

November 16, 2011

Mr. Ben Neill
Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

Subject: Response to Written Comments Regarding Amendment of Enrollment under Order No. R9-2008-0002, Proposed Flow Increase at Kinder Morgan Energy Partners, Mission Valley Terminal Remediation Dewatering Project, Mission Valley Terminal, San Diego, California (TSMC:40 0054)

Dear Mr. Neill:

SFPP, L.P. operating partnership of Kinder Morgan Energy Partners, L.P. (“Kinder Morgan”) provides the attached responses to written comments submitted in response to the Proposed Flow Increases at the Mission Valley Terminal Remediation Dewatering Project under Waste Discharge Requirements (“WDRs”) Order No. R9-2008-0002, NPDES No. CAG919002.

Kinder Morgan has reviewed the comments and offers the following submittals in response. First, we enclose a letter from the Principal and Senior Civil Engineers from ARCADIS, U.S., Inc., in charge of the ongoing remediation efforts. The ARCADIS letter addresses the technical issues raised by the comments received and helps match the technical data in the record with those comments that are unsubstantiated. Second, we enclose a letter from Katharine Wagner, from Downey Brand LLP, addressing legal arguments raised by the City of San Diego. Third, please find enclosed a report summarizing portions of the analytical groundwater model assessing the need to increase discharges from the remediation site. (Groundwater Modeling in Support of the Request to Increase Daily Average Discharge Rate under Order No. R9-2008-0002, NPDES Permit No. CAG919002; Mission Valley Terminal, 9950 and 9966 San Diego Mission Road, San Diego, California. 17 November 2011, ARCADIS, U.S.)

Kinder Morgan provides this detailed response with the aim of thoroughly addressing each concern raised in the comments submitted. However, since many of the comments did not provide new or revised technical information, we note that much of our response relates back to information already before the Regional Water Quality Control Board.

Please address any questions in this matter to me at scott_martin@kindermorgan.com.

Sincerely,



Scott Martin, P.G
Manager, Remediation

Enclosures

cc: Nancy Van Burgel, KMED
Rick Ahlers, Arcadis
Marcelo Garbiero, Arcadis
Katharine Wagner, Downey Brand LLP
David Gibson, RWQCB
Bob Morris, RWQCB
Julie Chan, RWQCB
Craig Carlisle, RWQCB
Sean McClain, RWQCB
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ENVIRONMENT

Subject:

Response to Written Comments Regarding Amendment of Enrollment under Order No. R9-2008-0002, Proposed Flow Increase at Kinder Morgan Energy Partners, Mission Valley Terminal Remediation Dewatering Project, Mission Valley Terminal, San Diego, California (TSMC:40-0054)

Date:
November 16, 2011

Dear Mr. Neill:

Contact:
Marcelo Garbiero, P.E.

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 responses to matters raised by the City of San Diego (City) with regard to the proposed increase to the daily average discharge flow rate permitted under the existing enrollment under Order No. R9-2008-0002, NPDES Permit No. CAG919002 (General Permit). The City of San Diego (City) Public Utilities Department and Transportation & Storm Water Department jointly submitted written comments to the Regional Water Quality Control Board, San Diego Region (RWQCB) on November 3, 2011. These comments were submitted in response to the RWQCB's October 21, 2011 Notice of Opportunity to Submit Written Comments Regarding Proposed Flow Increase at Kinder Morgan Energy Partners, Mission Valley Terminal Remediation Dewatering Project.

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Our ref:
CM010143.0078

Kinder Morgan appreciates the opportunity to respond and comment on these matters. At the core of this issue is the intention to accelerate the cleanup of groundwater to comply with the compliance criteria set forth in Directive No. 3 of Addendum No. 5 to Cleanup and Abatement Order (CAO) No. 92-01. As stated in the original request for enrollment modification,¹ the objective of accelerating the

¹ ARCADIS U.S., Inc. Request to Increase Daily Average Discharge Rate under Order No. R9-2008-0002, NPDES Permit No. CAG919002; Mission Valley Terminal, 9950 and 9966 San Diego Mission Road, San Diego, California. 24 August 2010.



Mr. Ben Neill
November 16, 2011

groundwater remediation activities is to “comply with the criteria ahead of the specified deadline” of December 31, 2013, which is in the interest of all stakeholders.

ARCADIS has performed groundwater modeling to assess the necessity for increasing discharge beyond the currently permitted 550 gallons per minute (gpm) and to assess the sufficiency of the requested 850 gpm discharge limit.² A summary of this analysis is being submitted to the RWQCB with this package, and confirms the necessity of the requested increase.

Kinder Morgan continues to take aggressive steps to meet its obligations regarding the cleanup of the City’s groundwater in accordance with the requirements set forth by the RWQCB. Kinder Morgan has undertaken a decisive and adaptive remedial strategy using robust technologies known to be effective in many subsurface conditions. All known alternatives for disposal of the treated groundwater have been thoroughly evaluated and presented to the RWQCB most recently in the application for re-enrollment under the General Permit. Technical and economic feasibility evaluation has shown that discharge to surface waters under the existing General Permit is the only feasible option considering technical, regulatory, and economic factors.

Kinder Morgan remains focused on taking steps that are protective of beneficial uses of groundwater and that provide the maximum benefit to the people of the State. ARCADIS is unaware of any viable beneficial re-use options currently available for the treated groundwater. However, as the RWQCB knows, Kinder Morgan has in the past offered to provide the City with water treated by the remediation system, and Kinder Morgan remains committed to discussing options for beneficial re-use of treated groundwater as the City proposes in their written comments.

The existing cleanup of the Mission Valley alluvial groundwater and the protection of that groundwater through the maintenance of a hydraulic containment barrier remain dependent on a continuous and reliable option for discharge of treated groundwater, as has been the case for many years. The City objects to this discharge to Murphy Canyon Creek in its comments despite its importance to the timely cleanup of the

² ARCADIS U.S., Groundwater Modeling in Support of the Request to Increase Daily Average Discharge Rate under Order No. R9-2008-0002, NPDES Permit No. CAG919002; Mission Valley Terminal, 9950 and 9966 San Diego Mission Road, San Diego, California. 17 November 2011.



Mr. Ben Neill
November 16, 2011

groundwater. Delays in approval of the increased rate of discharge will jeopardize the successful completion of these objectives, and further delay is not justified.

Detailed Response to City Comments

In keeping with the RWQCB's attempt to convene a technical meeting between the RWQCB, the City and Kinder Morgan, we understood the October 21, 2011 request for comments to seek technical information regarding the proposed increase in flow and Murphy Canyon Creek channel maintenance. The City's letter provides no technical information in this regard and only refers to a prior City submittal of "scientific analysis suggesting that some, if not all, the extracted groundwater could be re-injected to the aquifer and thereby accelerate the remediation of the MTBE/TBA plume."

Although there is no new technical support in the City's comments, for the RWQCB's ease of reference, ARCADIS provides specific technical responses to issues referred to by the City. The City provided comments under five categories:

1. Alleged non-compliance with NPDES General Permit requirements;
2. Alleged availability and feasibility of alternate discharge or re-use options;
3. Alleged right to compensation for "use of the City's water;"
4. Request for a technical analysis demonstrating the effects of flow increase on the pace of cleanup; and
5. City demands for conditional approval of discharge to MS4.

The City's comments do not discuss any potential impacts on the channel, including any "impacts on vegetation management, scour and build-up of sedimentation and erosion in the channel" referred to in minutes from their recent meeting with the RWQCB.³ The City also does not provide any technical support for its prior assertions that the proposed *flow increase* would affect these conditions within

³ Meeting between the RWQCB staff and the City of San Diego. Meeting Notes October 4, 2011, 10 – 11 a.m.



Mr. Ben Neill
November 16, 2011

Murphy Canyon Creek. As ARCADIS and Kinder Morgan have previously explained, the existing discharge and proposed increased discharge do not add sedimentation to the Creek. In the treated groundwater, sediments and suspended and settleable solids are reduced by the treatment process to extremely low concentrations, well below those found in Murphy Canyon Creek and in urban runoff. The presence of the discharge flow could possibly mobilize minor amounts of sediments already present in the half-mile section of Murphy Canyon Creek between the discharge point and the San Diego River, but only to a very limited and localized extent since the overwhelming majority of sediment redistribution is associated with larger flows typically occurring with precipitation events. Any maintenance associated with the presence of sediments in the receiving water would not be the result of Kinder Morgan's discharges permitted under Order No. R9-2008-0002, which do not contribute sediments to the system.

Issue #1: Alleged Non-Compliance with NPDES General Permit Requirements

The City claims that "discharges to the City's storm water conveyance system, including the [Murphy Canyon] Creek, are prohibited in the absence of the City's prior approval of the discharge." Additionally, the City states that the General Permit "expressly prohibits the discharge of extracted groundwater waste into the City's municipal separate storm sewer system (MS4) *without the prior approval of the MS4 operator.*"

- Kinder Morgan does not need the City's consent for continuing its discharge or amending its enrollment. Separate legal comments submitted by Kinder Morgan simultaneously with this letter explain the City's apparent misunderstanding of the General Permit and the discharge. The RWQCB has regulated the discharges to Murphy Canyon Creek under its NPDES program, at least as far back as 1996. The City's claim that it must approve the discharge has not previously been raised. Review of the permit indicates that the provision on MS4 approval is part of the background permit information regarding the *initiation* of discharges to an MS4. We find no "prohibition" of discharges without MS4 approval, or a requirement for MS4 operator satisfaction with details of the discharge. Section II.D itself cites its purpose as to "encourage communication" "in an effort to avoid misunderstandings and concerns over the types of discharges covered by this WDR."



Mr. Ben Neill
November 16, 2011

The City comments that the General Permit “expressly requires the discharger to demonstrate alternatives to discharging extracted groundwater waste into the MS4 and to demonstrate why it is technically or economically infeasible to implement these alternatives before any such discharge is permissible.” The City states that “This demonstration is a prerequisite to obtaining the MS4 operator's consent to the discharge in the first place. Kinder Morgan must demonstrate infeasibility to the City's satisfaction as well as to the satisfaction of the RWQCB.” Additionally, the City states that “Other alternatives for beneficial re-use of this water also may be available. But those alternatives have not been studied and demonstrated to the City's satisfaction”

- The General Permit Notice of Intent (NOI) requires the applicant to “Identify and discuss technical and economic feasibility of alternative disposal options” under “Items Required for Determining Eligibility.” This is a requirement imposed by the RWQCB for its own use in the application process. It is not clear why the City presumes that this allows their satisfaction in the matter to dictate whether the RWQCB can approve a General Permit application for amendment of enrollment.
- The technical and economic feasibility of alternate disposal options were presented to the RWQCB in the NOI.⁴ This requirement to the RWQCB has been fulfilled. The evaluation submitted assessed aquifer re-injection, discharge to a Publicly Owned Treatment Works (POTW), and discharge to a water reclamation facility.
- With respect to alternatives for “beneficial re-use”, Kinder Morgan has always been open to such options, if they exist, and in meetings and correspondence has expressed willingness to provide the treated groundwater to the City, unconditionally. The City has never responded to these offers with any proposal for use of the treated groundwater. Kinder Morgan remains, as always, willing to evaluate and discuss the feasibility of such options if the City or any other interested party has any to suggest. However, the remediation project should not be delayed in the meantime.

⁴ LFR an ARCADIS Company. Re-Enrollment for Coverage under NPDES General Permit No. CAG919002 (WDR). 11 March 2009.



Mr. Ben Neill
November 16, 2011

Given the current lack of feasible alternatives, amendment of the project's enrollment under the General Permit should proceed.

Issue #2: Alleged Availability and Feasibility of Alternate Discharge or Re-Use Options

The City claims to have presented “scientific analyses suggesting that some, if not all, the extracted groundwater could be re-injected to the aquifer and thereby accelerate the remediation of the MTBE/TBA plume.” Further, the City states that “re-injection via recharge basins or injection wells is being used successfully in other jurisdictions in California under similar circumstances... ”

- Kinder Morgan is unaware of any “scientific analyses” provided by the City that addresses all of the pertinent issues necessary to support the claim that re-injection is not only beneficial but technically and economically feasible.

The City calls for “comprehensive evaluation of alternatives to the current waste of [groundwater] and demonstrate to the City’s satisfaction that it is technically or economically infeasible to implement alternatives, e.g., re-injecting [treated groundwater] into the aquifer (now that the manganese treatment system is apparently functioning properly) or recycling treated groundwater On-Terminal through a recharge basin.”

- With respect to the City’s claim the current discharge of treated groundwater is a “waste” of the resource; the issue has been discussed at length by the RWQCB, the City, and Kinder Morgan. The City continues to mischaracterize this issue and fails to provide any legal or technical basis for its claims. As stated in the RWQCB letter to the City dated July 16, 2009 entitled “Response to City of San Diego’s Letter, Dated June 25, 2009, Mission Valley Terminal, Cleanup and Abatement Order No. 92-01 and Addenda Thereto”:

“No evidence has been submitted [by the City] that demonstrates that the remedial activities are diminishing the quantity of this resource. The aquifer is in hydrologic contact with the San Diego River and is recharged in part by the San Diego River. Groundwater elevation data from the site does not show that Kinder Morgan’s groundwater extraction is creating a condition of near or long term overdraft of the aquifer. Furthermore, the City’s statement that the

aquifer cannot be developed in its present contaminated state is simply untrue. Addendum No. 5 to the CAO requires Kinder Morgan to submit a Drinking Water Replacement Contingency Plan that includes a provision for Kinder Morgan to provide uninterrupted replacement water service, which may include wellhead treatment, if the City were to develop a water supply project before the cleanup is complete. In fact, Kinder Morgan has stated numerous times that they would provide wellhead treatment to any off-terminal area that could be impacted by petroleum releases from the Mission Valley Terminal.”

- A plan to develop this aquifer has not been provided to any concerned party to date. The aquifer is not a contained reservoir that is being drawn from and emptied. The area of groundwater extraction is continually under recharge from upstream areas. This is evidenced by the ongoing levels of groundwater extraction that are necessary to maintain a dewatered state in the LNAPL remediation area. Any suggestion that there is a fixed amount of water that is being wasted ignores basic hydrogeologic concepts and mischaracterizes available information on local hydrology.

- With respect to the issue of re-injection of treated groundwater, Kinder Morgan and ARCADIS remain of the opinion that the risks posed by such a strategy at this site far outweigh the potential remedial benefits that may be realized. The City continues to press the claim that mineral fouling is not a concern since the current groundwater treatment plant is successfully removing manganese. To reiterate comments provided previously:
 - The groundwater is very high in naturally occurring minerals. There are on average over 2,000 milligrams of naturally occurring total dissolved solids in every liter of groundwater. That is over two grams of salts in every liter of groundwater. That high mineral content is essentially supersaturated in the water, and there is a strong tendency for those minerals to come out of solution and produce scale.

 - Dissolved manganese and iron constitute less than 1 percent of the total *natural* mineral content of the groundwater in the Mission Valley aquifer. Calcium and magnesium are the more significant components of the total mineral load, comprising nearly half of the

total mineral content. Total calcium and magnesium concentrations, termed “hardness”, are not significantly affected by the presence of petroleum constituents in groundwater. The treated discharge has a total hardness of 900 to 1000 mg/L, which is classified as “Very Hard” by the United States Geologic Survey (USGS). Harder waters have a greater tendency to precipitate and scale. Further, as noted by the US Army Corp of Engineers (USACE), “Indicators of Incrusting Water” include “total carbonate hardness in excess of 300 ppm”⁵.

Issue #3: Alleged Right to Compensation for “use of the City’s Water”

The City indicates that “the RWQCB has the power to order Kinder Morgan to compensate the City for the cost of replacing the water Kinder Morgan extracts from the City’s aquifer to clean-up the contamination...” on the basis of California Water Code (CWC) section 13304(a) and the existence of “Pueblo rights to the use of the groundwater of the Mission Valley Aquifer.”

- Since the issuance of Addendum No. 5 on April 13, 2005, Kinder Morgan is obligated by Directive No. 9 of Addendum No. 5 to provide a plan for monitoring, remediation, and replacement water service in the event that a public or private water supply well is installed downgradient of contamination. Such a water supply well does not exist and further, to our knowledge, the City has not provided a plan to develop this aquifer with water supply wells or sought a permit from the California Department of Health Services for such water supply wells.
- Kinder Morgan has repeatedly, and prior to issuance of Addendum No. 5 to CAO 92-01, offered to provide the treated groundwater generated to the City for beneficial re-use. The City has never responded to these offers with any proposals for beneficial use of the groundwater.
- Comments submitted by Kinder Morgan legal counsel further address the requirements of Water Code Section 13304 and the City’s assertion that the

⁵ USACE. “Design, Construction, and Maintenance of Relief Wells”: pg 3-6 Table 3-1. 29 May 1992.



Mr. Ben Neill
November 16, 2011

Regional Board should require that Kinder Morgan pay the City for extracted groundwater.

Issue #4: Request for a Technical Analysis Demonstrating the Effects of Flow Increase on the Pace of Cleanup

The City questions “how the proposed increased flow rate will aid in expediting remediation as claimed in the TSO”.

- ARCADIS has previously explained the benefits of the flow increase on the remediation project. Groundwater modeling has confirmed the necessity for increasing discharge beyond the currently permitted 550 gpm.⁶ Both the necessity and sufficiency of the requested increase are discussed in the ARCADIS Technical Memo dated November 17, 2011, submitted to the RWQCB as part of this package.

Issue #5: City Demands for Conditional Approval of Discharge to MS4

The City describes a series of conditions under which they propose to consider providing approval of the discharge of treated groundwater for a period of one year. Increasing the discharge for one year will not meet the needs of the remediation project or the requirements of the CAO. The comments submitted by Kinder Morgan’s legal counsel discuss whether the City has authority to set conditions. However, ARCADIS offers the following technical responses to the City’s proposed conditions, as follows:

Condition 1: “Kinder Morgan pays the City, on a monthly basis, for the replacement cost of groundwater Kinder Morgan extracts from the City’s Mission Valley Aquifer to clean-up the contamination”

- The issue of replacement water is discussed under Issue #3 above.

⁶ ARCADIS U.S., Groundwater Modeling in Support of the Request to Increase Daily Average Discharge Rate under Order No. R9-2008-0002, NPDES Permit No. CAG919002; Mission Valley Terminal, 9950 and 9966 San Diego Mission Road, San Diego, California. 17 November 2011.



Mr. Ben Neill
November 16, 2011

Condition 2: "Kinder Morgan completes and submits within 2 months a comprehensive analysis demonstrating alternatives to discharging extracted groundwater waste into the MS4 and demonstrating why it is technically or economically infeasible to implement these alternatives for some or all of the discharge"

- This is discussed under Issues #1 and 2 above.

Condition 3: "If the analysis is thorough and shows to the City's satisfaction that it is technically or economically infeasible to implement any of the alternatives other than a live stream discharge to the City's MS4 system, then:

Condition 3a: "To avoid maintenance impacts to the Creek, Kinder Morgan must be required to discharge to a location other than the Creek, such as directly to the San Diego River; and"

- The City provides no technical support to the claim that the proposed flow increase would have an adverse impact on the conditions within the Creek. Moving the discharge to the San Diego River would be extremely costly, and the benefits have not been justified in the City's comments.

Condition 3b: "Kinder Morgan must bring TDS levels in the discharge promptly into compliance with the Basin Plan standard of 1500 mg/L; and"

- The Regional Board's October 21, 2011 request for comments expressly excludes TDS issues from its scope. The TSO establishes the mechanism by which the RWQCB will address TDS levels in the discharge.

Condition 3c: "Kinder Morgan must be required to conduct monthly monitoring (and quarterly reporting to the City) of the extracted groundwater treatment system; and"

- Monitoring of the treated groundwater discharge is submitted to the RWQCB on a monthly basis as part of the Self Monitoring Report program. These documents are in the public domain and available to the City and any other interested parties.

Condition 3d: "Kinder Morgan must be required to produce to the City on a quarterly basis all data related to wells, pumping tests, and water quality for all work performed by Kinder Morgan, its consultants or contractors on City property; and"



Mr. Ben Neill
November 16, 2011

- Monitoring and well installation information is provided to the RWQCB as required under the CAO and General Permit. These documents are in the public domain and available to the City and any other interested parties.

Condition 3e: "Kinder Morgan must obtain annual approval from the City for continued discharges to its MS4 system."

- We find no requirement for annual approvals in the General Permit. Kinder Morgan's legal counsel will address the basis for any specific demands by the City for conditions on the RWQCB's approval of the discharge.

If you have questions regarding the material presented in this report, please contact either of the undersigned.

Sincerely,

ARCADIS

A blue ink signature of C. Fredrik (Rick) Ahlers, written in a cursive style.

C. Fredrik (Rick) Ahlers, P.E.
Principal Civil Engineer

A blue ink signature of Marcelo A. Garbiero, written in a cursive style.

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

Copies:

S. Martin, KMEP
N. Van Burgel, KMEP

November 16, 2011

Mr. Ben Neill
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
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Subject: Response to City of San Diego Public Utilities Department's and Transportation & Storm Water Department's Comments on Tentative Order No. R9-2011-0052 to Provide a Time Schedule Order for Kinder Morgan Energy Partners to Comply with a Discharge Prohibition in its NPDES Permit No. CAG919002 for its Mission Valley Terminal Dewatering Discharge to Murphy Canyon Creek, Mission Valley Terminal, San Diego, California (TSMC:40-0054)

Dear Mr. Neill:

The City of San Diego (City) Public Utilities Department and Transportation & Storm Water Department jointly submitted written comments to the Regional Water Quality Control Board, San Diego Region (RWQCB) on November 3, 2011 in response to the RWQCB's October 21, 2011 Notice of Opportunity to Submit Written Comments Regarding Proposed Flow Increase at Kinder Morgan Energy Partners, Mission Valley Terminal Remediation Dewatering Project. On behalf of our client, SFPP, L.P., operating partnership of Kinder Morgan Energy Partners, L.P. (Kinder Morgan), we appreciate the opportunity to address the City's legal arguments and provide the following response to the City's comments.

It is important to note that the City provided no new information in their comments to the RWQCB, opposing the proposed increased flows. Rather, the City only offered a detailed list of conditions and impediments it wishes to have imposed on Kinder Morgan to encumber the remediation efforts which have been long underway and are nearing completion. The City did not substantiate their proposed conditions with technical data, nor did the City provide a proper legal basis for their arguments.

I. There is no Legal Basis for the City's Allegations that the NPDES General Permit Requires City Approval and Satisfaction of City Conditions

Over a decade after discharges from the remediation system to Murphy Creek commenced, the City has suddenly asserted that the discharge enters the City's MS4, and that the City's prior approval is required for the continuation of Kinder Morgan's discharge under NPDES Permit No. CAG919002 (General Permit). The City cites Provision II.D, which is one of the conditions to enrollment described in the General Permit. Many projects are discharging extracted or pumped groundwater throughout the area, including projects operated by the City itself. This appears to be the first time the City has asserted the right to impose drastic conditions, such as payment for extracted water, as a condition to the RWQCB's General Permit enrollment, much less as a condition to continued enrollment of existing projects. We have no choice but to conclude that the City is attempting to place hurdles in the path of progress in the remediation project, simply in order to further its agenda in litigation it has filed against Kinder Morgan in court. The RWQCB should not jeopardize its efforts to achieve effective remediation of the site, by allowing the City to enmesh the RWQCB into the separate dispute between the parties.

While the City's comments appear a transparent effort to achieve other ends, we provide the RWQCB specific observations on some of the City's specific assertions.

A. Provision II.D is Irrelevant because Murphy Canyon Creek is not an Municipal Separate Storm Sewer System (MS4)

Provision II.D is inapplicable to this discharge, because Murphy Canyon Creek is a receiving water, identified in the enrollment as a water of the United States, and is not the City's MS4. We note that the MS4 NPDES permit covering the City's MS4 defines MS4 as follows:

“A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, . . .; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.”

(See Order No. R9-2007-0001 section C-6.) The definition does not encompass waters of the U.S. identified as receiving waters. Thus, Murphy Canyon Creek is not an MS4.

B. Provision II.D does not Provide Authority to Stop or Impose Conditions on the Discharge

Even if the RWQCB were to find this is a discharge into an MS4, Provision II.D would not create authority on the part of the City to prohibit or prescribe specific conditions on the discharge. Provision II.D is not a discharge prohibition. It appears in a background information section of the General Permit, directing that permittees contact an MS4 operator before initiating discharges to its MS4. The provision appears intended simply to convey information to the

RWQCB and the discharger about the existence of an MS4 that may also have separate considerations. (See NPDES No. CAG919002 II.D (“This requirement encourages communications between the Dischargers enrolled under this WDR and local agencies responsible for MS4s in an effort to reduce misunderstandings and concerns over the types of discharges covered by this WDR”).) The provision makes no mention of MS4 approvals being required for amendments to existing enrollments.

In any event, arguments concerning prerequisites to commencement of the discharge are moot, and the City should not be permitted to raise this hurdle at this juncture in the project. The Mission Valley Terminal’s discharge is an existing project that has been enrolled under three successive versions of the same NPDES permit, Permit No. CAG919002, since at least 1996. (Order Nos. 96-41, 2001-0096, and 2008-0002). This discharge commenced at least fifteen years ago, and a costly and complex remediation system has been designed and installed under RWQCB oversight, in reliance on its continuation, and with the City’s knowledge. The City has participated extensively in RWQCB proceedings, admits that language similar to Provision II.D existed in prior Order No. 2001-96, has been copied on multiple amendments increasing the discharge rate, and has never before raised this issue.

The City’s letter suggests it may never have heard about the project’s enrollment or the amendment to the enrollment that allowed increased flow in late 2009. To the contrary, the enrollment amendment letter dated December 31, 2009, shows copies to Kris McFadden, Deputy Director, City of San Diego Storm Water Pollution Prevention Division, and Marsi Steirer, Deputy Director, City of San Diego Water Department. The original enrollment under Order No. 2008-0002, dated June 23, 2009, was also copied to Mr. McFadden and Ms. Steirer.

While the City’s knowledge of the discharge undoubtedly existed much earlier, we easily identified written correspondence to the City dating back to 1999, discussing the fact that the system discharges under an NPDES permit to Murphy Canyon Creek. A letter dated April 20, 1999 from Mark J. Sandon, Kinder Morgan Energy Partners L.P. to Joan Bennett, City of San Diego, Metropolitan Wastewater Department, applying for temporary discharge of treated groundwater to the City’s sewer system for a maximum allowed term of two years, describes that the discharge was covered under NPDES Order No. 96-41 for discharge to Murphy Canyon Creek.

Over the years, Kinder Morgan designed and installed a costly and complex remediation system, under RWQCB oversight. It did so in reliance on its continued ability to discharge extracted groundwater, unaware that the City intended to block the discharge by requiring a prior approval and extracting money and detailed conditions as a prerequisite to continuing the discharge. Kinder Morgan would be seriously injured by delays in its ability to meet deadlines in the CAO.¹

¹ Legally, any action by the City to terminate or seek termination of the discharge would also be barred by the doctrine of estoppel. Estoppel may be asserted against the government where justice and right require it. *City of Los Angeles v. Cohn* (1894) 101 Cal. 373, 377. The government will be bound by an equitable estoppel in the same

In sum, Provision II.D does not prevent the RWQCB from approving an amendment to the existing enrollment of this discharge under the General Permit. Nor should the City be allowed to raise this issue at this juncture, more than a decade after commencement of the discharge.

C. The RWQCB Lacks Authority to Impose the City's Proposed Conditions

The City claims that Provision II.D gives it ongoing veto power over the discharge, and the right to invent conditions to its satisfaction. It is legally impossible for an NPDES permit to grant the City new authority over a discharger. If the RWQCB had found a condition to enrollment under the General Permit lacking, the RWQCB's "remedy" would have been not to enroll the discharge, and thus to terminate it. This would have stopped the remediation project in its tracks, compromising hydraulic containment and causing migration of the plume. Reasonably, the RWQCB did enroll the discharge and, also reasonably, the City did not appeal the RWQCB's decision. The RWQCB should not entertain newly devised City conditions which condition continuation of the discharge on the extraction of steep payments from Kinder Morgan and which would delay critical groundwater remediation, on the strength of unsupported and vague technical arguments.

The City's list of demands cannot legally be imposed by the RWQCB under its authority to issue waste discharge requirements. Under Water Code Section 13263, the RWQCB is authorized to prescribe specific types of requirements, namely requirements "as to the nature of any proposed discharge, existing discharge, or material change in an existing discharge ... in relation to the conditions existing in the disposal area or receiving waters upon, or into which, the discharge is made, or proposed." Other than its request concerning TDS, which the RWQCB expressly omitted from the scope of the comments it would accept, the conditions urged by the City do not pertain to the nature of the discharge.

II. **Water Code Section 13304 does not Support Requiring Kinder Morgan to Pay for Groundwater it Extracts**

The City cites Water Code Section 13304(a) as support for its assertion that the RWQCB should require Kinder Morgan to compensate the City for water removed from the aquifer during remediation efforts. This is clearly an effort to enmesh the RWQCB in the City's attempt to seek damages from Kinder Morgan, which the City is pursuing in litigation in another forum. The RWQCB has no authority to award damages. (*People of California v. Kinder Morgan Energy Partners, L.P.*, (S.D. Cal., 2008) 569 F.Supp.2d 1073, 1081 ("the Water Boards have neither authority nor jurisdiction to award damages to injured parties").)

manner as a private party when the elements requisite to such an estoppel against the private party are present and, the injustice that would result from the failure to uphold an estoppel is of sufficient dimension to justify any effect upon public interest or policy that would result from the raising of an estoppel. *Lentz v. McMahon* (1989) 49 Cal.3d 393, 400.

An NPDES permitting proceeding obviously provides no basis for asserting rights to payment for water. The City's request under Section 13304 would require amendment of the CAO, which is outside the scope of the current proceeding.

In addition, as noted in the ARCADIS Technical Letter responding to the City's comments, the CAO already addresses replacement water service, calling for action only if water were already being pumped by the City to produce water service. Section 13304 provides no basis to go further than the CAO's existing conditions. Under California Water Code section 13304(a), the RWQCB "may require the provision of, or payment for, *uninterrupted replacement water service*, which may include wellhead treatment, to each affected public water supplier or private well owner." (Emphasis added.) This language was added to Section 13304 in order to clarify the authority of Regional Boards to require alternative water supplies pursuant to a cleanup. (*See In The Matter of the Petitions of Olin Corporation and Standard Fusee, Incorporated*, (May 19, 2005) 2005 WL 5166379, at 1 ("*Olin*").) If replacement water is ordered by the RWQCB it "shall have comparable quality *to that pumped by the public water system ... prior to the discharge of waste.*" (*See* Wat. Code §13304(f), see also *Olin*, supra, 2005 WL 5166379 at 5 (ordering discharger to supply interim uninterrupted replacement water service (i.e., bottled water or equivalent), in accordance with California Water Code Section 13304 until long term uninterrupted water service is restored).) There has been no City water service from the aquifer, and thus no interruption and no basis for replacement of water service. Thus, Section 13304 provides no basis for ordering compensation to the City.

The RWQCB is not the forum to adjudicate water rights. However, for the RWQCB's general information, we provide a brief response to the City's assertion that the remediation project is somehow taking water in the Mission Valley Aquifer owned by the City. It is clear under California law that the City does not own the groundwater; its reference to groundwater as "its water" is inappropriate. Water rights in California are property rights allowing the *use* of water, not awarding ownership of the water. (*See* California Water Code §100, §102.)² The City is statutorily prohibited from preventing the use of water by others. (*See* California Water Code §106.5 (no municipality shall "prevent the appropriation and application of water in excess of its reasonable and existing needs to useful purposes by others").) Regardless, the RWQCB need not, and cannot, adjudicate water rights disputes in either an NPDES or CAO proceeding.

There is simply no basis for the RWQCB to act on the City's request for payment by Kinder Morgan for water. The RWQCB should promptly proceed to approve Kinder Morgan's request for amendment of its General Permit enrollment, in order to avoid delays that will jeopardize the Mission Valley Terminal's remediation project and the public interest.

² The City asserts Pueblo rights to use the groundwater. Pueblo rights are also fundamentally use-base rights. "No one has the right to more water than is reasonably necessary for the beneficial use to be served." *City of Los Angeles v. City of Glendale* (1943) 23 Cal.2d 68, 74-75. Pueblo rights are measured by the present need of the City "leaving the water accessible to others until such time as the city needs it." *Id.*

III. Conclusion

Overall the City's comments offer no new technical information. The City asserts a right to condition the proposed flow increases to Murphy Canyon Creek without any legal basis, and without providing any technical justifications for the conditions. The City argues that Kinder Morgan has insufficiently supported its request to the RWQCB, but nowhere does the City cite to specific deficiencies in the data already before the RWQCB. Instead, the City generally complains that existing data has not satisfied their concerns. As addressed in the ARCADIS letter accompanying these comments, Kinder Morgan has provided ample support for the proposed increases which will allow for the advancement of the remediation efforts.

Thank you for the opportunity to provide these comments. If you have any questions on these issues, we will be glad to discuss them further.

Very Truly Yours,

DOWNEY BRAND LLP



Katharine E. Wagner

KEW:rdt

Cc: Scott Martin, KMEP
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Mr. Ben Neill
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

ENVIRONMENT

Subject:

Groundwater Modeling in Support of the Request to Increase Daily Average Discharge Rate under Order No. R9-2008-0002, NPDES Permit No. CAG919002; Mission Valley Terminal, 9950 and 9966 San Diego Mission Road, San Diego, California (TSMC: 40-0054)

Date:
November 16, 2011

Dear Mr. Neill:

Contact:
Rick Ahlers

ARCADIS U.S. Inc. (ARCADIS) has prepared this technical memorandum for the Mission Valley Terminal, located at 9950 and 9966 San Diego Mission Road, San Diego, California, on behalf of SFPP, L.P., an operating partnership of Kinder Morgan Energy Partners, L.P. This memorandum summarizes groundwater modeling performed in support of the proposed increase in the daily average discharge rate from the remedial extraction system currently operating in the on- and off-Terminal areas for the Mission Valley Terminal in San Diego, California (the Site). This increase in the average daily discharge rate is requested to allow for additional groundwater extraction that will accelerate cleanup of groundwater to meet the compliance criteria set forth in Directive No. 3 of Addendum No. 5 to Cleanup and Abatement Order 92-01, issued by the California Regional Water Quality Control Board, San Diego Region (RWQCB) ahead of the December 31, 2013 cleanup deadline. It is anticipated that this increased discharge rate will only be necessary until December 31, 2013, after which the average discharge is expected to decline.

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Our ref:
CM010143.0078

The groundwater flow and transport model was originally developed using the finite element DYN groundwater flow and transport simulation code (CDM 1999; LFR 2004a, 2004b). The original model, created by Camp Dresser & McKee (CDM), was updated and re-calibrated twice by LFR Levine Fricke (LFR; now ARCADIS) Details regarding the earlier model construction, development, calibration, remedial design development, and future predictions can be found in the above-referenced modeling documentation reports.

The model was used to evaluate locations and proposed pumping rates for existing and more recently installed groundwater extraction wells, and to predict dissolved-phase concentrations of MTBE and TBA over time in the downgradient off-Terminal areas. The relevant groundwater cleanup goals were established for the Site by the Off-Terminal Corrective Action plan (LFR 2005), in compliance with Addendum No. 5, to meet both primary and secondary maximum contaminant levels as well as the DHS health-based advisory level for tertiary butyl alcohol (TBA).

A report describing the revisions, calibration and application of the groundwater model will be submitted to the RWQCB no later than December 15, 2011. The recent updates to the groundwater model included incorporation of additional data (soil boring logs, groundwater elevation measurements, hydraulic testing, and additional contaminant concentrations obtained since the last model update in 2004) into the existing geologic model, updates to model hydraulic properties, and model boundary conditions. Additionally, in order to distribute the model as broadly as necessary in a format that allows for detailed external review and evaluation, the original DYN model was converted to the public-domain flow and transport simulation codes MODFLOW-2000 (McDonald and Harbaugh 1988; Harbaugh et al. 2000) and MT3DMS (Zheng and Wang 1998). The updated and converted model was re-calibrated with groundwater elevation and contaminant concentration data up through May 2010. Details regarding the conversion to MODFLOW, additional modifications to the model boundary conditions and hydraulic properties, flow and transport model calibration, model validation and sensitivity analysis, and results of future predictions of the attainment of cleanup goals will be found in the groundwater model update report.

This memo gives a brief description of how the model was used to evaluate and predict the effectiveness of the current extraction well configuration and allocation of pumping to meet the off-Terminal, distal plume cleanup goals for groundwater by the 2013 deadline. It also explains how results of that evaluation led to additional extraction scenarios (additional wells and a greater volume of total pumping), and provides the rationale for the proposed increase in the current extraction system capacity, which is necessary to provide an acceptable degree of confidence in meeting the cleanup goals and objectives.

Representation of Future Hydrologic Conditions

The calibrated model was extended approximately 3.5 years into the future (from May 2010 to December 31, 2013) to evaluate future predictions of recovery well

capture and future predictions of the attainment of groundwater cleanup goals. To represent the potential range in future hydrologic and climatic conditions in the prediction of future plume migration and remedial system operation/effectiveness, three future hydrologic scenarios were considered:

- Average Conditions – each year includes a dry season based on an assumed average dry-season condition and a wet season based on average precipitation and streamflow conditions.
- Maximum Wet Conditions – each year includes the assumed average dry condition and a wet season based on a prediction of the most wet, or “wettest wet season” precipitation and streamflow conditions.
- Minimum Wet Conditions – each year includes the assumed average dry condition and a wet season based on a prediction of the least wet, or “driest wet season” precipitation and streamflow conditions.

Details regarding how boundary conditions were established to simulate the three hydrologic scenarios will be provided in the groundwater model update report.

Representation of the Dissolved-Phase Distal Plume for Future Predictions

Figure 1 shows the initial plume conditions at the start of the future prediction simulations. These initial future conditions were used in each of the future hydrologic scenarios and represent the distal dissolved phase plume simulated as a “lumped”, or surrogate constituent “MTBE plus TBA” plume. The surrogate represents the combined masses of MTBE and TBA on a molar-equivalent basis. The molar-equivalent concentration of TBA is 0.84 percent of the MTBE concentration. In other words, 1 kilogram (kg) of MTBE has the same number of molecules as 0.84 kg of TBA, or equivalently, 100 µg/L of MTBE may transform (degrade) into 84 µg/L of TBA.

The surrogate approach was chosen based on observations of significant spatial and temporal variations in TBA degradation, and on the observations of a more uniform total bulk attenuation of MTBE plus TBA plume mass presented in the quarterly reports. This approach reduces the degrees of freedom in the uncertainty associated with the complex biogeochemical conditions observed within the plume footprint and provides a simplistic, yet conservative simulation of a plume undergoing average bulk attenuation mechanisms. This approach has been used in many fate and

transport models for chlorinated solvents and other organic chemical mixtures that undergo similar attenuation mechanisms (Heermann and Powers 1998; U.S. Environmental Protection Agency [USEPA] 1996). Recently, the USEPA conducted a study to evaluate using lumped or grouped chemicals for modeling the fate and transport of organic mixtures (USEPA Grant number R829355). Results of that study indicate this approach is desirable for similar constituents because it simplifies the numerical modeling by reducing the number of calibration parameters without a significant loss of accuracy. The rationale for and approach to using a surrogate plume will be described in greater detail in the groundwater model update report.

Continuous monitoring of groundwater elevations and continued analysis of the effectiveness of the LNAPL dewatering system and hydraulic capture evaluations indicate the distal plume has been effectively cut-off (detached) from its former off-Terminal LNAPL zone source. Therefore, for the purposes of evaluating the attainment of cleanup goals in the off-Terminal area by the December 31, 2013 deadline, the model simulates only the transport of the dissolved-phase distal plume downgradient of the LNAPL area dewatering wells (RW-3A, RW-5A, and RW-7A) within the vicinity of the stadium parking lot. This is also reflected in Figure 1.

The concentrations and concentration distributions for the observed plume from the quarterly monitoring event conducted in May 2010 (second quarter 2010) were used to define the initial concentrations for the predictive simulations. In addition, based on the more recent observations of TBA concentrations in the recovery wells located within the plume core, and to be conservative in the predictions of plume cleanup, the future simulations assume that no further degradation of MTBE or TBA occurs.

The objective of the predictive transport simulations was to evaluate whether the current configuration of the distal extraction system and the additional extraction that would be obtained with the proposed system expansion would achieve the proposed cleanup goals by the end of 2013. The proposed cleanup goals for MTBE and TBA are 5 micrograms per liter ($\mu\text{g/L}$) and 12 $\mu\text{g/L}$, respectively. Since November 2009, most of the MTBE present in the distal plume has converted to TBA and is present only at relatively low concentrations, as regularly documented in the quarterly Groundwater Monitoring and Remedial Progress Reports for the Site. Because the transport model uses a combined MTBE plus TBA surrogate, the goal against which the model results are evaluated is the more stringent MTBE goal of 5 $\mu\text{g/L}$, equivalent to reaching surrogate concentrations of less than 4.2 $\mu\text{g/L}$ by the end of 2013.

Simulated Extraction System Pumping

Groundwater extraction rates for the future predictions were assigned based on the assumption that the planned expansion of the groundwater extraction system will be implemented in November 2011. The locations of additional wells and the assumed total system extraction capacity of approximately 850 gpm are consistent with the information provided in the National Pollution Discharge Elimination System (NPDES) expansion proposal (ARCADIS 2010) and well installation work plan (ARCADIS 2011). Figure 2 shows the locations of the extraction wells currently in operation, as well as the more recently installed wells that are directly related to the discharge permit increase request.

To assign individual extraction well future pumping rates, observations of existing individual extraction well capacities and well and system duty cycles were considered, with the resulting assumption that a long-term average extraction rate of approximately 90 percent of the total expanded system capacity could be achieved. Rates for individual wells were allocated between containment wells at the mouth of Murphy Canyon (RW-35 through RW-37), the off-Terminal LNAPL dewatering area (RW-3/3A through RW-7/7A, RW-48, and RW-56), the expanded off-Terminal dewatering area (recovery wells RW-107 and RW-108), and what would be required for distal well extraction (RW-49 through RW-51, and RW-99 through RW-101) to maximize extraction at the downgradient edge of the distal plume in support of meeting the cleanup goals and objectives. Additionally, the remedial system expansion includes the addition of six new recovery wells (RW-109 through RW-114) installed at locations in between the current distal wells (as discussed below and as shown in Figure 2) (ARCADIS 2011).

Table 1 presents the total recovery well extraction rates for the end of the calibration period (May 2010) and future projections of flow based on assumptions regarding remedial system expansions outlined above. As shown in the table, the actual system extraction was specified from May 2010 to May 2011, and then projected from May 2011 through November 2011, based on plans at that time to re-allocate pumping from specific areas to enhance remediation at the distal end of the plume. At the time the simulations were conducted in May 2011, it was assumed that the proposed system discharge permit would be approved in November 2011.

Table 1 also includes the projected rates based on the recently submitted discharge permit increase. Under this scenario, the future simulations assume a total of 763 gpm will be the long-term average total pumping that can be obtained, with 437 gpm

allocated to the 12 most distal recovery wells (RW-49 through RW-51, RW-99 through RW-101, and RW-109 through RW-114). Results of these pumping allocations are discussed in the following section.

Prior to submittal of the recent discharge increase proposal, the total extraction assigned to the remaining time period in the future simulations (November 2011 through December 31, 2013) was approximately 550 gpm. Given the assumption that 90 percent of that total system flow could be achieved as a long term system average, the total predicted rate was approximately 495 gpm. Under this scenario, all of the difference in total extraction rate comes from the distal wells, including newly installed wells (RW-109 through RW-114), i.e., without the proposed permitted discharge, extraction from the distal plume would be reduced by more than 50 percent.

Results of the Predictive Simulations

As indicated above, prior to the recently proposed discharge permit expansion, a total projected extraction system pumping rate of approximately 495 gpm was allocated among existing extraction wells, with a focus on allocating as much pumping as possible to the distal wells in order to provide the most optimized projected cleanup. However, results of these preliminary simulations indicated the potential that a few localized areas of the simulated plume that may not reach the cleanup goals by the December 31, 2013 deadline. Given these results, additional simulations were performed using the increased pumping total of 763 gpm to assess the number of wells, well locations, and rates that would provide a high degree of confidence in meeting the remedial goals ahead of schedule to account for uncertainty in model predictions.

Figure 3 shows the simulated plume in the deep alluvium at the time that both remedial goals are met (i.e., 12 ug/L and 4.2 ug/L surrogate plume concentrations). As shown in the figure, the TBA goal of 12 ug/L is achieved approximately 14 months after the projected increase to a total system extraction of 763 gpm (January 2013). Likewise, the figure also shows the simulated plume in the deep alluvium when the effective MTBE goal of 4.2 ug/L is achieved, which occurs approximately 19 months after the projected increase to a total system extraction of 763 gpm (June 2013). Given that the model predicts attainment of these cleanup goals approximately 6 months before the CAO required date, we are confident that the proposed system expansion will achieve the remedial goals prior to December 31, 2013. Even though the model is well calibrated and conservatively assumes no future degradation of the

surrogate plume, some degree of uncertainty still exists, as with any predictive model. Therefore, given the inherent uncertainties, it is important that the system flow expansion be implemented as soon as possible.

If you have any questions about this submittal, please contact me.

Sincerely,

ARCADIS

C. Fredrik Ahlers, P.E.
Principal Civil Engineer
Project Technical Director
California Professional Engineer # C-66471

Attachments

Copies:
Scott Martin, KMEP

Nancy Van Burgel, KMEP

References

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Table 1. Recovery Well System Extraction Rates Assigned for Future Predictions
Memorandum re: Groundwater Modeling in Support of the Request to Increase Daily Average Discharge Rate
Mission Valley Terminal, San Diego, California

Well Groups	Recent Rate - to May 2011 (gpm) ¹	Projected Rate - May 2011 to November 2011 (gpm) ²	Original Projected Rate - November 2011 to December 2013 (gpm) ³	Final Projected Rate - November 2011 to December 2013 (gpm) ⁴
Hydraulic Containment (RW-35 through RW-37)	99	92	92	92
Off-Terminal Dewatering (RW-5A, -7A, -48, and -56)	128	113	113	113
Off-Terminal Northwest Dewatering (RW-3A, RW-107, and RW-10)	94	85	126	126
Distal Well Extraction (RW-8, RW-9, RW-49 through RW-51, RW-99 through RW-101, RW-109 through RW-114)	45	54	165	433
Total Extraction (gpm) ⁵:	367	344	495	763

Notes:

¹ Recent extraction rates refer to those in effect during model calibration; rates are based on Site operations information.

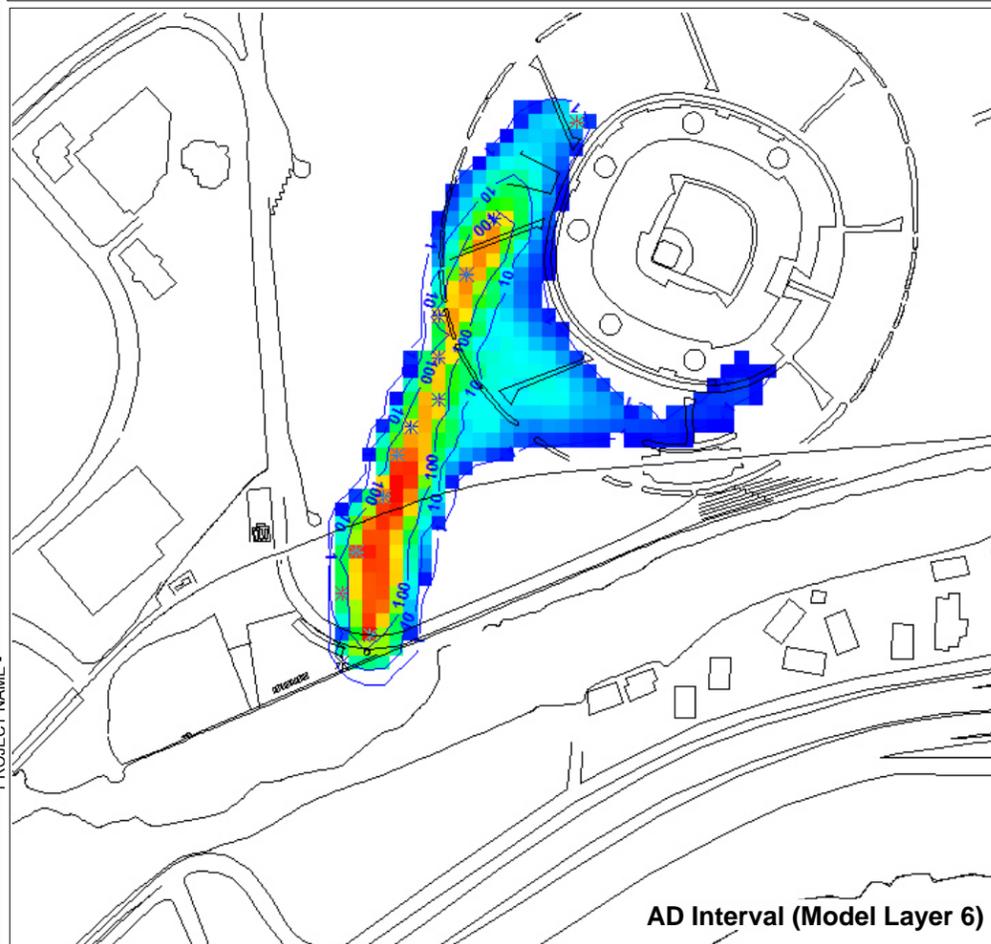
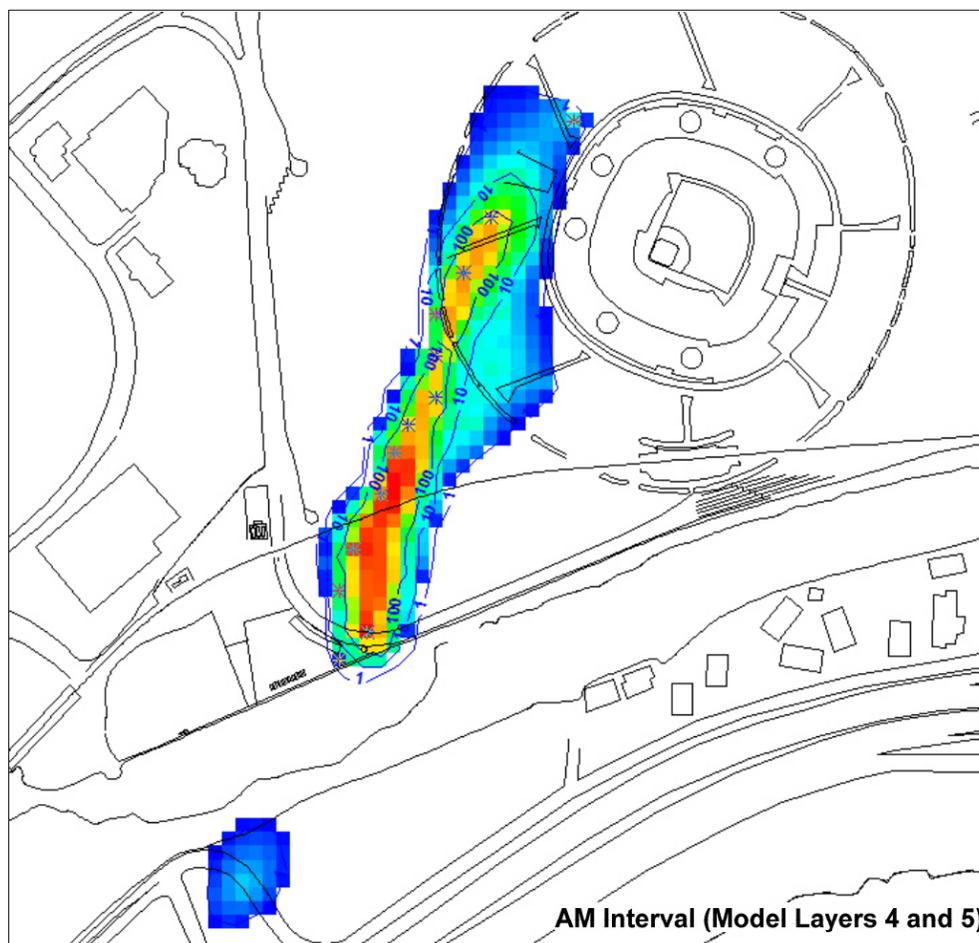
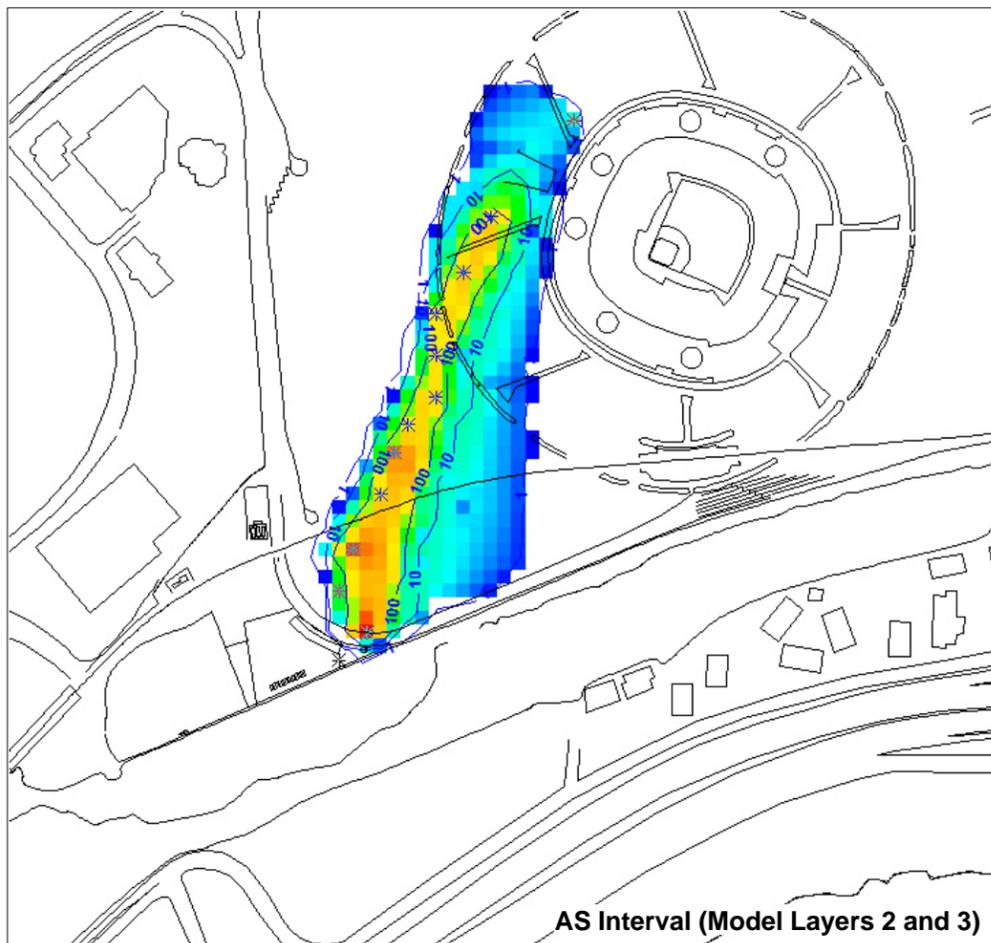
² Future projected extraction rates assumed at the time the model calibration was completed.

³ Future projected extraction rates based on permitted total system discharge at time predictions were developed.

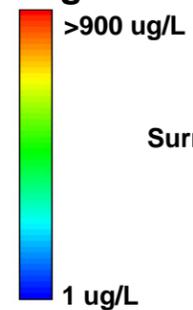
⁴ Future projected extraction rates based on the currently proposed increase in the total system discharge permit.

⁵ Both future projected extraction rate scenarios are based on an assumed duty cycle of approximately 90 percent.

gpm = gallons per minute



Legend



Surrogate Concentration Color Flood Scale

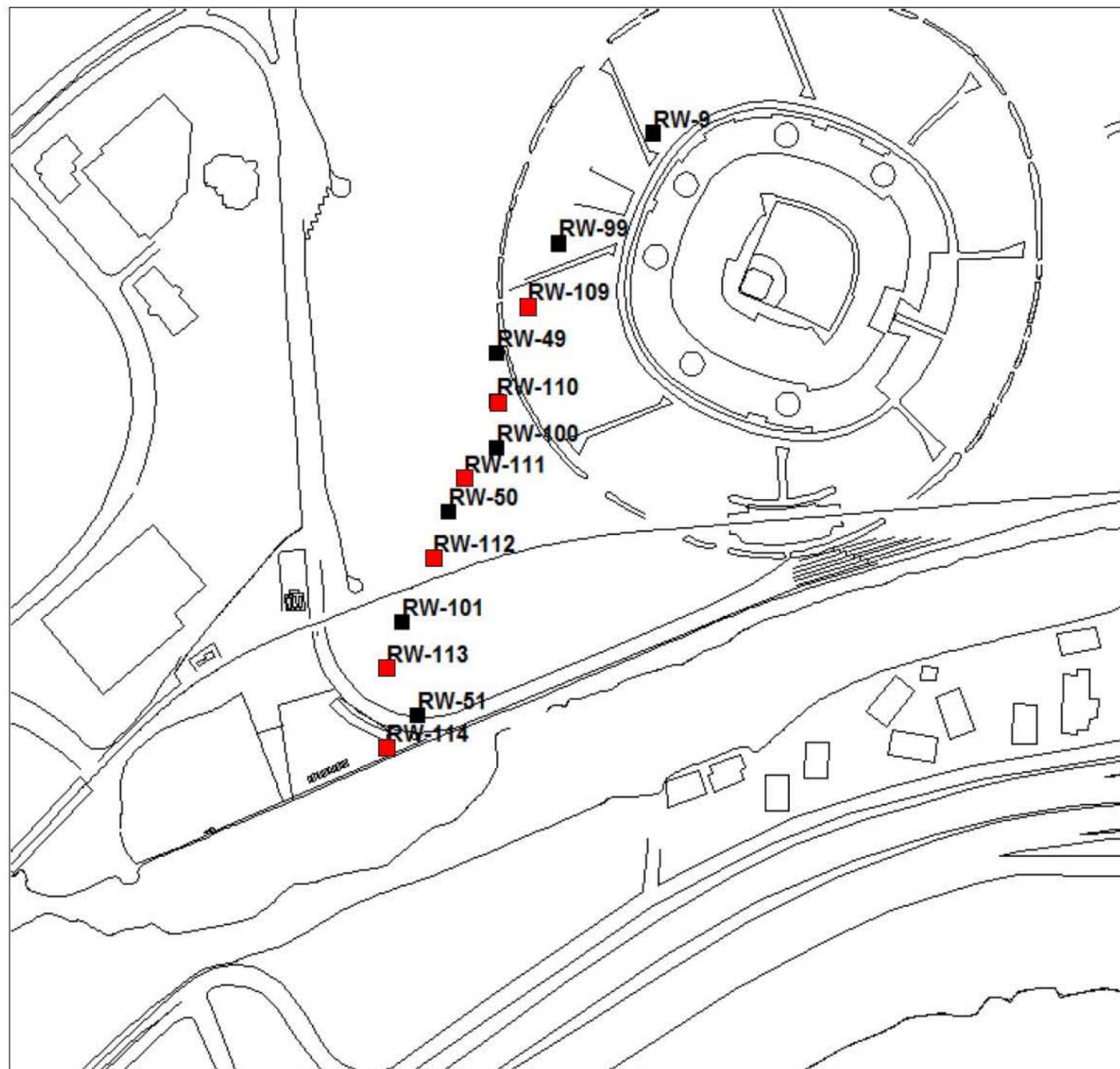
- 10 — Surrogate Concentration Contour, micrograms per liter (ug/L)
- * Recovery Well (RW)

Notes:

1. Initial surrogate concentrations are based on the observed TBA and MTBE concentrations in May 2010 (as presented in the 2Q2010 Quarterly Report).
2. The surrogate plume core concentrations were assigned values greater than the observed concentrations in recovery wells (located within the plume core) to account for the effects of wellhead dilution.

MISSION VALLEY TERMINAL SAN DIEGO, CALIFORNIA GROUNDWATER MODELING IN SUPPORT OF SYSTEM DISCHARGE PERMIT INCREASE	
SURROGATE PLUME INITIAL CONCENTRATIONS	
	FIGURE 1

PROJECT NAME



Legend

- RW-99**
■ Existing Distal Recovery Well
- RW-114**
■ New (Proposed) Distal Recovery Well

MISSION VALLEY TERMINAL
SAN DIEGO, CALIFORNIA
GROUNDWATER MODELING IN SUPPORT OF
SYSTEM DISCHARGE PERMIT INCREASE

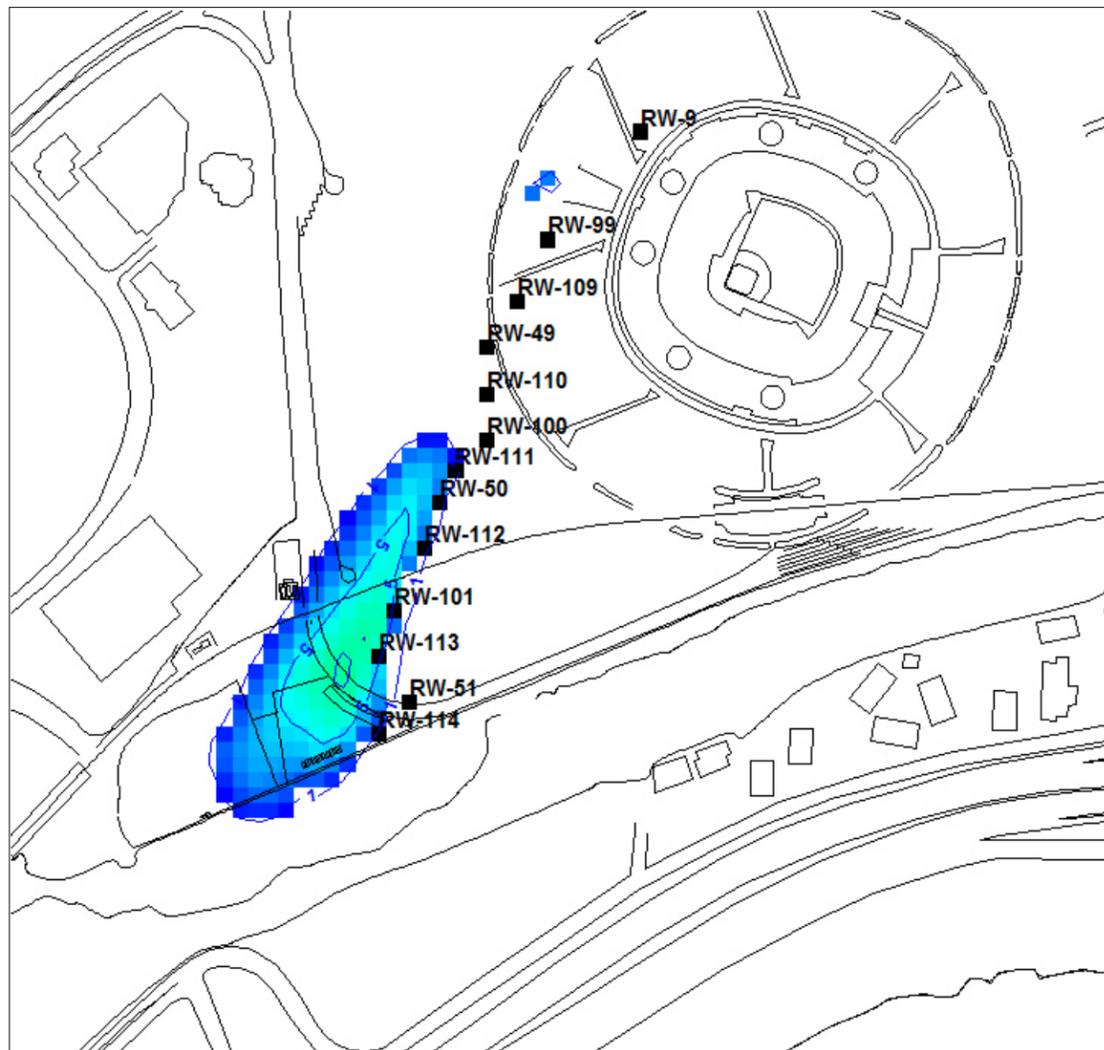
DISTAL RECOVERY WELLS



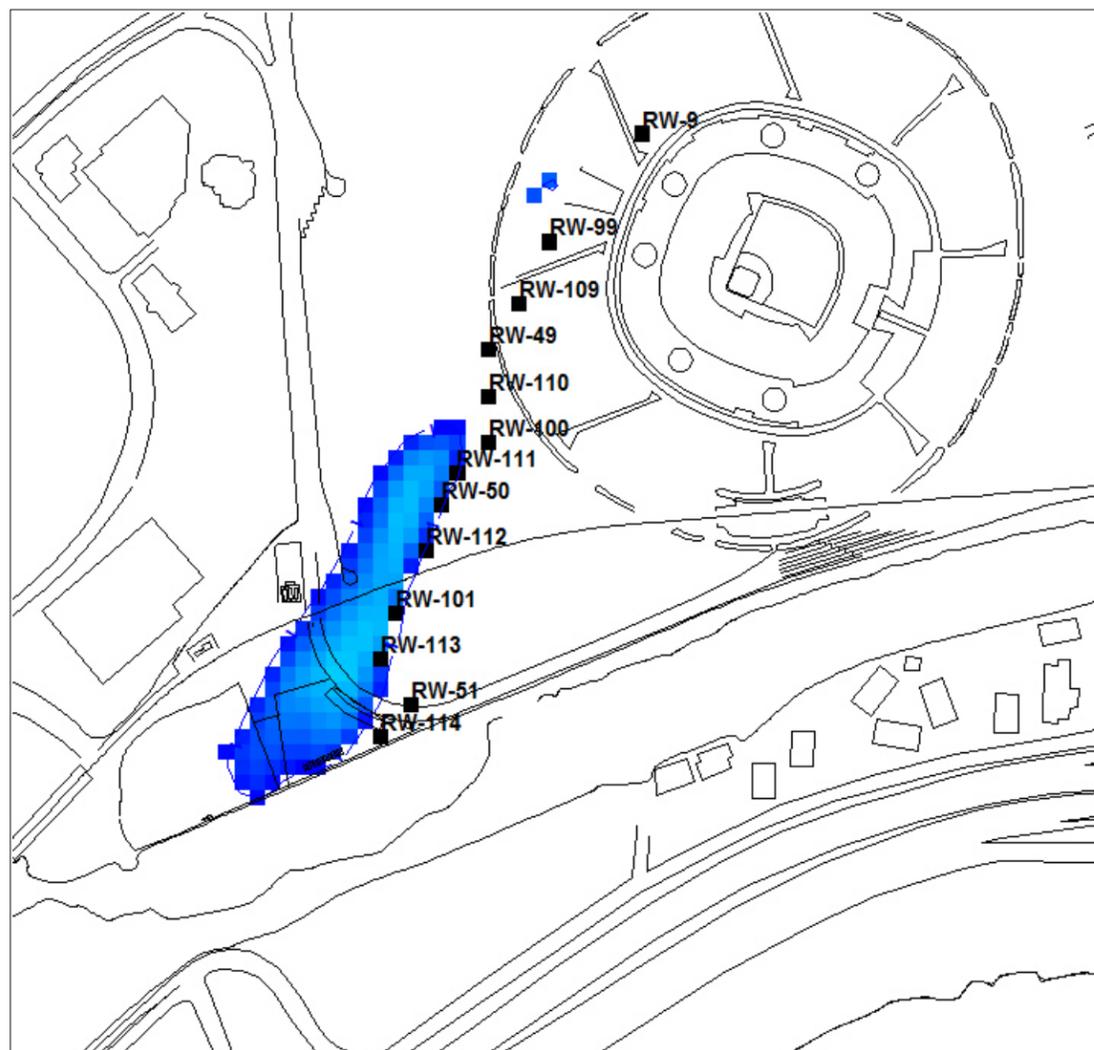
FIGURE

2

PROJECT NAME

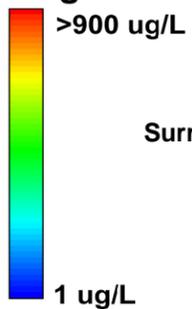


January 2013 (14 Months After System Expansion)
 Surrogate Concentrations <12 ug/L



June 2013 (19 Months After System Expansion)
 Surrogate Concentrations < 4.2 ug/L

Legend



Surrogate Concentration Color Flood Scale

—5— Surrogate Concentration Contour, micrograms per liter (ug/L)

■ RW-99
 Recovery Well (RW)

MISSION VALLEY TERMINAL
 SAN DIEGO, CALIFORNIA
 GROUNDWATER MODELING IN SUPPORT OF
 SYSTEM DISCHARGE PERMIT INCREASE

PREDICTED RESULTS - TIME AT WHICH
 CLEANUP GOALS ARE ATTAINED

