Jeffery Young, Chair
Central Coast Water Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401

November 1, 2013

Dear Mr. Young,

I ask that the Board intervene in a disagreement between RWQCB staff and a group of Morro Bay residents. On multiple occasions residents have identified and communicated their findings that statements made by RWQCB staff are illogical and out-of-sync with well-documented facts. Extensive, well-documented evidence has been provided. When faced with such a challenge, RWQCB staff members simply ignore the evidence provided and refuse to respond.

The particular disagreement in which I ask your intervention involves ongoing nitrate pollution of our ground water, drinking water, and the ocean. Morro Bay residents have presented extensive evidence that the nitrates in the Morro Basin municipal wells are primarily from sewage. The RWQCB staff insists they are from agriculture.

It has been suggested that perhaps RWQCB staff members are reluctant to admit to the likelihood that the MTBE remediation work triggered the nitrate contamination problem because they oversaw the MTBE remediation effort. If this is the case, I do not believe they have any cause for concern. The fact that sewage is getting into our wells is a direct result of failure by the City of Morro Bay to properly maintain its sewer lines. It is NOT because a breach or breaches in the aquifer boundary were accidentally caused by important and critically-necessary MTBE remediation work. If there were no leaking sewage, there would not be a serious problem.

Residents have identified and documented major flaws in RWQCB arguments regarding the source of the nitrates, but RWQCB staff has declined to respond to the residents' findings. I ask that you instruct them to do so.

This document contains 9 specific issues for which RWQCB staff response is requested. General background is provided below. Following that are discussions of the 9 issues:

The discussions include issue summaries, specific responses requested from RWQCB staff, excerpts from relevant communications between residents and RWQCB staff, and references to other pertinent documents.

Please help us put a stop to the pollution by instructing RWQCB staff to consider and appropriately respond to our findings.

Background:

In 1999, MTBE was found in the City of Morro Bay's wastewater treatment plant. This was a major concern because the plant is located a short distance from the City of Morro Bay's Morro Basin municipal well field. The wells are approximately 500 feet west of the Shell gasoline station site that was eventually determined to be the source of the MTBE.

In early 2000, soil boring samples from the Shell station site at 1840 Main Street revealed high concentrations of MTBE in the soil and groundwater. In March 2000, The RWQCB required the Shell station owner, Equilon/Equiva, to install monitoring wells and to conduct groundwater and soil sampling on the Shell site and off-site.

The results of the sampling conducted from May through August 2000 showed that the MTBE contaminant plume originated at the Shell station site and extended west under Main Street and Hwy 1. It was determined that the MTBE had entered the sewer system through breaks in the sewer lines.

In early 2001, the MTBE cleanup work began. Overseen by RWQCB staff, the work involved significant excavations at the Shell station site (which lies directly over the Morro Basin aquifer boundary) and the drilling of a total of 63 monitoring and extraction wells at the site and nearby. An RWQCB staff report prepared for the May 30, 2002 regular meeting describes some of the work done:

"*On January 24, 2002, Shell removed the inactive UST system to evaluate the source of the release (e.g., piping, fuel dispenser, etc.). Soil sample information and inspection did not pinpoint the exact source of the MTBE leak. In February 2002, Shell placed a slurry of oxygen release compounds (ORC□) in the saturated soils beneath the USTs and in the first few feet of gravel used to backfill the UST excavation. The ORC□ was placed in the UST excavation to stimulate bioremedation to remove MTBE and TBA in this area. In addition, two tank pit-monitoring wells (TP-N and TP-S) were installed within the former excavation to monitor the effectiveness of the ORC□ and water quality. Two extraction wells adjacent to the UST excavation (MW-7 and IW-1) were taken offline of the extraction system to allow the ORC□ to remain in place. Currently, groundwater extraction is from three offsite wells, IW-4, IW-5, and IW-6. Groundwater will continue to be sampled for petroleum hydrocarbon constituents and field tested for water quality parameters (e.g., dissolved oxygen, pH, etc.) on a bi-monthly basis in selected monitoring wells while the groundwater extraction system remains in operation.*"

Morro Bay does not use the Morro Basin wells during most of the year. In 1997, Morro Bay began receiving State water, which has become the City's primary water supply. The Morro Basin well field was subsequently used only in November during the State water maintenance shutdown. That practice continued until very recently, when the City began to use the wells more frequently. However, November is still ordinarily the period of maximum use of the wells.

In November, 2002, as it had been doing every November since 1997, the City of Morro Bay used the Morro Basin wells during the State Water shutdown. The nitrate levels in the well water immediately spiked well over the 43 ppm mcl. As soon as the City stopped using the wells, the nitrate levels dropped sharply and were soon below the mcl, where they remained until the following November. This pattern continues into the present, with major spikes occurring during significant well use.

Prior to 2002, the nitrate levels in the Morro Basin wells had NEVER exceeded the mcl. The sudden, radical change in the pattern of nitrate levels in the wells is clearly demonstrated in reported nitrate data, which has been kept since 1954.

The City of Morro Bay and its paid consultant have claimed that the nitrates are from agriculture. However, they are unable to explain just what farmers might have suddenly started doing in 2002 that would account for radical spikes in nitrate levels whenever the wells are used.

In 2008 two Morro Bay residents, Richard Sadowski and Marla Jo Bruton, challenged the City-funded nitrate study. They published a report presenting the theory that the excavations and well drilling associated with the MTBE remediation created breaches in the aquifer boundary, and that those breaches allowed sewage, exfiltrated from the City's dilapidated sewer lines, to be pulled into the wells. They noted that the date of the first spikes in the nitrates corresponded perfectly with the timing of the MTBE remediation work.

The residents found and documented a number of flaws in the City-funded study that claimed that the nitrates were from fertilizer. They asked the RWQCB to review and consider their findings.

They received a response from RWQCB staff member Harvey Packard. Mr. Packard defended the consultant's report. The residents then identified a number of serious flaws in Mr. Packard's analysis, and documented them in a letter to Mr. Packard. He never responded despite being asked more than once to do so.

In 2010, I began finding more evidence that the nitrates come from sewage, not agriculture. Eventually, I documented my findings and submitted them to Mr. Ken Harris for review. His staff did an analysis and I received the results in a letter from Mr. Harris. I found several very serious flaws in the analysis and documented those flaws, providing significant, well-documented evidence that major assertions and conclusions of the RWQCB analyst are not just wrong, but completely illogical. As of this writing, I have received no response from Mr. Harris.

Issues:

#1. Isotopic analysis of nitrogen and due diligence

RWQCB staff member Harvey Packard noted that Cleath concluded that nitrate contamination found in the Morro Basin wells is not exclusively from one source, and stated his belief that Cleath's isotopic study demonstrated due diligence in investigating potential nitrate sources..

Morro Bay residents Richard Sadowski and Marla Jo Bruton stated that they did not believe due diligence had been performed. They noted that the isotopic signatures of the nitrogen in the nitrates in the wells were completely outside the standard, documented ranges for fertilizer; however, they were typical of nitrates found in sewage – something that Sadowski and Bruton believe demonstrates the need for additional testing.

Sadowski and Bruton stated that, for the consultant to have performed due diligence, isotope values from the wells should have been compared to values from samples collected from Morro Bay's wastewater collection lines near the 1840 Main Street site, and from the creek water that the consultants allege is the source of the nitrates

Responses requested

1. Please explain why you believe that due diligence was performed when the consultant failed to collect and test samples of nitrates from the two suspected sources, and to compare the isotopic signatures form nitrates in those samples to the isotopic signatures of the nitrates found in the wells.

2. Please explain this in light of the fact that the isotopic signatures of the nitrates in the wells were typical of those found in sewage and inconsistent with those of fertilizer.

Excerpts from communications between RWQCB staff and Morro Bay residents

1. RWQCB: Letter from Harvey Packard to Richard Sadowski and Marla Jo Bruton, dated july 1, 2008 Page 1
Attachment A

"The Cleath Report examines several chemical and physical processes to assess the possible sources of nitrate in the City's wells. One process evaluates stable isotope fractionation in groundwater. The Cleath Report thoroughly examines associated literature on nitrate isotopic signatures for various sources of nitrate, and compares isotopic data from groundwater collected from each of the four City wells at the Highway 1 well field to literature values (e.9., Figure 14 of the Cleath Report). The Cleath report concludes that nitrate contamination found in the city's well field is not exclusively a result of nitrate ferlilizer applications or exclusively from sewer exfiltration. Although the isotopic study by itself may not be conclusive, it demonstrates Cleath and Associate's diligence in investigating any potential sources of nitrate."

2. Richard Sadowski and Marla Jo Bruton: Letter to Harvey Packard, dated July 7, 2008 Page 1 -
Attachment B

"As you may recall from our report and other communications, we independently followed the same procedure as did the consultants. We found that the isotopic signatures of the well water were nearly an exact match to values for sewage as documented in another study, and significantly outside the range for the isotopic signature of fertilizers:

McQuillan Study Values:

sewage from septic systems:	7.6 to 12.1
sewage at a primary sewage plant:	7.2 to 12.1
Morro Basin Well Values:	7.1 to 10.0
Standard Values for Commercial Fertilizer	-4 to +4

We agree with you that the results are inconclusive, but it is our position that they are only inconclusive because insufficient testing was done. We hold to our position that the data clearly indicates a strong likelihood that it is sewage, not fertilizer that is contaminating the wells."

"As we have stated numerous times, we would like to see isotope values from the wells compared to values from samples actually collected from Morro Bay's wastewater collection lines in the vicinity of the 1840 Main Street site, and from the creek water that the consultants allege is the source of the nitrates. That, in our opinion, would constitute due diligence with regard to the isotope studies."

Other pertinent documents

"Morro Basin Nitrate Study – Issues and Concerns" morrobayissues.info/nitratereport_final.docx

"Condition of the Morro Bay Wastewater Collection System - Video Inspection Review and Analysis" http://morrobayissues.info/Sewerlinecondition.pdf

Note: Richard Sadowski is a CWEA-certified grade 4 collections system expert.

#2. Tests for other components of wastewater

RWQCB staff member Harvey Packard stated that the Piper diagrams illustrated in the Cleath report (Figure 12) demonstrate that wastewater is not a significant component of the water produced and therefore exfiltration is not likely a source of nitrogen/nitrate.

Morro Bay residents Richard Sadowski and Marla Jo Bruton pointed out the fact that, in order for the data in the Piper diagrams to be meaningful, the tested samples should have been drawn when the nitrate levels were high. This is because, if the high nitrate levels are caused by sewage entering the wells, it would be at the time that nitrates are high that other components of wastewater would potentially be present at high levels also.

Sadowski and Bruton demonstrated, by referencing the dates on the laboratory reports in Appendix E of the Cleath report, that all of the samples used to test for other components of wastewater were drawn during periods when nitrate levels were low. So, naturally, components of wastewater were at low levels also.

To summarize, the timing of the drawing of the samples renders the data in the Piper diagrams meaningless.

Response requested

1. Please explain why you believe that, when one is attempting to determine if high nitrate levels are from sewage, one would not draw the samples to test for other components of wastewater at the time when nitrates are high.

2. Please explain how drawing the samples when the nitrates were low, and then demonstrating that at the, other components of wastewater were low also, is of any use in determining whether high nitrate levels are caused by sewage.

Excerpts from communications between RWQCB staff and Morro Bay residents

1. RWQCB: Letter from Harvey Packard to Richard Sadowski and Marla Jo Bruton, dated july 1, 2008 Page 2
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"The Cleath Report's analysis of the general chemical signature of local groundwater and wastewater suggests that produced supply well water does not have a significant component of wastewater. The Piper diagrams illustrated in the report (e.g., Figure 12 of the Cleath Report) demonstrate a clear separation in cation composition between groundwater and wastewater, even though there is less separation with the anions. Even with cation exchange, any appreciable mixing of exfiltrating wastewater with native groundwater produced by the supply wells would result in the supply well data plotting between wastewater and groundwater fields in the cation Piper diagram, (e.g., Figure 12 of the Cleath Report), which is not the case. Therefore, the chemical signature of the supply well water indicates that wastewater is not a significant component of the water produced and therefore exfiltration is not likely a source of nitrogen/nitrate."

2. Richard Sadowski and Marla Jo Bruton: Letter to Harvey Packard, dated July 7, 2008 Page 1
Attachment B

"The problem we have with your conclusion in this case is related to timing. The well water samples were gathered and tested in August and September. (see Cleath study Appendix E, Laboratory Reports for Ground Water and Surface Water Samples.)"

"The nitrate concentration spikes occur during November"

"In summary, it is our position that the data presented in the Piper diagrams is meaningless, because the samples of well water were not gathered at the correct time; only samples gathered during the November period when the wells are in use will give a meaningful result."

Note: See file lab receipts All from 2007. file name nitratestudylabreports.pdf Dates on the reports indicate that NONE of the samples were gathered at a time when the nitrates were high.

Other pertinent documents

Laboratory Reports from Cleath Morro Basin Nitrate Study
Attachment C

"Morro Basin Nitrate Study" – Timothy Cleath http://www.morro-bay.ca.us/documentcenter/view/450

#3. Change in Nitrate Concentrations in the Morro Valley and Well Water

RWQCB staff member Harvey Packard stated that the Cleath report demonstrated the change in nitrate concentrations through time in the lower Morro Valley groundwater and groundwater produced from the supply wells. He stated that the report shows that there is a direct and measurable correlation between nitrate increases in the Morro Valley and nitrate in the well water.

Morro Bay residents Richard Sadowski and Marla Jo Bruton replied that there was a serious problem regarding the timing of the collection of the samples tested. They noted that the 2007 samples were gathered in August, a time when we would expect to find more nitrates from fertilizer, due to the timing of crop fertilization cycles, whereas the1980 samples were gathered in December - some time after any significant applications of fertilizer, and well into the rainy season, meaning that any nitrates not used by the growing crops would be diluted by precipitation that has soaked into the soil.

Hence, comparing nitrate levels in samples drawn in August and December makes no sense. What would make sense would be comparison of nitrates in samples drawn in the same month of the year.

Sadowski and Bruton also cited the very sudden spikes in well water nitrate concentrations, which occur only in November, when the wells are pumping, and noted that there is absolutely no known change in farming operations that could account for that pattern.

In addition, Sadowski and Bruton cited other variables not addressed by Cleath in his comparison of the 2007 and 1980 nitrate levels. These include location of sampling, activities in the area immediately prior to sampling, usage of the area and possible changes in that usage over time.

Response Requested:

1. Please explain why you believe that comparing nitrate levels in one sample drawn in August and in a second sample drawn in December, makes sense in terms of declaring that there has been a significant change in nitrate levels over a period of multiple years.

2. Please identify any known, verified change in farming operations that would account for the sudden nitrates spikes that began to occur in November, 2002, and have occurred every November thereafter.

3. Please explain why you believe that Cleath's failure to account for other significant variables in his comparison of the 2007 and 1980 nitrate levels constitutes good scientific practice. Please address the following variables: location(s) of sampling, activities in the area immediately prior to sampling, usage of the area and possible changes in that usage over time

Excerpts from communications between RWQCB staff and Morro Bay residents

1. RWQCB: Letter from Harvey Packard to Richard Sadowski and Marla Jo Bruton, dated july 1, 2008 Page 2
Attachment A

"The Cleath Report provides another more direct line of evidence that agricultural sources are the primary source of nitrate by demonstrating the change in nitrate concentrations through time in the lower Morro Valley groundwater and groundwater produced from the supply wells. Knowledge of groundwater extraction dynamics, and the geometry of the Morro Valley alluvium, groundwater gradient, and well field placement, indicate that the well field produces nearly all of its groundwater from the Morro Valley. There is a direct and measurable correlation between nitrate increases in the Morro Valley and nitrate in water produced from the supply wells. For example, average nitrate concentrations in supply well MB-3 were approximately 15 milligrams per liter (mg/L) (Figure 4 and Appendix F of the Cleath Report) prior to 1992. Nitrate concentrations increased to an average of 60 mg/L after 2002 in that well. According to page 12 of the Cleath Report, nitrate concentrations from the lower Morro Valley monitoring wells (sampled in December 1980) averaged 34 mg/1. Lower Morro Valley groundwater samples collected in August 2007 (Figure 6 of the Cleath Report) averaged approximately 136 mg/L (Figure 6). Therefore, concentrations increased in both the City supply wells and the lower Morro Valley groundwater by a factor of four sometime between 1980 and 2007. Assuming no degradation of nitrate occurs, according to the above concentrations, nitrate from the lower Morro Valley is diluted by the creek and rainfall infiltration by a factor of approximately 2.3 before tt is produced by well MB-3. These concentration changes through time demonstrate a direct correlation between the nitrate concentrations in the lower Morro Valley groundwater and concentrations found in groundwater produced from the supply wells."

2. Richard Sadowski and Marla Jo Bruton: Letter to Harvey Packard, dated July 7, 2008 Page 2
Attachment B

"1. Again, we have a significant timing issue. In order to do a valid comparison between two samples, one must ensure that all possible variables that might influence the results have been considered, and that there is no

possibility that those variables could affect the results; render them invalid. We will focus here on what we consider the major variable that does not appear to be covered in your analysis.

The 2007 samples were gathered in August, a time when we would expect to find more nitrates from fertilizer, due to the timing of crop fertilization cycles. Crops are generally fertilized during the growing cycle, which, depending on the crop, generally extends from Spring through early Fall. August is also a dry month with little to no precipitation. Therefore, any dilution of nitrates in the groundwater would be expected to come solely from irrigation.

The 1980 samples were gathered in December. This would be some time after any significant applications of fertilizer, AND well into the rainy season, meaning that any nitrates not used by the growing crops would be diluted by precipitation that has soaked into the soil.

It is our position, therefore, that comparison of the lower Morro Valley groundwater nitrate concentrations from the months of August and December for ANY years is invalid, and can essentially be described as "comparing apples to oranges". Please note that this is just one variable not covered in the analysis provided. Others would include location of sampling, activities in the area immediately prior to sampling, usage of the area and possible changes in that usage over time.

2. Even if we ignore the very obvious timing issue described above, it is our position that there is clearly no demonstrated correlation between the alleged nitrate increases in the lower Morro Valley groundwater and **the very sudden spikes in well water nitrate concentrations, which occur only in November, when the wells are pumping**. There is absolutely no known change in farming operations that could account for that pattern. The sudden beginning of the spikes, in 2002, does, however, correlate VERY closely to the timing of the MtBE remediation work at 1840 Main Street. "

Other Pertinent Documents

Morro Basin Nitrate Study – Timothy Cleath http://www.morro-bay.ca.us/documentcenter/view/450

#4. Reference to Amick and Burgess study on sewer exfiltration

RWQCB staff member Harvey Packard cited a reference from "Exfiltration in Sewer Systems", a study by Amick and Burgess. Packard stated that the RWQCB staff had reviewed the Amick and Burgess study, and believed that a quote from that study was correctly applied by Cleath in support of the claim that exfiltrated sewage could not be a significant source of the nitrates in the wells.

Morro Bay residents Richard Sadowski and Marla Jo Bruton pointed out the fact that the quote used by Cleath is incomplete and taken out of context, and that the full statement in the Amick and Burgess study has the opposite meaning.

Response Requested:

1. Please explain how, if the RWQCB staff reviewed the Amick and Burgess study, staff failed to notice that the quote used by Cleath was out of context and incomplete.

2. Please explain why RWQCB staff, in concluding that exfiltrated sewage could not be a significant source of the nitrates in the wells, apparently did not take into account the following:

- **The fact that the Amick and Burgess study was about, and clearly outlined the serious risks of sewage exfiltration**

- **The fact that, according to the Amick and Burgess study, exfiltration rates have been found, in many places, to be quite severe. (for example, as stated in the study, exfiltration rates as high as 56% of total flow were estimated in one test in Berkeley, California)**

Excerpts from communications between RWQCB staff and Morro Bay residents

1. RWQCB: Letter from Harvey Packard to Richard Sadowski and Marla Jo Bruton, dated july 1, 2008 Page 2
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"Cleath and Associates made it apparent, in their discussion of "Sewer Exfiltration (page 16 of the Cleath Report)," that certain conditions (i.e., age of pipe, type of pipe, distance to groundwater levels, and pipe elevation) may provide an opportunity for sewer exfiltration to a minimal extent. Central Coast Water Board staff has reviewed the referenced documentation (Exfiltration in Sewer Systems, Amick and Burgess, December 2000) and believes that the Cleath Report accurately applies the information to the Morro Basin nitrate source contamination study. Page 17 of the Cleath Report concludes that exfiltration "is not likely a significant source of nitrate contamination to the City well field." Upon review of your allegations, your report does not provide direct measurable evidence in support of sewer exfiltration being a significant source of nitrate contamination. Water Board staff concurs with Cleath Report's conclusion explaining the sewer exfiltration as less than a significant source of nitrate contamination in the supply well system."

2. Richard Sadowski and Marla Jo Bruton: Letter to Harvey Packard, dated July 7, Page 3
Attachment B

"In reference to the study, "Exfiltration in Sewer Systems", you state that you believe that the Cleath report "accurately applies the information to the Morro Basin nitrate source contamination study."

Once again, we find ourselves in disagreement. On pages 16 and 17 of the Cleath report, it is stated,

"Despite a hydraulic potential for exfiltration along Main Street when the City well field is pumping, gravity sewer leaks quickly become plugged by sewer film and settleable solids in the sewage, theoretically reaching steady-state leakage rates in approximately one hour. A research study conducted at several locations in Germany, where sewer systems are generally older and in poor condition, showed that when pressure heads are below the sewer pipe crown (typical for gravity sewers) exfiltration rates were minimal (Amick and Burgess, 2000)"

Here is the complete statement, from the Amick and Burgess study, page 17 (study available online at http://www.epa.gov/nrmrl/pubs/600r01034/600r01034.pdf):

"At a pressure head below the sewer crown, which is typically the case in gravity flow sewer lines, exfiltration rates were minimal. At a pressure head of one pipe diameter, the exfiltration rate increased dramatically, to more than 26 gal/hour (gph) per joint in some segments. This high leakage rate can, in part, be attributed to the generally poor condition of the old sewer systems. A linear correlation between pressure head and exfiltration rate for several types of sewer defects was noted for pressure heads greater than 500 mm (20 inches). It was also noted that at lower flows and pressure heads, the exfiltration rate decreases exponentially, most likely from self-sealing from sewer film and settleable solids in the sewage. If the flow and pressure head increases, however, this self-sealing property is broken and the exfiltration rate increases rapidly." (emphasis ours)

On page 25 of their report, Amick and Burgess state, "Areas with significant portions of the system above, but in close proximity to, the groundwater table are probably at greatest risk." Note that most of Morro Bay's sewer lines do, indeed, lie above, but in close proximity to the groundwater table.

We believe it is clear that the statement in the Cleath report was taken out of context, and that the complete statement from the Amick and Burgess study has a meaning significantly different than that of the portion published in the Cleath study. We have attributed their failure to provide the complete quote to the likelihood that

they obtained the quote from a source other than the original report, as we have seen the out-of-context portion of the statement elsewhere."

Other pertinent documents

"Exfiltration in Sewer Systems" Amick and Burgess, December, 2000

"Morro Basin Nitrate Study" – Timothy Cleath http://www.morro-bay.ca.us/documentcenter/view/450

Note: The link to the Amick and Burgess study provided in the Sadowsi/Bruton report is no longer valid. Please use the file name cited above under "other pertinent documents"

#5. "Pro-active" maintenance of the Morro Bay wastewater collections system

RWQCB staff member Harvey Packard stated that RWQCB staff's conclusion was that that the City of Morro Bay was proactively operating and maintaining its collections system to correct sanitary sewer system deficiencies.

Morro Bay residents Richard Sadowski and Marla Jo Bruton cited evidence that the collection system was not being proactively maintained. They cited video inspections of the sewer lines and the numerous major defects shown in those inspections. They also cited news articles that told of impacts of the poor condition of the lines, including the entry of MTBE into the sewer system through pipe defects, and collapse of a major collections system line.

Response Requested:

Please explain, in light of the numerous defects shown in sewer line video inspections, and the evidence of poor line condition cited in news articles, how the RWQCB staff came to the conclusion that the City of Morro Bay was proactively maintaining its sewage collection system.

Excerpts from communications between RWQCB staff and Morro Bay residents

1. RWQCB: Letter from Harvey Packard to Richard Sadowski and Marla Jo Bruton, dated july 1, 2008 Page 3
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"In addition, the City of Morro Bay is required to comply with the Statewide General Waste Discharger Requirements for Sanitary Sewer Sysfems, Order No. 2006-0003- DWQ (General WDR). The City of Morro Bay obtained enrollment status under this General WDR on January 8,2007. The General WDR requires the city to develop a sanitary sewer management plan, which specif ically includes an operation and maintenance program. The operations and maintenance program is required to include collection system mapping, a preventative maintenance program, a rehabilitation and replacement program, and staff training. Furthermore, the sanitary sewer management plan includes a sanitary sewer evaluation component. The sanitary sewer evaluation identifies and prioritizes deficient portions of the sanitary sewer systems that experience overflows, hydraulic deficiencies, and inflow/infiltration (including exfiltration) issues. Upon preliminary review of the city's sanitary sewer management plan, Central Coast Water Board staff concludes that the city is compliant with General WDR provisions. Additionally, we conclude that the city is proactively operating and maintaining its collections system to correct sanitary sewer system deficiencies. For example, the city's main sewer line was relined the summer of 2001 to prevent infiltration/exfiltration. If there are current deficiencies in the liner, the expected rate of infiltration/exfiltration would be minimal, thus yielding a minimal potential for nitrate contamination."

2. Richard Sadowski and Marla Jo Bruton: Letter to Harvey Packard, dated July 7, 2008, Page 3
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"You note that the City of Morro Bay is required to comply with the State's General Waste Discharger Requirements for Sanitary Sewer Systems, and further state that the City is "proactively operating and maintaining its collections system to correct sanitary sewer system deficiencies".

We are indeed gratified that the City is finally taking steps to correct the very serious health and safety risks posed by the seriously dilapidated condition of its sewer lines; specifically the exfiltration of sewage into our soil and groundwater. In fact, we have been encouraging the City to do so for years. We must point out, however, that it appears to have taken the passage of a State law to influence them to begin corrective action. We do not consider this a sign that the City is, or has been, in any way pro-active in its approach.

Videotaped inspections of the lines have long demonstrated major defects in the lines. ***We found defects in one videotaped inspection that also existed in another inspection of the same section of line – done seven years before.***

You also state, "For example, the City's main sewer line was relined in the summer of 2001 to prevent infiltration/exfiltration. If there are current deficiencies in the liner, the expected rate of infiltration/exfiltration would be minimal, thus thus yielding a minimal potential for nitrate contamination". Again, we do not consider this evidence of a pro-active approach taken by the City, nor do we consider it a sign that significant exfiltration is not occurring in the Morro Bay sewer system.

We believe you are referring to the slip lining of the Highway 41 /Atascadero Road line, owned jointly by Cayucos and Morro Bay, that runs to the Wastewater Treatment Plant. ***We would not have described this line as "the City's main sewer line", and have never contended that it was a source of exfiltrated sewage, as this is one of the very few lines that lies below the water table. Furthermore, this is not a particularly long line, and it comprises only a VERY small portion of the total system.***

We believe that the major source of the exfiltrated sewage is most likely the Main Street trunk line, a much longer stretch of line that is in deplorable condition, with numerous major cracks, pipe misalignments, and separations that clearly provide the opportunity for major exfiltration. That line has NOT been relined.

With regard to the Hwy 41/Atascadero Road line, please consider this quote from a letter dated November 18, 1999, from David Phillips of the Cayucos Sanitary District to Bob Hendrix, Morro Bay City Manager, regarding the sewer line along Hwy. 41 (Atascadero Road),

"The pipeline damage that was apparent in past video inspections is the likely point of introduction".

During the emergency repair of the adjacent portion of this line, the District requested that we proceed to extend the repair of this line to the intersection of North Main Street. I believe that we went so far as to commission and complete a design for that replacement. The city has chosen not to proceed with the work."

The emergency repair referred to is, of course, the one done after it was determined that MtBE was entering the Wastewater Treatment Plant through this line, because it was in such poor condition that large amounts of MtBE-contaminated groundwater were infiltrating it. ***Please note the statement that the damage was apparent in past video inspections. Yet, nothing was done until there was an emergency that forced action.***

Please also consider these quotes from a Tribune article, "MtBE Complicates Task as Towns Mull Aging Sewer", dated May 24, 2000:

"Morro Bay and Cayucos are joint owners of a sewer plant, and the line being inundated with ground water serves both communities." and, "Two years ago the line collapsed in an area adjacent to the City's desalination plant and had to be replaced under an emergency declaration"

This does not sound to us like a glowing example of pro-active maintenance."

Other pertinent documents

Morro Basin Nitrate Study – Timothy Cleath http://www.morro-bay.ca.us/documentcenter/view/450

"Condition of the Morro Bay Wastewater Collection System - Video Inspection Review and Analysis" http://morrobayissues.info/Sewerlinecondition.pdf

Note: Richard Sadowski is a CWEA-certified grade 4 collections system expert.

#6. Hydraulic connection between area of Shell Station site and municipal well field

A letter from RWQCB Executive Officer Ken Harris stated that the area beneath the City's wells is likely hydraulically disconnected from the former Shell station area due to geologic formations in the area.

I cited a report done in 2005 to advise the City of Morro Bay regarding the advisability of closing the MTBE "case". Given that the RWQCB oversaw the MTBE remediation, I assume that the report must be in RWQCB files. Proof of a hydraulic connection to the wells is provided through a number of citations from that report, including these:

- *Page 7, paragraph 2: "The second problem with dismissing the MTBE detections at the MW-26 well cluster, is that the timing and behavior of the detections appear associated with production at the well field"*
- *Page 7, paragraph 3: MTBE concentrations in ground water collected from the well cluster have been detected during sampling events immediately following each water-use event at the City's well field"*
- *Page 8, paragraph 3: "Furthermore, by the end of remedial pumping activities in March, 2003, the core of the MTBE plume had already moved west of the extraction system's interceptor wells and beneath Highway 1. "*
- *Page 9, paragraph 1: MTBE Detections at the MW-26 well cluster, which is closest to the City well field, appear directly associated with pumping at the City's Highway 1 well field.*

I also provided a map drawn by an MTBE cleanup contractor, demonstrating the extremely close proximity of monitoring well MW-26 to the City wells.

Finally, I cited a news article and a reference in Morro Bay's 2005 Urban Water Management Plan. Both stated that the MTBE had been found very near to the wells.

Response Requested:

Please explain how the area of the Shell station can be "hydraulically disconnected" from the area where the City wells are located, given that MTBE was found in the groundwater a very short distance from the wells, and given that movement of the MTBE plume was demonstrated to be associated with use of the City wells.

Excerpts from communications between RWQCB staff and Morro Bay residents

1. RWQCB: Letter from Ken Harris to Linda Stedjee, dated September 25, 2013
Attachment D

"The area beneath the former Shell Station is adjacent to bedrock (a poor source for significant quantities of groundwater) and separated from sand/gravel units tapped by the City's wells by thick layers of clay and silt (thus the City's wells are likely hydraulically disconnected from the former Shell Station area as evidenced by lack of methyl tertiary-butyl ether (MTBE) detected in the City's wells)."

2. Linda Stedjee: Email to Ken Harris, dated 9/26/2013
Attachment E

On page 2 of your letter, it is stated,

"The area beneath the former Shell Station is adjacent to bedrock (a poor source for significant quantities of groundwater) and separated from sand/gravel units tapped by the City's wells by thick layers of clay and silt (thus the City's wells are likely hydraulically disconnected from the former Shell Station area as evidenced by lack of methyl tertiary-butyl ether (MTBE) detected in the City's wells)."

This is absolutely false. There is a myriad of documentation that shows the City's wells ARE hydraulically connected to the former Shell Station area - as evidenced by prior findings regarding the migration of MTBE.

I ask that you direct your attention to following sources:

a. The attached document, a May 1, 2006 letter from Spencer Harris and Timothy Cleath, of Cleath and Associates, to Mr. Frank Cunningnam, City of Morro Bay. subject, "Review of case closure request, former Shell Service Station, 1840 Main Street, Morro Bay, California" (document name may2006cleatherport.pdf)

You may find the entire document of interest, but I suggest you review the following items:

Page 5, paragraph 1: "Nevertheless, the trends of decreasing MTBE mass, both plume-wide and at key wells, do support a conclusion that the threat to the City well field is diminishing…"

Page 6, paragraph 4: The original MTBE detection came from wastewater sampling at the Morro Bay-Cayucos wastewater treatment plant, due to ground water with MTBE entering the sewer mains. Repairs to the leaking mains were performed, but gravel-filled seer line tenches (sic) remain as permeable conduits for ground water flow."

Page 7, paragraph 2: "The second problem with dismissing the MTBE detections at the MW-26 well cluster, is that the timing and behavior of the detections appear associated with production at the well field"

Page 7, paragraph 3: MTBE concentrations in ground water collected from the well cluster have been detected during sampling events immediately following each water-use event at the City's well field"

Page 8, paragraph 3: "Furthermore, by the end of remedial pumping activities in March, 2003, the core of the MTBE plume had already moved west of the extraction system's interceptor wells and beneath Highway 1. "

Page 9, paragraph 1: MTBE Detections at the MW-26 well cluster,which is closest to the City well field, appear directly associated with pumping at the City's Highway 1 well field.

So much for your analyst's conclusion that there is no hydraulic connection between the City wells and the area of the Shell station.

Here is the Delta consultants map showing the locations of the Shell station which I have shaded in red, detection well cluster MW-26, around which I have drawn a red box, and the City wells, which I have shaded in blue. You can see that those monitoring wells are right next to the City well field.

In addition, had your consultant done thorough research, he/she would have learned that the remediation crew had powerful pumps running during the remediation in order to keep the MTBE out of the wells. I believe it was also keeping out the exfiltrated sewage that, prior to the remediation work, had not been able to reach the wells in significant quantities, but was able to do so after the extensive excavations.

Other pertinent documents

1. Letter from Timothy Cleath to Frank Cunningham, subject, "Review of case closure request, former Shell Service Station, 1840 Main Street. Morro Bay, California", dated May 1, 2006
Attachment F

2. *Delta Consultants' map showing locations of MTBE monitoring and extraction wells*
Attachment G

3. Los Angeles Times article "Oil Firms Agree to Clean Up Morro Bay's Tainted Water", dated March 11, 2001
http://articles.latimes.com/2001/mar/11/news/mn-36298

4. City of Morro Bay 2005 Urban Water Management Plan, page 44 http://www.morro-bay.ca.us/documentcenter/view/451

#7. Allegedly declining well production from 2009 to present

A letter from RWQCB Executive Officer Ken Harris stated that production from the Morro Basin well field had been declining from 2009 to the present.

I provided a graph, based on City of Morro Bay water production reports, demonstrating that water production has not been declining. I noted that, aside from a major surge in 2010, which was caused by the fact that the State Water Project radically cut back the City of Morro Bay's water allotment, production has been pretty steady, and in 2012 was clearly up from the prior year.

Response Requested:

Please explain what data you used to support the assertion that Morro Basin well production has been declining since 2009, as it does not appear to be the Morro Bay well production data, obtained from official City of Morro Bay water production records, that was used in my analysis.

Excerpts from communications between RWQCB staff and Morro Bay residents

1. Letter from Ken Harris to Linda Stedjee, dated September 25, 2013
Attachment D

"The recent data provided by you indicates overall declining production from the well field over the period from 2009 to present; however, nitrate concentrations have increased during that time."

2. Email from Linda Stedjee to Ken Harris, dated 9/26/2013
Attachment E

"Your letter says that recent data I supplied was the basis of the above conclusion. Following is a chart that I supplied. The light blue line shows total well production at the Morro Basin well field. I believe it is clear that well field production is NOT declining. Aside from a major surge in 2010, which was caused by the fact that the State Water Project radically cut back the City of Morro Bay's water allotment, production has been pretty steady, and in 2012 was clearly up from the prior year. It did NOT decline. I cannot begin to imagine how your analyst could have looked at this chart and concluded that production is declining overall."

Other pertinent documents

1. City of Morro Bay water production reports for the Morro Basin well field

2. Graph, titled "Morro Basin Well Nitrates vs Total Well Production" in 9/26 email Linda Stedjee email
Attachment E

#8. Correlation between nitrate concentrations and creek flows

A letter from RWQCB Executive Officer Ken Harris stated that RWQCB staff's analysis of creek flow, well drawdown, well production, and nitrate concentrations indicates that there is a "yearly cycle and strong inverse correlation between nitrate concentrations and creek flows"

I cited documented Morro Bay rainfall data, and noted that it is an established fact that creek flows increase when it rains, and are heaviest during the rainy season; the creek dries up during the summer.

I cited a graph of rainfall versus nitrate levels, and pointed out the obvious fact that the graph clearly shows that during the rainy season (and hence, when creek flows are highest), the nitrates are also at their highest. Thus, there is not an inverse correlation between nitrate levels and creek flows. There is, in fact, a direct correlation.

Response Requested:

Please explain how the RWQCB analyst concluded that there is an inverse correlation between creek flows and nitrate levels, given the following facts:

- **It is an established fact that the creek flows are highest in Morro Bay during the rainy season, and**
- **well-documented nitrate and rainfall data are readily available, and**
- **When one puts the rainfall and nitrate level data together on the same graph, one sees that the time periods when nitrates are high are the same time periods when rainfall is at its highest**

Excerpts from communications between RWQCB staff and Morro Bay residents

1. Letter from Ken Harris to Linda Stedjee, dated September 25, 2013
Attachment D

"Our analyses of pre-2007 data on Morro Creek flows, rainfall, well drawdown, well production, and nitrate concentrations, along with new data on well production, rainfall, and nitrate concentrations provided in your July 8, 2013 email, indicate that there is a yearly cycle and strong inverse correlation between nitrate concentrations and creek flows. The ephemeral creek begins to flow after significant rainfall events. The well field induces groundwater recharge from the creek (as designed), thus diluting nitrate in groundwater from Morro Valley, especially groundwater captured by southern-most supply wells located nearest the creek."

2. Email from Linda Stedjee to Ken Harris, dated 9/27/2013
Attachment H

"As a first step in illustrating the problems with your analyst's conclusion, I direct your attention to the EXCEL worksheet I provided covering rainfall versus nitrate levels for well 03. I have attached a PDF version to this email. Rainfall data contained in the sheet is from weather-warehouse.com and can easily be verified. Please note that from May through November of 2012, there was no rainfall in Morro Bay at all - zip. Hence, we should be able to rule out any effects of flows in the "ephemeral creek" during that period."

"Please also note below the chart showing nitrate levels in well 03 versus rainfall. Your email says that there is a, strong inverse correlation between nitrate concentrations and creek flows. This, according to your email was based pre-2007 data and the new data that I provided. I believe it is very clear that the "new data" that I provided shows nothing of the kind."

Your email indicates that, "The ephemeral creek begins to flow after significant rainfall events". Yes, when it rains, creek flows, in general, are up. In Morro Bay, they are highest in winter and early spring - the rainiest time of year. By late spring, there is little-to-no rain and creek flows go down. By summer, the flow in Morro Creek is way down, totally dry in many areas, and it stays that way until the winter rains come again.

Please note that, as shown by the chart below for well 03, nitrates were clearly up during the 2010 rainy season - and so was the rainfall. Nitrates were up during the 2011 rainy season (winter and early spring) - and so were rainfall levels. I admit I do have a degree in mathematics, but I did not need that to notice that what we see here are not inverse correlations. They are direct correlations, which is exactly the opposite of the "strong inverse correlation between nitrate concentrations and creek flows" that your analyst claims.

Please also note that during the rainy season of 2012, there was also a direct correlation, not an inverse one. The 2012 correlation is a bit harder to see as there was less rainfall that year than in 2011, but it is clearly visible on the chart and in the supporting data. Directly below the nitrate peak in late 2012 is the highest rainfall level of the year.

My second major point regarding the fallacy in your analyst's assertion regarding flows and nitrate concentrations is in regard to the "pre-2007" data cited but not provided with your email. I am fascinated by the prospect that there may have been a complete reversal in the correlations, with pre-2007 correlations being inverse, and the correlations from 2010 being direct.

Fortunately, rainfall data for Morro Bay is available for the years prior to 2007, and nitrate data is available back as far as 1954. So, I obtained the rainfall data for the winter of 2002 - 2003 as an example.
We had a lot of rain that winter, so it is a good "test case" to see if the correlations hold both in dry and wet winters.

Here is the rainfall data for the 2002 - 2003 rainy season:

October, 2002 - 0.17
November, 2002- 2.18
December, 2002 - 5.07
January, 2003 - 0.52
February, 2003 - .84
March, 2003 - 1.92
April, 2003 - 1.67

I now direct your attention to the following graph of nitrate data in the Morro Basin wells from 1954 through 2007. This is excerpted from the graph provided farther down in this email. I enlarged the diagram and drew in the blue lines to make it clearer where the years begin and end. I now direct your attention to late 2002, when we had 5.07 inches of rain in the month of December (a LOT of rain for this area). Please note that is when the nitrate level spiked the highest. With the rainfall that high, and having had quite a bit of rain in November of 2002, it is clear that the creek flow levels would have been high as well.

Once again, this is a DIRECT correlation, not an inverse one. I do not believe it is necessary for me to go through this exercise for more pre-2007 data. It will show the same thing. We can tell that just from this graph. The nitrates always peak in the November - December timeframe. Not coincidentally, that was pretty much the only time period when the wells were being used for the years shown on the graph excerpt below.

My third point focuses on another conflict regarding your analyst's claims regarding the alleged (and now disproven) claim of an inverse correlation between creek flows and nitrate levels as an explanation for the nitrate spikes.

The following quote is from page 13 of Cleath's Morro Basin Nitrate Study

" Recent Trends in Nitrate Concentrations

Beginning in 2002, nitrate concentrations in MB-3 have exceeded the drinking water standard on a seasonal basis (Figure 4). The pattern of fluctuations, however, appears linked to well field production. Nitrate concentration peaks between 2002 and 2006 coincide with full scale production at the well field, which occurs annually around November during the State Water Project shut downs. Historically, nitrate concentrations in November were in decline, rather than peaking." (emphasis added)

I obviously do not agree with everything Cleath says, but in this case, his statement is clearly borne out by the data. See the chart above for corroboration of the underlined portion of Cleath's statement."

Other pertinent documents

"*Morro Basin Nitrate Study – Issues and Concerns" morrobayissues.info/nitratereport_final.docx*

#9. Pattern of comparative nitrate levels in the Morro Basin wells

A letter from RWQCB Executive Officer Ken Harris implies that the reason that relative nitrate levels in the Morro Basin always wells correspond to the distances of the wells from the sewage source identified by residents is dilution of nitrates by Morro Creek. The letter says that the creek starts to flow after significant rainfall and that well field induces groundwater recharge from the creek , thus diluting nitrate in groundwater from Morro Valley, especially that captured by the wells located nearest the creek. The letter also says that the wells get most of their water from groundwater flowing from Morro Valley through the narrows towards the ocean , and from induced recharge from Morro Creek.

I pointed out that the data clearly shows that the pattern of nitrate levels holds not only when the creek is flowing, but when it is not, and even when it has been completely dry for months. Year after year, regardless of weather, the pattern of relative nitrate levels remains same.

As an example, I specifically cited the period of May through November, 2012, when there was absolutely no rainfall recorded, so there was no creek flow to dilute the water reaching the wells. Yet, the pattern of nitrate levels remained the same.

Response Requested:

1. Please explain how water from the creek can dilute the nitrates in the wells when the creek is completely dry (summer and early fall).

2. Regarding the months when the creek IS flowing - given that the surface creek water comes from exactly the same source as the underground stream water (The Morro Valley), and given that ALL of that water is funneled through the aquifer "narrows" just before it reaches the area of the wells, please explain how the creek water could dilute the nitrate levels in the water drawn by the wells.

If you allege that the creek water has lower nitrate levels, please cite specific data and scientific principles that explain why the nitrates would be more concentrated in the underground stream; less concentrated in the surface flow.

Excerpts from communications between RWQCB staff and Morro Bay residents

1. Letter from Ken Harris to Linda Stedjee, dated September 25, 2013
Attachment D

"The ephemeral creek begins to flow after significant rainfall events. The well field induces groundwater recharge from the creek (as designed), thus diluting nitrate in groundwater from Morro Valley, especially groundwater captured by southern-most supply wells located nearest the creek."

"In terms of water balance, the City's wells get nearly all of their water from 1) groundwater flowing from Morro Valley through the narrows towards the ocean and 2) induced recharge from Morro Creek."

2. Email from Linda Stedjee to Ken Harris, dated 9/27/2013
Attachment H

"As a first step in illustrating the problems with your analyst's conclusion, I direct your attention to the EXCEL worksheet I provided covering rainfall versus nitrate levels for well 03. I have attached a PDF version to this email. Rainfall data contained in the sheet is from weather-warehouse.com and can easily be verified. Please note that from May through November of 2012, there was no rainfall in Morro Bay at all - zip. Hence, we should be able to rule out any effects of flows in the "ephemeral creek" during that period.

Please note that, as shown on the chart below, during the SEVEN MONTHS when there was absolutely no rainfall, the pattern remained exactly the same. Well 03 had the highest nitrate levels, and is closest to the sewage source. Well 04 is next closest, followed by well 14, and well 15, which is the most distant. There was no "ephemeral creek" flow going on - nothing to dilute groundwater nearest the creek. Yet, the pattern remained consistent."

Attachments:

A. Letter from Harvey Packard to Richard Sadowski and Marla Jo Bruton, dated july 1, 2008

B. Letter from Richard Sadowski and Marla Jo Bruton to Harvey Packard, dated July 7, 2008

C. Laboratory Reports from Cleath Morro Basin Nitrate Study

D. Letter from Ken Harris to Linda Stedjee, dated September 25, 2013

E. Email from Linda Stedjee to Ken Harris, dated 9/26/2013

F. Letter from Timothy Cleath to Frank Cunningham, subject, "Review of case closure request, former Shell Service Station, 1840 Main Street. Morro Bay, California", dated May 1, 2006

G. Delta Consultants' map showing locations of MTBE monitoring and extraction wells

H. Email from Linda Stedjee to Ken Harris, dated 9/27/2013

This concludes my presentation of facts and evidence refuting claims made by RWQCB staff. Again, I ask that you please help us put a stop to the pollution of our groundwater and the ocean by instructing RWQCB staff to consider and appropriately respond to our findings.

Sincerely,

Linda Stedjee

cc: Tom Howard, Executive Director, SWRCB; Dan Carl, Deputy Director, CCC, Madeline Cavalieri, District Mgr. CCC, Kurt Souza, CDPH, Nancy Stoner, Acting Assistant Administrator, EPA Office of Water, Margaret Davidson, Acting Director, NOAA Office of Ocean and Coastal Resource Management.

ATTACHMENT A
EXHIBIT 3-6

California Regional Water Quality Control Board
Central Coast Region

Linda S. Adams
Secretary for Environmental Protection

Internet Address: http://www.waterboards.ca.gov/centralcoast
895 Aerovista Place – Suite 101, San Luis Obispo, CA 93401-7906
Phone (805) 549-3147 • FAX (805) 543-0397

Arnold Schwarzenegger
Governor

July 1, 2008

Mr. Richard Sadowski and Ms. Marla Jo Bruton
490 Java Street
Morro bay, CA 93442

RESPONSE LETTER ADDRESSING THE MORRO BASIN NIRATE STUDY ISSUES AND CONCERNS COMPLAINT, MORRO BAY, SAN LUIS OBISPO COUNTY

Dear Mr. Sadowski and Ms. Bruton:

Central Coast Water Board staff has reviewed your April 2008 *Morro Basin Nitrate Study; Issues and Concerns* complaint letter (complaint) submitted on April 9, 2008. The complaint mainly discusses concerns with the December 7, 2007 *Morro Basin Nitrate Study* by Cleath and Associates (Cleath Report) for the City of Morro Bay. This letter provides our response to your complaint.

Your complaint alleges that sewer line exfiltration is the significant contributing source of nitrate contamination to the City of Morro Bay's (City) supply wells. Several Water Board staff members, with extensive background and expertise in isotope fractionation principles, groundwater geochemistry, groundwater flow and transport, and sewer collection systems, reviewed the Cleath Report and your complaint. It is our opinion that the conclusions of the Cleath Report are well founded and supported by several lines of evidence, resulting in a logical explanation. Water Board staff agrees with the conclusion that the primary source of nitrate contamination in the City's wells is from agricultural practices. This letter discusses specific findings of the Cleath Report that demonstrate justification for the report's conclusions.

The Cleath Report examines several chemical and physical processes to assess the possible sources of nitrate in the City's wells. One process evaluates stable isotope fractionation in groundwater. The Cleath Report thoroughly examines associated literature on nitrate isotopic signatures for various sources of nitrate, and compares isotopic data from groundwater collected from each of the four City wells at the Highway 1 well field to literature values (e.g., Figure 14 of the Cleath Report). The Cleath report concludes that nitrate contamination found in the city's well field is not exclusively a result of nitrate fertilizer applications or exclusively from sewer exfiltration. Although the isotopic study by itself may not be conclusive, it demonstrates Cleath and Associate's diligence in investigating any potential sources of nitrate.

The Cleath Report's analysis of the general chemical signature of local groundwater and wastewater suggests that produced supply well water does not have a significant component of wastewater. The Piper diagrams illustrated in the report (e.g., Figure 12 of the Cleath Report) demonstrate a clear separation in cation composition between groundwater and wastewater, even though there is less separation with the anions. Even with cation exchange, any appreciable mixing of exfiltrating wastewater with native groundwater produced by the supply wells would result in the supply well data plotting between wastewater and groundwater fields in the cation Piper diagram, (e.g., Figure 12 of the Cleath Report), which is not the case. Therefore, the chemical signature of the supply well water indicates that wastewater is not a significant component of the water produced and therefore exfiltration is not likely a source of nitrogen/nitrate.

The Cleath Report provides another more direct line of evidence that agricultural sources are the primary source of nitrate by demonstrating the change in nitrate concentrations through time in the lower Morro Valley groundwater and groundwater produced from the supply wells. Knowledge of groundwater extraction dynamics, and the geometry of the Morro Valley alluvium, groundwater gradient, and well field placement, indicate that the well field produces nearly all of its groundwater from the Morro Valley. There is a direct and measurable correlation between nitrate increases in the Morro Valley and nitrate in water produced from the supply wells. For example, average nitrate concentrations in supply well MB-3 were approximately 15 milligrams per liter (mg/L) (Figure 4 and Appendix F of the Cleath Report) prior to 1992. Nitrate concentrations increased to an average of 60 mg/L after 2002 in that well. According to page 12 of the Cleath Report, nitrate concentrations from the lower Morro Valley monitoring wells (sampled in December 1980) averaged 34 mg/L. Lower Morro Valley groundwater samples collected in August 2007 (Figure 6 of the Cleath Report) averaged approximately 136 mg/L (Figure 6). Therefore, concentrations increased in both the City supply wells and the lower Morro Valley groundwater by a factor of four sometime between 1980 and 2007. Assuming no degradation of nitrate occurs, according to the above concentrations, nitrate from the lower Morro Valley is diluted by the creek and rainfall infiltration by a factor of approximately 2.3 before it is produced by well MB-3. These concentration changes through time demonstrate a direct correlation between the nitrate concentrations in the lower Morro Valley groundwater and concentrations found in groundwater produced from the supply wells.

Cleath and Associates made it apparent, in their discussion of "Sewer Exfiltration (page 16 of the Cleath Report)," that certain conditions (i.e., age of pipe, type of pipe, distance to groundwater levels, and pipe elevation) may provide an opportunity for sewer exfiltration to a minimal extent. Central Coast Water Board staff has reviewed the referenced documentation (*Exfiltration in Sewer Systems*, Amick and Burgess, December 2000) and believes that the Cleath Report accurately applies the information to the Morro Basin nitrate source contamination study. Page 17 of the Cleath Report concludes that exfiltration "is not likely a significant source of nitrate contamination to

the City well field." Upon review of your allegations, your report does not provide direct measurable evidence in support of sewer exfiltration being a significant source of nitrate contamination. Water Board staff concurs with Cleath Report's conclusion explaining the sewer exfiltration as less than a significant source of nitrate contamination in the supply well system.

In addition, the City of Morro Bay is required to comply with the Statewide *General Waste Discharger Requirements for Sanitary Sewer Systems, Order No. 2006-0003-DWQ (General WDR)*. The City of Morro Bay obtained enrollment status under this General WDR on January 8, 2007. The General WDR requires the city to develop a sanitary sewer management plan, which specifically includes an operation and maintenance program. The operations and maintenance program is required to include collection system mapping, a preventative maintenance program, a rehabilitation and replacement program, and staff training. Furthermore, the sanitary sewer management plan includes a sanitary sewer evaluation component. The sanitary sewer evaluation identifies and prioritizes deficient portions of the sanitary sewer systems that experience overflows, hydraulic deficiencies, and inflow/infiltration (including exfiltration) issues. Upon preliminary review of the city's sanitary sewer management plan, Central Coast Water Board staff concludes that the city is compliant with General WDR provisions. Additionally, we conclude that the city is proactively operating and maintaining its collections system to correct sanitary sewer system deficiencies. For example, the city's main sewer line was relined the summer of 2001 to prevent infiltration/exfiltration. If there are current deficiencies in the liner, the expected rate of infiltration/exfiltration would be minimal, thus yielding a minimal potential for nitrate contamination.

In summary, Water Board staff concurs with the Cleath Report conclusions based on legitimate lines of evidence. Your complaint letter does not provide sufficient evidence or references to support the suggestion that sewer exfiltration is the primary source of nitrate contamination in the City supply wells. We appreciate your concern regarding nitrate contamination in the Morro Basin. If you have further questions regarding our assessment of the subject reports, please call **David LaCaro at (805)-549-38592** or email at dlacaro@waterboards.ca.gov.

Sincerely,

Harvey Packard

for Roger W. Briggs
Executive Officer

CC:

Mr. Steve von Dohlen
Deputy District Attorney
San Luis Obispo County District Attorney' Office
County Government Center, 4th Floor
San Luis Obispo, CA 93408

Mr. Dylan Wade
City of Morro Bay, Senior Civil Engineer
595 Harbor Street
Morro Bay, CA 93442

Ms. Gita Kapahi
Director of Public Participation
1001 I Street, P.O. Box 100
Sacramento, CA 95812

Mr. Mike Watson
Coastal Program Analyst
California Coastal Commission – Central Coast Office
725 Front Street, Suite 300
Santa Cruz, CA 95060

Mr. Spencer Harris
Cleath and Associates
1390 Oceanaire Drive
San Luis Obispo, CA 93405

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ATTACHMENT B

Mr. Harvey Packard
California Regional Water Quality Control Board
Central Coast Region
895 Aerovista Place
San Luis Obispo, California, 93401

July 7, 2008

Dear Mr. Packard,

Thank you for your response, dated July 1, 2008, to our April 2008 report, "The 'Morro Basin Nitrate Study': Issues and Concerns". We appreciate the time that you and your colleagues took to review and comment on our findings.

We must, however, respectfully disagree with all of the conclusions presented in your letter. Reasons for our disagreement are explained below.

Cleath Report examination of nitrate isotopes (ref. your letter, page 1, paragraph 3)

You note that the consultants analyzed isotope data from water from the four wells at the Hwy.1 well field, and compared them to literature values. You further state that although the results are inconclusive, the isotopic study demonstrates Cleath and Associates' diligence in investigating any potential sources of nitrate.

As you may recall from our report and other communications, we independently followed the same procedure as did the consultants. We found that the isotopic signatures of the well water were nearly an exact match to values for sewage as documented in another study, and significantly outside the range for the isotopic signature of fertilizers:

McQuillan Study Values	
sewage from septic systems:	**7.6 to 12.1**
sewage at a primary sewage plant:	**7.2 to 12.1**
Morro Basin Well Values:	**7.1 to 10.0**
Standard Values for Commercial Fertilizer:	**- 4 to + 4**

We agree with you that the results are inconclusive, but it is our position that they are only inconclusive because insufficient testing was done. We hold to our position that the data clearly indicates a strong likelihood that it is sewage, not fertilizer, that is contaminating the wells. We find it interesting that although samples were taken at a time when nitrate concentrations were relatively low, the isotope signature of those nitrates that were present is still consistent with that expected for sewage.

As to diligence, we believe that the consultants exercised all possible diligence given budgetary and other constraints we believe were imposed by the City of Morro Bay. However, we believe that comparing the isotopic signature of the well water to literature values does not constitute correct scientific procedure.

As we have stated numerous times, **we would like to see isotope values from the wells compared to values from samples actually collected from Morro Bay's wastewater collection lines in the vicinity of the 1840 Main Street site, and from the creek water that the consultants allege is the source of the nitrates**. That, in our opinion, would constitute due diligence with regard to the isotope studies.

General Chemical Signatures of Groundwater and Wastewater; Mixing Calculations (ref. your letter, page 2, paragraph 1)

You state that the Cleath report analysis, including the Piper diagrams, such as figure 12, show a clear separation between groundwater and waste water. You note that "*any appreciable mixing of wastewater with native groundwater produced by the supply wells would result in the supply well data plotting between wastewater and groundwater field in the cation Piper diagram…which is not the case*"

The problem we have with your conclusion in this case is related to timing. The well water samples were gathered and tested in August and September. (see Cleath study Appendix E, Laboratory Reports for Ground Water and Surface Water Samples.)

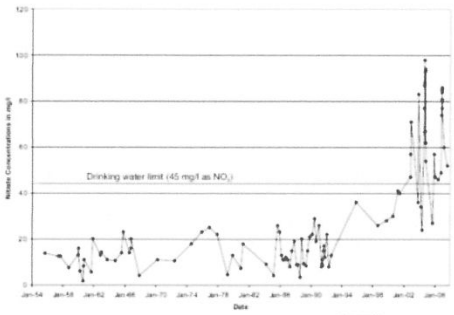

Figure 4
Well MB-3
Nitrate Concentrations
Morro Basin Nitrate Study
City of Morro Bay

Cleath & Associates

The nitrate concentration spikes occur during November, as shown by this chart of nitrate concentration patterns. It is then that we believe that sewage is being pulled into the wells by the pumping action. Once the wells stop pumping, nitrate levels drop significantly. We believe it is clear that once that happens, other components of sewage in the wells are also dramatically reduced.

It is our position, therefore, that the samples were gathered at the wrong time, and thus their analysis provides absolutely no proof that sewage is not the primary well water contaminant. We believe it is clear that samples gathered in August and September, many months after the last time the wells were pumping, would not show evidence of the presence of significant amounts of sewage.

In summary, it is our position that the data presented in the Piper diagrams is meaningless, because the samples of well water were not gathered at the correct time; only samples gathered during the November period when the wells are in use will give a meaningful result.

Change in Nitrate Concentrations in the Morro Valley and Well Water (ref. your letter, page 2, paragraph 2)

You state that "*The Cleath report provides another direct line of evidence that agricultural sources are the primary source of nitrate by demonstrating that through time in the lower Morro Valley groundwater and groundwater produced from the supply wells*". You refer to nitrate concentrations tested in lower Morro Valley monitoring wells in December, 1980, and compare them to samples collected in August, 2007, noting that the August, 2007 concentrations are significantly higher, and conclude that, "T*hese concentration changes through time demonstrate a direct correlation between the nitrate concentrations in the lower Morro Valley groundwater and concentrations found in groundwater produced from the supply wells*"

We disagree with your conclusion for two major reasons:

1. Again, we have a significant timing issue. In order to do a valid comparison between two samples, one must ensure that all possible variables that might influence the results have been considered, and that there is no possibility that those variables could affect the results; render them invalid. We will focus here on what we consider the major variable that does not appear to be covered in your analysis.

The 2007 samples were gathered in August, a time when we would expect to find more nitrates from fertilizer, due to the timing of crop fertilization cycles. Crops are generally fertilized during the growing cycle, which, depending on the crop, generally extends from Spring through early Fall. August is also a dry month with little to no precipitation. Therefore, any dilution of nitrates in the groundwater would be expected to come solely from irrigation.

The 1980 samples were gathered in December. This would be some time after any significant applications of fertilizer, AND well into the rainy season, meaning that any nitrates not used by the growing crops would be diluted by precipitation that has soaked into the soil.

It is our position, therefore, that comparison of the lower Morro Valley groundwater nitrate concentrations from the months of August and December for ANY years is invalid, and can essentially be described as "comparing apples to oranges". Please note that this is just one variable not covered in the analysis

provided. Others would include location of sampling, activities in the area immediately prior to sampling, usage of the area and possible changes in that usage over time.

2. Even if we ignore the very obvious timing issue described above, it is our position that there is clearly no demonstrated correlation between the alleged nitrate increases in the lower Morro Valley groundwater and **the very sudden spikes in well water nitrate concentrations, which occur only in November, when the wells are pumping**. There is absolutely no known change in farming operations that could account for that pattern. The sudden beginning of the spikes, in 2002, does, however, correlate VERY closely to the timing of the MtBE remediation work at 1840 Main Street.

References to Amick and Burgess Study (ref. your letter, page 2, paragraph 3)

In reference to the study, "Exfiltration in Sewer Systems", you state that you believe that the Cleath report "*accurately applies the information to the Morro Basin nitrate source contamination study.*"

Once again, we find ourselves in disagreement. On pages 16 and 17 of the Cleath report, it is stated,

"Despite a hydraulic potential for exfiltration along Main Street when the City well field is pumping, gravity sewer leaks quickly become plugged by sewer film and settleable solids in the sewage, theoretically reaching steady-staet leakage rates in approximately one hour. A research study conducted at several locations in Germany, where sewer systems are generally older abnd inpoor condition, showed that when pressure heads are below the sewer pipe crown (typical for gravity sewers) exfiltration rates were minimal (Amick and Burgess, 2000)"

Here is the complete statement, from the Amick and Burgess study, page 17 (study available online at http://www.epa.gov/nrmrl/pubs/600r01034/600r01034.pdf):

*"At a pressure head below the sewer crown, which is typically the case in gravity flow sewer lines, exfiltration rates were minimal. At a pressure head of one pipe diameter, the exfiltration rate increased dramatically, to more than 26 gal/hour (gph) per joint in some segments. This high leakage rate can, in part, be attributed to the generally poor condition of the old sewer systems. A linear correlation between pressure head and exfiltration rate for several types of sewer defects was noted for pressure heads greater than 500 mm (20 inches)**. It was also noted that at lower flows and pressure heads, the exfiltration rate decreases exponentially, most likely from self-sealing from sewer film and settleable solids in the sewage. If the flow and pressure head increases, however, this self-sealing property is broken and the exfiltration rate increases rapidly**."*
(emphasis ours)

On page 25 of their report, Amick and Burgess state, *"Areas with significant portions of the system above, but in close proximity to, the groundwater table are probably at greatest risk."* Note that most of Morro Bay's sewer lines do, indeed, lie above, but in close proximity to the groundwater table.

We believe it is clear that the statement in the Cleath report was taken out of context, and that **the complete statement from the Amick and Burgess study has a meaning significantly different than that of the portion published in the Cleath study.** We have attributed their failure to provide the complete quote to the likelihood that they obtained the quote from a source other than the original report, as we have seen the out-of-context portion of the statement elsewhere.

"Pro-active" Maintenance of the Morro Bay Wastewater Collections System (ref. your letter, page3, paragraph 2)

You note that the City of Morro Bay is required to comply with the State's General Waste Discharger Requirements for Sanitary Sewer Systems, and further state that the City is "*proactively operating and maintaining its collections system to correct sanitary sewer system deficiencies*".

We are indeed gratified that the City is finally taking steps to correct the very serious health and safety risks posed by the seriously dilapidated condition of its sewer lines; specifically the exfiltration of sewage into our soil

and groundwater. In fact, we have been encouraging the City to do so for years. We must point out, however, that it appears to have taken the passage of a State law to influence them to begin corrective action. We do not consider this a sign that the City is, or has been, in any way pro-active in its approach.

Videotaped inspections of the lines have long demonstrated major defects in the lines. **We found defects in one videotaped inspection that also existed in another inspection of the same section of line – done seven years before.**

You also state, "*For example, the City's main sewer line was relined in the summer of 2001 to prevent infiltration/exfiltration. If there are current deficiencies in the liner, the expected rate of infiltration/exfiltration would be minimal, thus thus yielding a minimal potential for nitrate contamination*". Again, we do not consider this evidence of a pro-active approach taken by the City, nor do we consider it a sign that significant exfiltration is not occurring in the Morro Bay sewer system.

We believe you are referring to the slip lining of the Highway 41 /Atascadero Road line, owned jointly by Cayucos and Morro Bay, that runs to the Wastewater Treatment Plant. **We would not have described this line as "the City's main sewer line", and have never contended that it was a source of exfiltrated sewage, as this is one of the very few lines that lies below the water table. Furthermore, this is not a particularly long line, and it comprises only a VERY small portion of the total system.**

We believe that the major source of the exfiltrated sewage is most likely the Main Street trunk line, a much longer stretch of line that is in deplorable condition, with numerous major cracks, pipe misalignments, and separations that clearly provide the opportunity for major exfiltration. That line has NOT been relined.

With regard to the Hwy 41/Atascadero Road line, please consider this quote from a letter dated November 18, 1999, from David Phillips of the Cayucos Sanitary District to Bob Hendrix, Morro Bay City Manager, regarding the sewer line along Hwy. 41 (Atascadero Road),

"*The pipeline damage that was apparent in past video inspections is the likely point of introduction".*

During the emergency repair of the adjacent portion of this line, the District requested that we proceed to extend the repair of this line to the intersection of North Main Street. I believe that we went so far as to commission and complete a design for that replacement. The city has chosen not to proceed with the work."

The emergency repair referred to is, of course, the one done after it was determined that MtBE was entering the Wastewater Treatment Plant through this line, because it was in such poor condition that large amounts of MtBE-contaminated groundwater were infiltrating it. **Please note the statement that the damage was apparent in past video inspections. Yet, nothing was done until there was an emergency that forced action.**

Please also consider these quotes from a Tribune article, "MtBE Complicates Task as Towns Mull Aging Sewer", dated May 24, 2000:

"Morro Bay and Cayucos are joint owners of a sewer plant, and the line being inundated with ground water serves both communities." and, *"Two years ago the line collapsed in an area adjacent to the City's desalination plant and had to be replaced under an emergency declaration"*

This does not sound to us like a glowing example of pro-active maintenance.

In conclusion, we believe that no one currently has conclusive evidence of the true source of the nitrates, simply because the necessary testing to establish that source has not yet been done. While we would agree that we do not have sufficient evidence or references to PROVE the suggestion that sewage is the primary source of the well contamination, we believe we have very strong evidence that points in that direction. We further believe that the Cleath study has not provided sufficient evidence or references pointing to a likelihood that fertilizer is the culprit. As previously noted, we believe that additional testing is essential, and should be completed as soon as practicable in order to provide real proof of the cause of the nitrate contamination of our drinking water wells.

Sincerely,

Richard E.T. Sadowski Marla Jo Bruton

cc: Mike Watson, California Coastal Commission
Members, California State Water Resources Control Board
Members, Morro Bay Public Works Advisory Board
Morro Bay Mayor and City Council Members
Katcho Achadjian, San Luis Obispo County Supervisor
Gita Kapahi, Director of Public Participation
Steve Van Dolan, Deputy District Attorney, San Luis Obispo County

ATTACHMENT C

APPENDIX E

Laboratory Reports for Ground Water and Surface Water Samples

CREEK ENVIRONMENTAL LABORATORIES, INC.
A Minority-owned Business Enterprise
141 SUBURBAN ROAD, SUITE C-5 • SAN LUIS OBISPO, CA 93401 • (805) 545-9838 • FAX (805) 545-0107

Spencer Harris
Cleath & Associates
1390 Oceanaire Drive
San Luis Obispo, CA 93405

Log Number: 07-C10472
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Little Morro Creek Upstream	Spencer Harris	08/16/07@14:45	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	340	2	1	mg/L	SM 2320B	08/26/07		7808
Chloride	44	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	750	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	0.2	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	0.9	0.4	1	mg/L	EPA 300.0			
pH	8.3	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	33	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	460	10	1	mg/L	SM 2540 C	08/23/07		7831
Sodium Adsorption Ratio	1.1	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.09	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	48	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	54	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.9	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	44	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	340	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

CREEK ENVIRONMENTAL LABORATORIES, INC.
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1390 Oceanaire Drive
San Luis Obispo, CA 93405

Log Number: 07-C10467
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Morro Creek Upstream	Spencer Harris	08/16/07@10:00	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	290	2	1	mg/L	SM 2320B	08/26/07		7807
Chloride	22	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	610	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	Not Detected	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	Not Detected	0.4	1	mg/L	EPA 300.0			
pH	8.1	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	36	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	320	10	1	mg/L	SM 2540 C	08/22/07		7756
Sodium Adsorption Ratio	0.6	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.10	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	40	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	50	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.5	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	22	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	300	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

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Log Number: 07-C10465
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "A"	Spencer Harris	08/16/07@09:45	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	340	2	1	mg/L	SM 2320B	08/26/07		7807
Chloride	21	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	670	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	Not Detected	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	Not Detected	0.4	1	mg/L	EPA 300.0			
pH	7.7	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	32	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	400	10	1	mg/L	SM 2540 C	08/22/07		7756
Sodium Adsorption Ratio	0.6	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.10	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	43	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	55	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	0.09	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.4	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	23	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	330	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

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Log Number: 07-C10466
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "B"	Spencer Harris	08/16/07@09:50	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	380	2	1	mg/L	SM 2320B	08/26/07		7807
Chloride	22	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	730	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	Not Detected	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	Not Detected	0.4	1	mg/L	EPA 300.0			
pH	7.4	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	31	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	420	10	1	mg/L	SM 2540 C	08/22/07		7756
Sodium Adsorption Ratio	0.5	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.10	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	43	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	2.4	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	59	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	0.68	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.4	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	22	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	350	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

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Log Number: 07-C10468
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "C"	Spencer Harris	08/16/07@11:00	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	330	2	1	mg/L	SM 2320B	08/26/07		7807
Chloride	28	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	730	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	Not Detected	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	Not Detected	0.4	1	mg/L	EPA 300.0			
pH	7.4	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	44	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	390	10	1	mg/L	SM 2540 C	08/22/07		7756
Sodium Adsorption Ratio	0.7	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.10	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	54	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	0.5	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	52	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	0.67	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.6	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	30	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	0.07	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	350	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

CREEK ENVIRONMENTAL LABORATORIES, INC.
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Spencer Harris
Cleath & Associates
1390 Oceanaire Drive
San Luis Obispo, CA 93405

Log Number: 07-C10469
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "D"	Spencer Harris	08/16/07@12:30	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	380	2	1	mg/L	SM 2320B	08/26/07		7807
Chloride	100	10	10	mg/L	EPA 300.0	08/20/07		7636
Electrical Conductance	1,100	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	5.4	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	24	0.4	1	mg/L	EPA 300.0			
pH	7.2	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	60	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	650	10	1	mg/L	SM 2540 C	08/23/07		7831
Sodium Adsorption Ratio	1.2	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.12	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	54	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	78	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.4	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	58	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	0.23	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	460	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

CREEK ENVIRONMENTAL LABORATORIES, INC.
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Spencer Harris
Cleath & Associates
1390 Oceanaire Drive
San Luis Obispo, CA 93405

Log Number: 07-C10470
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "E"	Spencer Harris	08/16/07@13:45	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	400	2	1	mg/L	SM 2320B	08/26/07		7808
Chloride	150	10	10	mg/L	EPA 300.0	08/20/07		7636
Electrical Conductance	1,200	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	3.3	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	15	0.4	1	mg/L	EPA 300.0			
pH	7.4	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	66	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	710	10	1	mg/L	SM 2540 C	08/23/07		7831
Sodium Adsorption Ratio	1.0	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.11	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	80	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	0.16	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	88	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.9	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	52	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	560	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

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Log Number: 07-C10471
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "F"	Spencer Harris	08/16/07@14:15	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	370	2	1	mg/L	SM 2320B	08/26/07		7808
Chloride	100	10	10	mg/L	EPA 300.0	08/20/07		7636
Electrical Conductance	1,100	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	14	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	64	0.4	1	mg/L	EPA 300.0			
pH	7.6	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	66	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	690	10	1	mg/L	SM 2540 C	08/23/07		7831
Sodium Adsorption Ratio	1.0	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.10	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	74	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	81	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.8	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	53	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	0.12	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	520	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

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Log Number: 07-C10473
Order: 04305
Project: Morro Bay Nitrate Study
Received: 08/16/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "G"	Spencer Harris	08/16/07@15:05	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	360	2	1	mg/L	SM 2320B	08/26/07		7808
Chloride	51	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	800	1	1	umhos/cm	SM 2510	08/16/07		7558
Nitrate as N	0.5	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	2.2	0.4	1	mg/L	EPA 300.0			
pH	7.7	0.1	1	pH units	SM 4500-H B	08/16/07		7558
Sulfate	36	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	480	10	1	mg/L	SM 2540 C	08/23/07		7831
Sodium Adsorption Ratio	1.1	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.09	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	46	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	61	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.6	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	46	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	360	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

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Log Number: 07-C10504
Order: 04318
Project: Morro Bay Nitrate Study
Received: 08/17/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "H"	Spencer Harris	08/17/07@12:00	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	380	2	1	mg/L	SM 2320B	08/26/07		7811
Chloride	140	10	10	mg/L	EPA 300.0	08/20/07		7636
Electrical Conductance	1,400	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	37	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	160	0.4	1	mg/L	EPA 300.0			
pH	7.3	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	97	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	940	10	1	mg/L	SM 2540 C	08/23/07		7831
Sodium Adsorption Ratio	1.3	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.11	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	88	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	0.1	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	100	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.8	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	77	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	0.07	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	640	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

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Log Number: 07-C10505
Order: 04318
Project: Morro Bay Nitrate Study
Received: 08/17/07
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REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "I"	Spencer Harris	08/17/07@12:15	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	380	2	1	mg/L	SM 2320B	08/26/07		7811
Chloride	140	10	10	mg/L	EPA 300.0	08/20/07		7636
Electrical Conductance	1,200	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	17	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	75	0.4	1	mg/L	EPA 300.0			
pH	7.2	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	76	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	780	10	1	mg/L	SM 2540 C	08/23/07		7831
Sodium Adsorption Ratio	1.4	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.12	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	71	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	95	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.7	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	75	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	570	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

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Log Number: 07-C10506
Order: 04318
Project: Morro Bay Nitrate Study
Received: 08/17/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "J"	Spencer Harris	08/17/07@12:20	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	390	2	1	mg/L	SM 2320B	08/26/07		7811
Chloride	170	10	10	mg/L	EPA 300.0	08/20/07		7636
Electrical Conductance	1,600	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	45	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	200	0.4	1	mg/L	EPA 300.0			
pH	7.1	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	110	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	980	10	1	mg/L	SM 2540 C	08/23/07		7831
Sodium Adsorption Ratio	1.4	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.11	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	94	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	0.2	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	110	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.8	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	80	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	690	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

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Log Number: 07-C10507
Order: 04318
Project: Morro Bay Nitrate Study
Received: 08/17/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "K"	Spencer Harris	08/17/07@12:30	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	400	2	1	mg/L	SM 2320B	08/26/07		7811
Chloride	180	10	10	mg/L	EPA 300.0	08/20/07		7636
Electrical Conductance	1,700	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	50	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	220	0.4	1	mg/L	EPA 300.0			
pH	7.2	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	120	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	1,000	10	1	mg/L	SM 2540 C	08/24/07		7882
Sodium Adsorption Ratio	1.4	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.12	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	100	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	0.1	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	120	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.9	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	88	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	760	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

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Log Number: 07-C10508
Order: 04318
Project: Morro Bay Nitrate Study
Received: 08/17/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "L"	Spencer Harris	08/17/07@14:00	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	440	2	1	mg/L	SM 2320B	08/26/07		7811
Chloride	60	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	1,000	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	Not Detected	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	Not Detected	0.4	1	mg/L	EPA 300.0			
pH	7.7	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	100	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	670	10	1	mg/L	SM 2540 C	08/24/07		7882
Sodium Adsorption Ratio	1.0	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.17	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	80	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	79	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	0.69	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.9	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	53	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	520	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

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Log Number: 07-C10509
Order: 04318
Project: Morro Bay Nitrate Study
Received: 08/17/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "M"	Spencer Harris	08/17/07@14:10	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	460	2	1	mg/L	SM 2320B	08/26/07		7811
Chloride	53	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	1,000	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	Not Detected	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	Not Detected	0.4	1	mg/L	EPA 300.0			
pH	7.6	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	93	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	670	10	1	mg/L	SM 2540 C	08/24/07		7882
Sodium Adsorption Ratio	1.2	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.21	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	78	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	75	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	0.71	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.9	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	60	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	500	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

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Log Number: 07-C10510
Order: 04318
Project: Morro Bay Nitrate Study
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REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
WEll "N"	Spencer Harris	08/17/07@14:15	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	380	2	1	mg/L	SM 2320B	08/26/07		7812
Chloride	54	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	870	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	0.4	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	1.8	0.4	1	mg/L	EPA 300.0			
pH	7.6	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	54	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	540	10	1	mg/L	SM 2540 C	08/24/07		7882
Sodium Adsorption Ratio	1.4	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.26	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	59	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	57	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	1.0	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.9	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	62	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	380	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

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Spencer Harris
Cleath & Associates
1390 Oceanaire Drive
San Luis Obispo, CA 93405

Log Number: 07-C10511
Order: 04318
Project: Morro Bay Nitrate Study
Received: 08/17/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "O"	Spencer Harris	08/17/07@14:20	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	370	2	1	mg/L	SM 2320B	08/26/07		7812
Chloride	48	1	1	mg/L	EPA 300.0	08/17/07		7619
Electrical Conductance	840	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	0.4	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	1.8	0.4	1	mg/L	EPA 300.0			
pH	7.6	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	53	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	540	10	1	mg/L	SM 2540 C	08/24/07		7882
Sodium Adsorption Ratio	1.3	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.25	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	59	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	56	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	0.26	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	0.9	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	58	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	380	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

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Log Number: 07-C10512
Order: 04318
Project: Morro Bay Nitrate Study
Received: 08/17/07
Printed: 08/30/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well "P"	Spencer Harris	08/17/07@14:45	Aqueous

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	690	2	1	mg/L	SM 2320B	08/26/07		7812
Chloride	970	20	20	mg/L	EPA 300.0	08/24/07		7814
Electrical Conductance	4,000	1	1	umhos/cm	SM 2510	08/17/07		7718
Nitrate as N	22	0.1	1	mg/L	EPA 300.0	08/17/07		7619
Nitrate as NO3	97	0.4	1	mg/L	EPA 300.0			
pH	7.4	0.1	1	pH units	SM 4500-H B	08/17/07		7718
Sulfate	230	0.5	1	mg/L	EPA 300.0	08/17/07		7619
Total Dissolved Solids	2,000	10	1	mg/L	SM 2540 C	08/24/07		7882
Sodium Adsorption Ratio	9.8	0.1	1		EPA 200.7	08/29/07		8012
Boron	0.89	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Calcium	56	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Iron	Not Detected	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Magnesium	220	0.03	1	mg/L	EPA 200.8	08/29/07		8005
Manganese	Not Detected	0.02	1	mg/L	EPA 200.8	08/29/07		8005
Potassium	1.1	0.1	1	mg/L	EPA 200.8	08/29/07		8005
Sodium	720	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Zinc	0.10	0.05	1	mg/L	EPA 200.8	08/29/07		8005
Hardness	1,000	1	1	mg/L CaCO3	EPA 200.8	08/30/07		8009

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

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Kimberly Peeples
City of Morro Bay
955 Shasta
Morro Bay, CA 93442

Log Number: 07-C5970
Order: 02562
Received: 05/08/07
Printed: 05/17/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well #3	Alex Kuchenmeister	05/08/07@08:40	Drinking Water

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	05/16/07		4778
Bicarbonate Alkalinity as CaCO3	370	2	1	mg/L	SM 2320B	05/16/07		4778
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	05/16/07		4778
Total Alkalinity as CaCO3	370	2	1	mg/L	SM 2320B	05/16/07		4778
Chloride	99	1	1	mg/L	EPA 300.0	05/09/07		4627
Total Cyanide	Not Detected	0.005	1	mg/L	SM 4500-CN C,E	05/16/07	05/14/07	4804
Color	20	1	1	units	SM 2120B	05/08/07		4631
Electrical Conductance	1,200	1	1	umhos/cm	SM 2510	05/08/07		4631
Fluoride	0.4	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Langlier Index (Corrosivity)	0.2	---	1	pH units	SM 2330B	05/17/07		4824
MBAS(Anionic Surfactants MW=340)	Not Detected	0.05	1	mg/L	SM 5540 C	05/10/07		4633
Nitrate as N	12	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Nitrate as NO3	55	0.4	1	mg/L	EPA 300.0			
Nitrite as N	Not Detected	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Odor	Not Detected	1	1	TON	SM 2150B	05/08/07		4631
pH	7.2	0.1	1	pH units	SM 4500-H B	05/08/07		4631
Sulfate	100	0.5	1	mg/L	EPA 300.0	05/09/07		4627
Total Dissolved Solids	690	10	1	mg/L	SM 2540 C	05/15/07		4808
Turbidity	3.5	0.1	1	NTU	SM 2130 B	05/08/07		4631
Calcium	80	0.03	1	mg/L	EPA 200.7	05/10/07	05/10/07	4638
Hardness	510	1	NA	mg/L CaCO3	EPA 200.7			
Iron	0.5	0.1	1	mg/L	EPA 200.7	05/10/07	05/10/07	4638
Mercury	Not Detected	0.001	1	mg/L	EPA 245.1	05/16/07	05/15/07	4801
Potassium	0.6	0.1	1	mg/L	EPA 200.7	05/10/07	05/10/07	4638
Magnesium	77	0.03	1	mg/L	EPA 200.7	05/10/07	05/10/07	4638
Sodium	49	0.05	1	mg/L	EPA 200.7	05/10/07	05/10/07	4638
Benzene	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromobenzene	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromochloromethane	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromodichloromethane	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683

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Kimberly Peeples
City of Morro Bay
955 Shasta
Morro Bay, CA 93442

Log Number: 07-C5971
Order: 02562
Received: 05/08/07
Printed: 05/17/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date & Time	Matrix
Well #4	Alex Kuchenmeister	05/08/07@08:45	Drinking Water

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	05/16/07		4778
Bicarbonate Alkalinity as CaCO3	360	2	1	mg/L	SM 2320B	05/16/07		4778
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	05/16/07		4778
Total Alkalinity as CaCO3	360	2	1	mg/L	SM 2320B	05/16/07		4778
Chloride	84	1	1	mg/L	EPA 300.0	05/09/07		4627
Total Cyanide	Not Detected	0.005	1	mg/L	SM 4500-CN C,E	05/17/07	05/17/07	4821
Color	5	1	1	units	SM 2120B	05/08/07		4631
Electrical Conductance	1,100	1	1	umhos/cm	SM 2510	05/08/07		4631
Fluoride	0.3	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Langlier Index (Corrosivity)	0.3	---	1	pH units	SM 2330B	05/17/07		4824
MBAS(Anionic Surfactants MW=340)	Not Detected	0.05	1	mg/L	SM 5540 C	05/10/07		4633
Nitrate as N	14	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Nitrate as NO3	62	0.4	1	mg/L	EPA 300.0			
Nitrite as N	Not Detected	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Odor	Not Detected	1	1	TON	SM 2150B	05/08/07		4631
pH	7.3	0.1	1	pH units	SM 4500-H B	05/08/07		4631
Sulfate	93	0.5	1	mg/L	EPA 300.0	05/09/07		4627
Total Dissolved Solids	640	10	1	mg/L	SM 2540 C	05/15/07		4808
Turbidity	0.7	0.1	1	NTU	SM 2130 B	05/08/07		4631
Calcium	81	0.03	1	mg/L	EPA 200.7	05/14/07		4715
Hardness	530	1	NA	mg/L CaCO3	EPA 200.7			
Iron	0.1	0.1	1	mg/L	EPA 200.7	05/14/07		4715
Mercury	Not Detected	0.001	1	mg/L	EPA 245.1	05/16/07	05/15/07	4801
Potassium	0.8	0.1	1	mg/L	EPA 200.7	05/14/07		4715
Magnesium	79	0.03	1	mg/L	EPA 200.7	05/14/07		4715
Sodium	49	0.05	1	mg/L	EPA 200.7	05/14/07		4715
Benzene	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromobenzene	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromochloromethane	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromodichloromethane	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683

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Kimberly Peeples
City of Morro Bay
955 Shasta
Morro Bay, CA 93442

Log Number: 07-C5972
Order: 02562
Received: 05/08/07
Printed: 05/17/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well #14	Alex Kuchenmeister	05/08/07@08:50	Drinking Water

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	05/16/07		4778
Bicarbonate Alkalinity as CaCO3	350	2	1	mg/L	SM 2320B	05/16/07		4778
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	05/16/07		4778
Total Alkalinity as CaCO3	350	2	1	mg/L	SM 2320B	05/16/07		4778
Chloride	88	1	1	mg/L	EPA 300.0	05/09/07		4627
Total Cyanide	Not Detected	0.005	1	mg/L	SM 4500-CN C,E	05/17/07	05/17/07	4821
Color	20	1	1	units	SM 2120B	05/08/07		4631
Electrical Conductance	1,100	1	1	umhos/cm	SM 2510	05/08/07		4631
Fluoride	0.2	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Langlier Index (Corrosivity)	0.1	---	1	pH units	SM 2330B	05/17/07		4824
MBAS(Anionic Surfactants MW=340)	Not Detected	0.05	1	mg/L	SM 5540 C	05/10/07		4633
Nitrate as N	16	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Nitrate as NO3	72	0.4	1	mg/L	EPA 300.0			
Nitrite as N	Not Detected	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Odor	Not Detected	1	1	TON	SM 2150B	05/08/07		4631
pH	7.1	0.1	1	pH units	SM 4500-H B	05/08/07		4631
Sulfate	91	0.5	1	mg/L	EPA 300.0	05/09/07		4627
Total Dissolved Solids	660	10	1	mg/L	SM 2540 C	05/15/07		4808
Turbidity	8.8	0.1	1	NTU	SM 2130 B	05/08/07		4631
Calcium	82	0.03	1	mg/L	EPA 200.7	05/14/07		4715
Hardness	530	1	NA	mg/L CaCO3	EPA 200.7			
Iron	0.7	0.1	1	mg/L	EPA 200.7	05/14/07		4715
Mercury	Not Detected	0.001	1	mg/L	EPA 245.1	05/16/07	05/15/07	4801
Potassium	1.0	0.1	1	mg/L	EPA 200.7	05/14/07		4715
Magnesium	79	0.03	1	mg/L	EPA 200.7	05/14/07		4715
Sodium	51	0.05	1	mg/L	EPA 200.7	05/14/07		4715
Benzene	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromobenzene	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromochloromethane	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683
Bromodichloromethane	Not Detected	0.5	1	ug/L	EPA 524.2	05/10/07		4683

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Kimberly Peeples
City of Morro Bay
955 Shasta
Morro Bay, CA 93442

Log Number: 07-C5974
Order: 02562
Received: 05/08/07
Printed: 05/17/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
Well #15	Alex Kuchenmeister	05/08/07@09:00	Drinking Water

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Carbonate Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	05/16/07		4778
Bicarbonate Alkalinity as CaCO3	340	2	1	mg/L	SM 2320B	05/16/07		4778
Hydroxide Alkalinity as CaCO3	Not Detected	2	1	mg/L	SM 2320B	05/16/07		4778
Total Alkalinity as CaCO3	340	2	1	mg/L	SM 2320B	05/16/07		4778
Chloride	81	1	1	mg/L	EPA 300.0	05/09/07		4627
Total Cyanide	Not Detected	0.005	1	mg/L	SM 4500-CN C,E	05/17/07	05/17/07	4821
Color	20	1	1	units	SM 2120B	05/08/07		4631
Electrical Conductance	1,000	1	1	umhos/cm	SM 2510	05/08/07		4631
Fluoride	0.2	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Langlier Index (Corrosivity)	0.1	---	1	pH units	SM 2330B	05/17/07		4824
MBAS(Anionic Surfactants MW=340)	Not Detected	0.05	1	mg/L	SM 5540 C	05/10/07		4633
Nitrate as N	7.8	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Nitrate as NO3	34	0.4	1	mg/L	EPA 300.0			
Nitrite as N	Not Detected	0.1	1	mg/L	EPA 300.0	05/09/07		4627
Odor	Not Detected	1	1	TON	SM 2150B	05/08/07		4631
pH	7.2	0.1	1	pH units	SM 4500-H B	05/08/07		4631
Sulfate	74	0.5	1	mg/L	EPA 300.0	05/09/07		4627
Total Dissolved Solids	580	10	1	mg/L	SM 2540 C	05/15/07		4808
Turbidity	2.3	0.1	1	NTU	SM 2130 B	05/08/07		4631
Calcium	75	0.03	1	mg/L	EPA 200.7	05/15/07		4787
Hardness	470	1	NA	mg/L CaCO3	EPA 200.7			
Iron	0.4	0.1	1	mg/L	EPA 200.7	05/15/07		4787
Mercury	Not Detected	0.001	1	mg/L	EPA 245.1	05/16/07	05/15/07	4801
Potassium	0.6	0.1	1	mg/L	EPA 200.7	05/15/07		4787
Magnesium	68	0.03	1	mg/L	EPA 200.7	05/15/07		4787
Sodium	49	0.05	1	mg/L	EPA 200.7	05/15/07		4787
Aluminum	Not Detected	0.05	1	mg/L	EPA 200.8	05/10/07	05/10/07	4636
Antimony	Not Detected	0.006	1	mg/L	EPA 200.8	05/10/07	05/10/07	4636
Arsenic	Not Detected	0.002	1	mg/L	EPA 200.8	05/10/07	05/10/07	4636
Copper	Not Detected	0.05	1	mg/L	EPA 200.8	05/10/07	05/10/07	4636

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Spencer Harris
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1390 Oceanaire Drive
San Luis Obispo, CA 93405

Log Number: 07-C10664
Order: 04377
Project: Morro Bay Nitrate Study
Received: 08/22/07
Printed: 09/06/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
MB-3	Spencer Harris	08/22/07@11:35	Drinking Water

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	370	2	1	mg/L	SM 2320B	08/30/07		8014
Chloride	100	10	10	mg/L	EPA 300.0	08/27/07		7892
Electrical Conductance	1,100	1	1	umhos/cm	SM 2510	08/22/07		7721
Nitrate as N	12	0.1	1	mg/L	EPA 300.0	08/23/07		7751
Nitrate as NO3	52	0.4	1	mg/L	EPA 300.0			
pH	7.5	0.1	1	pH units	SM 4500-H B	08/22/07		7721
Sulfate	91	0.5	1	mg/L	EPA 300.0	08/23/07		7751
Total Dissolved Solids	700	10	1	mg/L	SM 2540 C	08/29/07		8049
Boron	0.15	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Calcium	85	0.03	1	mg/L	EPA 200.7	09/04/07		8195
Hardness	540	1	NA	mg/L CaCO3	EPA 200.7			
Sodium Adsorption Ratio	1.0	0.1	1		EPA 200.7	09/06/07		8255
Copper	0.09	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Iron	0.85	0.02	1	mg/L	EPA 200.7	09/04/07		8195
Potassium	0.6	0.1	1	mg/L	EPA 200.7	09/04/07		8195
Magnesium	81	0.03	1	mg/L	EPA 200.7	09/04/07		8195
Manganese	0.07	0.02	1	mg/L	EPA 200.7	09/04/07		8195
Sodium	51	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Zinc	Not Detected	0.05	1	mg/L	EPA 200.7	09/04/07		8195

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

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Log Number: 07-C10663
Order: 04377
Project: Morro Bay Nitrate Study
Received: 08/22/07
Printed: 09/06/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
MB-4	Spencer Harris	08/22/07@11:30	Drinking Water

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	360	2	1	mg/L	SM 2320B	08/30/07		8014
Chloride	92	1	1	mg/L	EPA 300.0	08/23/07		7751
Electrical Conductance	1,000	1	1	umhos/cm	SM 2510	08/22/07		7721
Nitrate as N	11	0.1	1	mg/L	EPA 300.0	08/23/07		7751
Nitrate as NO3	49	0.4	1	mg/L	EPA 300.0			
pH	7.4	0.1	1	pH units	SM 4500-H B	08/22/07		7721
Sulfate	88	0.5	1	mg/L	EPA 300.0	08/23/07		7751
Total Dissolved Solids	650	10	1	mg/L	SM 2540 C	08/29/07		8049
Boron	0.16	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Calcium	88	0.03	1	mg/L	EPA 200.7	09/04/07		8195
Hardness	570	1	NA	mg/L CaCO3	EPA 200.7			
Sodium Adsorption Ratio	1.0	0.1	1		EPA 200.7	09/06/07		8255
Copper	Not Detected	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Iron	0.06	0.02	1	mg/L	EPA 200.7	09/04/07		8195
Potassium	0.8	0.1	1	mg/L	EPA 200.7	09/04/07		8195
Magnesium	85	0.03	1	mg/L	EPA 200.7	09/04/07		8195
Manganese	Not Detected	0.02	1	mg/L	EPA 200.7	09/04/07		8195
Sodium	56	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Zinc	Not Detected	0.05	1	mg/L	EPA 200.7	09/04/07		8195

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

CREEK ENVIRONMENTAL LABORATORIES, INC.
A Minority-owned Business Enterprise
141 SUBURBAN ROAD, SUITE C-5 • SAN LUIS OBISPO, CA 93401 • (805) 545-9838 • FAX (805) 545-0107

Spencer Harris
Cleath & Associates
1390 Oceanaire Drive
San Luis Obispo, CA 93405

Log Number: 07-C10662
Order: 04377
Project: Morro Bay Nitrate Study
Received: 08/22/07
Printed: 09/06/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
MB-14	Spencer Harris	08/22/07@11:25	Drinking Water

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	350	2	1	mg/L	SM 2320B	08/30/07		8014
Chloride	77	1	1	mg/L	EPA 300.0	08/23/07		7751
Electrical Conductance	1,000	1	1	umhos/cm	SM 2510	08/22/07		7721
Nitrate as N	11	0.1	1	mg/L	EPA 300.0	08/23/07		7751
Nitrate as NO3	48	0.4	1	mg/L	EPA 300.0			
pH	7.2	0.1	1	pH units	SM 4500-H B	08/22/07		7721
Sulfate	84	0.5	1	mg/L	EPA 300.0	08/23/07		7751
Total Dissolved Solids	640	10	1	mg/L	SM 2540 C	08/29/07		8049
Boron	0.17	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Calcium	75	0.03	1	mg/L	EPA 200.7	09/04/07		8195
Hardness	480	1	NA	mg/L CaCO3	EPA 200.7			
Sodium Adsorption Ratio	1.0	0.1	1		EPA 200.7	09/06/07		8255
Copper	Not Detected	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Iron	1.1	0.02	1	mg/L	EPA 200.7	09/04/07		8195
Potassium	0.9	0.1	1	mg/L	EPA 200.7	09/04/07		8195
Magnesium	70	0.03	1	mg/L	EPA 200.7	09/04/07		8195
Manganese	0.15	0.02	1	mg/L	EPA 200.7	09/04/07		8195
Sodium	48	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Zinc	Not Detected	0.05	1	mg/L	EPA 200.7	09/04/07		8195

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

CREEK ENVIRONMENTAL LABORATORIES, INC.
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141 SUBURBAN ROAD, SUITE C-5 • SAN LUIS OBISPO, CA 93401 • (805) 545-9838 • FAX (805) 545-0107

Spencer Harris
Cleath & Associates
1390 Oceanaire Drive
San Luis Obispo, CA 93405

Log Number: 07-C10661
Order: 04377
Project: Morro Bay Nitrate Study
Received: 08/22/07
Printed: 09/06/07

REPORT OF ANALYTICAL RESULTS

Sample Description	Sampled By	Sampled Date @ Time	Matrix
MB-15	Spencer Harris	08/22/07@11:20	Drinking Water

Analyte	Result	DLR	Dilution Factor	Units	Method	Date Analyzed	Date Prepared	Batch
Total Alkalinity as CaCO3	400	2	1	mg/L	SM 2320B	08/30/07		8014
Chloride	160	10	10	mg/L	EPA 300.0	08/27/07		7892
Electrical Conductance	1,300	1	1	umhos/cm	SM 2510	08/22/07		7721
Nitrate as N	8.6	0.1	1	mg/L	EPA 300.0	08/23/07		7751
Nitrate as NO3	38	0.4	1	mg/L	EPA 300.0			
pH	7.2	0.1	1	pH units	SM 4500-H B	08/22/07		7721
Sulfate	79	0.5	1	mg/L	EPA 300.0	08/23/07		7751
Total Dissolved Solids	760	10	1	mg/L	SM 2540 C	08/29/07		8049
Boron	0.29	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Calcium	100	0.03	1	mg/L	EPA 200.7	09/04/07		8195
Hardness	640	1	NA	mg/L CaCO3	EPA 200.7			
Sodium Adsorption Ratio	1.1	0.1	1		EPA 200.7	09/06/07		8255
Copper	Not Detected	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Iron	0.86	0.02	1	mg/L	EPA 200.7	09/04/07		8195
Potassium	0.9	0.1	1	mg/L	EPA 200.7	09/04/07		8195
Magnesium	93	0.03	1	mg/L	EPA 200.7	09/04/07		8195
Manganese	Not Detected	0.02	1	mg/L	EPA 200.7	09/04/07		8195
Sodium	65	0.05	1	mg/L	EPA 200.7	09/04/07		8195
Zinc	Not Detected	0.05	1	mg/L	EPA 200.7	09/04/07		8195

DLR = Detection Limit for Reporting. Results of "Not Detected" are below DLR.

CREEK ENVIRONMENTAL LABORATORIES

Lab Director, Michael Ng

Zymax FORENSICS

REPORT OF ANALYTICAL RESULTS

Client:	Bill Boucher City of Morro Bay 955 Shasta Morro Bay, CA	**Lab Number:** **Received:** **Matrix:**	40650 8/22/2007 Water
Project:	Morro Bay Nitrate Study	**Sample Description:**	See Below
Project Number:		**Analyzed:**	Sept. 26, 2007
Collected by:	S. Harris	**Method:**	CF-IRMS

$\delta^{15}N$ $\delta^{18}O$

LAB NUMBER	SAMPLE DESCRIPTION	$\delta^{15}N$ ‰	$\delta^{18}O$ ‰
40650-1	MB-15	7.9	16.0
40650-2	MB-14	7.1	12.9
40650-3	MB-4	8.8	13.1
40650-4	MB-3	10.0	13.6
40650-5	Ferilizer	0.7	13.8
Analytical Precision (1-sigma)		0.3	0.2

Submitted by,
Zymax Forensics, a DPRA company

River He, PhD
Isotope Lab Manager

40650-1d15n.xls
RH

ATTACHMENT D

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Central Coast Regional Water Quality Control Board

September 25, 2013

Ms. Linda Stedjee
lstedjee@charter.net

Sent via electronic mail only

Dear Ms. Stedjee:

RESPONSE TO JULY 2013 EMAIL RE: NITRATE CONCENTRATIONS IN GROUNDWATER, MORRO BAY, SAN LUIS OBISPO COUNTY

We appreciate your concern about nitrate pollution in the City of Morro Bay's drinking water wells, and bringing to our attention that nitrate concentrations have continued to increase since Cleath and Associates' 2007 report, submitted on behalf of the City. However, we do not agree with your argument, provided in an email to Mr. Kurt Souza with the California Department of Public Health dated July 8, 2013, that the primary source of the nitrate is sewer exfiltration, in particular, from sewer lines located in the vicinity of the former Shell Station located at the northeast corner of Highway 41 and Highway 1. Our conclusion is unchanged: the primary source of the nitrate pollution is chemical fertilizers applied to row crops in lower Morro Valley. The new hydrogeologic/chemical information you provided, including the City's pumping rates, nitrate concentrations in supply wells, rainfall averages, and analyses of nitrate isotope results, does not change our conclusion.

We have taken and continue to take action regarding nitrate discharges from chemical fertilizer application. The City has appropriately addressed the nitrate in its supply wells so that delivered water meets drinking water standards. We have no information indicating that there are discharges of nitrate from the area to local surface waters or the ocean. We discuss each of these items in further detail below.

Hydrogeologic/Chemical Information
Your email asserts that rainfall rates are not a significant factor in nitrate levels, rather the nitrate concentrations are directly related to total well field production from the City's four supply wells, and that the reason for higher concentrations in the northern-most well (MB-3) is that the source for the nitrate is sewer exfiltration north and west of this well, and work related to site cleanup work at the former Shell Station has breached clay layers and created a conduit for nitrate transport to the City's wells. In addition, you assert that the southern-most City wells have lower nitrate concentrations because of dilution and that Cleath's 2007 report inaccurately interprets the isotopic analysis of nitrate detected in the City wells. Water Board staff's responses are as follows:

- Our analyses of pre-2007 data on Morro Creek flows, rainfall, well drawdown, well production, and nitrate concentrations, along with new data on well production, rainfall, and nitrate concentrations provided in your July 8, 2013 email, indicate that there is a

yearly cycle and strong inverse correlation between nitrate concentrations and creek flows. The ephemeral creek begins to flow after significant rainfall events. The well field induces groundwater recharge from the creek (as designed), thus diluting nitrate in groundwater from Morro Valley, especially groundwater captured by southern-most supply wells located nearest the creek. The recent data provided by you indicates overall declining production from the well field over the period from 2009 to present; however, nitrate concentrations have increased during that time. In terms of water balance, the City's wells get nearly all of their water from 1) groundwater flowing from Morro Valley through the narrows towards the ocean and 2) induced recharge from Morro Creek. The area beneath the former Shell Station is adjacent to bedrock (a poor source for significant quantities of groundwater) and separated from sand/gravel units tapped by the City's wells by thick layers of clay and silt (thus the City's wells are likely hydraulically disconnected from the former Shell Station area as evidenced by lack of methyl tertiary-butyl ether (MTBE) detected in the City's wells).

- In the absence of significant creek flows (i.e., drought years), there is a greater lowering of the water table, higher drawdown per unit production from the well field, thus higher proportion of production from upgradient (e.g., lower Morro Valley) sources of groundwater that have demonstrated high nitrate concentrations. This, coupled with the fact that recent (2011) data from groundwater wells in lower Morro Valley indicate maximum nitrate concentrations had increased to above 300 micrograms per liter (from the low 200 micrograms per liter in 2007), continues to support the conclusion that the primary source of nitrate is from the lower Morro Valley. Concentrations of nitrate in the City's wells have increased in response to the above factors. In response to better nutrient management in the lower Morro Valley, we expect the trend to reverse after nitrate, stored in the unsaturated zone below the row crops and in groundwater between the City's wells and lower Morro Valley, is flushed out over the next few years.

- As stated in Cleath's 2007 report, nitrate isotopic data do not allow a conclusive determination of whether the nitrate contamination is derived exclusively from sewer exfiltration or exclusively from nitrate fertilizer application because the nitrate isotopic signature could be the result of 1) mixtures of sewer exfiltration and nitrate fertilizer applications, 2) mixtures of nitrate and ammonium fertilizer applications, or 3) exclusively from ammonium fertilizer applications. We concur with their conclusion.

Morro Valley Nutrient Monitoring

The Central Coast Water Board's Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Agricultural Order No. R3-2012-0011) requires individual ranches and farms to conduct surface water and groundwater quality monitoring in agricultural areas and to identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards. In addition, farms meeting criteria for higher threat to water quality are also required to evaluate nitrate loading and provide irrigation and nutrient management reporting. Growers must implement irrigation and nutrient management practices to control discharges to waters of the State. Initial groundwater monitoring results and nitrogen loading data for the Morro Valley Basin are still being collected and reported.

Thank you for your communication and concern regarding the water quality in the Morro Bay area. In addition to the nutrient management work, the Central Coast Water Board is also working closely with the City on the upcoming wastewater treatment plant upgrade project. The Water Board believes through these types of projects and work, the vision of healthy, sustainable watersheds will be achieved.

Sincerely,

Digitally signed by Kenneth A Harris Jr.
DN: cn=Kenneth A Harris Jr., o=Central Coast Regional Water Quality Control Board, ou=Executive Officer, email=Ken.Harris@waterboards.ca.gov, c=US
Date: 2013.09.25 16:01:00 -07'00'

Kenneth A. Harris Jr.
Executive Officer

cc:
Kurt Souza, CDPH-DDWEM-DWFO, kurt.souza@cdph.ca.gov

\\Seadog\vol1\Mgmt\Seniors\Shared\NPDES\NPDES Facilities\San Luis Obispo Co\Morro Bay-Cayucos WWTP\Stedjee letter sep 2013.docx

ATTACHMENT E

Subject: Re: RESPONSE TO JULY 2013 EMAIL RE: NITRATE CONCENTRATIONS IN GROUNDWATER, MORRO BAY, SAN LUIS OBISPO COUNTY
From: Linda Stedjee <lstedjee@charter.net>
Date: 9/26/2013 1:03 PM
To: "Harris, Ken@Waterboards" <Ken.Harris@waterboards.ca.gov>
CC: "Souza, Kurt (CDPH-DDWEM-DWFO)" <Kurt.Souza@cdph.ca.gov>, Diane.Glanville@waterboards.ca.gov, "Howard, Tom@Waterboards" <Tom.Howard@waterboards.ca.gov>
BCC: "[redacted]"

Mr. Harris,

I must take serious exception to the conclusions taken in your letter to me, dated September 25, on subject, "RESPONSE TO JULY 2013 EMAIL RE: NITRATE CONCENTRATIONS IN GROUNDWATER, MORRO BAY, SAN LUIS OBISPO COUNTY", attached (document name rwqcblettersept25.pdf)

Unfortunately, your analyst made at least two very serious errors based on false and/or insufficient information. I discuss the two major problems that I identified below:

1. Incorrect Assumption regarding Potential for Sewage to Travel in Groundwater from area of Shell Station to Municipal Well Field

On page 2 of your letter, it is stated,

> *"The area beneath the former Shell Station is adjacent to bedrock (a poor source for significant quantities of groundwater) and separated from sand/gravel units tapped by the City's wells by thick layers of clay and silt (thus the City's wells are likely hydraulically disconnected from the former Shell Station area as evidenced by lack of methyl tertiary-butyl ether (MTBE) detected in the City's wells)."*

This is absolutely false. There is a myriad of documentation that shows the City's wells ARE hydraulically connected to the former Shell Station area - as evidenced by prior findings regarding the migration of MTBE.

I ask that you direct your attention to following sources:

a. The attached document, a May 1, 2006 letter from Spencer Harris and Timothy Cleath, of Cleath and Associates, to Mr. Frank Cunningnam, City of Morro Bay. subject, "Review of case closure request, former Shell Service Station, 1840 Main Street, Morro Bay, California" (document name may2006cleatherport.pdf)

You may find the entire document of interest, but I suggest you review the following items:

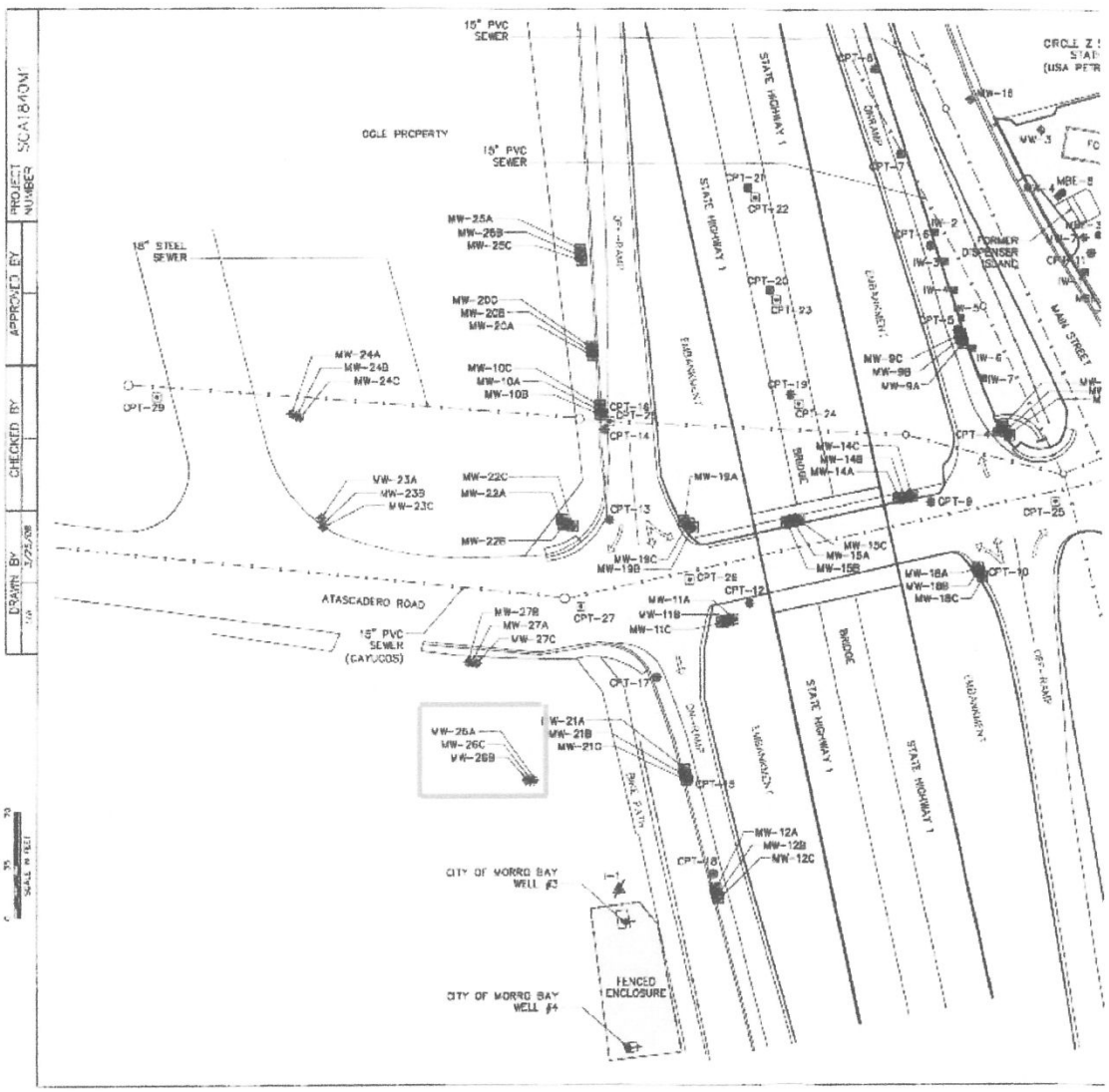
> Page 5, paragraph 1: "Nevertheless, the trends of decreasing MTBE mass, both plume-wide and at key wells, do support a conclusion that the threat to the City well field is diminishing..."
>
> Page 6, paragraph 4: The original MTBE detection came from wastewater sampling at the Morro Bay-Cayucos wastewater treatment plant, due to ground water with MTBE entering the sewer mains. Repairs to the leaking mains were performed, but gravel-filled seer line tenches (sic) remain as permeable conduits for ground water flow."
>
> Page 7, paragraph 2: "The second problem with dismissing the MTBE detections at the MW-26 well cluster, is that the timing and behavior of the detections appear associated with production at the well field"
>
> Page 7, paragraph 3: MTBE concentrations in ground water collected from the well cluster have been detected during sampling events immediately following each water-use event at the City's well field"

Page 8, paragraph 3: "Furthermore, by the end of remedial pumping activities in March, 2003, the core of the MTBE plume had already moved west of the extraction system's interceptor wells and beneath Highway 1. "

Page 9, paragraph 1: MTBE Detections at the MW-26 well cluster,which is closest to the City well field, appear directly associated with pumping at the City's Highway 1 well field.

So much for your analyst's conclusion that there is no hydraulic connection between the City wells and the area of the Shell station.

Here is the Delta consultants map showing the locations of the Shell station which I have shaded in red, detection well cluster MW-26, around which I have drawn a red box, and the City wells, which I have shaded in blue. You can see that those monitoring wells are right next to the City well field.



In addition, had your consultant done thorough research, he/she would have learned that the remediation crew

had powerful pumps running during the remediation in order to keep the MTBE out of the wells. I believe it was also keeping out the exfiltrated sewage that, prior to the remediation work, had not been able to reach the wells in significant quantities, but was able to do so after the extensive excavations.

b. Los Angeles Times article dated March 11, 2001 http://articles.latimes.com/2001/mar/11/news/mn-36298

Please note the following statements in the article:

> "While the foul-smelling gasoline additive MTBE has contaminated water wells around California, perhaps nowhere has it raised a bigger stink than in the picturesque tourist destination of Morro Bay.
>
> After the chemical compound was found near city wells, an investigation turned up one bombshell after another. A former gas station employee testified in January that records had been falsified to hide leaks from gasoline storage tanks.
>
> When Shell executives were questioned, they cited their 5th Amendment right to keep silent."
>
> "It's not in the realm of the worst problems," said John Rohrer, a geologist with Komex, a San Luis Obispo company that specializes in environmental cleanups.
>
> But because it was so near the city's drinking water wells, the pollution became a hot political issue in a town that treasures its resources and its natural setting on the fog-shrouded coast."

c. City of Morro Bay 2005 Urban Water Management Plan, page 44 http://www.morro-bay.ca.us /documentcenter/view/451

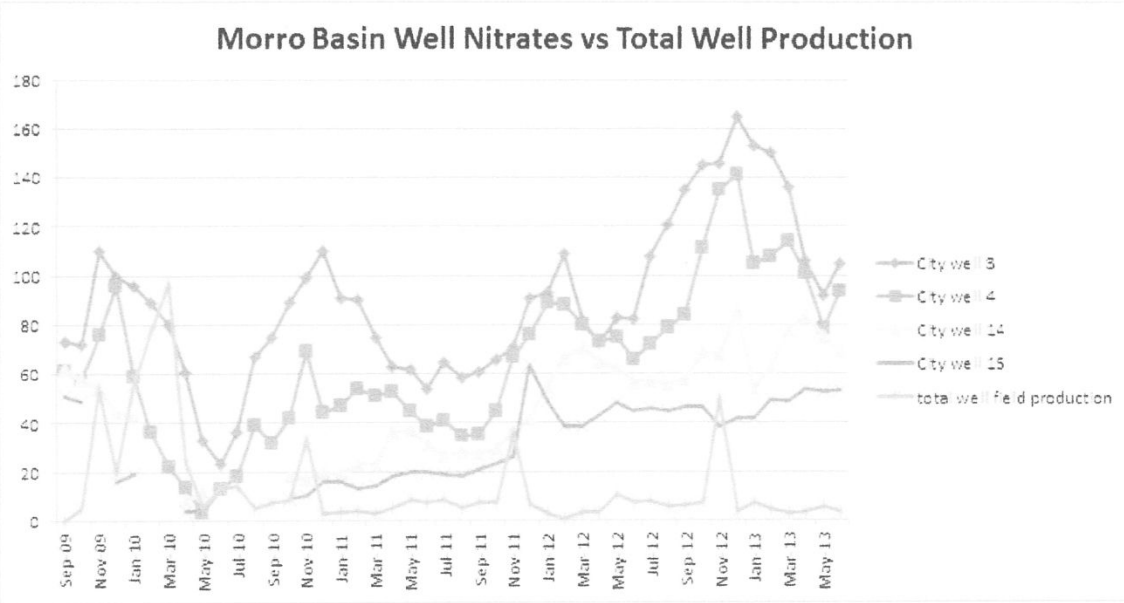
> "6.4.1
>
> The Morro Groundwater Basin was not utilized in 2001due to the presence of MTBE in the basin near the City's wells"

2. Incorrect statement regarding declining well production

On page 2 of your letter, it is stated,

> "*The recent data provided by you indicates overall declining production from the well field over the period from 2009 to present; however, nitrate concentrations have increased during that time.*"

Your letter says that recent data I supplied was the basis of the above conclusion. Following is a chart that I supplied. The light blue line shows total well production at the Morro Basin well field. I believe it is clear that well field production is NOT declining. Aside from a major surge in 2010, which was caused by the fact that the State Water Project radically cut back the City of Morro Bay's water allotment, production has been pretty steady, and in 2012 was clearly up from the prior year. It did NOT decline. I cannot begin to imagine how your analyst could have looked at this chart and concluded that production is declining overall.



I ask that you send your analyst back to do his/her homework and redo his/her work based on solid research and facts. Again, please remember that there is clear evidence of the hydraulic connection between the wells and the sewer lines near the Shell station site. That fact, taken together with the fact that the nitrate spikes began in 2002, after all that excavation at the Shell station site, and after the pumps at the remediation site were turned off, is pretty compelling. Those pumps clearly were not holding back just MTBE. They were also holding back sewage.

Linda Stedjee
Morro Bay

On 9/26/2013 9:35 AM, Glanville, Diane@Waterboards wrote:

Dear Ms. Stedjee:

The Central Coast Regional Water Quality Control Board is increasing its efforts to transmit correspondence and other information electronically, reducing the amount of paper used, and increasing the speed of which information is distributed. Therefore, you are receiving the attached correspondence for the subject site from the Central Coast Water Board in a Portable Data Format (PDF) and will not receive a hard copy unless requested. If you need help opening this document please refer to the link below:
http://www.adobe.com/products/acrobat/readstep2.html

Diane Glanville
Associate Governmental Program Analyst
Central Coast Water Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 90401
Phone: 805/542-4629

If there is magic on this planet it is contained in water.
The Immense Journey

Attachments:

may2006cleathreport.pdf	9.4 MB
rwqcblettersept25.pdf	128 KB

ATTACHMENT F

Cleath & Associates
Engineering Geologists
Hydrogeologists
(805) 543-1413
1390 Oceanaire Drive
San Luis Obispo
California 93405

May 1, 2006

2 pm

Mr. Frank Cunningham
City of Morro Bay
955 Shasta Avenue
Morro Bay, CA 93442

SUBJECT: Review of case closure request, former Shell Service Station, 1840 Main Street, Morro Bay, California.

Dear Mr. Cunningham:

Cleath & Associates has reviewed project files pertaining to cleanup and monitoring activities related to the subsurface release of gasoline containing methyl tertiary-butyl ether (MTBE) at the former Shell Service Station on Main Street at Highway 41. The purpose of this report is to provide technical input to the City of Morro Bay (City) regarding the case closure request submitted to the California Regional Water Quality Control Board (RWQCB), Central Coast Region, by Shell Oil Products US (Shell).

Conduct of Work

Cleath & Associates reviewed project reports with associated correspondence and records made available by the City. These documents were reviewed primarily to evaluate the accuracy of conclusions made by consultants in favor of the request for closure. This report is organized according to the conclusions being evaluated. Specific conclusions were obtained from the executive summary of the Aqui-Ver, Inc. (AVI) report dated December 16, 2005 entitled: *Summary of Safe Groundwater Use Conditions and Request for No Further Action; Former Shell Service Station, 1840 Main Street, Morro Bay, California*.

The following three conclusions from the AVI report are representative of the claims being made in support of site closure, and focus on issues central to the protection of the City's Highway 1 well field:

- The current [MTBE] plume mass (about 26 grams) is insufficient to propagate detectable impacts to the well field.

- This field demonstration [ground water use events], combined with other evaluations, indicates that water production can now occur without concern regarding MTBE impacts under any forseeable groundwater-use scenario.

- The site groundwater remediation history indicates that a water well could be placed in the core of the remaining MTBE plume and produce water with MTBE concentrations below the State

primary and secondary MCLs. Clearly, the more distant City wells are much safer than a well in the core of the remaining plume.

In addition to the AVI conclusions, two of the five points listed as rationale supporting Shell's case closure request in the RWQCB Public Notice and Request for Closure letter dated March 3, 2006, are discussed. These two points are as follows:

- Results from five groundwater pumping tests since 2002, indicate that the City of Morro Bay may use Morro Well Nos. 3, 4, 14, and 15 (located approximately 500 feet southwest of the site) without impact from the residual remaining MTBE. MTBE was not detected in any of the production wells and there was no observable movement of the plume during these pumping tests; and;

- Results of December 5, 2005, groundwater monitoring indicate that MTBE was not detected above its secondary maximum contaminant level of 5 micrograms per liter (µg/l), which is also the Water Board's cleanup objective for MTBE. Of the 53 monitoring wells sampled during the December 2005 sampling event, only three wells (MW-7, MW-26A, and IW-5) detected MTBE at concentrations of 1.1 µg/l, 2.8 µg/l, and 3.6 µg/l, respectively, as shown on the enclosed Figure 3.

Comments on AVI Conclusions

The following discussion focuses on the methodology and data interpretation of selected portions of the work conducted by Shell's consultants for the project. Overall, Cleath & Associates found the field work, well designs, monitoring program, and reporting to be professional and meeting or exceeding industry standards. The notable problems, where present, were mainly in the data interpretation and conclusions.

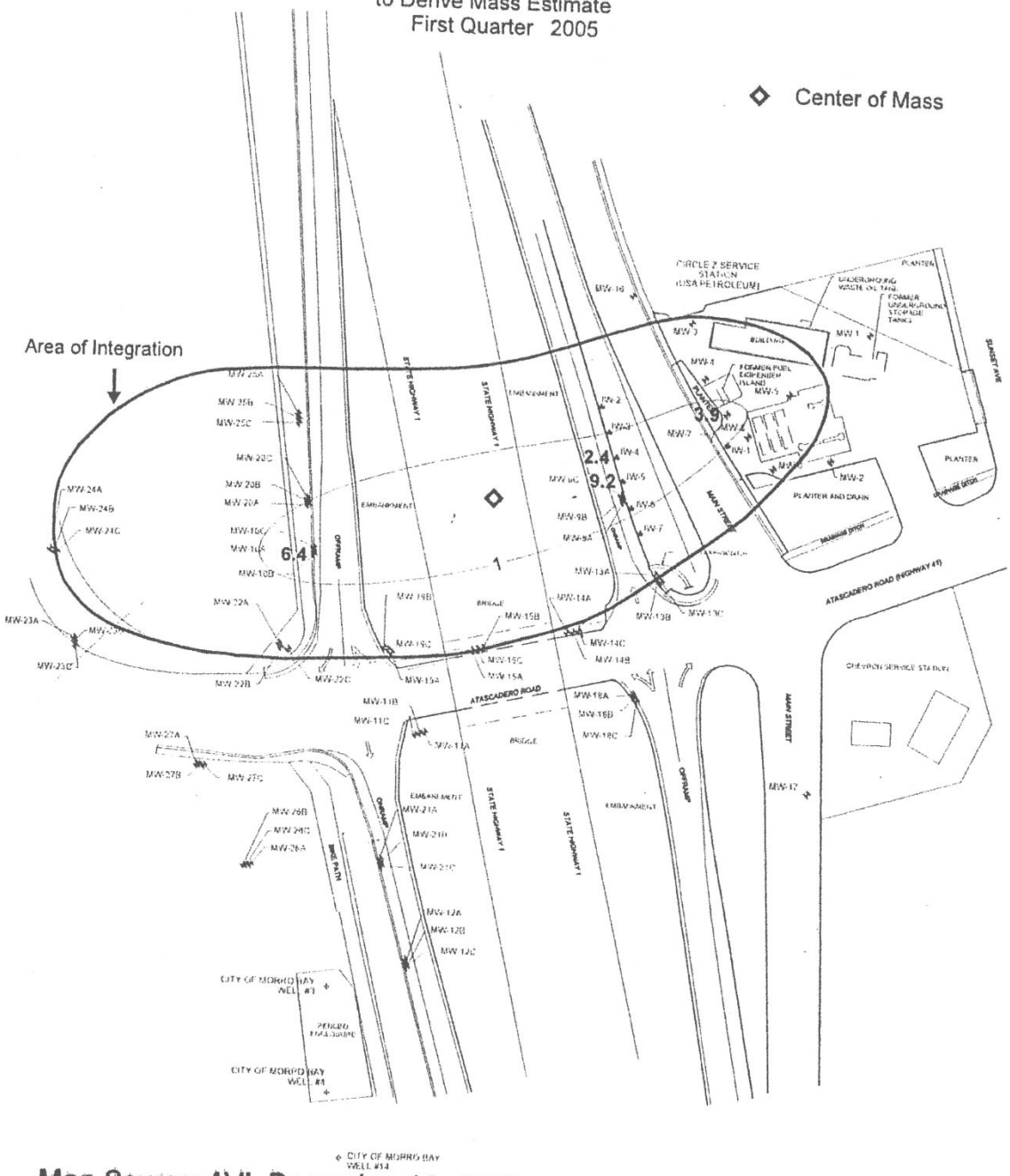
Conclusion 1: The current [MTBE] plume mass (about 26 grams) is insufficient to propagate detectable impacts to the well field.

The methodology used for MTBE mass calculation is a simplification of an inherently difficult calculation. The main conceptual problem with the simplified mass calculations is a lack of data near the calculated center of mass, which resulted in a bias toward underestimating the MTBE mass after the plume core moved beneath Highway 1.

For example, the 100 microgram per liter (µg/l) contour interval is missing from all but one of the eight contour maps beginning on the first quarter 2002 and through the fourth quarter 2003. The plume core, represented by the center of mass, has moved beneath Highway 1. Core perimeter values (wells on one or both sides of the highway) are greater than 50 µg/l in all but one of these eight monitoring events, and

Former Shell Station
1840 Main Street
Morro Bay, CA

MTBE Concentrations (ug/L)
to Derive Mass Estimate
First Quarter 2005



Map Source: AVI, December 16, 2005
Summary of Safe Groundwater Use Conditions
and Request for No Further Action; Appendix C

AQUI-VER, INC.

Former Shell Station
1840 Main Street
Morro Bay, CA

MTBE Concentrations (ug/L)
to Derive Mass Estimate
First Quarter 2005

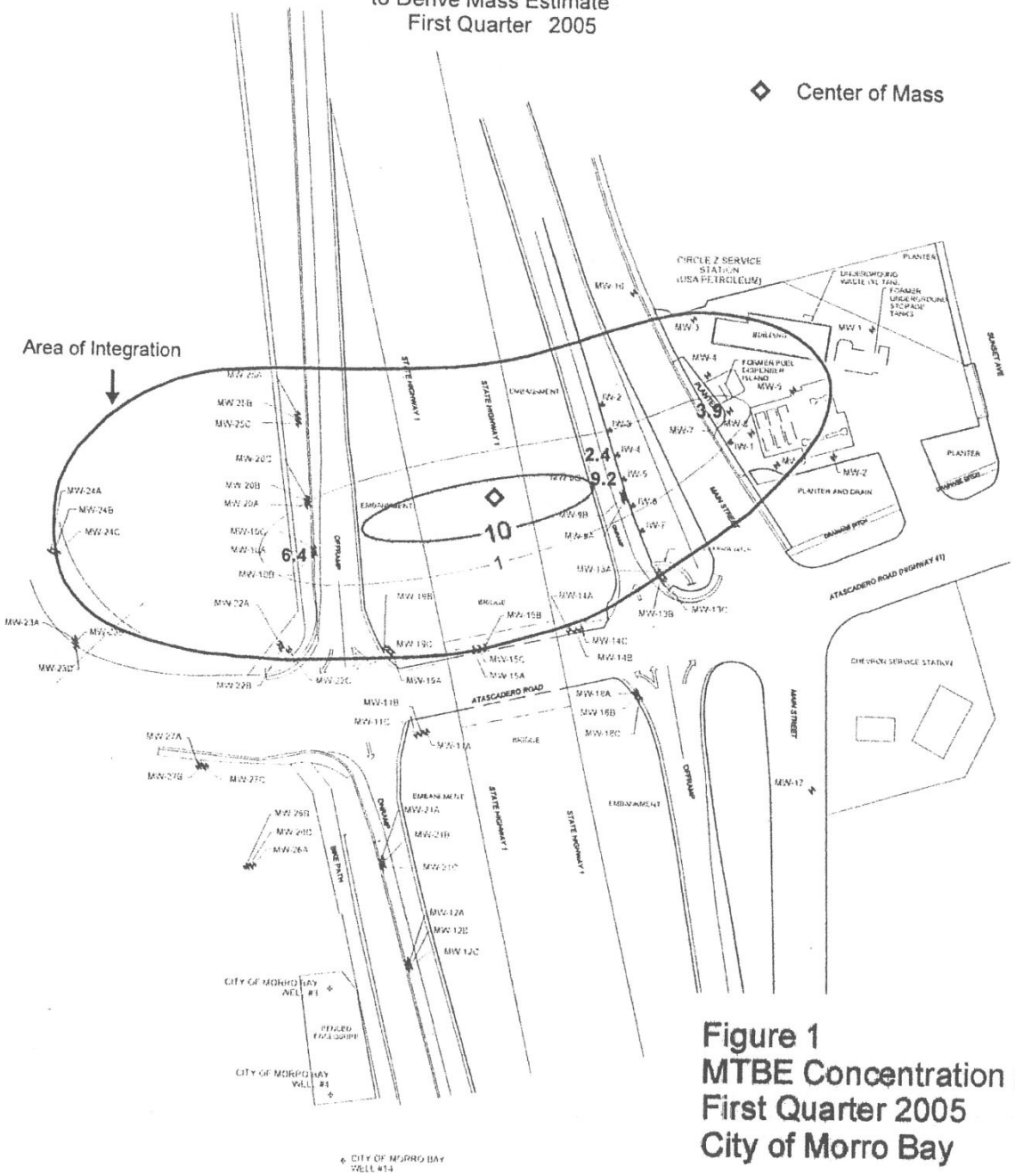


Figure 1
MTBE Concentration maps
First Quarter 2005
City of Morro Bay

Cleath & Associates

Base Map: AQUI-VER, INC.

NOTE: Modification by Cleath & Associates
10 µg/l isocontour line added

as high as 110 µg/l. Assuming that the greatest MTBE concentrations are in the plume core, a 100 µg/l contour interval should have been included on all contour maps through the fourth quarter 2003.

Similarly, the 10 µg/l MTBE concentration contour interval was dropped from contour maps and associated MTBE mass calculations beginning in the first quarter 2004, despite the lack of any data beneath Highway 1 (nearest the plume core) and with perimeter values above 9 µg/l on several occasions. Again, assuming the greatest MTBE concentrations are in the plume core, a 10 µg/l contour interval could have reasonably been included on all maps.

For example, Figure 1 presents the First Quarter 2005 MTBE concentration map with and without the 10 µg/l isoconcentration contour interval. Conclusion 1 uses 26 grams as the current estimated mass, based on the First Quarter 2005 MTBE concentration map with no assumed increase in MTBE mass at the plume core. If a 10 µg/l contour interval is introduced around the plume core beneath Highway 1, the mass estimate increases to approximately 73 grams (using the same methodology which calculated 26 grams).

The second part of Conclusion 1 relates to the transmission of MTBE in the subsurface. The methodology used by AVI to simulate MTBE movement in the subsurface involved a spreadsheet calculation (MTBEflux.xls). Using the AVI spreadsheet calculation with a revised mass estimate of 73 grams of MTBE indicates that detections of MTBE at the Highway 1 well field could occur, as summarized in Table 1 below.

Table 1
Flux Calculation Output
based on AVI, December 16, 2005 Report, Appendix C

	Plume Mass	Concentration	Well Field Production Rates (gpm)			
	grams	µg/l	300	400	500	700
MTBE	26	1.00	0.365	0.274	0.219	0.156
MTBE	73	2.81	**1.025**	**0.769**	**0.615**	0.438

Note: MTBE concentrations in µg/l. Detectable concentrations bolded.

Conclusion 2: This field demonstration [ground water use events], combined with other evaluations, indicates that water production can now occur without concern regarding MTBE impacts under any forseeable groundwater-use scenario.

The field demonstrations of safe well field use referenced in Conclusion 2 include a 20-day period in 2002 when ground water production averaged 360 gallons per minute (gpm), a 14-day period in 2003 when ground water production averaged 390 gpm, two periods in 2004 (the fist lasting 14 days at an average pumping rate of 435 gpm, and the second lasting 12 days at an average pumping rate of 385 gpm) and the most recent 15-day period of use in November 2005. Besides the field demonstrations, the Highway 1 well field was also pumped intermittently beginning in May 2004, with an estimated 206 acre-feet produced during that year.

Historical production at the well field prior to the importation of State Water Project (SWP) water in October 1997 was typically between 1 and 2 acre-feet per day, with annual production between 400 and 600 acre-feet per year. The City maintains a right, granted by the State Water Resources Control Board in July 1995, to produce up to 1.2 cubic feet per second (538.6 gallons per minute) and 581 acre-feet per year from the Morro ground water basin.

SWP water deliveries are not guaranteed. In the event of a pipeline or canal rupture, source contamination, or any lengthily delivery problem, including drought, a foreseeable groundwater-use scenario could very well include the sudden and necessary increase in Highway 1 well field production up to the City's maximum right to pump.

The amount of ground water production reported at the well field since discovery of the MTBE plume is less that the historical or foreseeable future production of 400-600 acre-feet, although there was a substantial amount of water produced during 2004. Safe water-use by the well field for up to 200 acre-feet of future annual production under ground water basin conditions similar to those in 2004 would be supported by the field data. Since 2003-2004 was a relatively dry rainfall year, ground water basin conditions would include below average water levels.

Whether or not any foreseeable ground water use scenario, such as full-scale production (581 acre-feet per year) at the well field, could result in MTBE detections in the drinking water supply is a question that cannot be answered strictly on the basis of the field demonstrations. Other evaluations would be necessary. Shell consultants have, in fact, performed a number of other evaluations, such as the MTBE mass estimate and transport evaluation discussed above under Conclusion 1.

MTBE trends analyses, numerical modeling of MTBE transport, and the natural component of plume attenuation through biodegradation have also been evaluated by AVI. These studies, along with the "ephemeral detections" of MTBE at the MW-26 well cluster are discussed below.

Trends Analyses

AVI presents two tables showing trends analyses for the MTBE plume in the December 16, 2006 report. One of these tables presents the estimated year when the plume-wide statistical average MTBE concentration would reach non-detect (2005-2006). A lack of accounting for increased MTBE mass at the plume core mentioned in the discussion for Conclusion 1 would affect this estimate and move it farther into the future. The second trends analysis estimates the year when MTBE concentrations at key wells would reach non-detect (at least by 2008-2011). This is a more useful analysis than the plume-wide average, although it still does not address potential maximum MTBE concentrations beneath Highway 1. Nevertheless, the trends of decreasing MTBE mass, both plume-wide and at key wells, do support a conclusion that the threat to the City well field is diminishing and could be negligible within the next five years. These trends do not, however, indicate that there is no current MTBE threat to the well field, as stated in Conclusion 2

Modeling Results

A ground water flow model and associated MT3D solute transport package was used by AVI to assess the potential for breakthrough of MTBE at the Highway 1 well field. Three different conceptual models were evaluated under three different pumping conditions (nine total scenarios), including a "worst-case condition" scenario. According to the report, no detectable MTBE would be expected at the City water supply wells under any of the scenarios.

All nine ground water flow modeling scenarios in the 2003 AVI report involved producing 270 acre-feet per year for two years from the City's well field. Pumping was concentrated over two 90-day periods, separated by 275 days of non-pumping. As noted earlier, however, a foreseeable pumping scenario would include up to 581 acre-feet of production at the Highway 1 well field. Therefore, the actual worst-case scenario has not actually been modeled. Nevertheless, allowing that the model construction is conservative, the results of the modeling do appear to support a safe water-use for maximum production at the Highway 1 well field over a 90-day period.

Natural Biodegradation

According to AVI, mechanical pump and treat operations can only account for approximately 25 percent of the mass reduction. The remaining 75 percent reduction in mass has been attributed to natural attenuation processes, with biodegradation as the most likely responsible process. Laboratory testing using microcosms of soil cores from the site is represented as evidence that bioremediation is occurring in the subsurface.

A review of the August 7, 2003 microcosm testing, however, shows the results are inconclusive. According to the report text, four soil core samples were prepared in duplicate (eight microcosms). Four

of the microcosms were tested for biodegradation, while the four duplicate microcosms were used as control and injected with a microbial respiration inhibitor to prevent biodegradation.

The laboratory results are reported as showing biodegradation had occurred in three of the four native soil microcosms. The sample with no biodegradation was labeled MW-20A. Coincidentally, results for only one control sample, the duplicate of MW-20A, were included in the report. Since the native soil microcosm of sample MW-20A did not show any biodegradation, its control duplicate would not have either, with or without the respiration inhibitor. Therefore, the MW-20A duplicate does not provide valid experimental control for attributing apparent loss of MTBE to biodegradation. Without any valid control, the tests are inconclusive. No explanation is given as to the why the results of the other three control microcosms are not included in the report.

In any event, the only assertion made by the microcosm test is that microbes capable of MTBE biodegradation are present in the subsurface in the site vicinity. In-situ conditions are quite different from the laboratory, and the microcosm test does not prove that MTBE biodegradation is actually occurring at the site. In fact, there is another explanation for the missing MTBE mass.

The original MTBE detection came from wastewater sampling at the Morro Bay-Cayucos wastewater treatment plant, due to ground water with MTBE entering the sewer mains. Repairs to the leaking mains were performed, but gravel-filled sewer line tenches remain as permeable conduits for ground water flow. There are several sewer mains below the water table adjacent to the former Shell service station. No discussion, modeling, or consideration of MTBE flux along man-made subsurface conduits has been found in the project reports. There are many unanswered questions in this regard, not the least of which is how much of the unaccounted for MTBE mass may currently exist in ground water within the permeable sewer trench system.

Natural biodegradation is certainly one possibility for apparent MTBE mass reduction, but it is not necessarily the most probable. Interception and transport of the MTBE plume along gravel-filled sewer trenches is likely. Since no ground water monitoring locations exist within the sewer main trenches, a significant amount of MTBE mass may be still be residing there, both inside and outside of AVI's area of integration.

MW-26 MTBE Detections

Detections of MTBE at the MW-26 well cluster are dismissed by Shell's consultant as not significant. According to AVI, the timing and behavior of of MTBE impacts in the MW-26 well cluster are associated with an alternate and minor local-area source. The detections are inconsistent with plume transport from the "main" MTBE dissolved-phase plume.

There are two problems with the above interpretation. First, if MTBE mass has been diverted along the sewer main trench system, then it wouldn't have to come from the "main" dissolved-phase plume,

because there would be another dissolved-phase plume along the trenches. Figure 2 shows the First Quarter 2005 MTBE concentration map also shown in Figure 1, but this time the detections at the MW-26 well cluster are included in the interpretation. A conceptual dissolved-phase plume is shown moving out of the Cayucos sewer main trench toward the well field. The elevation of the sewer line closest to the well field is 9.82 feet above sea level. Water levels in the area (based on Well-27A) fluctuate between 4 feet and 15 feet above sea level, with a median of 13.3 feet (there is typically a few feet of ground water in the trench). This trench turns north toward Cayucos at Main Street and passes between the former Shell service station and the interceptor well gallery, directly through the area of maximum MTBE concentrations measured in ground water.

The second problem with dismissing the MTBE detections at the MW-26 well cluster, is that the timing and behavior of the detections appear associated with production at the well field. Table 2 summarized this relationship.

Table 2
Well field pumping and maximum MTBE concentrations
MW-26 well cluster

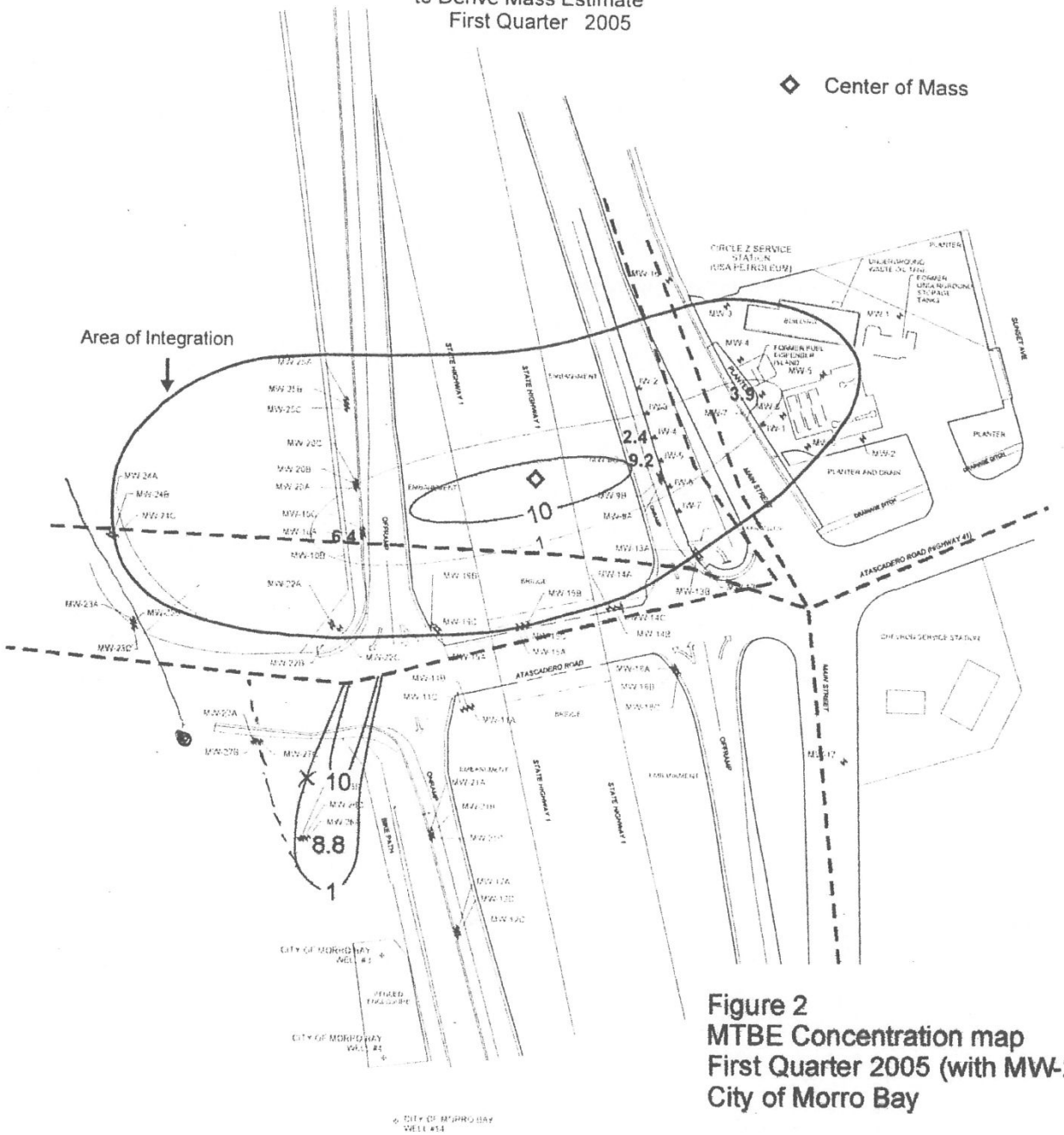
Pumping dates	Detection date	maximum MTBE concentration
10/28-11/16/02	12/17/02	3.7 µg/l
11/10-11/24/03	12/16/03	7.1 µg/l
Intermittent beginning in May 2004 through November 2004	continuous since June 2004	2.7 mg/l - 6/8/04 13 µg/l - 8/24/04 10 µg/l - 11/3/04 8.8 µg/l - 3/8/05 8.0 µg/l - 6/7/05 4.4 µg/l - 9/13/05 2.8 µg/l - 12/6/05
11/7-11/21/05		

MTBE concentrations in ground water collected from the well cluster have been detected during the sampling events immediately following each water-use event at the City's well field. In 2004, there was much greater overall production than during prior years, and MTBE concentrations measure at the well cluster lingered throughout 2005. This apparent association between well field production and detectable MTBE at the MW-26 well cluster warrants additional consideration.

Conclusion 3: The site groundwater remediation history indicates that a water well could be placed in the core of the remaining MTBE plume and produce water with MTBE concentrations below the State primary and secondary MCLs. Clearly, the more distant City wells are much safer than a well in the core of the remaining plume.

Former Shell Station
1840 Main Street
Morro Bay, CA

MTBE Concentrations (ug/L)
to Derive Mass Estimate
First Quarter 2005



NOTE: Modifications by Cleath & Associates
10 µg/l isocontour lines added
1 µg/l isocontour line and data point added near MW-26 well cluster
– – – – Approximate location of sewer mains added

Figure 2
MTBE Concentration map
First Quarter 2005 (with MW-26)
City of Morro Bay

Cleath & Associates

Base Map: AQUI-VER, INC.

X

Conclusion 3 references the site ground water remediation history. More specifically in the report text, AVI notes that the average concentration of MTBE at the conclusion of pump and treat operations was 4 µg/l, and, "...in principal, one could drink from the core of the plume". A review of the reported MTBE concentrations for extraction system water shows that while the final reported result was 4 µg/l MTBE, measured concentrations over the last year of remedial activities had declined to 4 µg/l or less on three other occasions, but had then increased to concentrations above the secondary MCL.

Furthermore, by the end of remedial pumping activities in March 2003, the core of the MTBE plume had already moved west of the extraction system's interceptor wells and beneath Highway 1. In fact, throughout the entire period of extraction system operation, MTBE concentrations were being reported above the primary MCL in monitoring wells hydraulically down gradient of the interceptor wells. There is no indication whatsoever from the site remediation history that a well in the plume core would not produce water with MTBE concentrations in excess of State standards for drinking water and above site clean up levels.

Comments on RWQCB Rationale for Site Closure

Several statements have been made supporting site closure by the RWQCB in correspondence to property owners dated March 3, 2006. Two of these statements are commented on below.

Statement 1: *Results from five groundwater pumping tests since 2002, indicate that the City of Morro Bay may use Morro Well Nos. 3, 4, 14, and 15 (located approximately 500 feet southwest of the site) without impact from the residual remaining MTBE. MTBE was not detected in any of the production wells and there was no observable movement of the plume during these pumping tests.*

Plume movement was reported by AVI during the 2002 pumping test. As noted in the September 23, 2003 report, "During the [2002] water use event, with pumping rates as high as 670 gallons per minute from all wells, and a strong hydraulic gradient toward the wellfield (recall Figure 3c), the MTBE plume appears to have deflected toward the wellfield under these conditions (Figure 6)."

Well field production during the five safe water-use pumping tests represented a minor fraction of typical historical annual well field production or potential future production. In 2004, however, overall well field production may be used to support safe water-use at the well field for up 200 acre-feet per year under relatively dry ground water basin conditions. Numerical transport evaluations discussed previously suggest that the City's water supply is safe from MTBE for production rates up to 270 acre-feet per year.

A full-scale well field production evaluation, consisting of a conservative "steady-state" spreadsheet analysis discussed previously under Conclusion 1, indicates detectable concentrations of MTBE could reach the well field when MTBE plume mass is recalculated. Existing mass estimates have not accounted

for increasing mass toward the plume core, which if considered would raise the total MTBE plume mass closer to 70 grams.

Statement 2: *Results of December 5, 2005, groundwater monitoring indicate that MTBE was not detected above its secondary maximum contaminant level of 5 micrograms per liter (µg/l), which is also the Water Board's cleanup objective for MTBE. Of the 53 monitoring wells sampled during the December 2005 sampling event, only three wells (MW-7, MW-26A, and IW-5) detected MTBE at concentrations of 1.1 µg/l, 2.8 µg/l, and 3.6 µg/l, respectively, as shown on the enclosed Figure 3.*

There have been only two quarters out of the last eight during which none of the water samples collected contained MTBE concentrations at or above the secondary MCL of 5 µg/l. These two events were First Quarter 2004 and Fourth Quarter 2005. Between these events, detections at monitoring wells reached up to 20 µg/l MTBE, which is greater than the primary MCL.

Furthermore, during the First Quarter 2004 event, well MW-6 was not sampled. This well had MTBE concentrations of 9.6 mg/l in the Fourth Quarter 2003, and 20 mg/l in the Second Quarter 2004. It could easily have produced MTBE concentration above the cleanup level in the First Quarter 2004. Considering this history, using results of one isolated monitoring event would not be a reliable method of assessing whether or not MTBE exists in ground water above the action level.

Summary

Shell has requested site closure with no further action for the former Shell service station at 1840 Main Street, Morro Bay. RWQCB staff concur with the request. A review of conclusions regarding the potential for impacts to the City's Highway 1 well field from MTBE, however, indicates some problems in data interpretation that are not supported by the data.

Specifically, the following points have not adequately addressed:

- The likelihood for MTBE concentrations in the plume core beneath the highway to be greater than perimeter well concentrations has not been accounted for in the MTBE isoconcentration contours, plume mass calculations, or trends analyses, all of which are central to conclusion made in favor of the request for site closure.

- The apparent disappearance of significantly more MTBE mass in the subsurface than that removed by pump and treat has been attributed to biodegradation, despite an inconclusive laboratory microcosm report, and historical evidence that suggests MTBE may be moving within gravel-filled sewer line trenches.

- MTBE Detections at the MW-26 well cluster, which is closest to the City well field, appear directly associated with pumping at the City's Highway 1 well field. Concentrations at this cluster were as high as 13 µg/l in 2004, which is the primary MCL.

Recommendations

Cleath & Associates would not recommend granting site closure with no further action at this time. Continued quarterly monitoring is advised, concurrent with the project consultant addressing the issues summarized above.

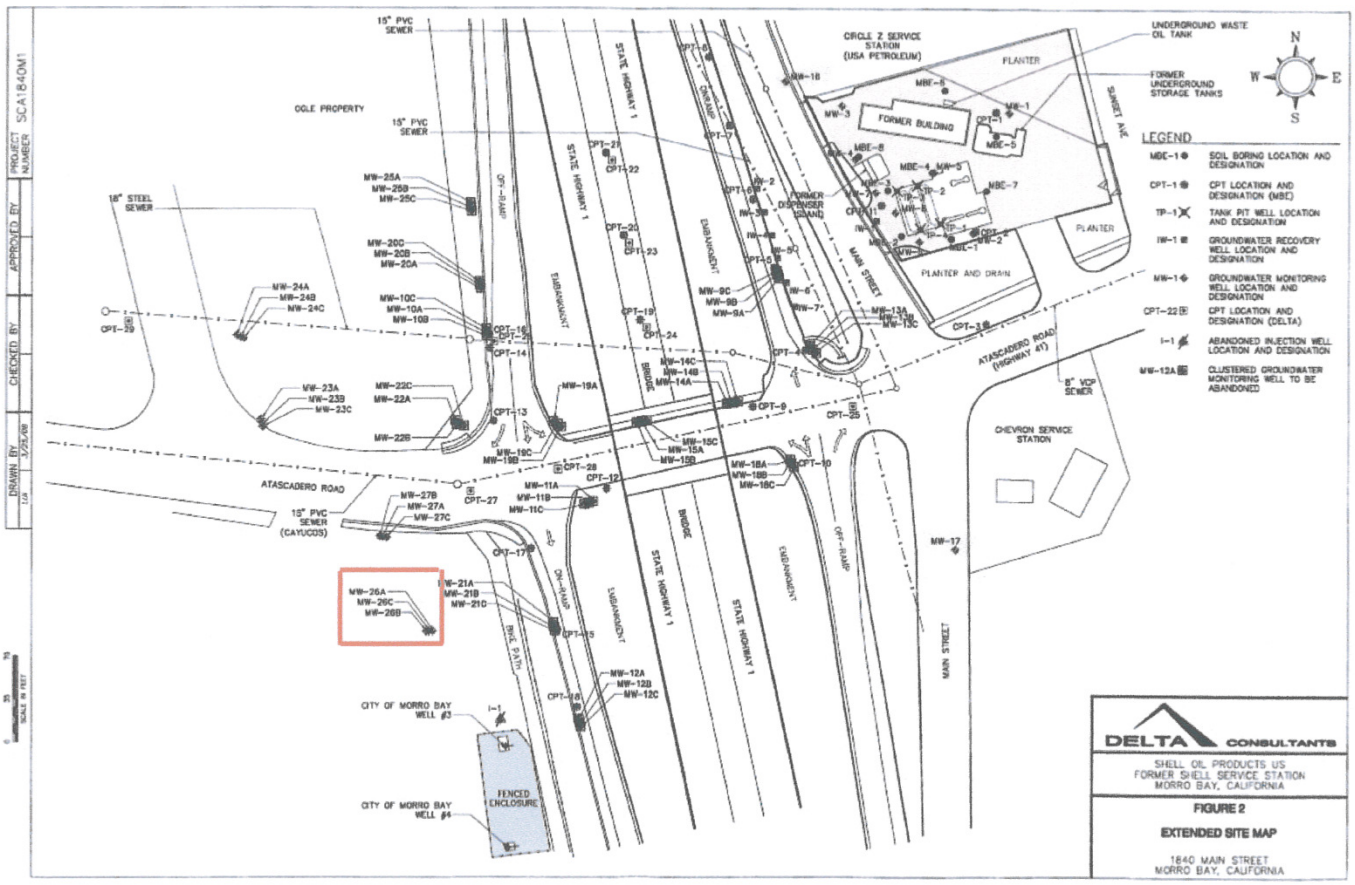
Please do not hesitate to call if you have any questions regarding the information or recommendations.

Sincerely,

Spencer J. Harris, HG 633
Associate Hydrogeologist

Timothy S. Cleath, HG 81
Principal Hydrogeologist

ATTACHMENT G



ATTACHMENT H

Subject: Fwd: Fwd: Another major problem with your analyst's work
Date: Fri, 27 Sep 2013 08:34:18 -0700
From: Linda Stedjee <lstedjee@charter.net>
To: Harris, Ken@Waterboards <Ken.Harris@waterboards.ca.gov>
CC:thoward@waterboards.ca.gov, Diane.Glanville@waterboards.ca.gov, "Souza, Kurt (CDPH-DDWEM-DWFO)" <Kurt.Souza@cdph.ca.gov>, Dan Carl <dcarl@coastal.ca.gov>, Madeline Cavalieri <mcavalieri@coastal.ca.gov>, "Robinson, Daniel@Coastal" <Daniel.Robinson@coastal.ca.gov>

Mr. Harris,

Reading through your letter again, I have found more significant problems with your analyst's work.

Your analyst attempts to dismiss the significance of my data showing that the well closest to the sewage source always has the highest nitrate level, the second-closest has the second-highest nitrate level, the third-closest has the third- highest level, and the most distant has the fourth-highest level. That attempt is seriously flawed.

You analyst says,

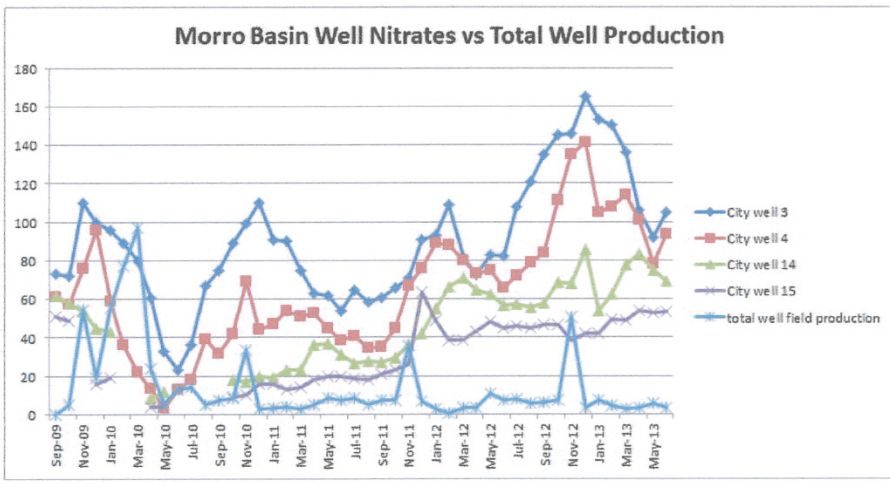
> Your email asserts that rainfall rates are not a significant factor in nitrate levels, rather the nitrate concentrations are directly related to total well field production from the City's four supply wells

and

> Our analyses of pre-2007 data on Morro Creek flows, rainfall, well drawdown, well production, and nitrate concentrations, along with new data on well production, rainfall, and nitrate concentrations provided in your July 8, 2013 email, indicate that there is a yearly cycle and strong inverse correlation between nitrate concentrations and creek flows. The ephemeral creek begins to flow after significant rainfall events. The well field induces groundwater recharge from the creek (as designed), thus diluting nitrate in groundwater from Morro Valley, especially groundwater captured by southern-most supply wells located nearest the creek.

As a first step in illustrating the problems with your analyst's conclusion, I direct your attention to the EXCEL worksheet I provided covering rainfall versus nitrate levels for well 03. I have attached a PDF version to this email. Rainfall data contained in the sheet is from weather-warehouse.com and can easily be verified. Please note that from May through November of 2012, there was no rainfall in Morro Bay at all - zip. Hence, we should be able to rule out any effects of flows in the "ephemeral creek" during that period.

Please note that, as shown on the chart below, **during the SEVEN MONTHS when there was absolutely no rainfall, the pattern remained exactly the same.** Well 03 had the highest nitrate levels, and is closest to the sewage source. Well 04 is next closest, followed by well 14, and well 15, which is the most distant. There was no "ephemeral creek" flow going on - nothing to dilute groundwater nearest the creek. Yet, the pattern remained consistent.



Please also note below the chart showing nitrate levels in well 03 versus rainfall. Your email says that there is a,

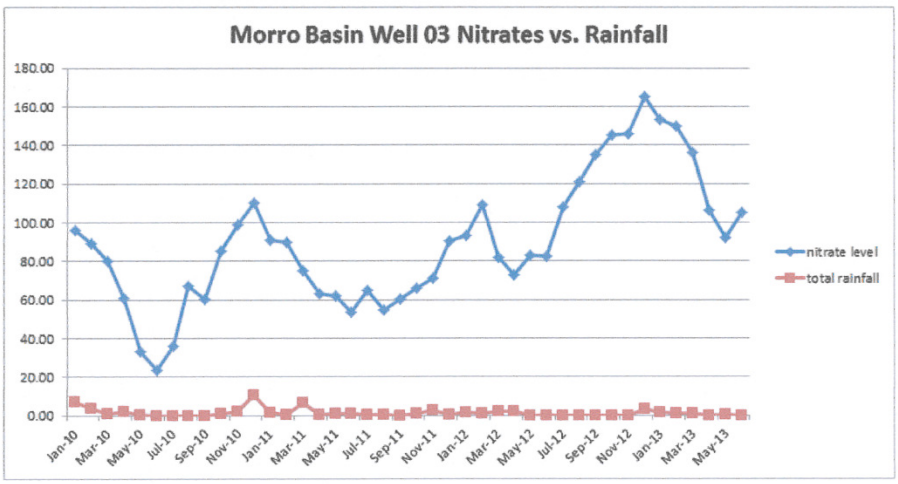
> strong inverse correlation between nitrate concentrations and creek flows.

This, according to your email was based pre-2007 data and the new data that I provided. I believe it is very clear that the "new data" that I provided shows nothing of the kind.

Your email indicates that, "The ephemeral creek begins to flow after significant rainfall events". Yes, when it rains, creek flows, in general, are up. In Morro Bay, they are highest in winter and early spring - the rainiest time of year. By late spring, there is little-to no rain and creek flows go down. By summer, the flow in Morro Creek is way down, totally dry in many areas, and it stays that way until the winter rains come again.

Please note that, as shown by the chart below for well 03, nitrates were clearly up during the 2010 rainy season - and so was the rainfall. Nitrates were up during the 2011 rainy season (winter and early spring) - and so were rainfall levels. I admit I do have a degree in mathematics, but I did not need that to notice that what we see here are not inverse correlations. They are **direct** correlations, which is exactly the opposite of the "strong inverse correlation between nitrate concentrations and creek flows" that your analyst claims.

Please also note that during the rainy season of 2012, there was also a direct correlation, not an inverse one. The 2012 correlation is a bit harder to see as there was less rainfall that year than in 2011, but it is clearly visible on the chart and in the supporting data. Directly below the nitrate peak in late 2012 is the highest rainfall level of the year.



My second major point regarding the fallacy in your analyst's assertion regarding flows and nitrate concentrations is in regard to the "pre-2007" data cited but not provided with your email. I am fascinated by the prospect that there may have been a complete reversal in the correlations, with pre-2007 correlations being inverse, and the correlations from 2010 being direct.

Fortunately, rainfall data for Morro Bay is available for the years prior to 2007, and nitrate data is available back as far as 1954. So, I obtained the rainfall data for the winter of 2002 - 2003 as an example.
We had a lot of rain that winter, so it is a good "test case" to see if the correlations hold both in dry and wet winters.

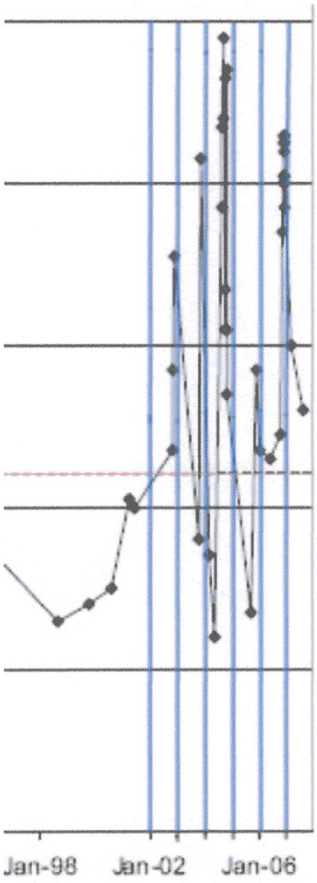
Here is the rainfall data for the 2002 - 2003 rainy season:

October, 2002 - 0.17
November, 2002- 2.18
December, 2002 - 5.07
January, 2003 - 0.52
February, 2003 - .84
March, 2003 - 1.92
April, 2003 - 1.67

I now direct your attention to the following graph of nitrate data in the Morro Basin wells from 1954 through 2007. This is excerpted from the graph provided farther down in this email. I enlarged the diagram and drew in the blue lines to make it clearer where the years begin and end. I now direct your attention to late 2002, when we had 5.07 inches of rain in the month of December (a LOT of rain for this area). Please note that is when the nitrate level spiked the highest. With the rainfall that high, and having had quite a bit of rain in November of 2002, it is clear that the creek flow levels would have been high as well.

Once again, this is a DIRECT correlation, not an inverse one. I do not believe it is necessary for me to go through this exercise for more pre-2007 data. It will show the same thing. We can tell that just from this graph. The nitrates always peak in the November - December timeframe. Not coincidentally, that was pretty much the only time period when the wells were being used for the years shown on the graph excerpt below.

Please note that November, 2002 is the first time the nitrates in the Morro Basin wells ever exceeded the mcl, and that this occurred after the mitigation team turned off the pumps they were using to keep the MTBE out of the wells.



Below is the complete graph from which the above excerpt was taken. Please note the sudden spikes, which are more dramatic when the whole graph is visible.

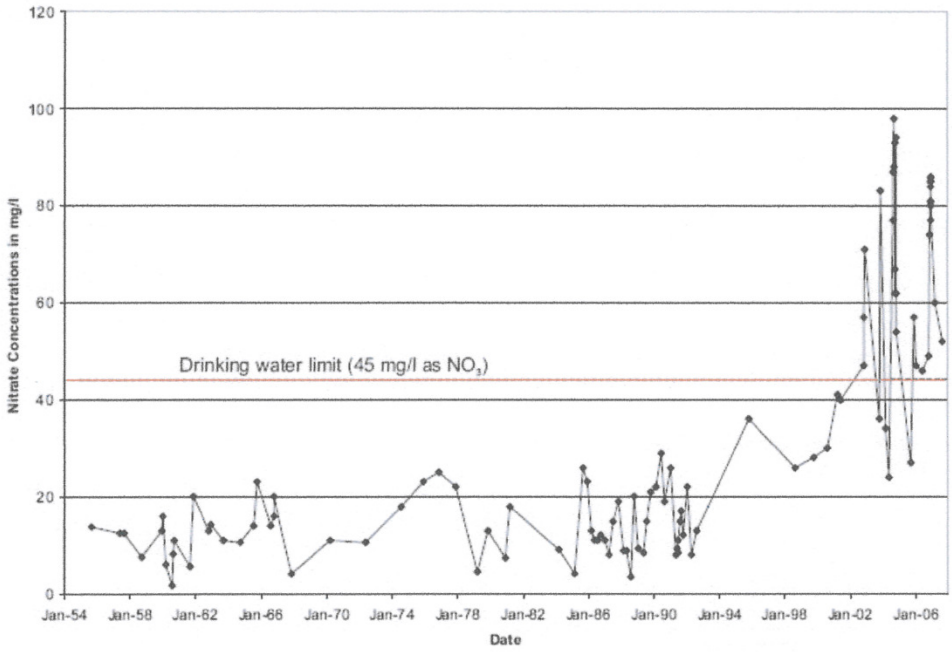


Figure 4
Well MB-3
Nitrate Concentrations
Morro Basin Nitrate Study
City of Morro Bay

Cleath & Associates

My third point focuses on another conflict regarding your analyst's claims regarding the alleged (and now disproven) claim of an inverse correlation between creek flows and nitrate levels as an explanation for the nitrate spikes.

The following quote is from page 13 of Cleath's Morro Basin Nitrate Study

> Recent Trends in Nitrate Concentrations
>
> Beginning in 2002, nitrate concentrations in MB-3 have exceeded the drinking water standard on a seasonal basis (Figure 4). **The pattern of fluctuations, however, appears linked to well field production. Nitrate concentration peaks between 2002 and 2006 coincide with full scale production at the well field, which occurs annually around November during the State Water Project shut downs. Historically, nitrate concentrations in November were in decline, rather than peaking.** (emphasis added)

I obviously do not agree with everything Cleath says, but in this case, his statement is clearly borne out by the data. See the chart above for corroboration of the underlined portion of Cleath's statement.

Again, please send your analyst back to do his/her homework. the longer we must wait for the RWQCB to deal with the true cause of the nitrate pollution in our wells, the longer our ground water and ocean continue to be polluted by exfiltrating sewage.

Linda Stedjee
Morro Bay

On 9/26/2013 9:35 AM, Glanville, Diane@Waterboards wrote:

Dear Ms. Stedjee:

The Central Coast Regional Water Quality Control Board is increasing its efforts to transmit correspondence and other information electronically, reducing the amount of paper used, and increasing the speed of which information is distributed. Therefore, you are receiving the attached correspondence for the subject site from the Central Coast Water Board in a Portable Data Format (PDF) and will not receive a hard copy unless requested. If you need help opening this document please refer to the link below:
http://www.adobe.com/products/acrobat/readstep2.html

Diane Glanville
Associate Governmental Program Analyst
Central Coast Water Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 90401
Phone: 805/542-4629

If there is magic on this planet it is contained in water.
The Immense Journey