ROCKY FLATS SITE
REGULATORY CONTACT RECORD

Purpose: Evaluation of Elevated Nitrate in Ground Water Samples from AOC Well B206989

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Discussion:
See attached document for discussion.

Resolution:
See attached document for resolution.

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Rocky Flats Contact Record
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Evaluation of Elevated Nitrate in Ground Water Samples from AOC Well B206989

Per the RFLMA, DOE is required to notify the agencies of AOC wells with reportable conditions. A reportable condition for nitrate at well B206989 was declared in the last week of August 2007. Notification of the CDPHE was made in a meeting at the Rocky Flats office on August 30, 2007. This document provides the RFLMA-required plan and schedule for an evaluation to address this specific occurrence.

Background

Well B206989 was classified as a Sentinel well until the signing of the RFLMA on March 14, 2007, at which point it was reclassified as an AOC well. This new classification has reportable requirements associated. Reportable conditions are triggered when the concentration of an analyte exceeds the corresponding RFLMA Table 1 level or uranium threshold for two consecutive routinely-collected samples (i.e., two consecutive semiannual samples).

Well B206989 is located at the toe of the Landfill Pond dam. It is screened in weathered bedrock. Analytical data from this well have often appeared anomalous; for example, concentrations of nitrate + nitrite as N (herein termed nitrate) and uranium typically exceed those in samples from other nearby wells, indicating these results are not indicative of a plume of contamination. (This document addresses only nitrate, as the uranium concentrations have not exceeded the 120 ug/L threshold since the RFLMA was signed.) The anomalous water quality does not appear to be associated with the landfill wastes.

The sample collected from this well in June 2007 contained 27 mg/L nitrate, exceeding the applicable Table 1 standard of 10 mg/L. (The 100 mg/L Temporary Modification does not apply to wells in the No Name Gulch drainage.)

Although this was only the first sample collected under its new AOC classification, because the result was consistent with previous data the DOE decided to consider the result a reportable condition. This document proposes a response to that condition. The response focuses on a statistical evaluation of the analytical data for nitrate from this well, with the results of that evaluation driving any subsequent action that may be necessary.

Data Summary

Table 1 below summarizes nitrate data from well B206989 collected since 2000. The 10 mg/L standard and the 100 mg/L Temporary Modification for Segment 5 are also included for reference. As shown, the June 2007 results are generally consistent with previous results, only one of which is less than the 10 mg/L standard.

Figure 1 presents these data in a time-series plot, and includes a best-fit regression trend line. The r^2 value, 0.1266, suggests the fit is not particularly good. This is to be expected given the variability of the data. Even so, the visually apparent overall decrease is confirmed.

Figure 2 shows the same data, but includes a trend calculated using the Seasonal-Kendall trending method. Once again, a decreasing trend is evident. But again, the statistical confidence is not high; as shown, the trend does not meet an 80% level of significance.

Recommended Response

Three different approaches – one subjective (visual) and two objective (regression and Seasonal-Kendall trend calculation) – suggest concentrations of nitrate in ground water samples from well B206989 are decreasing. Therefore, it does not appear likely that the nitrate concentrations reported for ground water in this well will impact surface water quality at the Point of Compliance (POC).

Installing a replacement well has been discussed in the past due to the anomalous results generated by samples from well B206989. However, given the apparent decreasing trend in nitrate, well replacement at this time would probably represent an unnecessary cost and should be postponed unless and until a potential negative impact to surface water quality is indicated (i.e., the concentration trend is increasing) and downstream surface water exceeds the nitrate standard at the POC.

The following evaluation strategy is recommended:

1. Well B206989 will continue to be monitored semiannually as an AOC well, in accordance with the RFLMA except as described below.
2. Nitrate data will continue to be evaluated for trend. Exceedance of the nitrate standard will not trigger additional reportable conditions, as the evaluation will still be ongoing.
3. If and when a decreasing Seasonal-Kendall trend in nitrate concentrations with a level of significance of 80% is reached, the CDPHE shall be notified and this formal evaluation shall conclude.
4. Alternatively, if an increasing Seasonal-Kendall trend in nitrate concentrations is indicated, even at less than 80% significance, consultation with the CDPHE shall commence on the next phase of the evaluation, which shall incorporate all additional information then available.
5. If the level of significance of the nitrate trend still has not reached 80% following receipt of data from the last routinely-collected sample in calendar year 2011, and a subset of the nitrate results from the most recent 8 routine semiannual samples also lacks this level of significance, the DOE and CDPHE shall consult to determine whether an alternative to or modifications of this strategy are warranted based on all then-available data. (The date 2011 is arbitrarily selected to encompass the next CERCLA 5-year review period; the minimum number of samples required to calculate a Seasonal-Kendall trend is 8.)
6. Following conclusion of this evaluation via Step 3 above, if concentrations still frequently exceed the standard, the DOE and CDPHE shall discuss whether a unique definition of reportable conditions should be established for nitrate in well B206989.

Table 1. Concentrations of nitrate in ground water samples from well B206989 since January 2000.

Date Sampled	Nitrate Concentration, mg/L
1/19/2000	40
6/15/2000	39
11/30/2000	44
2/28/2001	60
7/17/2001	33.3
12/4/2001	31.4
2/11/2002	69.4
7/18/2002	40.3
11/6/2002	19
2/12/2003	54.1
3/25/2003	48
1/7/2004	34
6/3/2004	41
8/18/2004	9.55
12/6/2004	37.5
5/26/2005	33.1
7/28/2005	28
11/9/2005	34.6
4/26/2006	45
10/10/2006	35
6/26/2007	27

NOTE: Results reported as nitrate + nitrite as N. Field duplicates, equipment rinsates, and special No Purge sampling method-evaluation samples omitted.

Figure 1. Time-series plot of analytical data from Table 1 together with calculated regression best-fit trend and corresponding R^2 value.

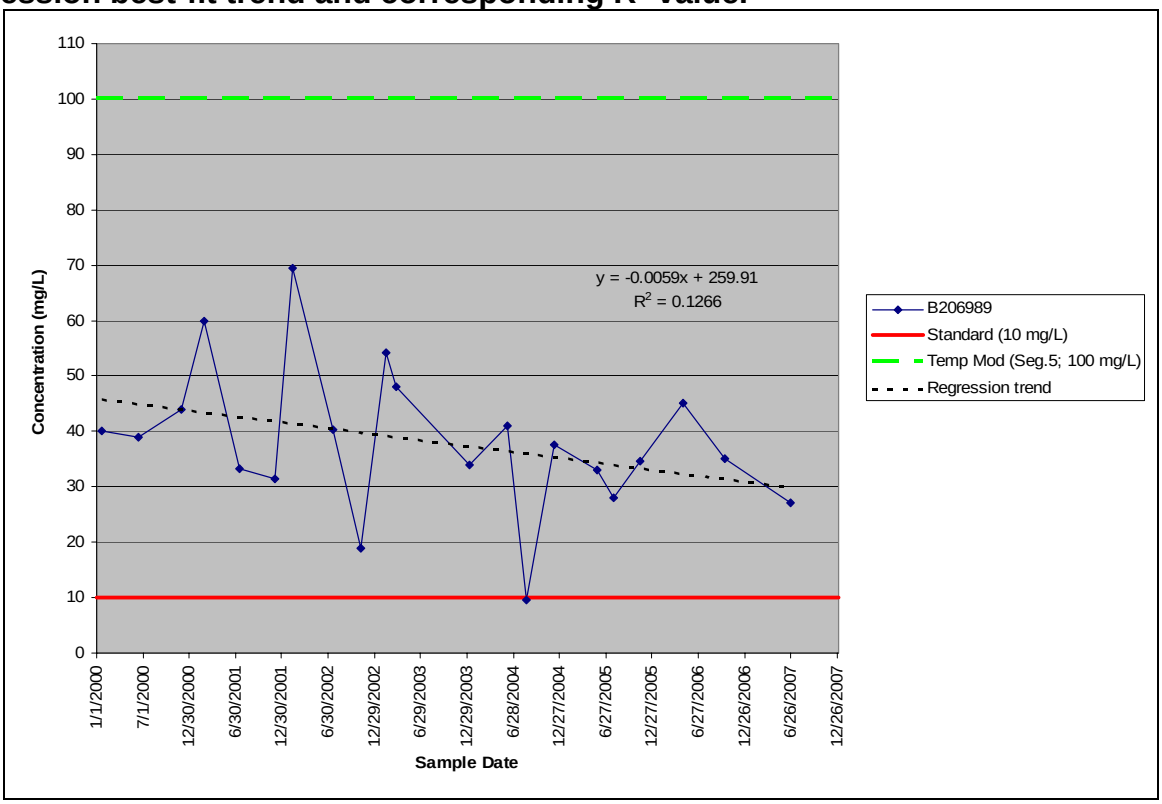

Figure 2. Plot of analytical data from Table 1 together with calculated Seasonal-Kendall trend.