater is in compliance with the requirements outlined in the TSO. The receiving water monitoring program ordered by the RWQCB was able to "ensure that the discharge does not cause, have a reasonable potential to cause, or contribute to an in-stream excursion above the Basin Plan's Water Quality Objective for TDS", as called for in the TSO Compliance Schedule. Pursuing a TDS loading mitigation plan or a treatment system would result in no observable benefit to receiving water quality conditions, and would not provide any meaningful contribution to achieving the surface water WQO for TDS.

7. Certification

All engineering information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by the undersigned ARCADIS California Professional Engineer.



April 15, 2014

Marcelo A Garbiero, P.E. Date
Principal Civil Engineer
California Professional Engineer # C-72947

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8. Limitations Statement

The opinions and recommendations presented in this report are based upon the scope of services, information obtained through the performance of the services, and the schedule as agreed upon by ARCADIS and the party for whom this report was originally prepared. This report is an instrument of professional service and was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the environmental consulting industry. No representation, warranty or guarantee, express or implied, is intended or given. To the extent that ARCADIS relied upon any information prepared by other parties not under contract to ARCADIS, ARCADIS makes no representation as to the accuracy or completeness of such information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared for a particular purpose. Only the party for whom this report was originally prepared and/or other specifically named parties have the right to make use of and rely upon this report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk.

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ARCADIS, therefore, does not provide any guarantees, certifications or warranties regarding any conclusions regarding environmental contamination of any such property. Furthermore, nothing contained in this document shall relieve any other party of its responsibility to abide by contract documents and applicable laws, codes, regulations, or standards.

9. References

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Tables

Table 1

Monitoring Data for Treatment Plant Influent, Discharge, and Receiving Water
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Date	Total Dissolved Solids Concentration (mg/L)			
	GW1-INF	GW2-INF	GWTS-EFF	RECEIVING WATER
Interim AMEL			**2,400**	
09/20/11	2100	--	2100	1800
10/04/11	2000	--	2000	1500
10/18/11	1970	--	1980	1930
11/01/11	1930	--	1930	2010
11/15/11	2000	--	1900	1600
12/02/11	2000	--	1900	2200
12/13/11	2010	--	2000	755
01/10/12	2010	--	1930	2410
01/24/12	--	--	1980	--
02/07/12	2060	--	2000	2470
03/06/12	2120	--	1900	2020
04/03/12	1990	--	2100	1340
04/06/12	--	2000	--	--
05/01/12	1960	--	1900	1920
06/01/12	2000	--	2000	2110
06/05/12	--	2100	--	--
07/10/12	2100	--	2100	1240
08/07/12	2340	2100	2100	1950
09/05/12	2190	2260	2200	2110
10/02/12	2030	--	2000	1440
11/13/12	1980	2040	2100	2030
12/10/12	1940	--	1950	2270
01/08/13	1850	1800	2100	1230
01/22/13	2000	1900	--	--
02/05/13	1860	1900	1800	2040
03/05/13	2180	2000	2080	2610
04/02/13	2000	1800	1800	2570
05/14/13	2130	1900	2060	2170
06/11/13	1900	--	2000	2050
06/19/13	--	2000	--	--
07/09/13	2150	1900	1930	1860
08/05/13	2100	--	--	--
08/06/13	--	2000	1920	1790
09/04/13	--	--	1900	1810
09/05/13	1960	--	--	--
09/10/13	--	1800	--	--
10/08/13	1890	1800	1810	1830
11/12/13	2000	1800	1900	2300
12/10/13	1910	1800	1900	1790
01/13/14	1710	--	1770	2190
01/14/14	--	2000	--	--
02/04/14	--	1900	2100	934
03/04/14	--	--	--	1660

Table 1

Monitoring Data for Treatment Plant Influent, Discharge, and Receiving Water
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Notes:
AMEL = Average monthly effluent limitation
Receiving Water = Upstream of discharge to Murphy Canyon Creek
GWTS = Groundwater treatment system
mg/L = Milligrams per liter
Inf = Influent
Eff = Effluent
GW1 = Groundwater treatment plant No. 1
GW2 = Groundwater treatment plant No. 2

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-1	01/09/12	2,440	14.07	6.29	2.13	8.32	86.0	3,156	Brown / Clear	None	Medium Cobble	Mild
WQ-1-DUP	01/09/12	2,420	--	--	--	--	--	--	--	--	--	--
WQ-1	01/23/12	--	13.95	6.30	--	9.92	-215.0	2,085	Clear	None	Cobble / Sand	Very Mild
WQ-1	01/24/12	834	14.16	8.03	0.76	10.10	-220.0	1,188	Clear	None	Cobble / Sand	Very Mild
WQ-1	02/07/12	--	14.96	--	1.90	--	--	2,990	--	--	--	--
WQ-1	02/08/12	1,010	16.31	7.88	0.90	10.05	103.3	1,479	Clear	Slightly Turbid	Cobble / Sand	Mild
WQ-1	02/20/12	1,910	14.35	6.16	1.74	12.30	108.1	2,627	Clear	None	Cobble / Sand	Very Mild
WQ-1	03/05/12	2,000	15.65	7.80	1.82	13.40	69.0	2,829	Clear	None	Cobble	Very Mild
WQ-1	03/21/12	1,300	13.96	7.75	0.95	7.25	106.0	1,466	Clear	None	Cobble / Sand / Moss	Mild
WQ-1	04/02/12	1,380	16.38	8.27	1.09	7.15	115.0	2,118	Clear	None	Cobble / Sand	Very Mild
WQ-1	04/16/12	1,380	14.30	6.41	1.21	1.96	-46.0	1,861	Clear	None	Cobble / Sand	Very Mild
WQ-1	04/30/12	1,800	17.30	6.90	1.51	8.70	121.0	2,899	Clear	None	Cobble / Mud	Very Mild
WQ-1	05/15/12	2,300	17.67	7.50	1.74	7.27	68.1	3,296	Clear	None	Cobble / Moss	None
WQ-1-DUP	05/15/12	2,420	--	--	--	--	--	--	--	--	--	--
WQ-1	05/31/12	2,090	17.95	7.10	1.48	5.85	67.5	2,834	Clear	None	Cobble / Sand	Very Mild
WQ-1	06/13/12	2,200	18.40	7.10	1.52	6.71	71.2	2,898	Clear	None	Cobble / Mud / Sand	Very Mild
WQ-1	07/02/12	2,200	19.40	8.11	1.54	7.38	42.7	2,945	Clear	None	Cobble / Sand	None
WQ-1	07/10/12	1,300	20.15	8.18	0.99	7.29	20.7	1,938	Clear	None	Cobble / Sand	Mild
WQ-1	07/31/12	2,030	20.16	8.71	1.51	8.20	19.8	2,898	Brown	Slightly Turbid	Mud	None
WQ-1	08/13/12	--	--	--	--	--	--	--	--	Possible sewage spill	--	--
WQ-1	08/27/12	1,850	21.64	8.00	1.53	8.56	-44.0	2,871	Clear	None	Cobble	Very Mild
WQ-1	09/10/12	1,500	22.17	8.17	1.22	8.65	-107.6	2,369	Clear	None	Gravel / Mud / Rock	None
WQ-1	09/24/12	1,720	23.50	8.38	1.20	8.62	-97.5	2,339	Brown / Clear	None	Mud / Moss	None
WQ-1	10/08/12	2,110	20.60	8.26	1.70	8.89	-103.7	3,238	Brown / Clear	None	Mud / Cobble	None
WQ-1	10/22/12	961	19.50	7.86	0.78	7.04	-125.3	1,551	Brown / Clear	None	Mud	None
WQ-1	11/05/12	2,170	18.39	8.10	1.78	9.26	-112.6	3,375	Brown / Clear	None	Mud / Moss / Cobble / Boulders	None
WQ-1	11/19/12	2,240	16.71	8.10	1.64	9.10	-141.2	3,126	Brown / Clear	None	Mud / Moss	None
WQ-1	12/03/12	1,580	18.00	7.95	1.62	6.75	183.0	2,670	Clear	None	Mud / Cobble	Very Mild

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-1	12/18/12	1,490	15.60	7.98	1.56	9.34	-153.5	2,447	Clear	None	Mud / Moss / Cobble	None
WQ-1	12/31/12	743	12.00	7.63	0.79	9.87	-130.2	1,174	Clear	None	Mud / Moss / Cobble	None
WQ-1	01/14/13	2,150	11.40	8.11	1.95	--	-158.6	2,720	Brown/Clear	None	Mud/Moss/Cobble/ Sand	Very Mild
WQ-1	01/21/13	1,250	15.48	8.46	1.15	12.73	-155.6	1,831	Brown / Clear	None	Mud / Moss / Cobble	--
WQ-1	02/05/13	2,250	14.73	7.72	1.69	9.09	-155.6	2,576	Brown / Clear	None	Mud / Moss / Cobble	None
WQ-1	02/18/13	2,470	--	8.26	2.06	13.46	-137.6	3,109	Brown / Clear	None	Mud / Moss / Cobble	None
WQ-1	03/04/13	2,770	17.20	8.60	2.03	15.30	-148.8	3,250	Clear	None	Mud / Moss / Cobble	None
WQ-1-DUP	03/04/13	2,680	--	--	--	--	--	--	--	--	--	--
WQ-1	03/18/13	2,070	16.13	8.51	1.75	11.56	-139.2	2,757	Clear	None	Mud / Moss / cobble	None
WQ-1	04/02/13	2,190	16.38	7.98	2.01	8.16	-81.2	3,168	Clear	Slightly Turbid	Mud / Moss / Cobble	None
WQ-1	04/16/13	1,660	15.12	7.65	1.35	5.37	-66.8	2,102	Clear	None	Mud / Moss / Cobble / Sand	Very Mild
WQ-1	04/30/13	2,100	17.21	8.66	1.91	8.08	-60.0	3,076	Brown	None	Mud / Moss / Cobble	None
WQ-1	05/14/13	1,940	18.34	7.49	1.65	6.59	-97.3	2,749	Brown	None	Moss / Cobble	None
WQ-1-DUP	05/14/13	1,970	--	--	--	--	--	--	--	--	--	--
WQ-1	05/28/13	2,090	18.05	7.89	1.95	6.48	-70.1	3,195	Brown / Clear	None	Mud / Moss / Cobble	--
WQ-1-DUP	05/28/13	2,150	--	--	--	--	--	--	--	--	--	--
WQ-1	06/11/13	2,070	18.61	7.25	1.76	8.45	-65.7	2,935	Brown / Clear	None	Mud / Moss / Cobble	None
WQ-1	06/25/13	1,820	19.30	7.30	1.73	6.80	-66.2	2,929	Clear	None	Mud / Moss / Cobble	None
WQ-1	07/08/13	2,080	21.13	7.80	1.84	11.25	-52.3	3,233	Brown / Clear	None	Mud / Moss / Cobble	None
WQ-1	07/22/13	2,000	21.09	7.26	1.90	7.59	51.2	3,327	Brown / Clear	Slightly turbid	Mud / Moss / Cobble / Sand	Very Mild
WQ-1	08/05/13	1,870	19.90	6.40	1.82	10.24	46.0	3,124	Tan	None	Mud / Cobble	None

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-1-DUP	08/05/13	1,850	--	--	--	--	--	--	--	--	--	--
WQ-1	08/20/13	1,890	20.34	7.02	1.97	7.23	-2.4	3,888	Brown / Red	Slightly Turbid	Mud / Moss / Cobble	Very Mild
WQ-1	09/04/13	1,800	21.80	7.10	1.74	5.80	38.5	3,112	Brown / Clear	None	Mud / Cobble / Vegetation	None
WQ-1	09/18/13	1,960	19.90	6.98	1.38	8.45	215.1	2,397	Brown	Slightly Turbid	Mud / Moss / Cobble	None
WQ-1	10/01/13	1,760	18.10	7.51	1.32	6.63	147.6	2,212	Clear	Slightly Turbid	Mud / Cobble	Mild
WQ-1	10/14/13	1,150	18.50	8.30	1.19	6.10	179.3	2,018	Brown / Clear	None	Cobble / Boulders / Sand / Vegetation	Very Mild
WQ-1	10/29/13	475	16.60	7.28	0.46	10.60	155.9	780	Brown	Moderately Turbid	Mudd / Cobble / Sand / Vegetation	Very Mild
WQ-1	11/12/13	2,260	14.81	7.40	2.18	4.38	142.1	3,286	Clear	None	Mud / Cobble / Boulders / Sand	Very Mild
WQ-1-DUP	11/12/13	2,070	--	--	--	--	--	--	--	--	--	--
WQ-1	11/25/13	1,870	14.69	7.12	1.59	7.50	189.8	2,440	Clear	None	Mud / Cobble / Boulders	Very Mild
WQ-1	12/09/13	933	12.18	7.48	0.82	7.61	181.1	1,220	Brown / Clear	Slighty turbid	Mud / Moss / Cobble / Boulders / Vegetation	Mild
WQ-1	12/24/13	1,850	11.52	7.69	1.94	8.49	101.5	2,717	Clear	None	Mud / Cobble / Vegetation	None
WQ-1	01/07/14	2,080	12.55	7.90	2.33	10.36	213.2	3,312	Brown / Clear	Slighlty Turbid	Mud / Moss / Boulders / Vegetation	Mild
WQ-1	01/21/14	2,200	14.17	7.67	2.22	10.16	170.0	3,301	Clear	Slightly Turbid	--	Mild
WQ-1	02/04/14	929	12.03	7.59	0.95	8.25	151.1	1,401	Clear	Slightly Turbid	Mud / Moss / Cobble / Boulders / Sand / Vegetation	Mild
WQ-1	02/18/14	2,320	16.69	7.62	2.26	9.29	152.9	3,553	Clear	None	Mud / Moss / Cobble / Boulders / Vegetation	Very Mild

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-1	03/04/14	1,580	15.50	7.81	1.42	9.45	159.3	2,233	Clear	Slightly Turbid	Moss / Cobble / Vegetation	Mild
WQ-2	01/09/12	2,280	15.83	6.40	1.96	7.05	66.0	3,065	Clear	None	Small Cobble / Sand	Mild
WQ-2	01/24/12	1,150	14.85	8.03	0.98	9.20	-198.0	1,540	Clear	Slighty Turbid	Cobble / Sand	Very Mild
WQ-2-DUP	01/24/12	1,140	--	--	--	--	--	--	--	--	--	--
WQ-2	02/08/12	1,320	16.21	6.90	1.03	7.88	182.0	1,670	Clear	Slightly Turbid	Cobble / Large Rock / Sand	Mild
WQ-2	02/20/12	2,000	16.85	7.51	1.77	7.50	29.8	2,828	Clear	None	Cobble / Sand	Mild
WQ-2	03/05/12	2,100	17.37	8.12	1.93	8.51	119.0	3,109	Clear	None	Cobble / Sand	Mild
WQ-2	03/21/12	1,700	15.40	7.90	1.22	5.56	193.1	1,922	Clear	None	Cobble / Sand / Mud	Mild
WQ-2-DUP	03/21/12	1,800	--	--	--	--	--	--	--	--	--	--
WQ-2	04/02/12	1,770	17.48	7.90	1.31	5.14	121.0	2,523	Clear	None	Cobble / Sand	Very Mild
WQ-2-DUP	04/02/12	1,720	--	--	--	--	--	--	--	--	--	--
WQ-2	04/16/12	1,730	16.00	6.94	1.46	1.59	-50.7	2,314	Clear	None	Cobble / Mud / Sand	Very Mild
WQ-2	04/30/12	2,000	19.24	7.37	1.68	6.99	165.0	3,201	Clear	None	Cobble / Mud	Very Mild
WQ-2	05/15/12	2,330	20.17	7.75	1.72	6.17	50.6	3,277	Clear	None	Cobble / Mud	Very Mild
WQ-2	05/31/12	2,150	20.37	7.48	1.60	5.27	45.5	3,067	Clear	None	Boulders / Sand	Very Mild
WQ-2-DUP	05/31/12	2,070	--	--	--	--	--	--	--	--	--	--
WQ-2	06/13/12	2,300	20.90	7.50	1.53	6.45	61.0	2,933	Clear	None	Cobble / Mud / Sand	Mild
WQ-2	07/02/12	2,100	21.70	7.95	1.59	5.91	37.6	3,041	Clear	None	Sand	None
WQ-2	07/10/12	1,990	20.90	8.04	1.57	6.22	13.6	3,006	Clear	None	Boulders / Mud / Sand	Mild
WQ-2	07/31/12	2,060	22.00	8.82	1.60	6.63	32.3	3,065	Clear	None	Mud	None
WQ-2-DUP	07/31/12	2,080	--	--	--	--	--	--	--	--	--	--
WQ-2	08/13/12	2,260	24.10	7.95	--	6.32	-104.3	3,006	Clear	None	Cobble / Sand	None
WQ-2-DUP	08/13/12	2,220	--	--	--	--	--	--	--	--	--	--
WQ-2	08/27/12	1,980	22.53	8.09	1.60	6.68	-58.8	3,074	Clear	None	Boulders / Cobble / Sand	Very Mild
WQ-2	09/10/12	2,200	22.93	8.13	1.71	7.33	-102.2	3,275	Clear	None	Mud / Rock / Sand	None
WQ-2	09/24/12	2,010	23.70	8.11	1.53	7.25	-98.1	2,949	Brown / Clear	None	Mud	None
WQ-2	10/08/12	2,040	21.50	8.17	1.69	7.28	-112.0	3,220	Clear	None	Mud / Cobble	None
WQ-2	10/22/12	1,550	20.40	7.89	1.24	5.85	-124.5	2,406	Brown	None	Mud / Boulders	None

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-2	11/05/12	2,040	19.83	8.20	1.74	7.86	-115.6	3,310	Brown / Clear	None	Mud / Boulders	None
WQ-2	11/19/12	2,210	19.43	8.00	1.70	7.85	-147.7	3,240	Brown / Clear	None	Mud / Boulders	None
WQ-2-DUP	11/19/12	2,250	--	--	--	--	--	--	--	--	--	--
WQ-2	12/03/12	1,910	19.75	7.57	1.85	5.72	-146.2	3,156	Clear	None	Mud / Cobble / Sand	Very Mild
WQ-2	12/18/12	1,730	17.90	7.86	1.83	8.76	-160.6	2,991	Brown	None	Mud / Cobble	None
WQ-2	12/31/12	785	11.91	7.92	0.82	7.65	-147.0	1,214	Brown	None	Mud / Cobble	None
WQ-2	01/14/13	1,900	16.80	7.91	1.81	7.29	-157.2	2,888	Clear	None	Mud/Cobble/Sand	Very Mild
WQ-2-DUP	01/14/13	1,840	--	--	--	--	--	--	--	--	--	--
WQ-2	01/21/13	1,770	17.53	7.98	1.60	8.14	-159.3	2,621	Brown / Clear	None	Mud / Cobble	High Water Level
WQ-2-DUP	01/21/13	1,800	--	--	--	--	--	--	--	--	--	--
WQ-2	02/05/13	2,100	19.13	8.02	1.84	6.73	-163.8	3,095	Brown / Clear	None	Mud / Boulders	None
WQ-2	02/18/13	2,200	18.65	8.12	1.84	6.91	-147.5	3,065	Clear	None	Mud / Cobble	None
WQ-2-DUP	02/18/13	2,090	--	--	--	--	--	--	--	--	--	--
WQ-2	03/04/13	2,430	20.10	8.10	1.84	7.50	-150.6	3,171	Clear	None	Mud / Cobble	None
WQ-2	03/18/13	2,040	19.70	8.22	1.79	7.22	-144.6	3,049	Clear	None	Boulders / Sand	None
WQ-2-DUP	03/18/13	2,120	--	--	--	--	--	--	--	--	--	--
WQ-2	04/02/13	1,980	20.69	8.24	1.80	6.50	-116.7	3,145	Clear	None	Mud / Cobble	None
WQ-2-DUP	04/02/13	1,890	--	--	--	--	--	--	--	--	--	--
WQ-2	04/16/13	1,810	19.21	7.98	1.54	5.76	-89.4	2,613	Clear	None	Cobble / Boulders / Sand	Very Mild
WQ-2	04/30/13	1,890	20.99	8.15	1.67	5.74	-37.4	2,593	Clear	None	Mud / Boulders	None
WQ-2	05/14/13	2,090	21.54	7.41	1.71	5.76	-101.8	3,048	Clear	None	Sand	None
WQ-2	05/28/13	1,940	21.43	7.73	1.74	6.38	-74.3	3,089	Clear	None	Mud / Sand /Cobble	--
WQ-2	06/11/13	2,040	20.53	7.77	1.99	5.87	-73.9	3,446	Clear	None	Mud / Cobble / Sand	None
WQ-2-DUP	06/11/13	2,220	--	--	--	--	--	--	--	--	--	--
WQ-2	06/25/13	1,920	22.00	7.70	1.86	5.77	-68.0	3,336	Clear	None	Cobble / Sand	None
WQ-2	07/08/13	2,020	22.96	7.82	1.88	8.43	-57.7	3,428	Clear	None	Mud / Cobble	None
WQ-2-DUP	07/08/13	1,990	--	--	--	--	--	--	--	--	--	--
WQ-2	07/22/13	1,990	22.32	7.71	1.93	5.57	33.3	3,464	Clear	None	Cobble / Boulders / Sand	Very Mild
WQ-2	08/05/13	1,930	21.90	7.40	1.59	6.33	5.5	3,548	Clear	None	Mud / Cobble	None

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-2	08/20/13	1,810	22.13	7.80	2.00	6.81	-14.6	3,576	Clear	None	Boulders / Sand / Cobble	Very Mild
WQ-2	09/04/13	1,770	23.60	7.50	1.84	5.94	48.1	3,407	Clear	None	Sand / Cobble	None
WQ-2-DUP	09/04/13	1,800	--	--	--	--	--	--	--	--	--	--
WQ-2	09/18/13	1,880	21.20	7.66	1.39	7.89	242.6	2,495	Clear	None	Mud / Cobble / Sand	None
WQ-2	10/01/13	1,830	18.10	7.87	1.61	7.75	162.0	2,657	Clear	Slightly Turbid	Mud / Cobble	Mild
WQ-2	10/14/13	1,700	19.10	8.09	1.83	5.13	203.6	3,080	Clear	None	Cobble / Moss / Boulders / Sand / Vegetation	Very Mild
WQ-2-DUP	10/14/13	1,600	--	--	--	--	--	--	--	--	--	--
WQ-2	10/29/13	1,140	17.70	7.14	1.17	9.10	159.3	1,949	Brown / Clear	Slighlty Turbid	Mud / Cobble / Boulders / Sand / Vegetation	Very Mild
WQ-2	11/12/13	1,910	18.71	7.60	1.92	3.75	126.3	3,202	Clear	NOne	Moss / Cobble / Boulders / Sand / Vegetation	Very Mild
WQ-2	11/25/13	1,900	18.51	7.04	1.59	4.41	162.3	2,667	Clear	None	Moss / Cobble / Boulders / Sand / Vegetation	Very Mild
WQ-2	12/09/13	1,740	16.77	7.58	1.55	5.22	168.1	2,491	Brown	Slighty turbid	Moss / Cobble / Boulders	Very mild
WQ-2	12/24/13	2,000	16.91	7.88	1.93	6.68	164.5	3,086	Clear	None	Cobble / Sand	None
WQ-2	01/07/14	1,840	13.85	7.81	2.13	7.95	181.5	3,145	Brown	Slighlty Turbid	Moss / Cobble / Boulders	Very Mild
WQ-2	01/21/14	2,030	15.37	7.67	1.99	9.58	178.7	3,064	Clear	Slightly Turbid	Mud / Cobble / Sand	Very Mild
WQ-2-DUP	01/21/14	1,980	--	--	--	--	--	--	--	--	--	--
WQ-2	02/04/14	1,380	14.22	7.28	1.39	6.15	228.5	2,116	Green	Slightly Turbid	Cobble / Sand / Vegetation	Very Mild
WQ-2	02/18/14	2,280	14.26	7.42	2.25	3.81	170.4	3,346	Clear / Green	None	Moss / Cobble / Boulders / Sand / Vegetation	Fair
WQ-2	03/04/14	1,460	14.87	7.69	1.36	3.00	148.5	2,104	Brown / Clear	Slightly Turbid	Moss / Cobble / Sand	Mild

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-3	01/09/12	1,460	12.33	6.44	1.36	6.70	63.8	1,981	Brown	Highly Turbid	Bedrock / Mud / Rip rap	Mild
WQ-3	01/24/12	1,220	12.30	7.98	1.14	8.75	-190.6	1,670	Brown	Highy Turbid	Bedrock / Mud	Mild
WQ-3	02/08/12	985	13.62	6.68	0.91	6.24	176.6	1,394	Brown	Highly Turbid	Mud / Rock	Mild
WQ-3-DUP	02/08/12	1,020	--	--	--	--	--	--	--	--	--	--
WQ-3	02/20/12	825	13.92	7.76	0.82	6.27	-38.0	1,274	Brown	Highly Turbid	Mud / Rock / Boulders	Very Mild
WQ-3-DUP	02/20/12	790	--	--	--	--	--	--	--	--	--	--
WQ-3	03/05/12	850	14.94	8.06	0.89	7.05	113.5	1,404	Brown	Highly Turbid	Bedrock / Boulders / Mud	Mild
WQ-3	03/21/12	460	13.40	7.96	0.40	5.00	170.9	626	Brown	Highly Turbid	Mud	Mild
WQ-3	04/02/12	943	16.97	8.10	0.73	4.55	117.0	1,447	Brown	Moderately Turbid	Boulders / Mud	Very Mild
WQ-3	04/16/12	991	15.80	6.90	0.83	1.35	-61.0	1,352	Brown	Turbid	Cobble / Mud	Very Mild
WQ-3-DUP	04/16/12	957	--	--	--	--	--	--	--	--	--	--
WQ-3	04/30/12	1,000	19.18	7.18	0.95	4.33	131.3	1,876	Brown / Red	Turbid	Boulders / Mud	None
WQ-3-DUP	04/30/12	1,000	--	--	--	--	--	--	--	--	--	--
WQ-3	05/15/12	1,270	21.19	7.58	1.03	3.20	41.7	2,023	Brown	Highly Turbid	Boulders / Mud	Very Mild
WQ-3	05/31/12	1,630	20.59	7.40	1.25	2.87	35.0	2,421	Brown	Turbid	Boulders / Mud	Very Mild
WQ-3	06/13/12	1,800	20.40	7.50	1.38	4.82	55.0	2,665	Clear	Highly Turbid	Boulders / Mud	Mild
WQ-3-DUP	06/13/12	1,800	--	--	--	--	--	--	--	--	--	--
WQ-3	07/02/12	2,200	20.60	7.83	1.61	2.63	38.2	3,069	Brown / Green	Highly Turbid	Boulders / Mud	Very Mild
WQ-3	07/10/12	2,090	20.70	7.62	1.66	2.60	-45.3	3,173	Brown / Green	Highly Turbid	Boulders / Mud	Mild
WQ-3	07/31/12	2,130	20.75	8.71	1.74	2.09	-58.7	3,317	Brown	Highly Turbid	Mud	None
WQ-3	08/13/12	2,590	22.20	6.95	--	0.81	-124.6	3,557	Brown	Highly Turbid	Boulders / Mud	Very Mild
WQ-3	08/27/12	2,030	21.15	7.55	1.76	6.19	-58.1	3,344	Tan	Highly Turbid	Boulders / Mud	Very Mild
WQ-3-DUP	08/27/12	2,060	--	--	--	--	--	--	--	--	--	--

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-3	09/10/12	2,100	21.44	6.96	2.07	0.39	-148.3	3,899	Green / Tan	Highly Turbid	Mud / Rock	None
WQ-3	09/24/12	2,280	21.80	7.56	1.86	4.97	-97.4	3,540	Brown	Moderately Turbid	Mud	None
WQ-3	10/08/12	2,160	20.10	7.51	1.87	3.02	-118.3	3,545	Gree / Tan	Highly Turbid	Moss	None
WQ-3-DUP	10/08/12	2,110	--	--	--	--	--	--	--	--	--	--
WQ-3	10/22/12	1,730	19.40	7.62	1.43	3.16	-126.5	2,756	Brown	Highly Turbid	Mud / Boulders / Vegetation	None
WQ-3	11/05/12	2,140	16.97	7.65	1.91	2.76	-124.2	3,609	Brown / Green	Highly Turbid	Mud / Moss / Leaves / Plants	None
WQ-3-DUP	11/05/12	2,200	--	--	--	--	--	--	--	--	--	--
WQ-3	11/19/12	2,390	16.10	7.64	1.86	3.52	-153.4	3,525	Brown / Green	Highly Turbid	Mud / Moss / Leaves / Plants	None
WQ-3	12/03/12	1,810	17.23	7.42	1.95	2.81	-161.7	3,130	Brown / Green / Tan	Highly Turbid	Mud / Boulders	Very Mild
WQ-3-DUP	12/03/12	1,890	--	--	--	--	--	--	--	--	--	--
WQ-3	12/18/12	875	13.90	7.54	0.94	8.30	-167.8	1,457	Brown	Highly Turbid	Mud / Moss	Very Mild
WQ-3	12/31/12	1,030	10.58	7.84	1.06	6.45	-151.4	1,490	Brown	Highly Turbid	Mud / Moss	Very Mild
WQ-3	01/14/13	1,290	9.60	7.89	1.15	8.16	-155.3	1,580	Brown	Moderately turbid	Mud/Moss/Plants	Very Mild
WQ-3	01/21/13	1,330	10.72	7.83	1.19	9.40	-152.5	1,671	Brown	Moderately Turbid	Mud / Leaves	Stagnant
WQ-3	02/05/13	954	14.51	7.90	0.87	5.76	-168.3	1,371	Brown	Highly Turbid	Mud / Vegetation	None
WQ-3-DUP	02/05/13	953	--	--	--	--	--	--	--	--	--	--
WQ-3	02/18/13	1,280	14.00	8.00	1.13	6.95	-144.7	1,727	Brown	Moderately Turbid	Mud / Boulders / Grass	None
WQ-3	03/04/13	1,130	15.60	8.30	0.97	7.10	-147.0	1,551	Brown	Moderately Turbid	Mud / Boulders / Vegetation	None
WQ-3	03/18/13	908	17.21	8.29	0.79	5.72	-147.3	1,327	Brown	Moderately Turbid	Mud / Boulders / Vegetation	None
WQ-3	04/02/13	1,310	18.93	8.14	1.22	3.97	-127.3	2,089	Brown	Highly Turbid	Mud / Boulders	None

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Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-3	04/16/13	1,510	16.52	8.21	1.35	4.56	-95.4	2,182	Brown	Highly Turbid	Mud / Moss / Cobble / Boulders	Very Mild
WQ-3	04/30/13	1,560	19.25	8.07	1.48	3.75	68.9	2,529	Brown	Moderately Turbid	Mud / Vegetation	None
WQ-3-DUP	04/30/13	1,630	--	--	--	--	--	--	--	--	--	--
WQ-3	05/14/13	1,590	21.75	6.98	1.71	1.62	-121.3	3,053	Brown	Moderately Turbid	Mud / Cobble / Vegetation	None
WQ-3	05/28/13	1,770	19.40	7.43	1.83	2.45	-79.3	3,107	Clear	Moderately turbid	Boulders / Moss	--
WQ-3	06/11/13	2,110	19.47	7.44	2.15	2.23	-92.4	3,609	Tan	Moderately TUrbid	Moss / Boulders	None
WQ-3	06/25/13	2,200	19.70	7.30	2.18	1.78	-79.8	3,678	Brown/Green	Highly Turbid	Mud / Vegetation	None
WQ-3-DUP	06/25/13	2,260	--	--	--	--	--	--	--	--	--	--
WQ-3	07/08/13	1,330	22.42	7.83	1.36	5.27	-62.5	2,504	Tan	Moderately turbid	Moss / Boulders	None
WQ-3	07/22/13	1,810	20.36	6.78	2.03	3.13	9.2	3,497	Brown / Green / Red	Highly Turbid	Mud / Moss / Boulders	Very Mild
WQ-3	08/05/13	2,060	19.80	7.50	2.06	4.38	-6.7	3,503	Brown	Highly Turbid	Mud / Vegetation	None / Moss / Algae on water
WQ-3	08/20/13	2,280	20.31	7.23	2.37	3.03	-260.4	4,043	Brown / Red / Green	Highly Turbid	Mud / Moss / Boulders	Very Mild
WQ-3-DUP	08/20/13	2,260	--	--	--	--	--	--	--	--	--	--
WQ-3	09/04/13	2,120	21.90	6.80	2.36	2.76	-95.7	4,157	Brown	Highly Turbid	Mud / Vegetation	None
WQ-3	09/18/13	2,290	20.80	7.13	1.64	3.53	33.0	2,831	Brown	Highly Turbid	Mud / Vegetation	None
WQ-3	10/01/13	1,720	20.80	7.98	1.40	8.04	162.0	2,474	Brown	Moderately Turbid	Mud / Vegetation	Mild
WQ-3	10/14/13	1,970	16.60	7.90	2.15	1.54	-12.0	3,388	Brown / Tan	Hihgly Turbid	Mud / Moss / Boulders / Vegetation	Very Mild
WQ-3	10/29/13	662	15.37	7.47	0.74	4.11	8.1	1,200	Brown / Green	Highly Turbid	Mud / Cobble /Boulders / Vegetation	Very Mild

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
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Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-3	11/12/13	2,250	14.31	7.12	2.28	2.11	76.7	3,385	Green	Highly Turbid	Moss / Boulders	Very Mild
WQ-3	11/25/13	2,030	14.36	6.80	1.72	3.09	-46.4	2,603	Green	Highly Turbid	Moss / Boulders	Very Mild
WQ-3	12/09/13	1,970	10.85	7.51	1.97	4.72	-81.2	2,717	Green	Highly turbid	Mud / Moss / Boulders	Very mild
WQ-3	12/24/13	1,600	11.52	7.50	1.76	5.77	-32.7	2,475	Brown	Highly Turbid	Mud / Vegetation	None
WQ-3	01/07/14	1,530	10.85	7.42	1.77	7.45	-55.3	2,451	Green	Highly Turbid	Mud / Moss / Boulders	Very Mild
WQ-3-DUP	01/07/14	1,400	--	--	--	--	--	--	--	--	--	--
WQ-3	01/21/14	1,700	11.18	7.24	1.77	7.92	-37.8	2,467	Green	None	Mud / Vegetation	Very Mild
WQ-3	02/04/14	1,530	12.88	7.06	1.60	6.87	-113.2	2,341	Brown	Highly Turbid	Mud / Moss / Boulders / Vegetation	Mild
WQ-3	02/18/14	1,710	15.53	7.32	1.72	3.58	-116.6	2,671	Green / Tan	Highly Turbid	Mud / Moss / Boulders / Vegetation	Mild
WQ-3	03/04/14	591	15.35	7.53	0.59	4.83	66.8	962	Brown / Clear	Slightly Turbid	Mud / Sand / Vegetation	Mild
WQ-3-DUP	03/04/14	546	--	--	--	--	--	--	--	--	--	--
WQ-4A	01/09/12	1,480	12.21	6.35	1.32	5.97	49.6	1,917	Brown	Highly Turbid	Mud	Mild
WQ-4A	01/24/12	1,210	12.15	7.65	1.13	10.00	-181.0	1,651	Brown	Highy Turbid	Mud	Mild
WQ-4A	02/08/12	1,030	13.73	6.82	0.92	6.53	161.3	1,419	Brown	Highly Turbid	Mud	Mild
WQ-4A	02/20/12	808	13.78	7.83	0.71	6.11	60.7	1,109	Brown	Highly Turbid	Mud	Mild
WQ-4A	03/05/12	870	14.97	7.92	0.83	6.36	119.9	1,325	Brown	Highly Turbid	Mud	Mild
WQ-4A-DUP	03/05/12	890	--	--	--	--	--	--	--	--	--	--
WQ-4A	03/21/12	490	13.36	7.81	0.34	4.92	151.4	535	Brown	Highly Turbid	Mud	Mild
WQ-4A	04/02/12	1,020	16.77	8.00	0.74	4.64	124.0	1,474	Brown / Clear	Slightly Turbid	Mud	Very Mild

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
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Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-4A	04/16/12	975	15.80	6.96	0.83	1.54	-55.2	1,356	Clear / Brown	Slightly Turbid	Mud	Very Mild
WQ-4A	04/30/12	1,000	19.25	7.45	0.89	5.08	165.0	1,745	Clear / Brown	Highly Turbid	Mud	Very Mild
WQ-4A	05/15/12	1,280	21.17	7.60	1.07	4.80	42.5	2,093	Brown	Highly Turbid	Boulders / Mud	None
WQ-4A	05/31/12	1,600	20.64	7.43	1.28	3.70	38.0	2,481	Brown	Highly Turbid	Mud	Very Mild
WQ-4A	06/13/12	1,900	20.40	7.50	1.42	4.51	54.3	2,735	Clear	Highly Turbid	Boulders / Mud	Mild
WQ-4A	07/02/12	2,300	20.60	7.90	1.61	3.81	39.0	3,079	Brown / Green	Highly Turbid	Boulders / Mud	Very Mild
WQ-4A	07/10/12	2,000	20.60	7.81	1.64	3.96	61.6	3,130	Brown	Moderately Turbid	Mud / Reeds	Mild
WQ-4A-DUP	07/10/12	2,060	--	--	--	--	--	--	--	--	--	--
WQ-4A	07/31/12	2,190	20.90	8.85	1.67	4.55	2.7	3,182	Clear	None	Mud	None
WQ-4A	08/13/12	2,380	23.80	7.68	--	4.49	-110.5	3,180	Green	Highly Turbid	Mud / Vines	Very Mild
WQ-4A	08/27/12	1,980	21.96	7.75	1.74	4.32	-65.8	3,318	Brown / Red	Highly Turbid	Boulders / Mud	Very Mild
WQ-4A	09/10/12	2,200	22.68	7.83	1.80	4.83	-103.5	3,420	Green / Tan	Highly Turbid	Mud	None
WQ-4A-DUP	09/10/12	2,300	--	--	--	--	--	--	--	--	--	--
WQ-4A	09/24/12	2,120	22.70	7.89	1.68	5.14	-96.5	3,210	Brown	Moderately Turbid	Mud	None
WQ-4A	10/08/12	2,220	20.10	7.67	1.84	4.41	-116.0	3,491	Green / Gray	Highly Turbid	Mud / Plants	None
WQ-4A	10/22/12	1,710	19.50	7.76	1.41	3.71	-127.6	2,716	Brown	Moderately Turbid	Mud	None
WQ-4A-DUP	10/22/12	1,660	--	--	--	--	--	--	--	--	--	--
WQ-4A	11/05/12	2,120	17.66	7.85	1.84	5.42	-115.2	3,486	Brown	Slightly Turbid	Mud / Leaves / Plants	None
WQ-4A	11/19/12	2,330	16.71	7.78	1.81	5.51	-151.6	3,432	Brown	Slightly Turbid	Mud / Leaves / Plants	None
WQ-4A	12/03/12	1,780	17.43	7.53	1.91	3.18	-164.4	3,084	Green / Tan	Highly Turbid	Mud	Very Mild

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Water Quality Monitoring Data for Receiving Waters
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Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-4A	12/18/12	843	13.90	7.75	0.91	7.25	-163.2	1,404	Brown	Sightly Turbid	Mud / Moss	Very Mild
WQ-4A	12/31/12	995	10.64	7.81	1.03	6.62	-151.3	1,457	Brown	Slightly Turbid	Mud / Moss	Very Mild
WQ-4A	01/14/13	1,220	7.50	7.89	1.12	6.12	-160.3	1,448	Brown	Slightly turbid	Mud	Very Mild
WQ-4A	01/21/13	1,350	10.81	7.96	1.21	8.85	-147.3	1,712	Brown	Highly Turbid	Mud / Leaves / Sticks	Stagnant
WQ-4A	02/05/13	937	14.42	7.91	0.87	5.95	-159.4	1,365	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4A	02/18/13	1,260	13.81	7.99	1.11	7.72	-143.5	1,696	Brown / Clear	Moderately Turbid	Mud / Leaves	None
WQ-4A	03/04/13	1,140	15.50	8.10	0.98	7.30	-147.4	1,564	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4A	03/18/13	909	17.28	8.13	0.79	5.55	-149.2	1,332	Brown	Moderately Turbid	Mud	None
WQ-4A	04/02/13	1,340	18.54	8.23	1.20	4.48	-124.7	2,037	Brown	Slightly Turbid	Mud	None
WQ-4A	04/16/13	1,580	16.30	8.18	1.36	4.70	-99.0	2,180	Brown	Highly Turbid	Mud / Moss / Boulders	Very Mild
WQ-4A-DUP	04/16/13	1,550	--	--	--	--	--	--	--	--	--	--
WQ-4A	04/30/13	1,620	19.05	8.12	1.50	3.74	28.5	2,547	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4A	05/14/13	1,720	21.78	7.37	1.44	3.15	-109.0	2,606	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4A	05/28/13	1,830	19.16	7.54	1.83	3.60	-75.5	3,075	Tan	Highly turbid	Mud / Vegetation	--
WQ-4A	06/11/13	2,120	19.08	7.54	2.05	3.97	-83.8	3,418	Tan	Hlhgly Turbid	Mud / Vegetation	None
WQ-4A	06/25/13	2,150	19.80	7.50	2.06	3.50	-74.6	3,496	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4A	07/08/13	1,530	22.47	7.74	1.42	5.08	-59.0	2,600	Tan	Highly Turbid	Mud / Vegetation	None
WQ-4A	07/22/13	1,950	20.93	7.18	1.89	3.81	27.0	3,304	Brown / Green	Highly Turbid	Mud / Moss / Boulders	Very Mild
WQ-4A-DUP	07/22/13	1,980	--	--	--	--	--	--	--	--	--	--

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Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-4A	08/05/13	1,960	19.70	7.51	2.07	4.25	-10.3	3,307	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4A	08/20/13	2,240	20.02	7.58	2.36	4.69	-83.5	3,998	Brown / Red / Green	Highly Turbid	Mud / Moss / Boulders	Very Mild
WQ-4A	09/04/13	2,260	22.30	7.00	2.20	3.71	-11.5	3,931	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4A	09/18/13	2,190	19.60	7.29	1.64	5.24	123.2	2,808	Green / Tan	Highly Turbid	Mud / Vegetation	None
WQ-4A	10/01/13	1,620	17.29	7.48	1.36	5.99	204.5	2,234	Brown	Highly Turbid	Mud / Vegetation	Mild
WQ-4A-DUP	10/01/13	1,780	--	--	--	--	--	--	--	--	--	--
WQ-4A	10/14/13	2,010	17.00	8.10	2.11	3.94	74.9	3,360	Brown / Green / Tan	Highly Turbid	Mud / Moss / Vegetation	Very Mild
WQ-4A	10/29/13	665	15.33	7.38	0.67	9.87	71.8	1,085	Brown / Green	Highly Turbid	Mud / Vegetation	Very Mild
WQ-4A	11/12/13	2,190	13.63	7.20	2.18	3.81	95.7	3,200	Green	Highly Turbid	Mud / Moss	Very Mild
WQ-4A	11/25/13	1,950	14.05	6.99	1.66	3.55	14.7	2,502	Tan	Moderately Turbid	Mud / Moss	Very Mild
WQ-4A	12/09/13	2,130	10.90	7.58	1.91	5.69	-72.7	2,634	Green	Highly turbid	Mud / Moss / Vegetation	Very mild
WQ-4A	12/24/13	1,530	10.76	7.65	1.62	7.74	172.1	2,248	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4A	01/07/14	1,400	10.16	7.68	1.66	7.73	69.7	2,266	Brown / Green	Highly Turbid	Mud / Moss / Vegetation	Very Mild
WQ-4A	01/21/14	1,690	11.37	7.40	1.75	8.17	164.2	2,452	Green	None	Vegetation	Very Mild
WQ-4A	02/04/14	1,520	12.51	7.46	1.51	7.68	117.0	2,193	Brown	Highly Turbid	Mud / Moss	Vey Mild
WQ-4A	02/18/14	1,690	15.53	7.57	1.68	4.11	40.2	2,604	Brown / Green	Highly Turbid	Mud / Vegetation	Mild
WQ-4A-DUP	02/18/14	1,670	--	--	--	--	--	--	--	--	--	--
WQ-4A	03/04/14	605	15.27	7.50	0.58	1.99	92.1	900	Brown / Clear	Slightly Turbid	Mud / Sand / Vegetation	Very Mild
WQ-4B	01/09/12	1,350	9.61	5.79	1.21	2.52	-13.6	1,659	Brown / Clear	Slightly Turbid	Detritus / Mud	Mild
WQ-4B	01/24/12	1,220	12.16	7.70	1.13	9.71	-176.0	1,661	Brown	Highy Turbid	Mud	Mild

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-4B	02/08/12	844	13.28	6.90	0.81	5.64	176.1	1,240	Brown	Highly Turbid	Mud	Mild
WQ-4B	02/20/12	876	13.55	7.89	0.78	7.60	109.0	1,208	Brown	Highly Turbid	Mud	Mild
WQ-4B	03/05/12	960	13.75	8.02	0.91	6.59	120.2	1,396	Brown	Moderately Turbid	Mud	Mild
WQ-4B	03/21/12	490	13.76	7.96	0.34	5.47	157.6	546	Brown	Highly Turbid	Mud	Mild
WQ-4B	04/02/12	997	16.25	8.00	0.74	4.57	109.0	1,473	Brown	Moderately Turbid	Boulders / Mud	Very Mild
WQ-4B	04/16/12	999	15.84	6.95	0.84	1.48	-56.5	1,368	Brown	Turbid	Boulders / Mud	Very Mild
WQ-4B	04/30/12	1,100	17.78	7.37	0.91	3.30	201.5	1,792	Clear / Brown	Highly Turbid	Mud	Very Mild
WQ-4B	05/15/12	1,120	19.55	7.68	0.95	1.60	39.0	1,859	Brown	Moderately Turbid	Boulders / Moss / Mud	Very Mild
WQ-4B	05/31/12	1,610	20.62	7.50	1.28	3.89	31.0	2,479	Brown	Mildly Turbid	Boulders / Mud	Very Mild
WQ-4B	06/13/12	1,500	19.10	7.60	1.14	1.71	49.0	2,221	Clear	Highly Turbid	Mud	Very Mild
WQ-4B	07/02/12	2,300	20.60	8.20	1.59	4.91	28.8	3,041	Clear	None	Sand / Mud	Very Mild
WQ-4B-DUP	07/02/12	2,200	--	--	--	--	--	--	--	--	--	--
WQ-4B	07/10/12	1,890	20.60	7.74	1.64	4.45	69.5	3,138	Clear	None	Mud	Mild
WQ-4B	07/31/12	2,040	20.90	8.91	1.67	5.45	18.4	3,186	Clear	None	Mud	None
WQ-4B	08/13/12	2,460	23.70	7.49	--	5.15	-106.3	3,105	Clear	Slightly Turbid	Mud	Very Mild
WQ-4B	08/27/12	2,070	21.82	7.83	1.74	5.55	-67.1	3,308	Clear	None	Mud / Sand	None
WQ-4B	09/10/12	2,300	22.72	7.87	1.77	6.23	-100.2	3,371	Clear	None	Mud / Sand	None
WQ-4B	09/24/12	2,210	22.86	7.95	1.65	6.51	-95.1	3,158	Brown / Clear	None	Mud	None
WQ-4B-DUP	09/24/12	2,240	--	--	--	--	--	--	--	--	--	--
WQ-4B	10/08/12	2,130	20.10	7.78	1.84	5.26	-114.6	3,494	Brown / Clear	None	Mud	None
WQ-4B	10/22/12	1,680	19.57	7.77	1.39	4.29	-128.5	2,681	Brown / Clear	None	Mud	None
WQ-4B	11/05/12	2,220	17.30	7.95	1.36	6.53	-114.9	2,625	Brown / Clear	Slightly Turbid	Mud	None
WQ-4B	11/19/12	2,480	16.41	7.83	1.69	6.42	-154.1	3,213	Brown	Slightly Turbid	Mud	None
WQ-4B	12/03/12	1,740	17.27	7.56	1.57	3.58	-165.2	2,551	Clear	None	Mud / Sand	Very Mild

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-4B	12/18/12	888	13.95	7.62	0.94	7.89	-163.1	1,446	Brown	Moderately Turbid	Mud	Very Mild
WQ-4B	12/31/12	978	10.51	7.93	1.02	6.69	-152.1	1,445	Brown	Moderately Turbid	Mud	Very Mild
WQ-4B	01/14/13	1,350	8.80	7.84	1.20	7.49	-158.8	1,606	Brown	Slightly turbid	Mud	Very Mild
WQ-4B	01/21/13	1,340	8.84	7.75	1.30	4.15	-158.4	1,738	Brown	Moderately Turbid	Mud / Leaves / Sticks	Stagnant
WQ-4B	02/05/13	987	13.96	7.87	0.89	5.87	-157.2	1,376	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4B	02/18/13	1,280	12.82	7.97	1.13	5.70	-144.7	1,685	Clear	None	Mud / Branches	None
WQ-4B	03/04/13	1,240	14.80	8.00	1.03	7.40	-147.1	1,613	Brown	Moderately Turbid	Mud	None
WQ-4B	03/18/13	872	16.45	8.01	0.80	5.24	-147.3	1,315	Brown	Slightly Turbid	Mud / Vegetation	None
WQ-4B	04/02/13	1,080	16.49	8.10	0.99	2.64	-125.0	1,625	Brown	Slightly Turbid	Mud / Moss	None
WQ-4B	04/16/13	1,380	14.66	8.11	1.20	4.69	-103.1	1,862	Clear	None	Mud / Moss	Very Mild
WQ-4B	04/30/13	1,490	18.00	7.32	1.35	2.50	76.9	2,256	Brown	Slightly Turbid	Mud	None
WQ-4B	05/14/13	1,690	21.45	7.38	1.36	2.70	-110.9	2,453	Brown	None	Mud	None
WQ-4B	05/28/13	1,770	19.23	7.55	1.82	4.73	-73.5	3,072	Tan	Moderately turbid	Mud / Vegetation	--
WQ-4B	06/11/13	2,270	19.25	7.65	2.04	5.17	-82.1	3,414	Tan	Moderately Tubid	Mud / Vegetation	None
WQ-4B	06/25/13	2,220	19.90	7.60	2.06	4.03	-72.9	3,502	Clear	None	Mud / Moss	None
WQ-4B	07/08/13	1,480	22.60	7.82	1.42	5.84	-57.9	2,613	Tan	Moderately turbid	Mud / Vegetation	None
WQ-4B	07/22/13	1,820	20.89	7.34	1.89	3.92	29.0	3,262	Clear	Slightly Turbid	Mud / Moss / Sand	Very Mild
WQ-4B	08/05/13	2,080	20.00	7.60	2.06	4.44	-16.8	3,513	Clear	None	Mud / Moss	None / Vegetation growing on water
WQ-4B	08/20/13	2,220	20.22	7.66	2.36	6.43	-54.2	4,010	Clear	Slightly Turbid	Mud / Sand / Cobble	Very Mild
WQ-4B	09/04/13	2,270	23.10	7.10	2.21	3.70	0.8	3,997	Brown / Clear	None	Mud / Vegetation	None

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
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Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-4B	09/18/13	2,370	19.70	7.43	1.64	6.90	192.8	2,809	Clear	Slightly Turbid	Mud / Vegetation	None
WQ-4B	10/01/13	1,710	17.09	7.54	1.35	7.09	190.1	2,201	Clear	--	Mud / Moss	MIld
WQ-4B	10/14/13	1,990	16.90	8.17	2.09	3.88	80.5	3,331	Brown / Clear	Moderately Turbid	Mud / Sand / Vegetation	Very Mild
WQ-4B	10/29/13	681	15.33	7.42	0.69	9.94	79.5	1,116	Brown / Clear / Green	Highly Turbid	Mud / Moss / Vegetation	Very Mild
WQ-4B	11/12/13	2,200	13.82	7.33	2.23	3.48	103.5	3,277	Brown / Clear	Moderately Turbid	Mud / Moss / Sand / Vegetation	Very Mild
WQ-4B	11/25/13	2,030	12.55	7.10	1.70	2.51	-30.1	2,457	Brown	None	Mud / Moss / Vegetation	Very Mild
WQ-4B	12/09/13	1,450	10.72	7.66	1.82	5.17	-15.6	2,512	Brown	Highly turbid	MUd / Moss / Vegetation	Very mild
WQ-4B	12/24/13	1,680	9.41	7.76	1.69	5.75	97.9	2,253	Brown	Highly Turbid	Mud / Vegetation	None
WQ-4B	01/07/14	1,390	9.39	7.45	2.03	1.70	-112.2	2,682	Clear	Slighlty Turbid	Mud / Moss / Vegetation	Very Mild
WQ-4B	01/21/14	1,770	9.54	7.29	1.85	2.85	-30.7	2,472	Brown / Clear	None	Vegetation	Very Mild
WQ-4B	02/04/14	1,080	12.41	7.47	1.45	6.71	82.8	2,113	Brown	--	Concrete	None, concrete channel
WQ-4B	02/18/14	1,730	14.01	7.51	1.73	2.85	-9.6	2,596	Brown / Clear / Red	None	Mud / Cobble / Sand / Vegetation	Very mild
WQ-4B	03/04/14	613	15.29	7.58	0.59	2.37	103.9	954	Brown	Slightly Turbid	Mud / Sand / Vegetation	Very Mild
WQ-5	09/04/13	2,410	23.20	7.70	2.33	6.99	29.5	4,217	Clear	None	Moss / Concrete channel / Vegetation	None, Concrete Channel
WQ-5	09/18/13	2,760	21.10	7.46	2.12	10.12	179.1	3,711	Clear	None	Moss / Concrete	None, Concrete Channel
WQ-5	10/01/13	2,040	17.05	7.62	0.97	7.54	195.9	1,603	Clear	Slighlty Turbid	Moss	None, Concrete Channel
WQ-5	10/14/13	1,460	19.40	8.79	1.44	8.45	197.0	2,465	Clear / Green	None	Moss / Concrete	None; Concrete Channel

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
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Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-5	10/29/13	1,700	16.13	7.29	1.59	10.10	158.1	2,498	Clear / Green	Slighlty Turbid	Moss / Concrete	None, Concrete Channel
WQ-5-DUP	10/29/13	1,490	--	--	--	--	--	--	--	--	--	--
WQ-5	11/12/13	2,310	14.47	7.61	2.56	5.52	141.5	3,778	Clear	None	Moss / Concrete	None,Concrete Channel
WQ-5	11/25/13	2,880	16.14	7.48	2.39	9.86	158.9	3,701	Clear	None	Moss / Sand / Concrete	None, Concrete Channel
WQ-5	12/09/13	2,860	13.04	7.51	2.68	9.47	176.1	3,834	Brown / Clear	Slighty turbid	Moss / Sand / Concrete	None; Concrete channel
WQ-5	12/24/13	2,990	11.38	7.63	3.25	9.00	126.1	4,403	Clear	None	Moss / Concrete	None
WQ-5-DUP	12/24/13	2,290	--	--	--	--	--	--	--	--	--	--
WQ-5	01/07/14	2,100	13.23	8.43	2.43	10.10	192.6	3,503	Clear	Slighlty Turbid	Moss / Sand / Concrete	None, Concrete Channel
WQ-5	01/21/14	2,000	19.41	7.36	2.11	8.95	182.7	3,552	Clear	None	Mud / Sand / Vegetation / Concrete	None, Concrete Channel
WQ-5	02/04/14	1,780	17.51	7.26	1.78	7.71	168.5	2,896	Clear	Slightly Turbid	Concrete	None, concrete channel
WQ-5-DUP	02/04/14	1,880	--	--	--	--	--	--	--	--	--	--
WQ-5	02/18/14	2,820	18.16	7.87	2.85	9.86	149.9	4,582	Clear / Green	None	Concrete	None; Concrete Channel
WQ-5	03/04/14	2,290	15.90	7.75	1.93	9.70	131.4	3,025	Clear	Slightly Turbid	Moss / Concrete	None; Concrete Channel
WQ-6	09/18/13	2,070	20.60	8.21	1.41	10.00	252.4	2,492	Clear	None	Cobble / Sand / Vegetation / Concrete	None, Concrete Channel
WQ-6-DUP	09/18/13	2,080	--	--	--	--	--	--	--	--	--	--

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-6	10/01/13	1,820	22.82	7.32	1.39	5.68	178.5	2,582	Clear	Slightly Turbid	Concrete	None, Concrete Channel
WQ-6	10/14/13	1,330	19.00	8.82	1.26	8.21	215.9	2,165	Clear	None	Cobble / Sand / Concrete	None; Concrete Channel
WQ-6	10/29/13	670	16.83	7.74	0.65	18.40	108.2	1,090	Clrar / Red	Slighlty Turbid	Cobble / Sand / Vegetatiom / Concrete	None, Concrete Channel
WQ-6	11/12/13	2,140	14.37	8.02	2.27	5.11	118.5	3,383	Clear	None	Cobble / Sand / Vegetation / Concrete	None, Concrete Channel
WQ-6	11/25/13	2,180	15.12	5.18	1.78	8.93	104.3	2,741	Clear	None	Sand / Vegetation / Concrete	None, Concrete Channel
WQ-6	12/09/13	1,740	11.81	8.19	1.16	9.70	75.6	1,684	Clear	Slighty turbid	Cobble / Sand / Vegetation / concrete	None; Concrete channel
WQ-6-DUP	12/09/13	1,380	--	--	--	--	--	--	--	--	--	--
WQ-6	12/24/13	2,130	11.41	8.28	2.18	11.36	172.2	3,021	Brown	Moderate Turbid	Concrete / Mud / Grass / Trash	None
WQ-6	01/07/14	2,300	12.34	8.49	2.47	10.65	121.6	3,490	Clear	Slighlty Turbid	Cobble / Sand / Vegetation / Concrete	None, Concrete Channel
WQ-6	01/21/14	2,260	13.17	8.15	2.34	11.98	172.5	3,378	Clear	Slightly Turbid	Vegetation / Concrete	None, Concrete Channel
WQ-6	02/04/14	1,460	12.67	8.04	1.89	8.21	151.3	1,871	Clear	Slightly Turbid	Concrete	None, concrete channel
WQ-6	02/18/14	2,400	16.11	8.23	2.38	7.21	120.2	3,683	Clear / Green	None	Moss / Vegetation / Concrete	None; Concrete Channel
WQ-6	03/04/14	1,620	15.95	8.13	1.53	4.15	110.7	2,409	Brown / Clear	--	Mud / Sand / Vegetation / Concrete	None; Concrete Channel

Table 2

Water Quality Monitoring Data for Receiving Waters
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Sample Location	Date	Laboratory Analysis	Field Monitoring						Visual Observation			
		TDS (mg/L)	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	ORP (mV)	Conductivity (µS/cm)	Color	Turbidity	Sedimentation	Erosion
WQ-7	09/18/13	1,960	22.40	7.27	1.44	7.09	293.9	2,642	Brown	Highly Turbid	Moss / Vegetation / Concrete	None, Concrete Channel
WQ-7	10/01/13	1,820	18.42	8.18	1.39	9.10	221.6	2,344	Clear	Slightly Turbid	Concete	None, Concrete Channel
WQ-7	10/14/13	1,590	23.10	7.90	1.87	4.64	193.2	3,426	Clear / Green	Slighty Turbid	Mud / Moss / Cobble / Cocrete	None; Concrete Channel
WQ-7	10/29/13	1,310	19.52	7.21	1.29	15.00	99.2	2,224	Brown / Clear	Moderately Turbid	Vegetation / Concrete	None, Concrete Channel
WQ-7	11/12/13	1,840	21.51	7.28	0.97	4.36	105.9	1,782	Clear / Green	Slightly Turbid	Vegetation / Concrete	None, Concrete Channel
WQ-7	11/25/13	1,680	22.36	7.15	1.59	3.68	84.5	2,897	Clear	None	Vegetation / Concrete	None, Concrete Channel
WQ-7-DUP	11/25/13	1,910	--	--	--	--	--	--	--	--	--	--
WQ-7	12/09/13	1,320	20.17	7.56	1.51	4.11	0.7	2,625	Clear	Slighty turbid	Vegetation / concrete	None; Concrete channel
WQ-7	12/24/13	1,850	19.22	7.42	1.96	6.55	145.2	3,287	Clear	Mild	Concrete / Sand / Grass	None
WQ-7	01/07/14	1,830	18.93	7.52	2.11	7.20	101.5	3,507	Clear	Slighlty Turbid	Vegetation / Concrete	None, Concrete Channel
WQ-7	01/21/14	2,320	15.09	8.10	2.57	15.40	163.1	3,870	Clear	Slightly Turbid	Concrete	None, Concrete Channel
WQ-7	02/04/14	1,580	12.41	7.81	1.18	13.02	116.1	1,732	Clear	Slightly Turbid	Moss / Concrete	None, concrete channel
WQ-7	02/18/14	2,280	17.19	7.73	2.32	5.99	125.1	3,679	Brown / Clear	Moderately Turbid	Mud / Moss / Vegetation / Concrete	None; Concrete Channel

Table 2

Water Quality Monitoring Data for Receiving Waters
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WQ-7	03/04/14	1,790	16.11	7.60	1.62	2.68	118.8	2,562	Clear	Slightly Turbid	Mud / Sand / Vegetion / Concrete	None; Concrete Channel

Notes:
DUP = Duplicate
TDS = Total dissolved solids
DO = Dissolved oxygen
ORP = Oxidation-reduction potential
mg/L = Milligrams per liter
°C = Degrees Celsius
ppt = Parts per thousand
mV = Millivolts
µS/cm = Microsiemens per centimeter

Table 3

Hydraulic Groundwater Modeling Results and TDS Loading Estimates
Mission Valley Terminal, San Diego, CA
ARCADIS CM010143.0156

Reach	Groundwater Surface Water Interaction				TDS Estimate[3]		TDS Loading			Monitoring Locations used for TDS estimates[3]
	No-Pumping Condition[1] (gpm)	Remedial Pumping Condition[1] (gpm)	Stream Condition[2]	Pumping Induced Difference (gpm)	Conductivity (µS/cm)	TDS Concentration (mg/L)	No-Pumping Condition (lb/day)	Remedial Pumping Condition (lb/day)	Pumping Induced Difference (lb/day)	
1	17.6	15.1	Gaining	-2.5	4,176	2,673	565	485	-80	S-9, S-12, and S-13
2	12.0	1.9	Gaining	-10.1	4,176	2,673	385	62	-323	S-9, S-12, and S-13
3	0	0	Neutral	0	--	--	--	--	--	--
4	-2.3	-67.3	Losing	-65.0	--	1,680	-46	-1,356	-1,309	WQ-07
5	90.3	90.3	Gaining	0	3,066	1,962	2,124	2,124	0	No neighboring monitorong wells. Median conductivity value of all Gaining reaches.
6	30.1	29.9	Gaining	-0.1	3,066	1,962	708	704	-3	No neighboring monitorong wells. Median conductivity value of all Gaining reaches.
7	-19.4	-41.5	Losing	-22.1	--	1,970	-458	-979	-522	WQ-03
8	140	122	Gaining	-18.1	3,066	1,962	3,284	2,859	-425	R-61AS and R-62AS
9	106	78.5	Gaining	-27.1	2,952	1,889	2,391	1,778	-614	R-82AS, R-31AS, R-46AS, R-64AS, and R-63AS. 3Q13 for R-30AS, R-65AS.
10	29.2	21.2	Gaining	-8.1	3,547	2,270	796	576	-219	R-24AS, R-28AS, R-26AS, R-23AS, R-83AS, and R-25AS
11	83.3	73.6	Gaining	-9.7	2,882	1,844	1,843	1,628	-215	R-24AS and R-28AS
12	302	301	Gaining	-1.4	1,641	1,050	3,804	3,787	-17	R-29AS
Groundwater Discharge	**792**	**624**	**Gaining**	**-167**			**15,396**	**11,669**	**-3,727**	
Remedial Discharge[4]	**0**	**171**		**171**		**1,865**	**0**	**3,824**	**3,824**	GW-EFFLUENT (TDS)
Net Difference				**4**					**97**	

Notes:
TDS = Total Dissolved Solids
gpm = gallons per minute
lbs/day = pounds per day
µS/cm = microsiemens per centimeter

1. Negative flow rate values indicate flow from surface water to groundwater Positive flow rate values indicate flow from groundwater to surface water.
2. A "Gaining" stream condition represents discharge from groundwater to surface water. A "Losing" stream condition represents recharge from surface water to groundwater.
3. TDS Concentrations: -Representative TDS concentrations for water transfering between the aquifer and surface water were selected from data collected in the fourth quarter of 2013, except as noted.
   -Groundwater to surface water flow (gaining reach) used conductivity values observed in nearby groundwater monitoring wells.
   -Surface water to groundwater flow (losing reach) used TDS concentrations observed at upstream water quality monitoring locations.
4. Remedial Pumping Condition assumes 171 gallons per minute of treated groundwater discharge.

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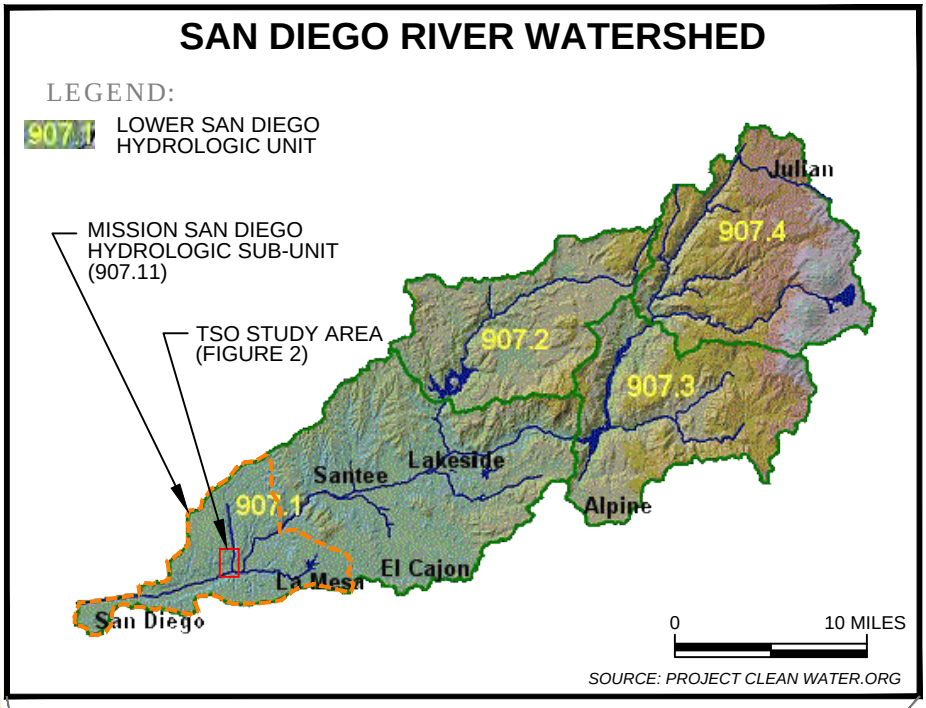
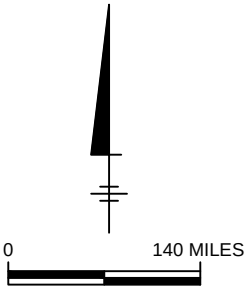
Figures





MISSION VALLEY TERMINAL
SAN DIEGO, CALIFORNIA

SITE LOCATION

ARCADIS

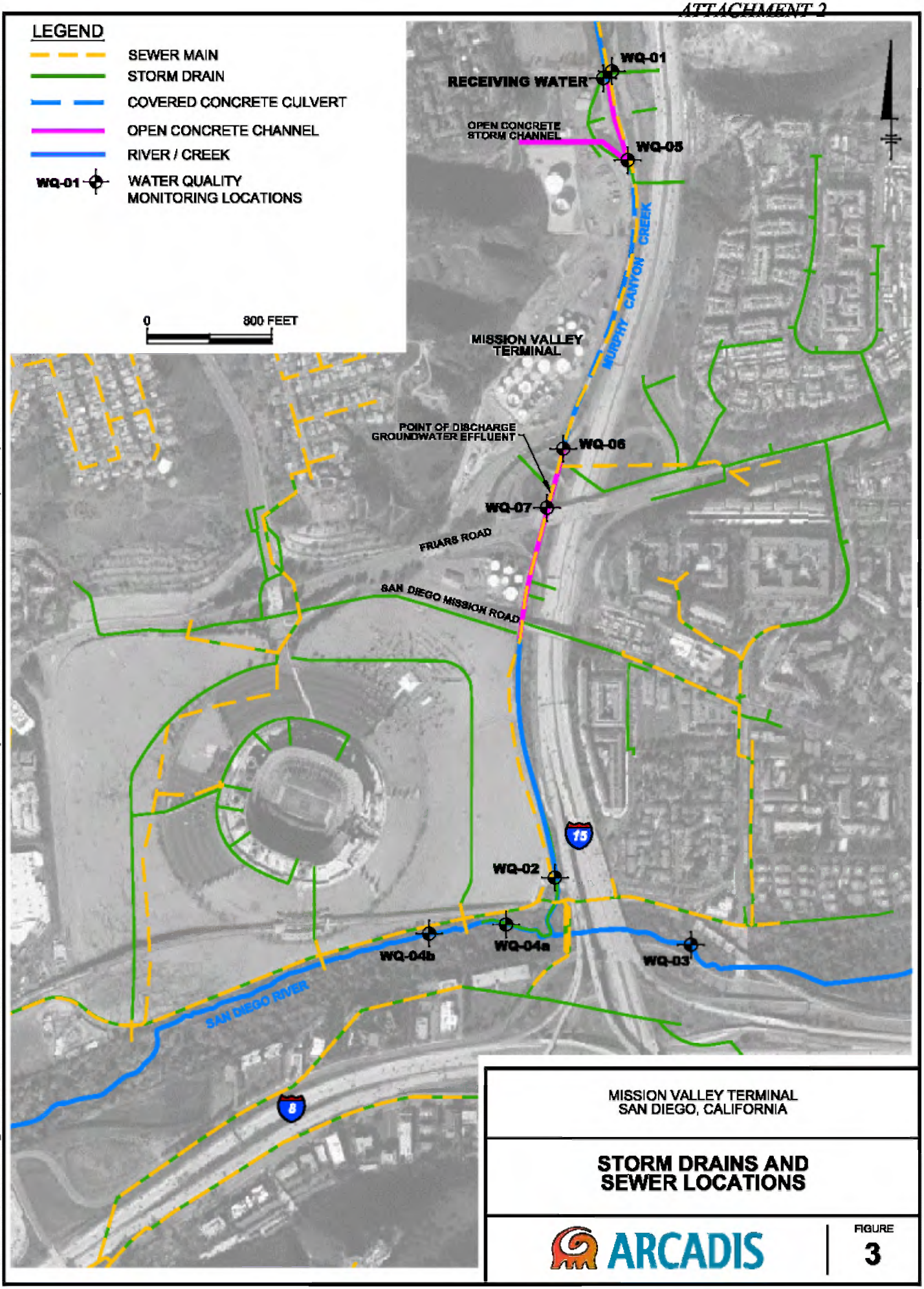
FIGURE
1

MISSION VALLEY TERMINAL
SAN DIEGO, CALIFORNIA

TSO STUDY AREA

ARCADIS

FIGURE
2



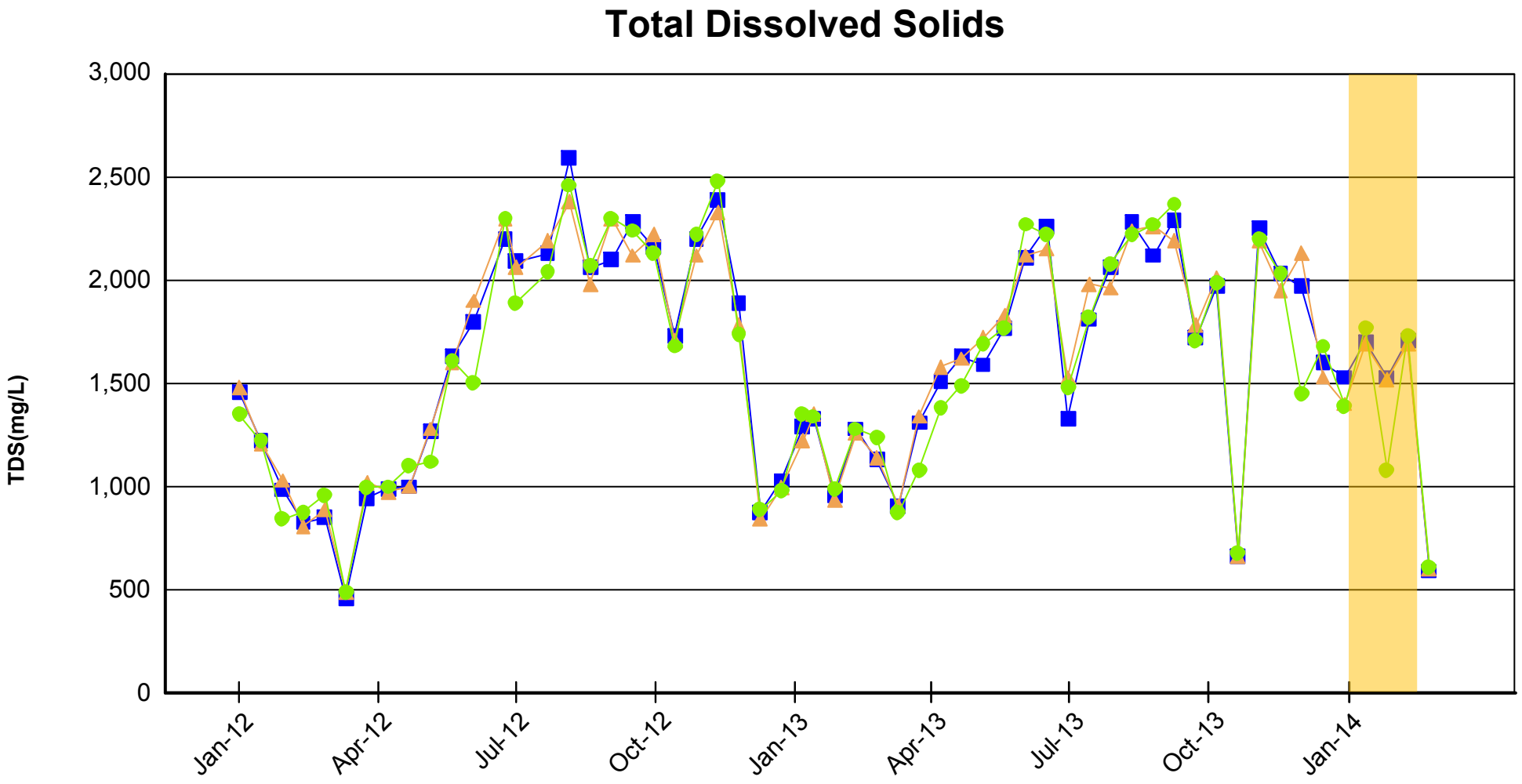
MISSION VALLEY TERMINAL
SAN DIEGO, CALIFORNIA

STORM DRAINS AND SEWER LOCATIONS

ARCADIS

FIGURE
3

San Diego River - Upstream and Downstream of Murphy Canyon Creek Confluence

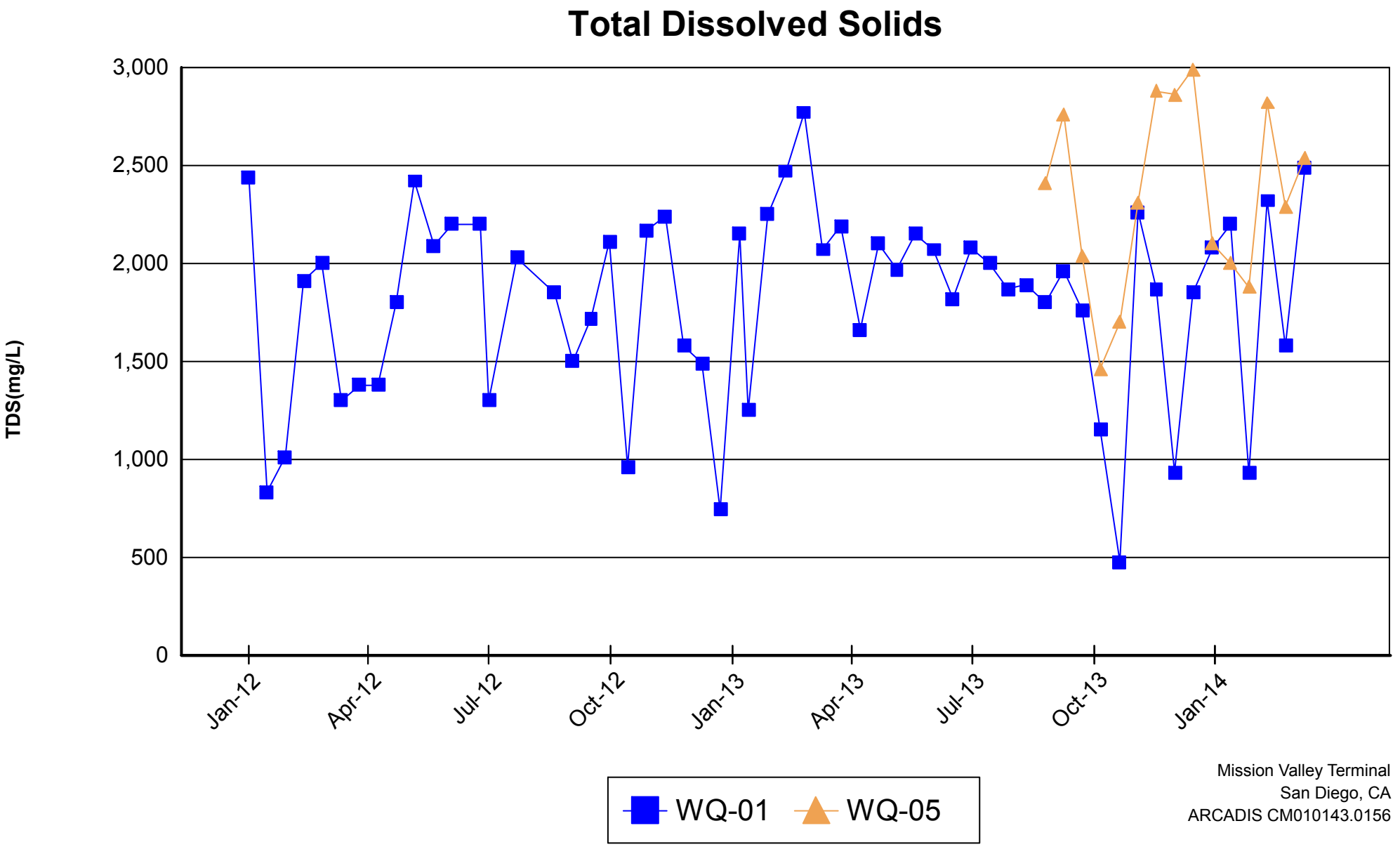


Remedial discharge reduced from 2013 average of 693 gpm to February 2014 average of 123 gpm.

Mission Valley Terminal,
San Diego, CA
ARCADIS CM010143.0156

Figure 4

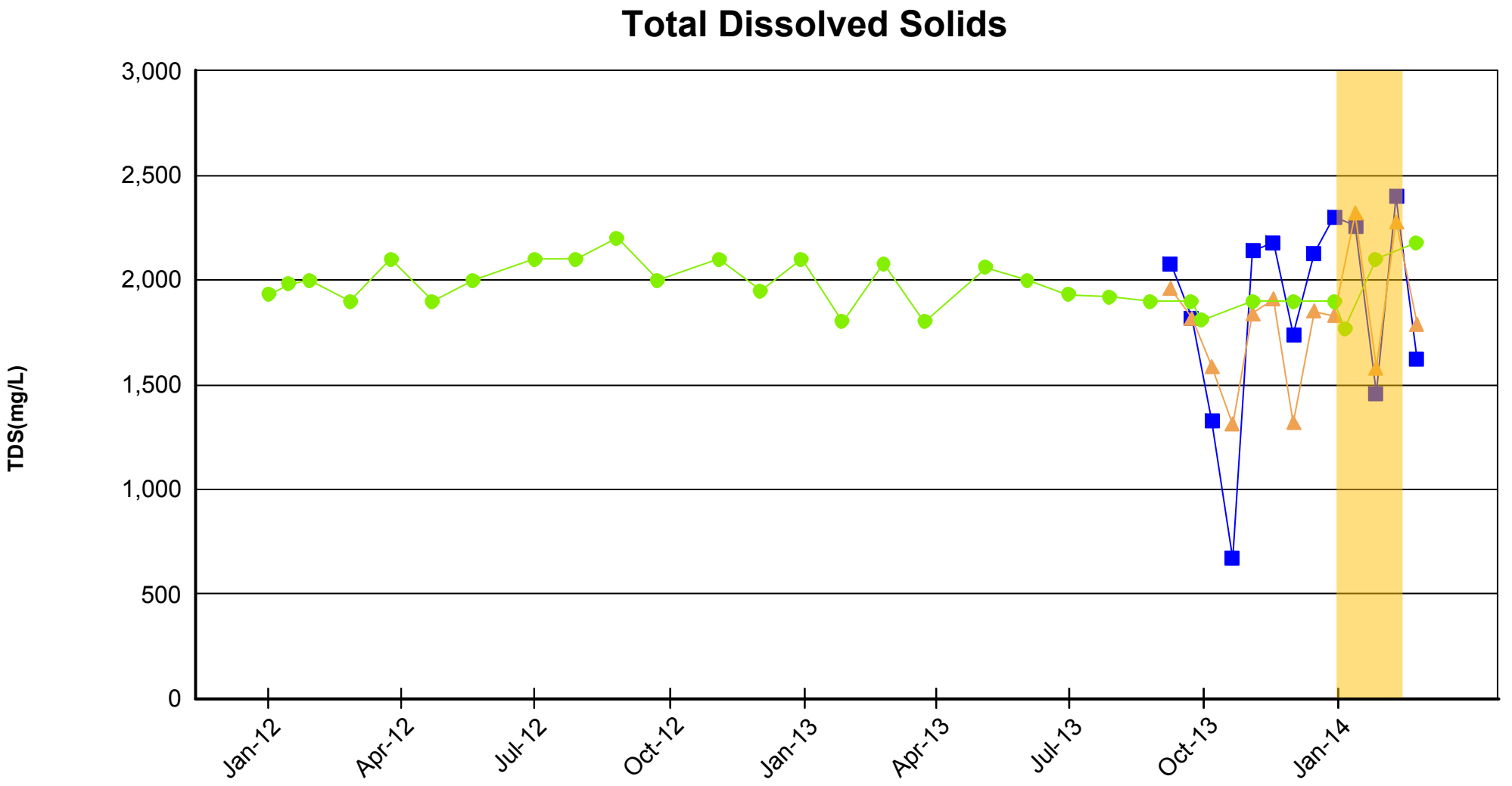
Murphy Canyon Creek - Upstream and Downstream of North Storm Drain Channel



Mission Valley Terminal
San Diego, CA
ARCADIS CM010143.0156

Figure 5

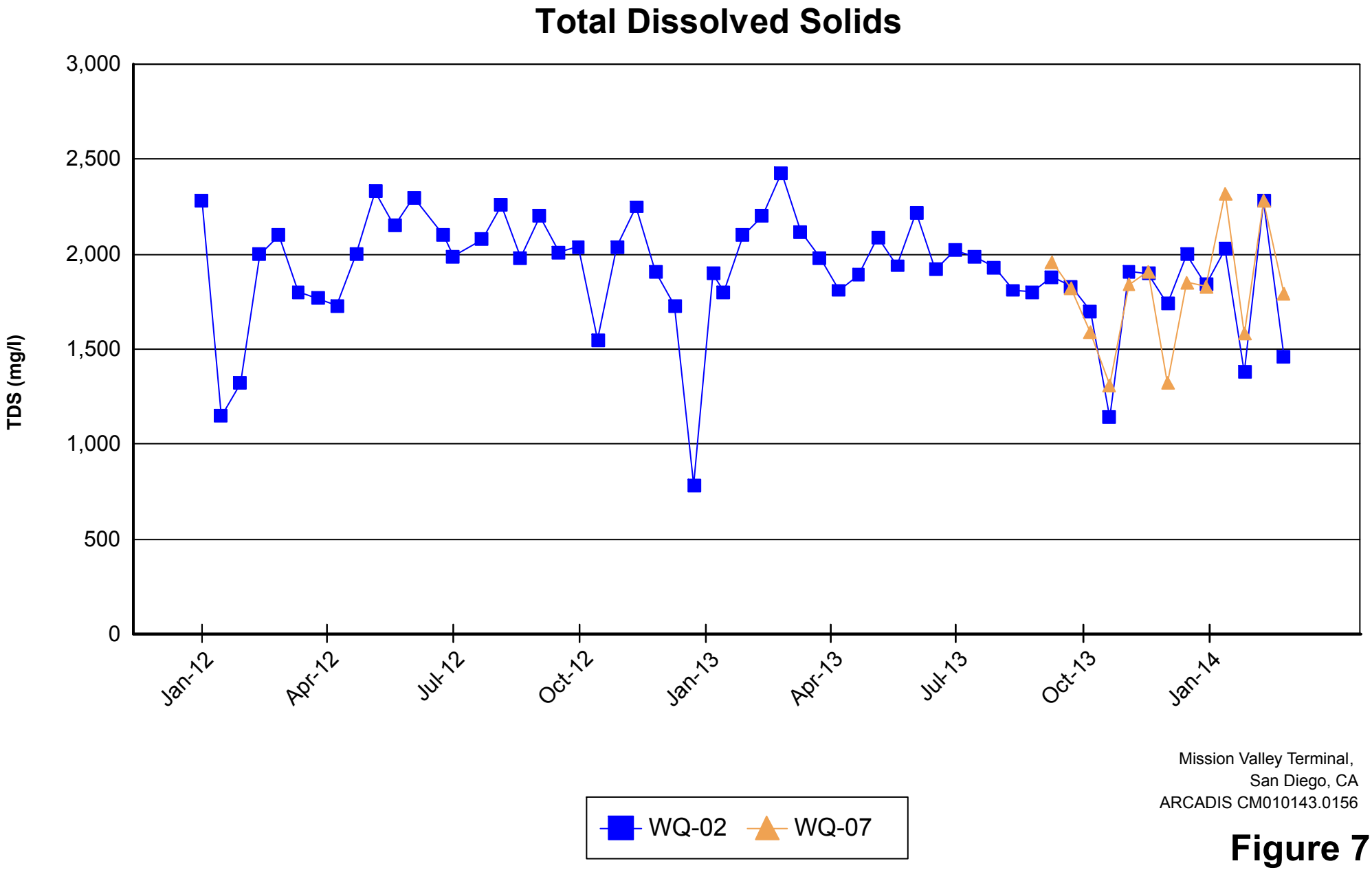
Murphy Canyon Creek - Upstream and Downstream of MVT Discharge and Storm Culvert



Mission Valley Terminal,
San Diego, CA
ARCADIS CM010143.0156

Figure 6

Murphy Canyon Creek - Upstream and Downstream of Natural Unlined South Reach



Mission Valley Terminal,
San Diego, CA
ARCADIS CM010143.0156

Figure 7

LEGEND

RIVER / CREEK

AREA OF HYDRAULIC MODEL

WQ-01 WATER QUALITY MONITORING LOCATIONS

1 STREAM REACH NUMBER

0 1250' 2500'

GRAPHIC SCALE

RECEIVING WATER

OPEN CONCRETE STORM CHANNEL

WQ-01

WQ-02

WQ-03

WQ-04a

WQ-04b

WQ-05

WQ-06

WQ-07

MISSION VILLAGE DRIVE

FRIARS ROAD

SAN DIEGO MISSION ROAD

MURPHY CANYON CREEK

SAN DIEGO RIVER

805

15

8

1 2 3 4 5 6 7 8 9 10 11 12

MISSION VALLEY TERMINAL
SAN DIEGO, CALIFORNIA

HYDRAULIC GROUNDWATER MODELING STREAM REACH DESIGNATIONS

ARCADIS

FIGURE 8

KATHARINE E. WAGNER (Bar No. 119429)
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Attorneys for Petitioner
KINDER MORGAN ENERGY PARTNERS, L.P.

BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

In the Matter of Kinder Morgan Energy Partners, L.P.'s, Petition for Review of Action by the San Diego Regional Water Quality Control Board's Denial of Request to Rescind or Modify Time Schedule Order Time Schedule Order No. R9-2011-0052.	**AFFIDAVIT OF MARCELO A. GARBIERO IN SUPPORT OF KINDER MORGAN ENERGY PARTNERS, L.P. PETITION FOR REVIEW AND REQUEST FOR STAY [WATER CODE §§ 13320-13321]**

I, Marcelo A. Garbiero, hereby declare and state as follows:

4. I am a Principal Civil Engineer with ARCADIS U.S., Inc., and a licensed Professional Civil Engineer in California with 14 years' experience in the field of remediation and treatment system engineering.

5. Attached as Exhibit A is a true and correct copy of a Technical Letter I have prepared, dated December 23, 2014, and titled *Estimated Impacts of Compliance with Future Tasks in Time Schedule Order R9-2011-0052 (TSO) if the Discharge of Treated Groundwater must be Treated to Reduce TDS, and Other Short Term Cost Impacts of Regional Board Direction of November 26, 2014* (the ARCADIS Technical Letter).

6. The ARCADIS Technical Letter estimates costs associated with meeting ongoing and future requirements issued in the Time Schedule Order, Order No. R9-2011-0052 (TSO) of the San

Diego Regional Water Quality Control Board (Regional Board), including design, construction, and operation of a reverse osmosis treatment system for the discharge of treated groundwater from Mission Valley Terminal operated by SFPP, L.P., an operating partnership of Kinder Morgan Energy Partners, L.P. (Kinder Morgan). The discharge of treated groundwater is addressed in the TSO and the November 26, 2014, letter from David Gibson, Executive Officer of the Regional Board, to Scott Martin of Kinder Morgan. The ARCADIS Technical Letter also provides estimates of costs associated with other known or potential elements of TSO compliance, such as ongoing monitoring and evaluation of potential for reinjection of the discharge as an alternate disposal method.

7. I am the ARCADIS principal engineer in responsible charge of remediation system operations at the Mission Valley Terminal in accordance with Addendum No. 5 to Cleanup and Abatement Order No. 92-01.

8. I am familiar with the remediation activities at the Mission Valley Terminal, particularly operation of the systems extracting, treating and discharging treated groundwater from the site under NPDES General Permit No. 2008-0002, based on firsthand involvement as an engineer on the remediation project over the past 10 years. I am familiar with the remediation project documents submitted pursuant to the NPDES General Permit and the TSO, and those developed and in process relating to the design and feasibility of the potential mitigation options of reverse osmosis treatment and reinjection of the treated groundwater discharge.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed December 23, 2014, in San Diego, California

By: _____
MARCELO A. GARBIERO, P.E.

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Infrastructure · Water · Environment · Buildings

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Sacramento, California 95825

ENVIRONMENT

Subject:
Estimated Impacts of Compliance with Future Tasks in Time Schedule Order R9-2011-0052 (TSO) if the Discharge of Treated Groundwater must be Treated to Reduce TDS, and Other Short Term Cost Impacts of Regional Board Direction of November 26, 2014.

Date:
December 23, 2014

Contact:
Marcelo Garbiero, P.E.

Phone:
562.496.3000

Email:
marcelo.garbiero@arcadis-us.com

Our ref:
CM010143.0133

Dear Ms. Wagner:

ARCADIS U.S., Inc. (ARCADIS) has prepared the following letter on behalf of SFPP, L.P., an operating partnership of Kinder Morgan Energy Partners, L.P. (Kinder Morgan) providing a description of estimated future costs of tasks Kinder Morgan will perform in response to the requirement set forth in Time Schedule Order No. R9-2011-0052 (TSO). These "estimated future costs" cover the period from the date of submittal of this letter through the end of the State Water Resources Control Board's (SWRCB) 270-day review period. As discussed in further detail below, the end of this review period coincides with the TSO's September 30, 2015 deadline to complete construction of a treatment system to reduce total dissolved solids (TDS) in the treated groundwater discharge. While some uncertainty exists regarding which mitigation measure would be employed, in either case the estimated future costs between now and the end of September 2015 would be substantial, falling within the range of $1 million to $2.5 million in capital expenditures. Subsequently, resources would be expended on commissioning, startup, and operations of a constructed system, with an increase in annual operating costs ranging from $160,000 to $180,000.

The discharger submitted the *Demonstration of Compliance and Status for TSO No. R9-2011-0052* on April 15, 2014 to the Regional Water Quality Control Board, San Diego Region (RWQCB) which demonstrated that the discharge does not "cause or contribute to an in-stream excursion or violation of the Basin Plan" and therefore fulfilled the requirements of the TSO. On November 26, 2014, the RWQCB issued a response that it was ". . . unable to grant [Kinder Morgan's] request . . ." and that all ongoing and future requirements remain in effect. The discharger still concludes

compliance has been demonstrated and no additional mitigation measures are called for.

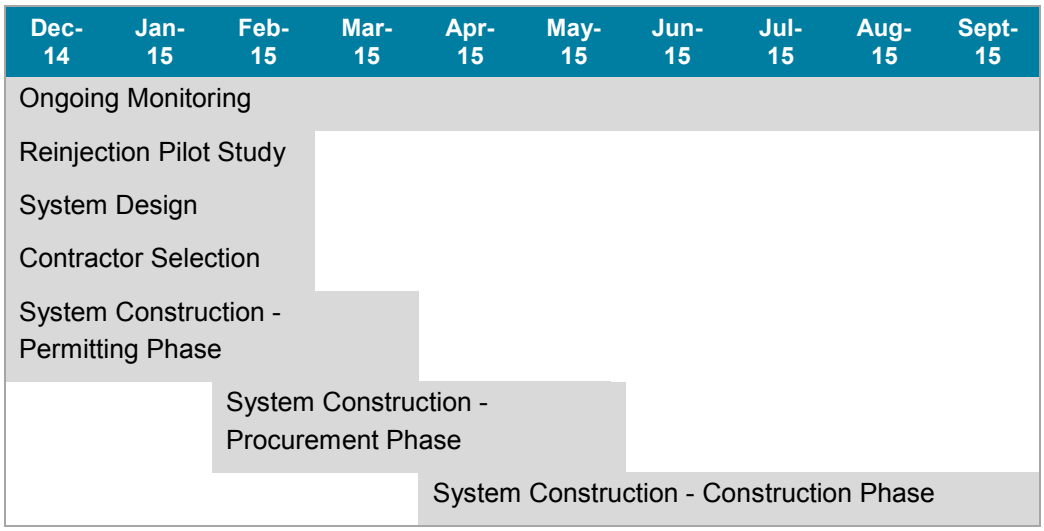
Kinder Morgan is committed to continuing to comply with all the requirement of the TSO as it has done to date. Based on the Regional Board's action on November 26, 2014, Kinder Morgan continues to pursue the potential installation of a reverse osmosis treatment system as described in the *Total Dissolved Solids Treatment Feasibility Study and Evaluation* dated March 28, 2014. Additionally, Kinder Morgan continues to pursue the development of a potential groundwater reinjection system as an alternative means of treated groundwater disposal. These potential mitigation options are discussed further below.

The following sections provide a breakdown of the estimated future costs that would be incurred by Kinder Morgan in compliance with ongoing requirements of the TSO and future milestones, specifically those listed in Items 8 through 11 of the TSO Compliance Schedule. These sections are:

- TDS Treatment System Design and Contractor Selection
- TDS Treatment System Construction
- Alternate Disposal Option – Groundwater Reinjection Pilot Testing
- Potential System Operation Costs
- Ongoing Monitoring of Water Quality

These estimated future costs have been prepared based on their respective level of project definition. The project level definition is higher with definitive cost estimates for near term tasks (i.e., through first quarter of 2015), whereas project level definition is lower with preliminary cost estimates for the more distant tasks (i.e., second and third quarters of 2015) which are still in the design phase. The estimated schedule for execution of these tasks is summarized in the table below.

Schedule Summary



The expenditure for near term tasks is spread evenly across the schedule shown. The expenditure for the more distant tasks will not be evenly spread within their periods of execution. While it is not feasible at this stage to provide a detailed cash flow for these tasks, it is anticipated that there would be more spending at the start of each phase as equipment providers and construction contractors are issued payments for procurement of materials and commitment of time. Further details are provided in the sections below.

TDS Treatment System Design and Contractor Selection

Kinder Morgan has previously completed the required treatment option feasibility study and treatment system preliminary design in compliance with Items 5 and 6 of the TSO Compliance Schedule. Item 8 of the TSO Compliance Schedule states that the Discharger must "[c]omplete final design and select contractor for construction of treatment system." no later than January 30, 2015.

ARCADIS is currently completing final design of a treatment system, on behalf of Kinder Morgan, that would provide a reduction of total dissolved solids in the treated groundwater discharged under the General Permit. This treatment system would be a new reverse osmosis unit process added to the existing groundwater treatment system. The new system would require the inclusion of pH adjustment pre-treatment and post-treatment to manage fouling risks to the reverse osmosis system. The

implementation of a reverse osmosis system requires the discharge of a concentrated brine waste to the municipal sewer system. This system will require a quarter mile brine discharge line to be installed underground within the active Terminal area, which is a component of this design.

The estimated future costs that would be incurred by Kinder Morgan by continuing to pursue design of this potential treatment system are summarized in the table below.

Cost Estimate – Design and Contractor Selection

Task	Basis of Estimate	Cost Estimate
Finalize Design of Treatment System (Design Phase)	Currently contracted scope of work	$32,000
Select Contractor (Bid Phase)	Currently contracted scope of work	$10,000

Treatment System Construction

Item 9 of the TSO Compliance Schedule states that by April 30, 2014, the Discharger must "[b]egin construction of selected treatment option, if other options, which were identified in workplan (sic) and pursued by the Discharger are ineffective in demonstrating compliance with Discharge Prohibition IV.C." Currently, construction of the treatment system is planned to include the following major categories:

- Purchase of wastewater discharge capacity to sewer (connection fee),
- Fabrication of equipment, primarily the reverse osmosis system, tanks, and electrical control panels,
- Site grading and preparation,
- Trenching and installation of underground brine discharge conveyance,
- Procurement of piping, pumps, valves, instrumentation, and other ancillary equipment,
- Construction of concrete foundation and secondary containment,
- Mechanical and electrical installation of all procured equipment.

Item 10 of the TSO Compliance Schedule states that the Discharger must "[c]omplete construction" no later than September 30, 2015. Construction would

therefore be estimated to occur between approximately April 15, 2015 and September 15, 2015, ahead of the respective TSO deadlines.

The estimated future costs that would be incurred by Kinder Morgan by proceeding to construct this potential treatment system are summarized in the table below.

Cost Estimate – Treatment System Construction

Task	Basis of Estimate	Cost Estimate
Wastewater Discharge Capacity Connection Fee (Permitting Phase)	Final estimate provided by City Industrial Wastewater Control Program for 31 gpm of brine discharge	$664,907
Reverse Osmosis System Procurement & Construction (Procurement Phase)	Formal Vendor Proposal – Bauer International Corp. Proposal No. P092014-5	$148,111
Fabricated Equipment Procurement (Procurement Phase)	Engineer's estimate based on current conceptual design and previous system construction	$150,000
Construct Treatment System (Construction Phase)	Engineer's estimate based on current conceptual design and previous system construction	$1,450,000

It is estimated that approximately $814,000 would be committed by the April 30, 2015 deadline to begin construction. This includes 100 percent of permit fees and a 50 percent down payment for equipment procurement tasks. Subsequently, it is reasonable to expect 20% of the construction phase costs, or approximately $290,000, will be committed in the first 30 days of construction, between April and May 2015, in order to mobilize construction contractors to the site for the construction phase. The balance of these costs, $1.31M, would then be distributed through the construction phase, from April 2015 through September 2015, as equipment is delivered and phases of construction are completed, in accordance with contracting terms yet to be negotiated. It is expected that all of these costs would be committed ahead of the September 30, 2015 deadline since all of the permitting, procurement, and construction would need to be fully executed to comply with the deadline.

Alternate Disposal Options – Groundwater Reinjection Pilot Study

Item 4 of the TSO Compliance Schedule required the submission of a work plan that included ". . . options, including at least one option for additional treatment of the discharge . . ." to address compliance with Discharge Prohibition IV.C. The discharger proposed a number of alternative mitigation options in the *TDS Loading Mitigation Options Work Plan for Time Schedule Order No. R9-2011-0052* dated September 27, 2013. In addition to the option of demonstrating compliance through required studies, and the option of reverse osmosis treatment, the work plan included a number of disposal options such as reinjection into the aquifer, discharge to Publicly Owned Treatment Works (POTW) or water reclamation facility, and land application.

The status of the proposed options was subsequently updated in the *Demonstration of Compliance and Status for TSO No. R9-2011-0052* dated April 15, 2014 and the *Total Dissolved Solids Loading Mitigation Plan* dated June 30, 2014. Land application was deemed infeasible as it would not be able to accommodate the discharge flow rate required. In response to a permit application, the City of San Diego Industrial Wastewater Control (IWCP), stated in an October 17, 2014 letter that the permit ". . . cannot be approved at this time . . ."; effectively making discharge to the POTW infeasible. Therefore, reinjection into the aquifer is the only alternate disposal option that has been carried forward, and the discharger has been performing pilot study to evaluate the technical feasibility of this option.

The discharger successfully completed a short term groundwater reinjection pilot study between July 28 and August 1, 2014 to evaluate the feasibility of reinjection as a means of disposing treated groundwater. This study concluded that the aquifer was capable of receiving approximately 12 to 14 gallons per minute (gpm) of treated groundwater at the pilot test well. The discharger recently initiated a long term pilot study to evaluate reduction in injectability over extended and continuous injection, because such changes in injectability are likely to occur based on experience, due to well fouling, with resulting long term reductions in sustainable injection capacity. This long term pilot study is expected to operate for approximately 3 months and conclude in late February 2015.

If the pilot study results conclude that reinjection is a feasible long term option for disposal of treated groundwater, then the discharger may elect to pursue this option instead of finalizing construction of the reverse osmosis treatment system described above. The estimated future costs that would be incurred by Kinder Morgan by

continuing to pursue this alternate disposal option are summarized in the table below.

Cost Estimate – Groundwater Reinjection Pilot Study

Task	Basis of Estimate	Cost Estimate
Long Term Reinjection Pilot Study	Currently contracted scope of work	$42,744
Conceptual Full Scale Reinjection System Design and Construction	Engineer's estimate based on current conceptual design: 15 on-Terminal injection wells, 200 gpm	$1,020,000

Potential System Operation Costs

Subsequent to completion of construction for either the reinjection disposal option or the potential TDS treatment system option at the end of September 2015, the cost implications would continue to mount due to the costs to commission, startup, and operate a constructed system. Annual operations costs would include additional operations and maintenance, monitoring and reporting for compliance purposes, added energy costs for electricity, and in the case of the reverse osmosis system, the cost of waste brine disposal to the sewer. The estimated future annual operating costs that would be incurred by Kinder Morgan if either of the constructed systems was built are summarized in the table below.

Cost Estimate – Potential Annual System Operating Costs

Task	Basis of Estimate	Cost Estimate
Treated Reinjection System Annual Operating Costs	Engineer's estimate based on current conceptual design: 15 on-Terminal injection wells, 200 gpm	$160,000
Reverse Osmosis System Annual Operating Costs	Engineer's estimate based on current conceptual design	$180,000

Ongoing Monitoring of Water Quality

Items 1 and 2 of the TSO Compliance Schedule require the Discharger to implement additional monitoring measures to monitor TDS concentrations in the influent and effluent of the existing groundwater treatment system and to monitor surface water conditions upstream and downstream of the point of discharge to Murphy Canyon Creek. These requirements were initiated late in 2011 and early in 2012, presumably in order to address Item 3 of the TSO Compliance Schedule that states "[s]ubmit technical report summarizing the results of the study to evaluate the potential for discharge to cause, or contribute to an in-stream excursion . . ." no later than June 28, 2013. While this monitoring program has continued well beyond its usefulness as evaluations of data and conclusions have been provided in the *Technical Summary Report for Time Schedule Order (TSO) No. R9-2011-*0052 dated June 28, 2013 and the *Demonstration of Compliance and Status for TSO No. R9-2011-0052* dated April 15, 2014, the monitoring programs continue in their original form because the TSO provided no means for ending monitoring once the study was complete, and the RWQCB also has not responded to our request submitted in the most recent semi-annual progress report[1] to reduce the monitoring program to only those aspects that serve ongoing requirements (e.g., treatment system effluent grab samples to assess compliance with interim effluent limits).

The estimated future costs that would be incurred by Kinder Morgan by continuing to perform this monitoring program are summarized in the table below.

Cost Estimate – Ongoing Monitoring of Water Quality

Task	Basis of Estimate	Cost Estimate
Ongoing Monitoring Program	Currently contracted scope of work through 9/30/2015	$58,103

[1] ARCADIS. 2014. Semiannual Status Report for Time Schedule Order No. R9-2011-0052. October 10.

If you have questions regarding the material presented in this letter, please contact the undersigned.

Sincerely,

ARCADIS

Marcelo A. Garbiero, P.E.
Principal Civil Engineer

Copies:
S. Martin, KMEP
N. Van Burgel, KMEP