Larsen, Thurman

From: Larsen, Thurman
Sent: Thursday, June 30, 2011 9:31 AM
To: 'VanHorn, Kristen, NMENV'; 'Chavez, Carl J, EMNRD'
Subject: SEMI-ANNUAL REPORT (#2)- Passive Bio-venting Project for remediating ULSD
Attachments: COVER LETTER 070111.doc; BIOVENTING MONITORING LOG.xls; QaQc-062811.pdf; CAL 011411.pdf; CAL 012111.pdf; CAL 021711.pdf; CAL 120710.pdf; CAL 122710.pdf; QaQc-032211.pdf; QaQc-042711.pdf; QaQc-052711.pdf

Dear Kristen and Carl,

The above attachments includes the cover letter for the semi-annual report (#2) for the passive bio-venting and remediation project of the ULSD tanks (T-115/T-116) area, the Bio-venting Monitoring Log, and Qa/Qc Data for your review. If you should have any questions regarding this report, please either call me directly or send me an e-mail.

Regards,

Beck Larsen; CHMM, REM, RPG
Environmental Engineer

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Western Refining
GALLUP

WNR
NYSE

July 1, 2011

New Mexico Environmental Department
Hazardous Waste Bureau (HWB)
1301 Siler Road, Building B
Santa Fe, NM 87507
Attn: Kristen Van Horn

New Mexico Energy, Minerals and Natural Resources
Oil Conservation Division (OCD)
1220 South St. Francis Drive
Santa Fe, NM 87505
Attn: Mr. Carl Chavez

Re: **REPORT #2**:
Semi-annual Report submittal for Passive Bioremediation (Bio-venting) Project for remediating Ultra Low Sulfur Diesel (ULSD) in accordance with (NSR Permit No. 0633-M8-R3, Part A.214)

Dear Ms Van Horn and Mr. Chavez:

Western Refining (Gallup Refinery) was granted the new NSR Permit 0633-M8-R3 that was signed on October 6, 2010. Under Part A.214 of the new permit, Western Refining is allowed to install a Passive Bioremediation (bio-ventilation) System for any Ultra Low Sulfur Diesel (ULSD) fuel spills that may occur at our facility. This report will include monitoring data based on nine events extending from December 7, 2010 through June 28, 2011.

Western Refining previously addressed the preliminary layout, pipe manufacturing, boring and pipe installation, and pipe survey in the letter to the Agency of March 11, 2011. Therefore, any reference to or detailed discussions of these issues will be omitted from this report unless changes or modifications are made to the bio-ventilation system such as addition or subtraction will be mentioned if required.

The Agency will find an excel workbook included as an attachment. The workbook includes the "Bio-venting Monitoring Log", graphs of "Daily Overall Average VOC Concentration", "Daily Maximum vs Daily Average", Daily Minimum vs Daily Average", and (C(1) through C 16). A detailed discussion of each will follow below.

VOC Monitoring and Qa/Qc Procedures- As indicated in the letter to the Agency, LDAR (Leak-Detection and Repair) personnel will conduct the VOC monitoring using a Flame Ionizing Detector (FID) (TVA-1000). As previously stated, Method 21 uses a portable instrument to detect VOC leaks from sources. The regulations do not specify a

model or type of VOC instrument. However, the type of instrument does have to adhere to certain guidelines and requirements as specified in the regulations. One of the requirements for the instrument is that the detector either should be a catalytic oxidation, flame ionization, infrared absorption, or photo-ionization type of detector. Specific instrument methodology is addressed under Method 21. LDAR personnel use the proper Qa/Qc procedures for Volatile Organic Compounds (VOC) monitoring as prescribed by EPA in accordance with Method 21. This document specifies all guidelines for Qa/Qc procedures and detection of VOC leaks from process equipment. Daily Qa/Qc must be performed prior to VOC monitoring.

Monitoring Schedule- Initially VOC monitoring was conducted on a bi-monthly basis from December through January in order to establish a VOC base line. In February 2011, VOC monitoring frequency was changed from a bi-monthly to a monthly basis. The objective of the bio-ventilation system is to decrease the average VOC concentration over time to a satisfactory standard. Western has conducted monthly VOC monitoring through June 2011 in order to collect enough historical data on the bio-venting system. Beginning on July 1, 2011, Western will commence a quarterly VOC monitoring schedule. The sampling events or monitoring will occur during October-December (4th qtr), January-March (1st qtr), April-June (2nd qtr), and July-September (3rd qtr).

Discussion of Semi-annual Monitoring Period Results- (Refer to "Bio-venting Monitoring Log", and graphs "Daily Overall Average VOC Concentration", " Average vs Maximum Concentration", "Average vs Minimum Concentration", "Average VOC Concentration by Sample Point", and individual standpipes (C (1) through 16).

1. Bio-venting Monitoring Logs vs Daily Overall Average VOC Concentration-

Nine sampling periods were conducted and included in this semi-annual report as indicated from the Bio-venting Monitoring Log. The average was calculated for each sampling event as reflected at the bottom of each column in the Bio-venting Monitoring Log. The VOC concentration over time is shown to have decreased from the initial event (December 7, 2010) to the latest sampling event (June 28, 2011). The initial overall daily average from December 7, 2010 was measured and found to be 27847 ppm. The overall daily average from June 28, 2011 was found to be 7881 ppm. If one views the graph of the "Daily Overall Average VOC Concentration", one can ascertain a definite reduction in VOC concentration over time. An exponential decrease is indicated by the "Trend Line" as shown. In order to determine the effectiveness of the Bio-venting System, it will have to be evaluated over a time dependant variable. Therefore, the daily overall concentration is expected to have a high initial concentration with an exponential decay over time. A Mathematical Model for this type of differential equation and decay function will be of the following general format: dC/dt=k*C, where C is the VOC concentration. The coefficient (k), which is a negative value, includes the dampening coefficient for the exponential function as the generalized solution that should theoretically approach an asymptotical value over a time (t). The General Solution to

this differential equation will take the following general format: $C=C_0*e^{(kt)}$, where C is the VOC concentration (ppm) at time (t) and C_0 is the initial VOC concentration. The coefficient (k) is same coefficient as mentioned above and provides a constant for the exponential function for the general solution to the differential equation. Once again, the solution to this generalized equation should also theoretically approach an asymptotical value over a time (t).

Please note that the relative outside temperature has been plotted in conjunction with the daily overall average VOC concentration as a comparison. It appears that there is a slight correlation between the outside temperature and the VOC concentration; however, several variables may contribute to any deviation from the average. The temperature is base on the average daily outside temperature and does not reflect the gas temperature. Also, the VOC concentration is taken at the sample point near top of pipe. Vapor concentration is not uniform and will vary due to the vapor pressure of the material and due to the permeability of the soil matrix.

2. Comparative Analysis between the "Daily Overall VOC Concentration"; "Daily Maximum vs Daily Average Concentration", and "Daily Minimum vs Daily Average Concentration" graphs–

The "Daily Overall VOC Concentration" graph is divided into two distinct sections that will be analyzed separately. The graph is drawn from data collected during sampling events and put into the cells of the "Bio-venting Monitoring Log" as shown. Daily average from each column was first calculated as an initial baseline for comparative analysis in order to determine an exponential decay constant that will be eventually utilized to determine the time require to cease monitoring. The accuracy of this constant will improve as the data is collected. The overall VOC reduction is the primary goal for the Bio-venting System.

The daily maximum and daily minimum are both components of the "Bio-venting Monitoring Log" daily columns. Each day has a maximum and minimum value that is shown in each column; however, when they are averaged over the sampling time period, they tend to normalize each other through cancellation. Individually however, they are apparent.

3. "Daily Maximum vs Daily Average Concentration" graph –

If one refers to the graph designated as "Daily Maximum vs Daily Average Concentration", one finds there is a correlation between the maximum concentration values and average daily values. On the days that there is a high concentration one will find that the daily average will also increase. This is due to this high concentration value numerically increasing the daily average.

4. "Daily Minimum vs Daily Average Concentration" graph –

If one refers to the graph designated as "Daily Minimum vs Daily Average Concentration", one also finds that there is a similar correlation between the minimum

concentration values and average daily values. On the days that there is a high or low minimum concentration value one will also find a similar reflective image. These lower concentration values will tend to normalize the overall daily averages in order produce an exponential VOC concentration reduction per unit of time.

5. "Standpipe Graph (C (1) through C16)
Sixteen standpipes (C(1) through C16) were monitored from December 7, 2010 through June 30, 2011 for VOC concentration. These values are indicated in the Bio-venting Monitoring Log. A graph was prepared for each standpipe in order to determine the effectiveness of each standpipe. Base on individual standpipe data, it was determined that each standpipe has been effective in reducing the amount of VOC concentration. A "Trend Line" for each standpipe clearly reflects a theoretical reduction over time.

Report Submittals- Passive bioremediation (bio-ventilation) of ultra low sulfur diesel (ULSD) for spill material in order to augment reduction of VOC concentration is a time dependent process. In February 2011, VOC monitoring frequency was changed from a bi-monthly to a monthly basis. The objective of the bio-ventilation system is to decrease the average VOC concentration over time to a satisfactory standard. Western has conducted monthly VOC monitoring through June 2011 in order to collect enough historical data on the bio-venting system. Beginning on July 1, 2011, Western will commence a quarterly VOC monitoring schedule. The sampling events or monitoring will occur during October-December (4th qtr), January-March (1st qtr), April-June (2nd qtr), and July-September (3rd qtr).

Western Refining (Gallup Refinery) will continue to provide the Agency with semi-annual progress report on or about July 1st and January 1st based on the prior semi-annual sampling results.

If you should require any additional information or assistance in this matter, please contact me at the number listed below or via e-mail.

Sincerely,

Beck Larsen, CHMM/REM/PG
Environmental Engineer
Western Refining Southwest

Direct Line: (505) 722-0258
e-mail: Thurman.larsen@wnr.com

Cc: File
Attachment: Excel File
Qa/Qc Data