

# ROCKY FLATS SITE

## REGULATORY CONTACT RECORD

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**Purpose:** Statistically Higher Concentrations of Analytes in Groundwater Downgradient of the Original Landfill (OLF) and Present Landfill (PLF)

**Contact Record Approval Date:** May 10, 2010

**Site Contact(s)/Affiliation(s):** Scott Surovchak, U.S. Department of Energy (DOE); Linda Kaiser, S.M. Stoller; John Boylan, S.M. Stoller; George Squibb, S.M. Stoller; Rick DiSalvo, S.M. Stoller

**Regulatory Contact(s)/Affiliation(s):** Carl Spreng, Colorado Department of Public Health and Environment (CDPHE)

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**Introduction:** This Contact Record documents the results of the evaluation of groundwater samples at the PLF and OLF in accordance with the *Rocky Flats Legacy Management Agreement* (RFLMA) Attachment 2, “Legacy Management Requirements.”

Groundwater at the PLF is monitored quarterly in three upgradient and three downgradient Resource Conservation and Recovery Act (RCRA) wells. Groundwater at the OLF is monitored quarterly in one upgradient and three downgradient RCRA wells. RCRA well water quality is evaluated in accordance with the decision flowchart presented in RFLMA Attachment 2, Figure 10, “RCRA Wells.”

Concentrations in downgradient wells are evaluated to determine if the concentrations are significantly higher than those in the upgradient wells. Concentrations in downgradient wells are also evaluated to determine if there is a statistically significant increasing trend. If concentrations are statistically higher in downgradient wells than in upgradient wells, or if downgradient wells show statistically significant increasing concentration trends, consultation regarding the appropriate response is required.

Significantly higher downgradient concentrations and increasing trends were observed for some analytes. These conditions were discussed in a consultation meeting on March 29, 2010.

### **PLF**

Statistical evaluations of groundwater data from PLF RCRA wells were performed as part of the 2009 RFLMA Annual Report preparation. These evaluations indicated that several constituents are present at statistically higher concentrations in downgradient groundwater than in upgradient groundwater, as determined by the analysis of variance (ANOVA) statistical method. These statistical results, which are identical to those reported in the RFLMA 2008 Annual Report, are summarized in Table 1.

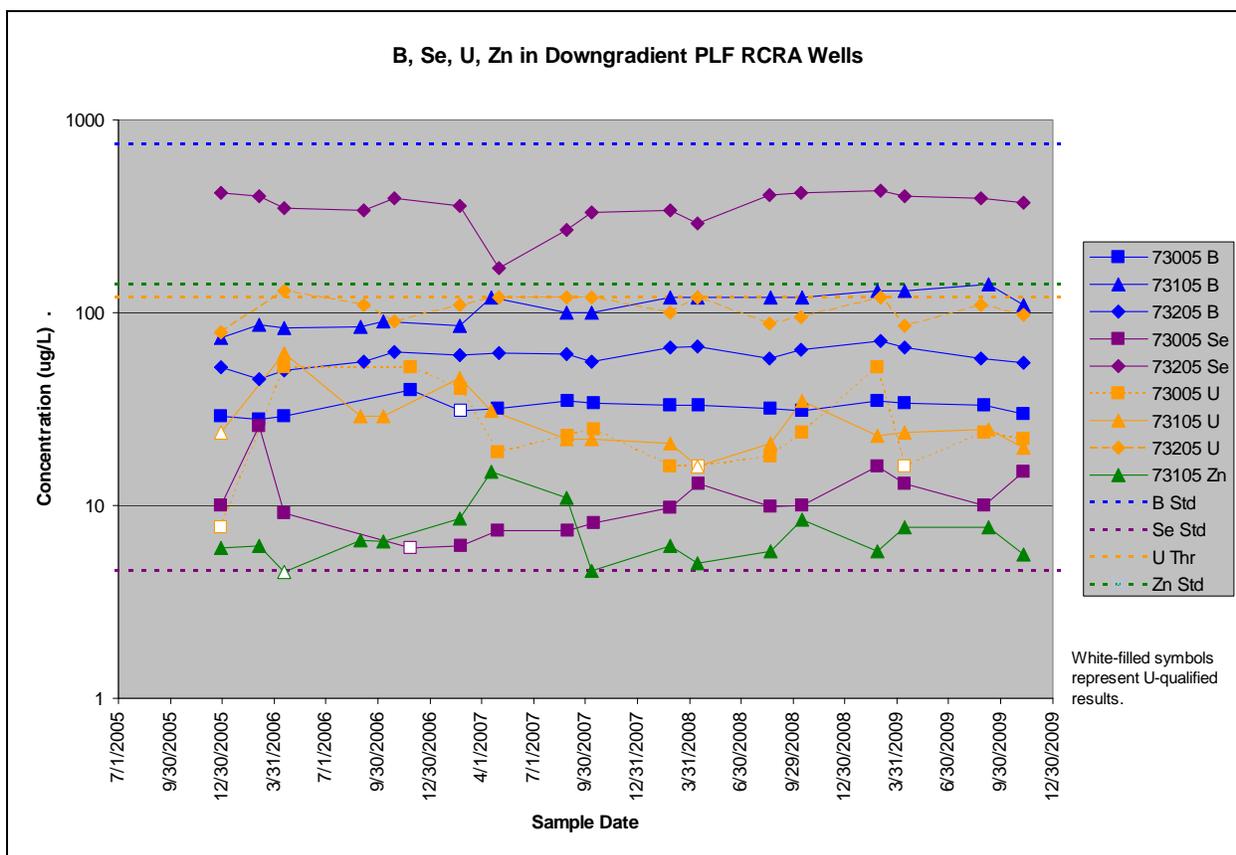
Table 1. Results of Groundwater ANOVA Evaluation for 2009 at the PLF

Analyte	73005	73105	73205
B	x	x	x
Se	x		x
U	x	x	x
Zn		x	

Note: x = analyte is present in groundwater at a statistically significant higher concentration in the indicated downgradient well compared to upgradient wells.

Prior to the 2009 samples, data from downgradient PLF RCRA wells were insufficient to support statistical trending. With the groundwater data collected in 2009, adequate data are now available. Results of trending calculations using the Seasonal Kendall method indicate that groundwater samples from downgradient well 73105 have a statistically significant (at the 95 percent level of confidence) increasing trend in boron concentrations. Concentrations of boron remain well under the RFLMA Attachment 2, Table 1 standard of 750 micrograms per liter ( $\mu\text{g/L}$ ). The highest concentration observed in 2009 was 140  $\mu\text{g/L}$ . Other constituents identified as having greater concentrations downgradient than upgradient (Table 1) are not represented by increasing trends of the same statistical significance.

Constituents identified as having greater concentrations downgradient than upgradient are illustrated on the time-series plots of data presented in Figure 1. The lack of any clear increasing trends other than boron in well 73105 is visually apparent in these plots.



Notes: B = boron, Se = selenium, U = uranium, Zn = zinc; Std = applicable standard, Thr = threshold. Only those analyte-well combinations identified in the ANOVA evaluation of PLF groundwater data as having statistically significant higher concentrations in downgradient RCRA wells (Table 1) are shown. Uranium data are compared to the uranium groundwater threshold value. In addition to the nondetects ("U"-qualified results), numerous other results were qualified ("B," "J"), but are not shown differently for the sake of simplicity. Note logarithmic concentration scale.

Figure 1. Concentrations of Constituents Identified in 2009 ANOVA Evaluations of Groundwater Data from Downgradient PLF RCRA Wells

## OLF

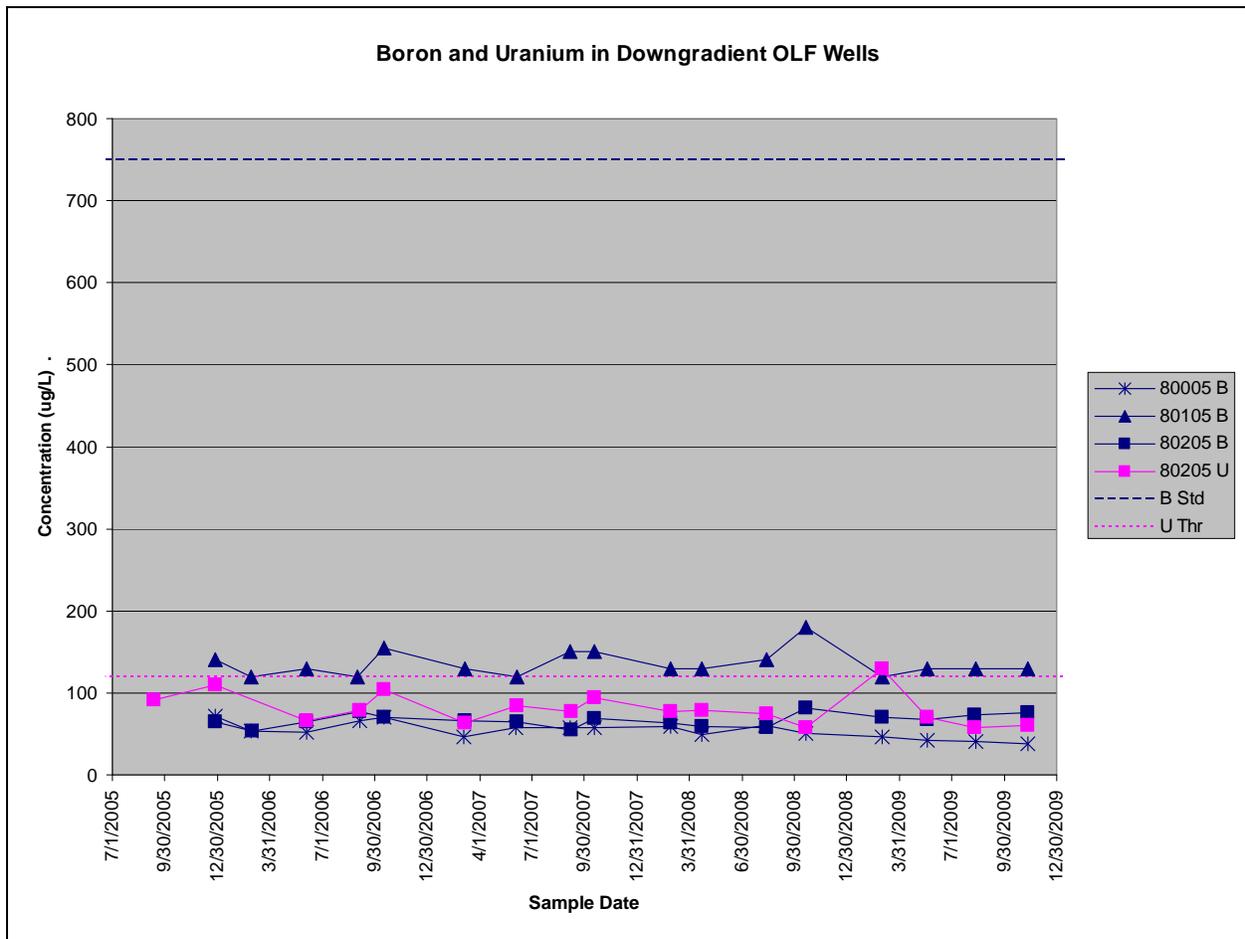
Statistical evaluations of groundwater data from OLF RCRA wells were performed as part of the RFLMA 2009 Annual Report preparation. These evaluations indicated two constituents are present at statistically higher concentrations in downgradient groundwater than in upgradient groundwater, as determined by the ANOVA statistical method. These results, which are identical to those reported in the RFLMA 2007 and 2008 Annual Reports, are summarized below in Table 2. Consultation regarding the 2007 and 2008 evaluations is documented in Contact Record 2008-05.

Constituents identified as having greater concentrations downgradient than upgradient are illustrated on the time-series plots of data presented in Figure 2.

Table 2. Results of Groundwater ANOVA Evaluation for 2009 at the OLF

Analyte	80005	80105	80205
B	x	x	x
U			x

Note: x = analyte is present in groundwater at a statistically significant higher concentration in the indicated downgradient well compared to upgradient wells.



Notes: B = boron, U = uranium; Std = applicable standard, Thr = threshold. Only those analyte-well combinations identified in the ANOVA evaluation of OLF groundwater data as having statistically significant higher concentrations in downgradient RCRA wells are shown. Uranium data are compared to the U groundwater threshold value. Several results were qualified ("B," "J"), but are not shown differently for the sake of simplicity.

Figure 2. Concentrations of Constituents Identified in 2009 ANOVA Evaluations of Groundwater Data from Downgradient OLF RCRA Wells

Previously, groundwater data from downgradient OLF RCRA wells have been insufficient to support statistical trending. With the groundwater data collected in 2009, adequate data are now available. Results of trending calculations using the Seasonal Kendall method indicate a statistically significant (95 percent confidence level) decreasing trend in boron concentrations in samples from downgradient well 80005. In addition, groundwater samples from downgradient well 80205 have a statistically significant (at the 95 percent confidence level) increasing trend in

selenium concentrations. However, every result for selenium in samples from this well is qualified, either with a U (nondetect) or a J (estimated) or B (the constituent was detected in the blank). Not a single result represents an unqualified detection. Therefore, the validity of this trend is suspect. For the same reason, the 85th percentile concentration of selenium in this well, which is calculated as 9.125 µg/L (above the standard of 4.6 µg/L), may not be representative.

Surface water downgradient of the OLF, as monitored at location GS59, shows no adverse impact due to elevated concentrations of B, Se, or U in groundwater at the OLF.

**Resolution:** Statistical evaluations of groundwater quality at the PLF and OLF identified a few constituents that are present at higher concentrations in downgradient wells than in upgradient wells and identified fewer constituents that displayed increasing concentration trends. These constituents were below RFLMA Attachment 2 Table 1 standards, or for uranium below the groundwater threshold value. The parties agreed that the appropriate response is to continue monitoring RCRA wells in accordance with RFLMA. Carl Spreng approved this summary of the March 29, 2010, consultation.

**Closeout of the Contact Record:** This Contact Record will be closed out when it is posted to the Rocky Flats website.

**Contact Record Prepared by:** John Boylan

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**Distribution:**

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