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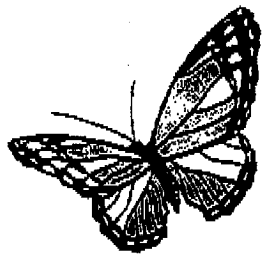
CITIZENS FOR LOWRY LANDFILL ENVIRONMENTAL ACTION NOW

71 Algonquain Street • Aurora, CO 80018 • (303) 364-2905 • FAX (303) 361-6713
912 360-7098



September 12, 2011

Bonita Lavelle
US EPA Region 8, 8EPR-PS
1595 Wynkoop Street
Denver, CO 80202-1129

Dear Bonita:

Please find our comments on the second O&M report for 2010. We appreciate this opportunity to comment on this document and look forward to seeing a written response from the responsible parties as well as changes in future Remedial Action and Operations & Maintenance Status Reports based on these and other stakeholder and agency comments. To facilitate a response from the responsible parties, we have provided a copy of these comments to them under separate cover.

The recent technical meeting was very useful as an update on site activities and in developing comments for this document. However, we were delayed in developing these comments as we are still waiting for documents requested/recommended in the July 7, 2012 meeting. These documents include:

1. A copy of the Lowry Landfill July 7, 2011 presentation
2. The "Interim Data Report, Effectiveness Evaluation North Boundary Barrier Wall" (November 2002) which is a bound technical presentation to the EPA on November 26, 2002
3. New transects requested in the July 7, 2011 meeting by Phil Oberlander

We did provide another request for these documents in our cover letter for these comments to Tim Shangraw at Engineering Management Support, Inc.

As a related issue, we would like to remind you of our previous request for a public update such as a factsheet for the north end 1,4-dioxane project. With more than two years since the last update, we are sure you share our concern for keeping both local decision makers and the nearby residents up to date so they can trust that efforts are in progress to mitigate the current situation. In light of recent and planned changes to the system, the need to keep the public informed has become even more important.

Sincerely,

Bonnie L. Rader

Bonnie Rader, CLLEAN

C: Andrew P. Schmidt, US EPA Region 8
Lee Pivonka, CDPHE

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General Comments

1. Figures showing distribution of 1,4-dioxane, including Figures C5.5-C5.7, show wells that have not been sampled in several years. This results in figures that are cluttered and not representative of current results (see Specific Comments below). It would be more appropriate to highlight the wells on the figure with recent applicable analysis and have the other site wells illustrated in half tone or omitted. This issue would be best addressed by providing badly needed plume maps for different dates showing changes in the plume over time.

2. There are actions prescribed in the ROD in the event of issues at the NBBW such as pulse pumping that would be appropriate in light of the 1,4-dioxane and potential nitrate releases north of the site. The US EPA Project Manager has expressed concerns during the February 24, 2010 meeting with CLLEAN that the lack of structural integrity due to age prohibits these actions. What actions will be taken to address this issue and comply with the ROD? Should the structural integrity of the NBBW be a topic for review?

3. The suitability of point of compliance wells (POCs) and other monitoring features used at the site is questionable when injection or extraction facilities are placed immediately adjacent to them. Due to nearby injection and extraction features; some monitoring wells are no longer indicators of regional conditions. Subsequently, the perimeter of the site no longer has compliance monitoring via the POC well system. Actions are required that may include an update of the GWMP to account for the direct manipulation at the POCs by the north end remediation efforts and to develop a new set of POC wells to replace the ones now inside of the 1,4-dioxane plume north of the NBBW.

4. Tables in the text of the report should be labeled and numbered. This is a professional norm for such documents because it allows ease of reference, particularly important to reviewers. Examples of unlabeled tables can be found on page 5 (Section 2.1.2), page 6 (Section 2.1.3 and 2.1.4) and page 16 – 17 (Section 4.3.1).

5. The report states in section 4.4.2, Page 18 “Wells B-313 and GW-109 are located near the NBBW injection trench. The presence of 1,4-dioxane in these wells is consistent with re-injection of extracted groundwater prior to 2001 that was either not treated or only minimally treated to remove 1,4-dioxane, nitrate, and nitrite. Beginning in 2001, only potable water was used for re-injection. These changes in the quality of the injected water over time cause the high degree of data variability in the overall data sets for these wells.”

   It has been ten years since the end of disposal of 1,4-dioxane in the injection trench. Yet there is still a persistent quantity of 1,4-dioxane in the groundwater. For the report to claim that the 1,4-dioxane concentrations are “consistent with re-injection” there needs to

General Comments (continued)

(Comment 5 continued)
be an analysis that benefits from recent data. The purpose of the needed analysis is to determine if this claim is reasonable in light of current conditions. The mass of 1,4-dioxane in groundwater in 2001 can be approximated and compared to the amount of mass removed by pumping or migrated out of the NBBW area. This would aid in determining 1) if the continued presence of 1,4-dioxane at the current concentration is reasonable, 2) if 1,4-dioxane persistence in the NBBW is expected, 3) how long it may take to remove the 1,4-dioxane above performance concentrations at current pumping rates, and 4) is it likely that an unknown source of 1,4-dioxane is contributing to today's concentrations. It is expected that there will be notable uncertainty in the analysis. However, it should be possible to state if whether the concentration data are internally consistent to within a factor of about two or three. If they are not internally consistent, then the conceptualization and/or data adequacy needs to be discussed. The issue was discussed with the Agencies in 2006 (Section 4.4.3.2, Page 22) and the mass issue needs to be re-opened.

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Specific Comments

#	Section(s)	Page	Comment
6	2.1.2	5	The first table should provide additional information for "water injected" with at least the same detail as the water source listing in the table. Tables should also be labeled and numbered for ease of reference.
7	2.1.5	7	The discussion for sludge monitoring references Appendix A-3. Unlike the similar Appendix A-4.1, this table provides no reference or listing of permitted levels. These should be added to the table to insure the analysis meets both the permit needs (detection limits) and that detected levels are below permit levels. It should be noted that for the effluent reviewed in Appendix A4.1 several parameters have detection limits that exceed permit limits.
8	2.2.1	8	(data presented in Appendix A-4.1, referenced on page 8) A number of the parameters such as 1,2-Dibromo-3-chloropropane, vinyl chloride and pentachlorophenol have minimum detectable (reporting limit?) concentrations at or near the permit limit. Others, such as benzo(a)anthracene, n-nitroso-di-n-propylamine and acrylonitrile have minimum detectable concentrations well above the permit limit. Subsequently, the statement "all discharge standards were met" on page 8 is not supported by the data referenced.
9	2.2.2.2	9	Regarding Monthly VOC Monitoring, the report states "Statistical trending analysis for these compounds are presented in Appendix A-4.2.2. No increasing trends were identified…". Appendix A-4.2.2 contains confidence intervals for the mean of the last eight data points which is not trend analysis. The additional trend analysis results along with improved labeling for this data would be useful.
10	2.2.2.2	10	Similar to the VOC monitoring, trend analysis for Radionuclide results is discussed in the report and alludes to Appendix A-4.3.2. However, there is not trend analysis in Appendix A-4.3.2. In fact, the choice of scaling would actually hide any observable trends for several of the presented parameters. With only 6 parameters graphed, this could be graphed in another program for a better presentation as opposed to the default produced by the statistics software.
11	2.2.2.2	10	(Appendix A- 4.2.1) the influent source marked TP150 shows no 1,4-dioxane. This may be a product of an elevated detection limit (200 µg/L), this will need to be corrected for this waste stream to provide early warning trend analysis for 1,4 dioxane.

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Specific Comments (Continued)

#	Section(s)	Page	Comment
12	4.4.2	18	The following statement is made: "Due to the overall variability of the results, wells B-313, GW-109, and MW38-830N-230E possess insufficient data to assess compliance for 1,4-dioxane (Table 4.5). The levels of 1,4-dioxane in wells B-313 and MW38-830N-230E displayed decreasing trends. The levels of 1,4-dioxane in well GW-109 displayed a stable trend." The statement does not appear to be consistent. If the data has excessive variability, then the trend is unknown. However, it might be appropriate to quantify the trend as "observed" or simply state values "appear to be decreasing when data is plotted without analysis". Examination of Graph 8 for well B-313 demonstrates that much of the variability in 1,4-dioxane concentrations occurred before 2004. The data after 2006 have much less variability and could be interesting when compared to performance standards. A test for statistical outliers should be used on the data and the anomalous values removed before testing for compliance or, if a change in management (new extraction or injection) could be associated after data collection then the data could be separated into before and after treatment changes. Given the very high concentrations at the well for the first two samples, it may be many years before there are a sufficient number of samples (if all are about the same concentration) collected to overcome the initial variability in concentrations. Although it may be administratively not possible to reevaluate these data because of the U.S. EPA agreed-upon procedures, this issue should be addressed in the next 5-year review or a new "time zero" be included in work plans.
13	4.4.2	18	The following statement is made "Wells B-313 and GW-109 are located near the NBBW injection trench. The presence of 1,4-dioxane in these wells is consistent with re-injection of extracted groundwater prior to 2001 that was either not treated or only minimally treated to remove 1,4-dioxane, nitrate, and nitrite. Beginning in 2001, only potable water was used for re-injection. These changes in the quality of the injected water over time cause the high degree of data variability in the overall data sets for these wells." It is an important observation to report that the changes in injected water chemistry add to the variability but the persistence of the very soluble 1,4-dioxane, nitrate and nitrite after a few years is not likely due to injection 10 plus years prior. Subsequently, it would be more correct to state "The early elevated concentrations" instead of "The presence" in the second sentence.

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Specific Comments (Continued)

#	Section(s)	Page	Comment
12	4.4.2	18	The increasing nitrate concentration appears to be consistent with decreasing dissolved oxygen concentration (Figure 1 and Figure 2 below) this may indicate that the nitrate conditions are tempered by denitrification. This would also indicate that if nitrate was residual (no new addition) then concentrations would likely be stable or decreasing. This issue should be added to this discussion. Since both nitrate and 1,4-dioxane are water soluble, there is likely a relationship between the persistent 1,4-dioxane concentrations and increasing nitrate at this location.
13	4.4.2	Table 4.5	Table 4.5 has trend labeled as "decreasing" for parameters/wells also marked "insufficient data". Similar to the comment regarding trend above, with no reference to a statistical method within the GWMP, this label is not appropriate. It would be correct to leave the trend box blank, indeterminate or reference the text for discussion. This conclusion is also somewhat vague considering the Groundwater Monitoring Plan only provides two descriptions for trends for compliance wells; "increasing" and "not increasing". (Appendix C, pg. 8, Groundwater Monitoring Plan Revision Number 1, December 28, 2005).
14	4.4.2	18	The explanation of the statistical analysis is vague; the relationship between "displayed decreasing trends" and Sen's or other trend test is not established adequately. It is recommended to either use better language from the GWMP or provide a more direct discussion.
15	4.4.3.1	20	The statement regarding BM-11X-100N "Based on the Sen's test, the temporal trend in the TCE concentration in this well is stable" is not a correct interpretation based on the GWMP. To find the null hypothesis true for the calculation, the result is more appropriately "Chemical concentration is not increasing over time". This general error appears in multiple locations in the document.
16	4.4.3.1	20	The evaluation of TCE migration in the PM-11 area assumes that the hydraulic gradient is perfectly aligned with the slurry wall. This is incorrect. There is a component of flow northward along the slurry wall which may be transporting TCE away from the corresponding compliance well outside of the slurry wall. This needs to be addressed in the report.

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Specific Comments (Continued)

#	Section(s)	Page	Comment
17	4.3.3.2	20-21	The effects of injecting clean water near monitoring and compliance wells is undefined and may be having a significant influence on water quality measurements. The radius of hydraulic influence and radius of hydraulic displacement should be calculated for each injection well based on the time and amounts of water injected. Without this supporting analysis, the results of the monitoring program are subject to great uncertainty. Plotting water level elevations is insufficient to demonstrate areas actually being swept by clean water to flush contaminants from the aquifer.
18	4.4.3.2	20	With each change in the treatment in the NBBW area, trend analysis should be restarted or at least a second set of calculations presented for discussion such as that found for B-326WD and B-326UD (a timeline for the system is badly needed in the report). What is presented in Figure C-5.8 appears to not include changes in extraction/injection in the area after 2007. For both the wells, there is a notable upward "tail" to the graphed data in the last few sampling events (note related comments above).
19	4.4.3.4	23	The discussion regarding the MW38-830N-230E does not include data from nearby downgradient wells such as MW38-1028-256E, which would be important in supporting the conclusions provided. It is particularly important because control is apparently dependent on a single extraction point (labeling the extraction point or an additional figure for the area would be helpful).
20	4.4.3.5	24	Appendix G does not include field measurements later than 2009 for wells discussed in this section. Field measures such as ORP, as mentioned in this section, along with pH and dissolved oxygen would be important to interpreting the results in regards to iron reduction and subsequent solubilization. Due to the lack of recent ORP data, the statement "Field measurements of oxidation-reduction potential (ORP) obtained from these wells indicates the presence of reducing conditions (ORP values less than zero) in groundwater in these areas." Is not supported by current data.

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Specific Comments (Continued)

#	Section(s)	Page	Comment
21	4.4.3.3	23	The review of the nitrate issues in the NBBW area appears to dismiss any evaluation of the source of nitrate with the statement: "Review of the potentiometric surface in this area indicates that wells B-313, B-326-WD, and MW62-WD are located downgradient of the NBBW and MW77-WD is located cross-gradient to the NBBW, the operation of which serves to contain contamination and prevent further contaminant migration to the area of these wells, as discussed above. Although ongoing migration to the area of these wells is not expected, these wells are located outside of the capture zone established by the NBBW (Figure 4.15). Consequently, there is a potential for nitrate already present in this area to migrate further." There are two additional scenarios that appear to be unevaluated: 1. Migration of nitrate around the eastern end of the NBBW. This will require additional discussion and potentially additional drilling in the area, but it should be considered since the groundwater chemistry does not appear to agree with the conclusions regarding groundwater movement. 2. Changes in injections/extraction in the area resulting in changes in water chemistry. This could be for a variety of factors including reduction in the rate of denitrification resulting in loss of biocontainment to increased rate of leaching of nitrate or other changes due to the chemistry of injected water and/or changes in groundwater levels. The actual situation may also be a combination of all of the above as well. However, the situation is very like Case 3 and investigation would likely add to the understanding of other important issues including 1,4-dioxane persistence and performance of the NBBW.
22	4.4.3.5	24	The statement "Pyrite-rich layers and nodules have been identified in core samples obtained from the Dawson Fm. beneath the Site." and "Naturally occurring oxidizing conditions are expected to increase with distance away from the landfill, which in turn, will lower the solubility of iron in groundwater. Consequently, the potential for migration of iron from this area is considered to be low." Should include a reference. These are both important to management of the issue and should be well supported if a new investigation is not triggered.

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Specific Comments (Continued)

#	Section	Page	Comment
23	4.4.3.5	24	The statement "The absence of any VOCs or other more mobile constituents typically found within, and downgradient of the landfill mass and waste pits, indicates that the presence of iron in these wells is due to localized sources" may not be entirely applicable to the situation. As indicated in the discussion, changes in other, more general, water quality parameters including ORP due to migration of contaminated water from the site can increase the solubility and subsequent concentration of iron.
24	4.4.3.5	24	For PM-6XUD and MW106UD there is an outward gradient indicating potential for migration off of the site. How may this affect the conclusion that the iron issue is entirely localized?
25	4.5.5	28	The 1,4-dioxane plume beyond the NBBW is now a large and significant feature of the site but with little to no vertical migration assessment for the area. Additional, deeper, wells are needed north of MW-113UD and MW-326UD.
26	4.6.1	28	MW38-825S445E appears to not be meeting the objectives of the MW38 source control plan, i.e. "The potentiometric maps for the two quarters in this reporting period show only a slight (2 foot) cone of depression surrounding the extraction well, probably due to high hydraulic conductivity of the channel sands in this vicinity and the intermittent extraction with the solar powered pump." As stated in the plan "The mechanism to achieve the latter objective is to lower the water table surrounding the extraction well to below that of the southern end of the MW38 channel, or approximately 3.5 ft from pre-pumping static conditions." Are corrective actions planned or are there other factors expected to occur to remedy the situation? It would appear that increased pumping at this location is an easy first step.
27	9.2.4.3	42-43	The source and nature of the nitrate problem in the MW77 and B-326 area has not been defined plus the area and potential mass of the plume is at best estimated. Conclusions as to final remedy would be premature. With this in mind, it would be more appropriate to state "Implementation of the additional actions in the area of wells MW77-WD and B-326-WD as described above for 1,4-dioxane may effect nitrate occurrences in these areas, and groundwater extraction from North End wells further downgradient may capture nitrate from the NBBW area if it were to occur" than the current text; "Implementation of the additional actions in the area of wells MW77-WD and B-326-WD as described above for 1,4-dioxane should also address nitrate occurrences in these areas, and groundwater extraction from North End wells further downgradient should capture any potential migration of nitrate from the NBBW area if it were to occur."

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Specific Comments (Continued)

#	Section	Page	Comment
28	Appendix A- 3	Section 2.1.5	Uranium activity is noted in the sludge but total uranium data is not available. It is also noted the proceeding Appendix, Uranium is not a parameter for the water.
29	Appendix C-3		Among other issues, this appendix has inconsistent page numbering, components are not marked consistent with other appendixes and there are mismarked columns on the tables (% detected column is not actually a percentage).
30	Appendix C-5	Figures 5.5 – 5. 7	These figures should show the spatial distribution of 1,4-dioxane in shallow groundwater in the North End Area. Instead, they are a poorly organized color coded well location map. An actual spatial distribution, a plume map, is required for this discussion. The figures presented include well sampling points such as T2- T5 that have not been monitored since 1998. (see general comment 1) Wells T2- T5 are actually coded with small blue dots described as "Dioxane14_2010 _3Q10 Events" in the legend which may be correct for the potentiometric maps but not 1,4-dioxane results.
31	Appendix C-5	Figure C-5.8	Trend analysis reports should include when treatment started (time zero for the appropriate trend analysis) and basic results of the trend analysis to provide opportunities for comparison of results by reviewers as well as specific decisions in the use of the data and application of the particular statistical method presented.
32	Appendix C3	Table 1	Table 1 of Appendix C3 show trend data without identifying any parameters, including if the Sen's Test or Shewart-CUSUM control charts are used. The appropriate trend test should be specified. This is an issue for multiple tables and figures describing trend analysis.
33	Appendix C-5	C-5-3	On page C-5-3 four of the 32 wells listed were not put through Sen's testing due to lack of data. According to Table C-5.1, each of the four wells mentioned had five data points, which meets the minimum of 4 points needed to run Sen's test. Trend testing appears to have been omitted for these locations.
34	Appendix G		As data from B-313 was being reviewed, high reporting limits for nitrite (0.5-5 mg/L) were noted. A more typical value is 0.025 – 0.05 mg/L. A review of the method may be required to reach a more reasonable reporting limit for future analysis.

35. General Comment for Appendix C-5 of the Groundwater Monitoring Plan

In 2008 the 1,4-dioxane plume was estimated to contain about 37 pounds of contaminant. The total amount extracted since the remedial pumping began is 2.8 pounds with 0.47 pounds removed from July through December 2009. As the plume continues to disperse in groundwater it is expected that the amount of recovered mass per reporting period at these extraction and monitoring wells will significantly decrease.

Therefore a very optimistic estimate of the remedial pumping period to remove the mass of 1,4-dioxane would be:

- 37 initial pounds – 2.8 removed pounds = 34.2 remaining pounds,
- 34.2 remaining pounds / (0.47 pounds / 6 months) = about 437 months or about 36 years to reduce to the performance standard.

More realistically it may take over 100 years of remediation to extract the 1,4-dioxane known to exist at concentrations above the performance standard of 6.1 ug/L. Considerable progress has been made by the enhanced remedial actions north of the site in the last few years. This effort should be expanded to include a greater area of the 1,4-dioxane plume where there is currently no remedial pumping. The goal of this expansion should be to reduce concentrations in groundwater to below the performance standard in no more than 20 years.

The 2010 report states that the presence of 1,4-dioxane in the area of the NBBW is due to residual concentrations. As stated in the report, the last review of this issue was conducted in 2006. The additional 5 years of data may allow a better description of the issue and determine if the present interpretation is valid. How long will it take based on the2006 data to remove the residual concentrations within the zone of capture of the NBBW?

(Item) 36. ***Figures Developed for the Comments***

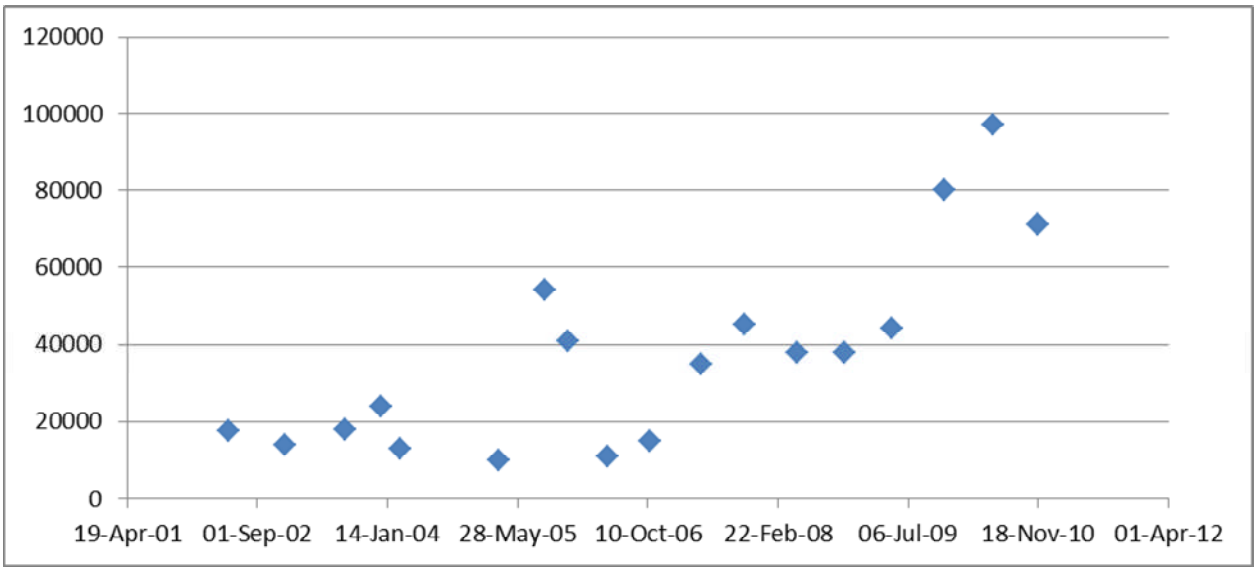

Figure 1. Nitrate concentrations in B-313.

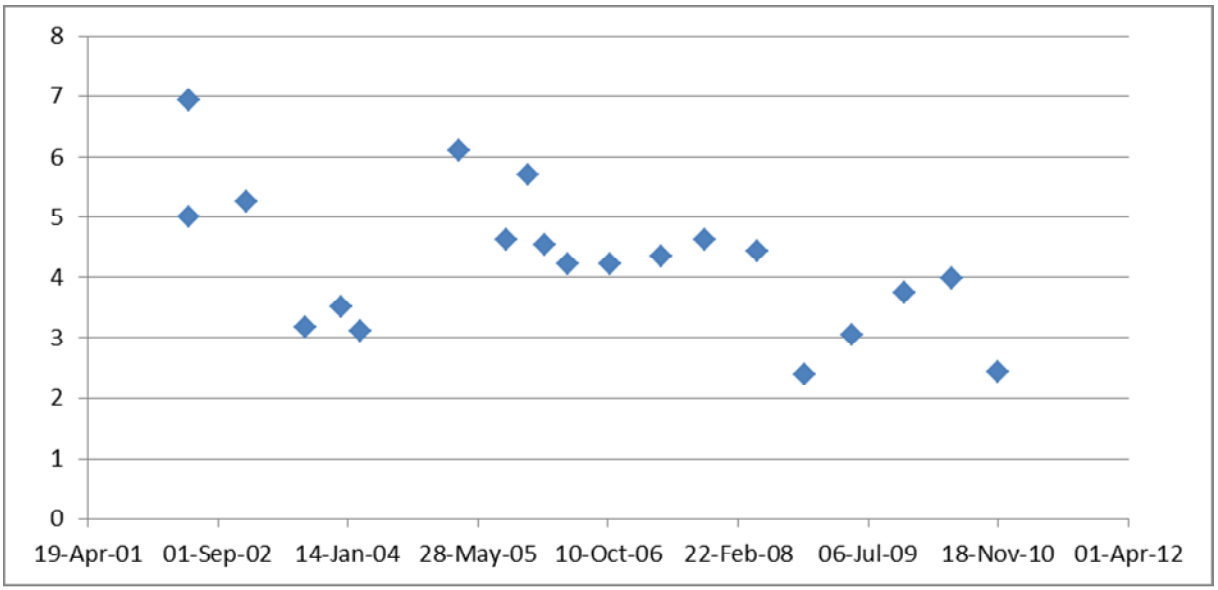

Figure 2. Dissolved Oxygen in B-313.