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ENVIRONMENT
& HEALTH

Mr. Mostafa Mehran
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118

Re: Fate and Transport Model Questions
Whirlpool Facility - Fort Smith, Arkansas
EPA No. ARD042755389
AFIN No. 66-00048
CAO LIS 13-202

Dear Mr. Mehran:

Date March 7, 2016

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Ramboll Environ US Corporation (Ramboll Environ), on behalf of Whirlpool Corporation, is submitting this response to Arkansas Department of Environmental Quality's (ADEQ) informal questions and comments regarding the fate and transport models generated for the north and south plumes as discussed within the Two Year Technical Review Report (Report). These informal questions and comments were received as part of ADEQ's initial review of the Report prior to the webinar presented by Ramboll Environ to review and summarize the fate and transport models for the north and south plumes. ADEQ comments are provided in italics below and the respective Whirlpool responses follow.

QUESTION 1: *The text of the report states that for each well evaluated a regression curve, a slope and a residual graph for the three analytes were produced. Please provide this information.*

RESPONSE: The regression analysis for trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) are attached for reference (Attachment C of the letter consisting of Appendix E for TCE and Appendix D for cis-1,2-DCE and VC) (the regression analysis documentation was submitted under separate cover on February 26, 2016).

QUESTION 2: *The report refers to "regression trends using all data, or maximum refined analysis interpretations." Please define "maximum refined analysis interpretations."*

RESPONSE: In cases in which a peak in the concentration was observed, the regression analysis was refined by limiting the analysis to the data collected after the peak concentration was observed. Thus the refined slope was determined based on time periods of decreasing concentration after the peak.

QUESTION 3: *The report states that the absence of cis-1,2-DCE and VC at a predominant number of wells indicate that degradation is not "stalling." The absence of daughter products could also be explained because they are not forming at all.*

RESPONSE: Section 4.4.1 of the report indicates "The concentration trends for cis-1,2-DCE and VC from a predominant number of wells are characterized as non-detect, decreasing or stable indicating that the natural degradation of cis-1,2-DCE and VC is not "stalling" or causing an increase in the concentrations of either of these constituents…" (also provided in the Executive Summary and Conclusions section of the report). We agree that it is possible that daughter products are not being formed at every individual well location.

QUESTION 4: *If natural attenuation is occurring through anaerobic biodegradation and the low amounts of DCE and VC observed in the groundwater are due to rapid dechlorination, please explain why the end product, ethene, is virtually absent from the groundwater. If degradation is occurring due to abiotic or chemical degradation, why are increased concentrations of carbon dioxide and chlorine not present?*

RESPONSE: The Report indicates the chemical, geochemical and microbial results provide strong evidence that natural attenuation of VOCs is occurring via various mechanisms in many areas of the northern, northeastern and southern plumes. Natural attenuation is defined by USEPA as physical, chemical and biological processes that act without human intervention to reduce the mass, toxicity, mobility and volume of constituent concentrations. Natural attenuation processes as defined by USEPA include biodegradation, dispersion, dilution, sorption, volatilization and chemical or biological stabilization, transformation or destruction. The Report does not present any conclusions regarding which specific mechanisms may be responsible for most or all of the natural attenuation occurring either at the site generally, or at any specific well location. ADEQ is correct that certain specific parameters are associated with anaerobic biodegradation and abiotic or chemical degradation. However, to repeat; all of the above-listed EPA mechanisms are forms of natural attenuation and natural attenuation is clearly occurring throughout the site and offsite locations.

Further, the Report identified 17 wells in which Dehalococcoides (DHC) concentrations were detected at a concentration greater than 30 cells/milliliter (mL) at any time during the past two years. During the fourth quarter of 2015, six of these 17 wells exhibited TCE concentrations below detection limits. Of the remaining 11 wells, DHC was detected in 10 of these wells during the fourth quarter of 2015 (DHC was not detected in ITMW-7 during the fourth quarter of 2015). Ethene was detected in eight of these 10 wells at concentrations ranging from 0.14 micrograms per liter (µg/L) (RW-69) to 7.4 µg/L (MW-38) (ethene was not detected in MW-46R or ITMW-18 during the fourth quarter of 2015). Therefore, ethene was detected in a predominant number of the wells were biological activity was occurring during the fourth quarter of 2015, confirming the detection of ethene as a result of anaerobic biodegradation as noted by ADEQ (ethene concentrations are a function of TCE and DHC concentrations).

Carbon dioxide and chloride have been detected in a majority of the wells monitored during the past two years. For comparison, the highest carbon dioxide concentration detected during the fourth quarter of 2015 occurred in MW-61R at 8,230,000 ug/L which is an increase from 265,000 µg/L during the third quarter of 2015 primarily due to the ISCR treatment (chloride increased from 110,000 µg/L in third quarter of 2015 to 130,000 ug/L during the fourth quarter of 2015). Therefore, increased carbon dioxide and chloride concentrations measured in MW-61R are a result of abiotic reactions occurring as noted by ADEQ (carbon dioxide concentrations are a function of TCE and iron concentrations).

As discussed above, no single natural attenuation process is responsible for a majority of degradation observed at the site. The data reflects that various natural attenuation processes exist throughout the groundwater plumes.

QUESTION 5: *Hydraulic conductivity values used to constrain the model appear to have been obtained from only six wells at the site (one in the boundary portion of the Northeast Plume, three each in the boundary portion of the Northern and Southern Plume). This is only one hydraulic conductivity value for every 7.6 acres (329,800 square feet). This limited number of hydraulic conductivity values does not adequately represent the major portion of the entire plume.*

QUESTION 6: *During membrane interface probe (MIP) profiling slug tests were conducted in several boreholes located in Areas 1, 2 and 3 and beneath the western portion of the manufacturing building. Were these slug test results included in constructing the model? Did Whirlpool use these hydraulic conductivity data to calibrate or verify the model?*

QUESTION 7: *Given the lack of hydraulic conductivity values obtained in the field, the method used to calibrate the model to hydraulic heads by allowing the model to vary hydraulic conductivity and the need to check the calibration of the model, ADEQ recommends that several wells across the site be selected for slug testing. The hydraulic conductivity values obtained from the slug testing could then be compared to the model generated hydraulic conductivities to assess the validity of the flow model.*

COMBINED RESPONSE: The range of hydraulic conductivities measured at the site is based upon performance of 50 hydraulic conductivity tests [i.e. pumping tests, slug tests and membrane interface probe (MIP) profiling hydraulic conductivity tests] completed at various onsite and offsite locations within the northern plume, southern plume, northeastern plume and the source area. The measured hydraulic conductivities range from a minimum of 0.1 feet/day [3.4E-05 centimeters per second (cm/sec)] calculated for Slug-HPT-09 using pneumatic slug testing (adjacent to DP-14, under the west central portion of the former manufacturing building) to a maximum of 93 feet/day (3.3E-02 cm/sec) calculated for observation well MW-65 during a pump test using MW-35R as the pumping well (immediately north of Ingersoll Avenue). The attached table summarizes the measured hydraulic conductivities and the figure depicts the various locations where hydraulic conductivities were measured.

The flow model considers hydraulic conductivities covering the range of measured hydraulic conductivities or ranging from 0.5 feet/day to 100 feet/day or 10-5 cm/sec to 10-2 cm/sec. The hydraulic conductivity values were not manually set within the model but were instead generated by the model by the Pilot Point calibration method which adjusts K values until the best fit is achieved (i.e. the predicted water levels closely match the measured water levels in the respective wells).

The current models appear to be well calibrated based upon comparison of the predicted water levels at respective wells and the measured water levels (Figures 4-8 and 4-12 in the Report).

Calibrated hydraulic conductivities were compared to model hydraulic conductivities and the results are discussed in Attachment A.

QUESTION 8: *How were dispersion/dispersivity values for the model determined?*

RESPONSE: The dispersion factors for the fate and transport models for both plumes were 10 feet along the flow path (longitudinal), 1 foot lateral to flow and 0.1 feet vertical. These are low values relative to the size of the plume, since only limited spreading of the plume has been observed. Also, since groundwater velocities are low, dispersion is not expected to be significant. If we increase dispersion, the respective plumes dissipate quicker, but significant plume dispersion has not been observed during the last 20+ years based upon monitoring data and groundwater gradients.

Sensitivity analysis on dispersivity for the fate and transport models has been performed and the results are included in Attachment B.

The sensitivity analysis for the north plume indicates that changing the longitudinal flow from 10 feet in the base case for the model to 0 or 100 feet only changes the time to achieve the MCL by one year. For the high dispersivity case (100 feet longitudinal, 1 feet, lateral and 0.1 feet vertical), a regression line was fit to the simulated output at MW-46R and the slope was compared to the base case. All other parameters including TCE reaction rate were kept constant. The degradation rate slope at MW-46R in the high dispersivity case remains -0.14, so the existing TCE reaction rate setting remains appropriate to represent the historical attenuation rate for the plume.

The sensitivity analysis for the south plume indicates that changing the longitudinal flow from 10 feet in the base case for the model to 0 or 100 feet changes the time (i.e. year) when the TCE plume may migrate beyond the south boundary. For the low dispersivity (0 feet longitudinal, 0 feet, lateral and 0 feet vertical), the plume is anticipated to flow past the south boundary at a concentration of 0.9 µg/L in 2031. For the high dispersivity case (100 feet longitudinal, 1 feet, lateral and 0.1 feet vertical), the plume is anticipated to flow past the south boundary at a concentration of 2.5 µg/L in 2036. For the high dispersivity case, a regression line was fit to the simulated output for at ITMW-7 and the slope was compared to the base case. All other parameters including TCE reaction rate were kept constant. The degradation rate slope at ITMW-7 in the high dispersivity case was -0.07, compared to the current case of -0.15. This suggests using the higher dispersivity values would necessitate increasing the TCE reaction rate (i.e. lowering the

half-life) for the model output to match the average historical trend for the tail of the plume. Even without making this adjustment to the model, which would accelerate TCE removal from the model domain, the model does not predict TCE exceeding the MCL beyond the property line. The results for the zero dispersivity case also show no offsite exceedance of the MCL.

QUESTION 9: *How were the six wells in the Northern Plume and three wells in the Southern Plume with increasing chlorinated ethene concentrations utilized in determining the degradation rate constant for the model?*

RESPONSE: This comment refers to the increasing concentration trends based upon the Mann-Kendall test discussed in Section 4.1.1 of the Fourth Quarter 2015 Groundwater Monitoring Report. The trend analysis performed is based upon groundwater monitoring data from 2009 through the fourth quarter of 2016 (as noted in Fourth Quarter 2015 Groundwater Monitoring Report). The referenced six wells in the north plume consist of MW-55/55R, MW-56/56R, MW-57/57R, MW-61/61R, MW-66 and MW-67/67R and the referenced three wells in the south plume consist of ITMW-6, ITMW-10 and MW-38.

The regression analysis performed for these subject nine wells concluded the following:

- The frequency of detection (FOD) (i.e. TCE concentration is non-detect or less than 5 µg/L more than 50% of the time) was too low for ITMW-6, MW-66, MW-67R and MW-55R; therefore, these wells were excluded from the analysis.
- MW-38 has exhibited a 50% decrease in TCE concentration since October 2014 due to ISCO; therefore, this well was excluded from the analysis (see response to Question 15).
- MW-61R currently exhibits a concentration below 5 µg/L due to in-situ chemical reduction (ISCR); therefore, this wells was excluded from the analysis.
- MW-56R was used to calculate the average degradation rate for the north plume. This well has a slope of -0.48.
- MW-57R and ITMW-10 exhibited increasing trends; therefore, these wells were excluded from the analysis (see response to Question 14 for further discussion of MW-57R).

In summary, only two wells were excluded from the regression analysis since they continue to exhibit increasing TCE concentration trends (as discussed above other wells were excluded either due to FOD or performance of in-situ chemical oxidation (ISCO) or ISCR which dramatically reduced concentrations at these locations). The predominant number of wells in the north and south plumes continue to exhibit stable to decreasing concentration trends.

As discussed in the Report, spatial variability exists in the data set including the data from ITMW-10. Due to the existing spatial variability and the limited ability to reproduce this variability in the groundwater model, a simplified approach was used by identifying an average regression slope (-0.15) for the south plume for use for the fate and

transport model (the basis and calculation of the average slope is discussed in the Report).

It should be noted that ITMW-10 is located south of the south end of the former manufacturing building and is located more than 600 feet north of the south property boundary while monitoring wells ITMW-6 and MW-189 are positioned between ITMW-10 and the south boundary. As noted in the Report regarding ITMW-10, additional rounds of sampling will help determine whether this trend is persistent and whether refinement of the southern plume model in the vicinity of this location is necessary. However, the overall validity of model is not jeopardized by the concentration trend of a single well. Of the 35 wells monitored in the south plume for the Mann Kendall statistical test, only the TCE concentration trend at ITMW-10 does not conform to the stable or decreasing TCE concentration trends identified for the south plume wells (the stability of ITMW-6 and MW-38 are discussed above).

QUESTION 10: *The calculated degradation rate constants are extremely low. With the large width to length ratios of the northern and southern plumes might not macro dispersion alone (given the heterogeneity of the Basal Transmissive Zone) account for the decrease in concentration as one moves down-gradient?*

RESPONSE: The degradation rate constants were calculated based upon site data for the specific wells that met the minimum criteria for regression analysis and modeling. Due to the spatial variability, the degradation rate constants for the north, south and source areas were conservatively selected from the respective range. For the North Plume, the degradation rate constants ranged from -0.02 to -0.48 and the average from this dataset was -0.15 and thus was selected as the degradation rate constant for the North Plume. For the South Plume, the data ranged from -0.02 to -0.40 and -0.15 was the selected as the degradation rate constant. The source area was -0.04 (average of ITMW-19 and MW-25; although, the slope of MW-25 is -0.67 if the data from November 2010 through May 2014 is evaluated, but selection of the -0.04 slope adds further conservatism to the regression analysis and subsequent fate and transport modeling). Higher degradation rates have been determined within the north and south plumes and the source area. As previously discussed, more conservative degradation rates were chosen to facilitate groundwater modeling (i.e. iteration process described in the Model Inputs submittal dated February 26, 2016).

The dispersion factors for both plumes were 10 feet along the flow path, 1 foot lateral to flow and 0.1 foot vertical (see response to Question 8). These are low values relative to the size of the plume, since limited spreading of the plume has been observed. Also, since groundwater velocities are low, dispersion is not expected to be significant. If dispersion values were increased in the model, the respective plumes would dissipate quicker (Attachment B), however significant plume dispersion has not been observed during the last 20+ years based upon monitoring data and groundwater gradients.

Macro dispersion may account for some decreases in concentration, but it is not the sole natural attenuation process occurring in the north, south or northeast plumes as

discussed in the responses to Questions 4 and 15, which discuss the evidence of biologic and abiotic degradation processes and the detection of breakdown constituents.

QUESTION 11: *What was the retardation coefficient for TCE used in the model? What was the soil organic carbon content value used to determine the retardation coefficient for the model? How was the soil organic carbon content determined?*

RESPONSE: Kd = foc* Koc = 2 mL/grams (g), also see attached model inputs for both the south and the north plume models (Attachment C).

QUESTION 12: *What were the soil organic carbon/water partitioning coefficients (Koc) used for the various chlorinated ethenes?*

RESPONSE: The model was only run for TCE.

Log Koc = 2.0 – published value [US Geological Survey (USGS) Description, Properties and Degradation of Selected Volatile Organic Compounds Detected in Ground Water — A Review of Selected Literature][1].
Koc = 100 mL/g

QUESTION 13: *The report regression trend analysis indicates an average slope of -0.15 µg/L-1 yr -1. This would result in a half-life of (t1/2 = LN(2)/slope) of 4.6 years not the 110 days used in the model. Please explain.*

RESPONSE: The average slope is calculated as the log of concentration over time. The log must be taken into account during the calculation. However the half-life of 110 days was not calculated from the formula discussed above, rather an iteration process was used during model calibration where potential half-life rates were entered into the model to achieve resulting future concentration trend slopes that approach the documented average degradation rate of -0.15 (slope from regression analysis). The best fit identified at MW-46R was a half-life rate of 110 days which produced a slope of -0.14.

QUESTION 14: *MW-46R used to calibrate the half-life of the Northern Plume is located at the edge of the plume. Why wasn't a well more on the center line of the plume such as MW-57R or MW-58R used to calibrate the half-life value for the Northern Plume?*

RESPONSE: Three wells are clustered near the center of the plume including MW-56R, MW-57R and MW-58R. MW-46R, MW-56R, MW-57R and MW-58R are located within of a radius of less than 200 feet. The regression analysis for these wells indicates:

- MW-46R exhibited a degradation slope of -0.11;
- MW-56R exhibited the highest degradation slope at -0.48;
- MW-57R exhibits an increasing concentration as discussed in Question 9; and
- MW-58R exhibits the lowest degradation slope at -0.02.

As shown above and discussed in the Report, spatial variability exists in the data set. Due to the existing spatial variability and the limited ability to reproduce this variability

[1] USGS Reston, VA 2006; This report is a Web-only publication: *http://pubs.usgs.gov/ofr/2006/1338/*.

in the groundwater model, a simplified approach was used by identifying a centrally located well (MW-46R) which exhibits close to the average regression slope (-0.15) (MW-46R is also outside of ISCO and ISCR influence areas). MW-46R was chosen as it more closely matches the generalized regression slope for the North Plume based upon the mean and histogram of the results of the regression analysis (see response to Question 13).

The best fit identified at MW-46R was a half-life rate of 110 days which produced a slope of -0.14 based upon modeled future data.

QUESTION 15: *MW-38 has the highest percentage of daughter products to parent TCE (max = 0.76, min = 0.33) and largest population of DHC of all the monitoring wells over the last two years; however, it also has an increasing trend in total chlorinated ethene concentration and total ethene molar mass. Additionally, the percentage of daughter products to parent TCE is decreasing as the concentration of TCE is increasing. How was this information incorporated into the model?*

RESPONSE: The trend analysis performed for groundwater concentrations from 2009 – 2015 for MW-38 is identified as increasing; however, the concentrations have been reduced by more than 50% since October 2014 (i.e. reduced from 6,750 µg/L – 6,970 µg/L to 2,740 µg/L). The percentage of cis-1,2-DCE compared to TCE in October 2014 was 12% and this percentage increased to 50% in October 2015.

To provide a more conservative model, any data which may have been influenced by ISCO or ISCR was not included in the regression analysis evaluation; therefore the effects of TCE reduction at MW-38 after October 2014 were not included in the degradation factor used in the model (i.e. those data were omitted from regression analysis for selection of the average degradation slope factor in the source area as well as from the subsequent iteration process to select the appropriate TCE half-life factor used for the fate and transport model).

MW-38 is located in the source area and a conservative degradation factor or -0.04 and TCE half-life of 300 days was determined as the appropriate factor based upon the iteration process of selecting the half-life factor (selected based upon analysis of ITMW-19 and MW-25 prior to ISCO).

QUESTION 16: *The transport model outcomes are reliant on the initial distribution of TCE. The surface of the shale appears to slope from the source area to underneath the manufacturing building. TCE introduced to the trench would have spread laterally as it seeped into the ground eventually reaching the shale basement rock and flowing down slope. Prior to ISCO treatments the TCE trend at MW-25 (well closest to the trench) displayed a stable TCE concentration trend. Although ISCO treatments have reduced the concentration of TCE in groundwater in the area immediately adjacent to the trench, the concentration and extend of TCE underneath the manufacturing building is unknown. How would extensive yet undefined TCE contamination underneath the manufacturing building affect the model results?*

RESPONSE: The slope of the shale surfaces marginally dips to the southeast beneath the northwest corner of the building with the lowest elevation occurring in the vicinity of MW-95 (elevation 443.5, Figure 2-4 in the Report) which is part of the southwest to northeast bedrock low beneath the northwest portion of the manufacturing building (see Figure 2-4 in the Report) that transitions into a trough trending west to east along Ingersoll Avenue, extending toward the Boys and Girls Club. Further southeast from this trough the elevation of the shale increases to 445 at DP-55.

The highest TCE concentrations have always been associated with wells outside the northwest corner of the building and the highest TCE concentrations continue to be present in wells outside of the building. MW-25 has historically exhibited the highest TCE concentrations. However, the TCE trend at MW-25 was decreasing prior to the ISCO treatments that commenced in May and October 2014 (see Figure 4-4 in the Two Year Technical Review Report) (Table 7 Temporal Trend Analysis for the 2014 Second Quarter Progress Report also indicates a decreasing TCE concentration trend for MW-25) (see discussion of regression analysis for MW-25 in response to Question 10).

The initial investigation beneath the building included MIP screening of soil and groundwater. The location exhibiting the highest electron capture device (ECD) response was M-69 [greater than 1 microvolt (µV) x 10^7]. Probe DP-14 was performed at M-69 to characterize soil and groundwater at this location. The groundwater grab sample collected at this location exhibited a TCE concentration of 17 milligrams per liter (mg/L) (soil concentrations in vadose zone soil ranged from 0.57 mg/kilograms (kg) to 0.63 mg/kg and the saturated soil TCE concentration was 1 mg/kg). Other MIP locations exhibiting noteworthy ECD responses included M-54, M-55 and M-100 and probes DP-54, DP-55 and DP-56 were performed adjacent to these MIP locations respectively. Vadose zone soil at DP-54 exhibited concentrations less than 50 micrograms per kilogram (µg/kg), at DP-56 the concentration was reported at the detection limit of 5 µg/kg and in DP-55 concentrations ranged from 0.39 mg/kg to 0.97 mg/kg; and TCE concentrations were 0.006 mg/kg and 0.03 mg/kg in saturated soil. The soil and groundwater data was collected from soil probes selected from MIP locations exhibiting an ECD response; therefore, the data collected from the soil probes provides a biased characterization beneath the building.

Subsequently MW-92, MW-93, MW-94 and MW-95 were installed south of Area 1 in October 2014 before ISCO was performed. These wells were constructed with well screens completed to the surface of the bedrock. The TCE concentrations in these wells were lower than the concentrations in MW-25 prior to ISCO and the current TCE concentrations in these wells remain below the TCE concentration in MW-25. Although TCE impact in groundwater has been characterized beneath the building, there is no indication that higher concentrations of TCE extend beneath the building based upon the assessment of the MW-25 and MW-92 through MW-95 installed south of Area 1.

In addition, the extent of the southern plume beyond the south end of the building has been monitored for 25 years (since January 1990).

The interior MIP data and corresponding soil probes for collection of soil and groundwater data, groundwater monitoring data from MW-25 and interior wells MW-92 through MW-95 and groundwater monitoring data south of the building, do not suggest that extensive TCE contamination exists beneath the building. Much of the groundwater monitoring data for the site has been considered in the model (data from select wells was excluded as a result of the regression analysis). The exclusion of data from select wells does not impact the outcome of the model; however, monitoring is planned to continue to confirm the validity of the model.

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Yours sincerely,

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Principal

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LIST OF ATTACHMENTS

Attachment A: Comparison of Calibrated Hydraulic Conductivities to Modeled Hydraulic Conductivities
Attachment B: Sensitivity Analysis on Dispersivity
Attachment C: Regression Analysis

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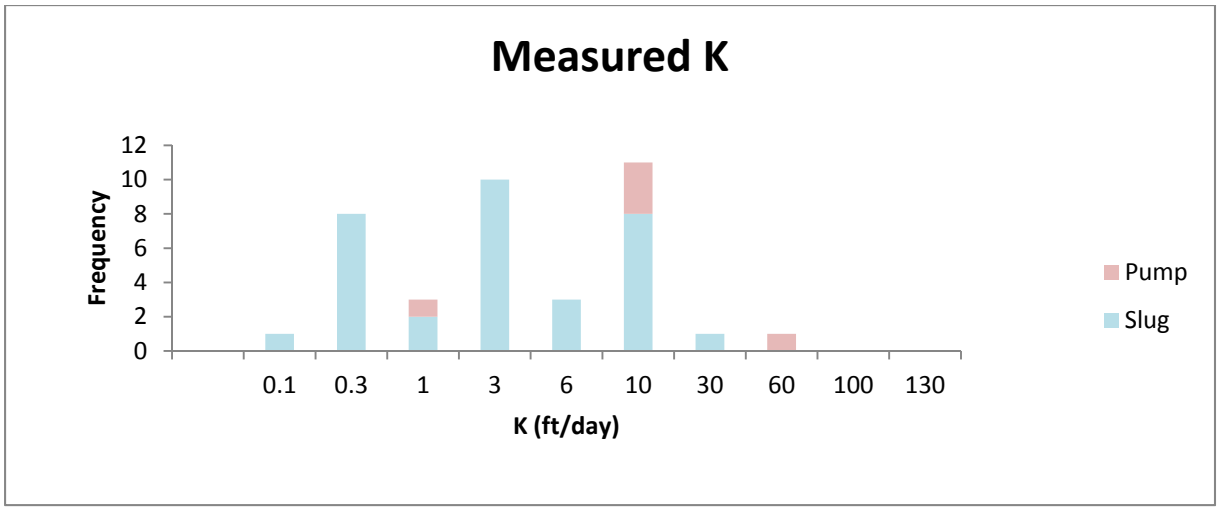
ATTACHMENT A

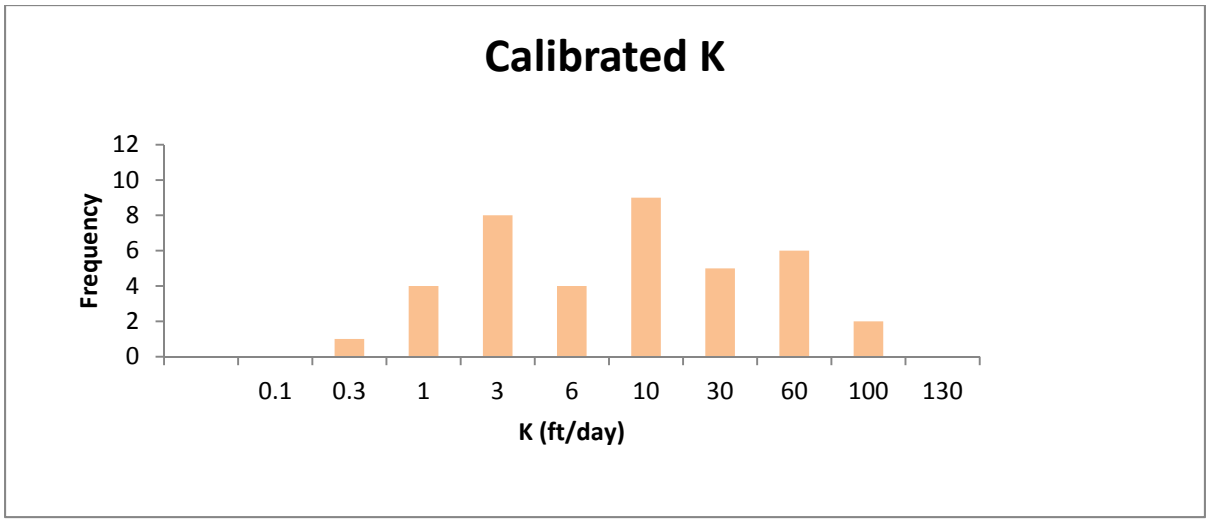
Comparison of Calibrated Hydraulic Conductivities to Modeled Hydraulic Conductivities

ATTACHMENT A
COMPARISON OF CALIBRATED VERSUS MODELED HYDRAULIC CONDUCTIVITY
Whirlpool Facility - Fort Smith, Arkansas

The hydraulic conductivity (K) values for the Basal Transmissive Zone (BTZ) resulting from the pilot points calibrations of the North and South Plume models were compared against the measured values from aquifer tests conducted at the site. Measured K values have been primarily obtained from slug tests, however pumping test results are available for seven locations. For wells with K values estimated from both slug and pumping tests, the pumping test results were preferred for this evaluation, because they are more characteristic of a larger area of the aquifer, whereas a slug test only characterizes the region within a few feet of the well screen.

Most of the calibrated values derived from the calibration were within an order of magnitude of the measured K values. The plots below show the frequency distributions of K values (in log scale) from field measurements and from the pilot points calibration (for the set of wells with aquifer test data).





Whirlpool Site - Fort Smith, AR
Hydraulic Conductivity Testing

Year	Location		Results		Method	Source
	Well/Point ID	Flow Regime	cm/sec	ft/day		
2015	TMW-10	Northern (Brazil Ave)	1.76E-04	0.5	ST	Ramboll Environ 2015
2015	TMW-11	Northern (Brazil Ave)	2.50E-04	0.7	ST	Ramboll Environ 2015
2015	MW-193	Northern (N of Brazil & Jenny Lind)	8.90E-05	0.3	ST	Ramboll Environ 2015
2015	MW-184	Northeastern	1.70E-04	0.5	ST	Ramboll Environ 2015
2015	MW-188	Southern	1.40E-03	4.0	ST	Ramboll Environ 2015
2015	MW-189	Southern	1.40E-03	4.0	ST	Ramboll Environ 2015
2015	MW-186	Southern	3.00E-04	0.9	ST	Ramboll Environ 2014
2014	Slug-06	Southeast of Source	8.80E-04	2.5	PN	Ramboll Environ 2014
2014	Slug-08	Southeast of Source	3.50E-04	1.0	PN	Ramboll Environ 2014
2014	Slug-09	Southern (Beneath building)	3.40E-05	0.1	PN	Ramboll Environ 2014
2014	Slug-10	Southern (Beneath building)	8.80E-05	0.2	PN	Ramboll Environ 2014
2010	MW-70[1]	Northern (North of Jacob Ave)	5.30E-03	15.0	PT	ERM Interim Measures Status Report 2010
2010	MW-71[1]	Northern	8.10E-03	23.0	PT	ERM Interim Measures Status Report 2010
2006	MW-65	Northern (North of Ingersoll Ave)	3.30E-02	93.5	PT	ERM Corrective Action Strategy Work Plan Addendum 2006
1999	ITMW-1	Southern	5.18E-03	14.7	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-2	Southern	1.58E-03	4.5	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-3	Southern	2.07E-03	5.9	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-4	Southern	7.62E-03	21.6	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-5	Southern	1.19E-03	3.4	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-6	Southern	5.18E-03	14.7	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-7	Southern	9.45E-04	2.7	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-9	Southern	1.58E-03	4.5	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-10	Southern	2.35E-03	6.7	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-11	Southern	4.27E-03	12.1	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-12	Southern	1.77E-03	5.0	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-13	Southern	9.75E-04	2.8	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-14	Southern	2.83E-04	0.8	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-15	Southern	2.35E-03	6.7	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-16	Southern	2.29E-03	6.5	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-17	Southern	1.01E-02	28.5	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-18	Southern	1.73E-03	4.9	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-19	Southern	5.18E-04	1.5	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-20	Southern	1.71E-04	0.5	ST	ERM Supplemental Site Investigation, 2000
1999	ITMW-21	Southern	3.02E-04	0.9	ST	ERM Supplemental Site Investigation, 2000
1999	MW-22	Northeastern	1.83E-03	5.2	ST	ERM Supplemental Site Investigation, 2000
1999	MW-23	Southern	1.52E-03	4.3	ST	ERM Supplemental Site Investigation, 2000
1999	MW-24	Southern	6.40E-03	18.1	ST	ERM Supplemental Site Investigation, 2000
1999	MW-25	Southern	1.16E-03	3.3	ST	ERM Supplemental Site Investigation, 2000
1999	MW-26	Southern	2.10E-03	6.0	ST	ERM Supplemental Site Investigation, 2000
2000	MW-27	Southern	4.57E-03	13.0	ST	ERM Supplemental Site Investigation, 2000
2000	MW-28	Southern	1.25E-02	35.4	ST	ERM Supplemental Site Investigation, 2000
2000	MW-29	Southern	3.96E-03	11.2	ST	ERM Supplemental Site Investigation, 2000
2000	MW-30	Southern	4.27E-03	12.1	ST	ERM Supplemental Site Investigation, 2000
1997	ITMW-6	Southern	7.40E-03	21.0	ST	Malcolm Pirnie Supplemental Site Investigation, 1997
1997	ITMW-11[2]	Southern	4.60E-03	13.0	PT	Malcolm Pirnie Supplemental Site Investigation, 1997
1997	ITMW-12[2]	Southern			PT	Malcolm Pirnie Supplemental Site Investigation, 1997
1997	ITMW-13[2]	Southern			PT	Malcolm Pirnie Supplemental Site Investigation, 1997
1990	ITMW-2	Southern	4.12E-04	1.2	ST	IT Site Investigation of North and South Storage Tank Areas, 1990
1990	ITMW-3	Southern	7.10E-04	2.0	ST	IT Site Investigation of North and South Storage Tank Areas, 1990
1990	ITMW-6	Southern	2.54E-03	7.2	ST	IT Site Investigation of North and South Storage Tank Areas, 1990

Min	3.40E-05	0.1
Max	3.30E-02	93.5
Mean	3.29E-03	9.3

PT = Pumping Test
ST = Slug Test
PN = Pneumatic Slug Test through Geoprobe rods with pullback screen

[1] - Primary observation well used during pump test performed at RW-69.

[2] - average hydraulic conductivity reported for ITMW-11,12,13 Malcom Pirnie, 1997

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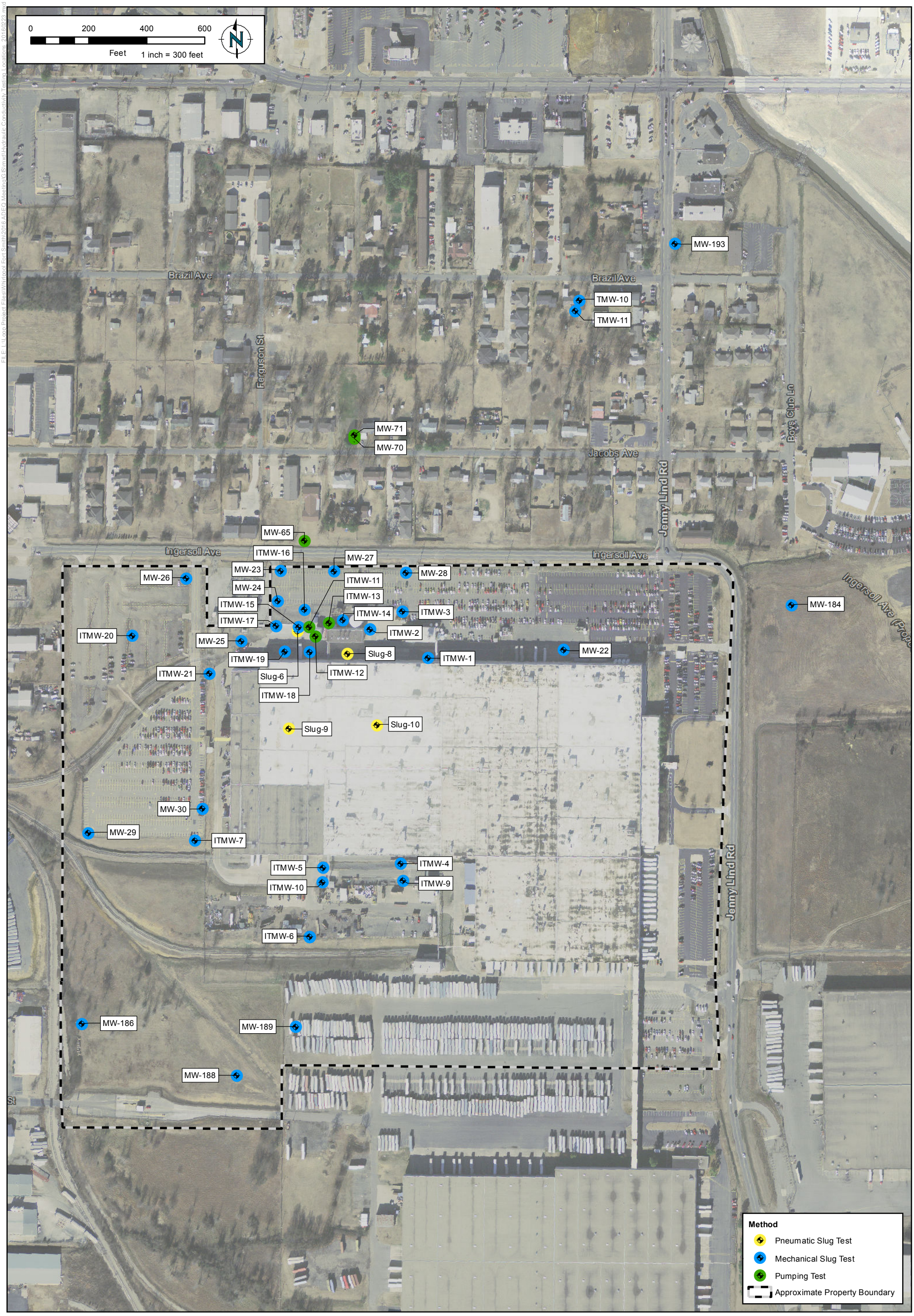

RAMBOLL ENVIRON

HYDRAULIC CONDUCTIVITY TESTING LOCATIONS

Whirlpool Facility - Fort Smith, Arkansas

Figure 1

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RAMBOLL ENVIRON

ATTACHMENT B
Sensitivity Analysis on Dispersivity

ATTACHMENT B
SENSITIVITY ANALYSIS ON DISPERSIVITY
Whirlpool Facility - Fort Smith, Arkansas

The sensitivity of model outcomes to dispersivity was evaluated by running two additional scenarios:

- a zero dispersivity case (low); and
- a 10X dispersivity case (high).

The 10x dispersivity case represents typical settings for dispersivity, where longitudinal, lateral and vertical dispersivities are set to 10, 1, and 0.1% of the plume length, respectively.

North Model Results

	Low	Current	High
Dispersivity (long/lat/vert)	0/0/0	10/1/0.1	100/1/0.1
Cleanup Time (years)	34	33	32
Cleanup Year (Q4)	2049	2048	2047

For the high dispersivity case, a regression line was fit to the simulated output at MW-46R and the slope was compared to the current case. All other parameters including TCE reaction rate were kept constant. The degradation rate slope at MW-46R in the high dispersivity case remains -0.14 (slight increase prior to rounding from -0.139 to -0.144), so the existing TCE reaction rate setting remains appropriate to represent the historical attenuation rate for the plume. The cleanup time in the high dispersivity case becomes slightly shorter. The results for the zero dispersivity case are virtually identical to the current results.

South Model Results

	Low	Current	High
Dispersivity (long/lat/vert)	0/0/0	10/1/0.1	100/1/0.1
Max Off-Site Value (ug/l)	0.9	1.0	2.5
Peak Year	2031	2042	2036

For the high dispersivity case, a regression line was fit to the simulated output for at ITMW-7 and the slope was compared to the current case. All other parameters including TCE reaction rate were kept constant. The degradation rate slope at ITMW-7 in the high dispersivity case was -0.07, compared to the current case of -0.15. This suggests using the higher dispersivity values would necessitate increasing the TCE reaction rate (i.e. lowering the half-life) for the model output to match the average historical trend for the tail of the plume. Even without making this adjustment to the model, which would accelerate TCE removal from the model domain, the model does not predict TCE exceeding the MCL beyond the property line. The results for the zero dispersivity case also show no offsite exceedance of the MCL.

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ATTACHMENT C
Regression Analysis

APPENDIX E

Regression Analysis

Groundwater sample results for trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) at individual monitoring wells located in the northern plume and southern plume were used to evaluate the attenuation of these constituents. A stepwise approach was used as follows:

- The concentrations of TCE, cis-1,2-DCE and VC in each individual well from historic sampling events through the fourth quarter 2015 were compiled for this evaluation (the TCE data is provided in the Appendix and the cis-1,2-DCE and VC data are provided in Appendix D).
- A specific maximum detection limit was set for the analytes at each well based on the analyte's highest recorded detection limit historically recorded at that well. A consistent detection limit is required for all samples to obtain a valid regression analysis.
- Chemical concentrations that were recorded as non-detect or were detected at lower than one-half of the specific maximum detection limit were modified to the one-half the specific maximum detection limit value.
- These values, the associated sample dates, and the frequency of detection (FOD) were entered into a monitored natural attenuation (MNA) spreadsheet for each individual well that automated the regression calculations.
- The regression model for each constituent was not calculated if the FOD for that constituent was below 50%.
- The regression of log transformed concentration data was used to calculate the slope, determine if the slope was significantly different from zero, and determine regression residuals (difference in concentrations comparing the actual data with the predicted concentration from the trend line see the concentration trend charts and the respective residual graphs for specific wells in the individual well analyses section).

The output of this evaluation includes a regression line, an estimate of the slope, and a residual graph of the three analytes for each well (TCE, cis-1,2-DCE and VC). The regression was used to determine if the trend at the well being evaluated for a particular chemical of interest is increasing, not significant, or decreasing. The residual graphs from the regression were evaluated to verify if the modeled values fit the measured data at each well and meet the statistical assumptions of linear regression. The regression residuals from valid models produced residuals plots with random deviations from the measured values, homogenous variances, and no temporal trends in the residuals (regression residuals consist of the difference between the actual concentration and the predicted concentration from the trend line, and the results of this comparison are provided on the residual graphs). Poor, or invalid models present residual plots with systematic or structured regression residuals[1].

Wells that show impacts from the ISCO or ISCR injections were further assessed by excluding data from sampling events after the injections to address the likelihood that degradation rates

[1] If the residual data points in the residual graph are randomly dispersed in the graph, a linear regression model is appropriate; otherwise, a non-linear model is more appropriate.

are temporarily enhanced by ISCO and ISCR treatment and therefore result in inaccurate estimates of the baseline rate of reduction. This adds a measure of conservatism to the model in that Site data with faster degradation rates are not included in this analysis. Data from some wells were further refined by determining the maximum historic concentration of a respective analyte and only including data from that specific sampling event forward to provide a more valid estimate of current degradation rates.

The goal of this regression analysis and the associated refinements was to estimate slopes that characterize the 'average or representative' rate of reduction in the concentrations so that the representative slope can be used to determine a TCE degradation rate constant or half-life. The refinements are designed to target the time period that will best reflect current conditions and to limit the influence of the ISCO injections and other transient processes that confound the estimate.

The historical contaminant concentration trends at a given location are a function of various factors: groundwater velocity, flow direction, retardation, concentration distribution, reaction rates, etc. For the MNA analysis, the regression lines were fit to measured Site data and the slopes reflect the combined influence of all these Site-specific factors. The data evaluated for each well, plots of the data points, fitted line, regression residuals for each line, calculated slope, and a short description of the results were compiled and are included in this appendix on a well by well basis. The slopes used to calculate the northern and southern plume degradation rates are discussed below.

Northern Plume Degradation Rate:

To represent the overall representative TCE degradation rate for the North Plume, the regression slope values for wells in the North Plume with declining concentration trends were averaged resulting in an average value of -0.15. The slope values used for this calculation are shown below:

Location	Slope [a]
MW-23	-0.13
MW-24	-0.08
MW-32	-0.13
MW-33	-0.08
MW-34	-0.03
MW-35R	-0.15
MW-41	-0.14
MW-46R	-0.11
MW-56	-0.48
MW-58	-0.06
MW-65	-0.16

RW-69	-0.09
MW-70	-0.16
IW-73	-0.27
IW-74	-0.02
IW-76	-0.28
IW-78	-0.21
IW-79	-0.10
IW-80	-0.11
Max	-0.48
Min	-0.02
Average	**-0.15**

[a] Slopes in units of ln(µg/l)/year

Southern Plume Degradation Rate:

For evaluation of the South Plume, the plume extent was divided into two regions - one region encompassing the source area where ISCO treatment was performed consisting of monitoring wells ITMW-11 to ITMW-15, ITMW-18, ITMW-19 and MW-25, and one region covering the remainder of the plume. The regression trends near the source area were temporally variable and difficult to generalize as a result of ISCO treatments and/or highly variable monitoring results prior to ISCO treatment. The long term data trends at MW-25 and ITMW-19 prior to ISCO treatments (both slopes of -0.04) were selected as representative of the source area[2] (decreasing concentrations for MW-25 and ITMW-19 are also depicted on Figure 4-4).

Since there are few downgradient wells near the tail of the plume with histories of detected values or long-term data records, the model concentration trends were set to not exceed the average of predicted degradation rates at downgradient wells ITMW-4, 5, 7, 9 and MW-30, listed below. The average of these rates based on regression trends using all data, or maximum refined analysis interpretation where applicable, produced a regression slope of -0.15, equal to the North Plume average.

Location	Slope [a]
ITMW-4	-0.11

[2] The regression analysis for MW-25 indicates a slope of -0.04 for the data from February 1999 through May 2014 (i.e. prior to ISCO at this location), and this is the slope used for comparison for selection of the TCE biodegradation half-life value for fate and transport modeling. MW-25 was also assessed by selecting a maximum historic concentration (i.e. 270 mg/L in November 2010) followed by performance of regression analysis for the data set from November 2010 through May 2014 which produced a regression slope of -0.67 indicating a more significant rate of degradation in the source area prior to ISCO. However, this “concentration peak” at MW-25 is not distinctive and did not represent a significant change above the trend line; and therefore, the data may not have represented a real peak and could have been the result of natural variation. The more conservative regression analysis and assessment of residuals considering the February 1999 through May 2014 data set has been utilized for regression analysis and subsequent fate and transport modeling.

ITMW-5	-0.05
ITMW-7	-0.40
ITMW-9	-0.19
MW-30	-0.02
Average	**-0.15**

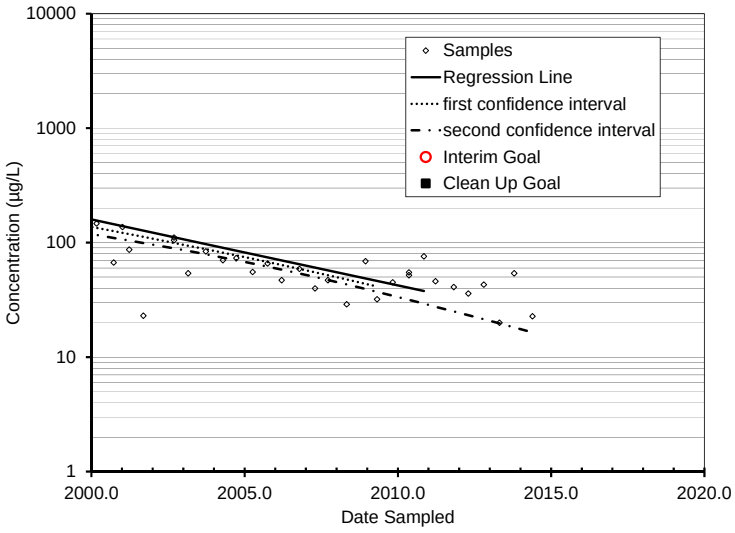
[a] Slopes in units of ln(µg/l)/year

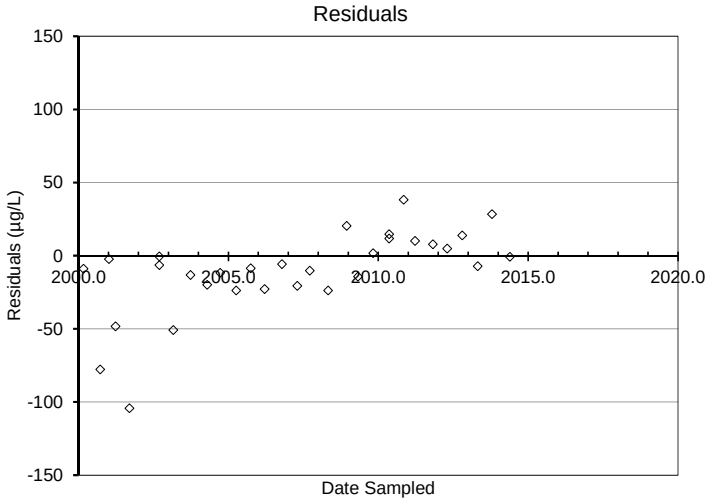
Individual Well Analyses

North Plume, Well MW-23

Date	Value	Included in Regression
12/1/1996	210	Yes
5/1/1997	2400	Yes
2/1/1999	350	Yes
2/1/1999	440	Yes
3/1/2000	147	Yes
9/21/2000	67	Yes
1/5/2001	137	Yes
3/26/2001	87	Yes
9/11/2001	23	Yes
9/11/2002	111	Yes
9/11/2002	105	Yes
2/27/2003	54	Yes
9/25/2003	83.9	Yes
4/15/2004	70.3	Yes
9/22/2004	73.4	Yes
4/5/2005	55.5	Yes
9/29/2005	65.8	Yes
3/17/2006	47.1	Yes
10/14/2006	59	Yes
4/19/2007	39.9	Yes
9/19/2007	47	Yes
4/29/2008	29	Yes
12/10/2008	69	Yes
4/27/2009	32	Yes
10/29/2009	45	Yes
5/12/2010	55	Yes
5/12/2010	52	Yes
11/5/2010	76	Yes
3/23/2011	46	Yes
10/27/2011	41	Yes
4/18/2012	36	Yes
10/19/2012	43	Yes
4/25/2013	20	Yes
10/16/2013	54	Yes
5/22/2014	22.8	Yes
7/8/2014	27.8	*No*
9/12/2014	62.1	*No*
10/23/2014	189	*No*
1/15/2015	115	*No*
4/14/2015	57.5	*No*
7/23/2015	37.8	*No*
10/8/2015	0.65	*No*

North Plume, Well MW-23
Date Range: 12/1/1996 to 5/22/2014 (ISCO Impacts Excluded)



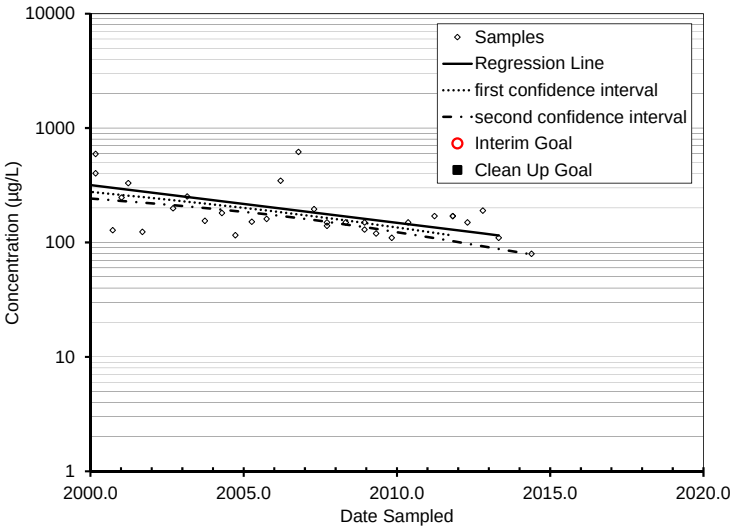


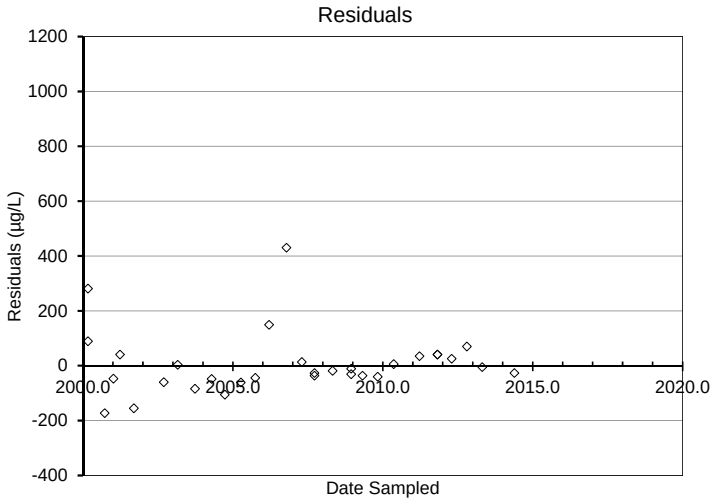
FOD 100%
Slope -0.13
p-value < 0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-24

Date	Value	Included in Regression
2/1/1999	1400	**Yes**
3/1/2000	403	**Yes**
3/1/2000	595	**Yes**
9/21/2000	128	**Yes**
1/5/2001	247	**Yes**
3/26/2001	330	**Yes**
9/11/2001	124	**Yes**
9/11/2002	199	**Yes**
2/27/2003	253	**Yes**
9/25/2003	155	**Yes**
4/15/2004	181	**Yes**
9/23/2004	116	**Yes**
4/6/2005	152	**Yes**
9/29/2005	161	**Yes**
3/16/2006	347	**Yes**
10/14/2006	620	**Yes**
4/19/2007	196	**Yes**
9/20/2007	140	**Yes**
9/20/2007	150	**Yes**
4/29/2008	150	**Yes**
12/10/2008	150	**Yes**
12/10/2008	130	**Yes**
4/27/2009	120	**Yes**
10/29/2009	110	**Yes**
5/12/2010	150	**Yes**
3/23/2011	170	**Yes**
10/27/2011	170	**Yes**
10/27/2011	170	**Yes**
4/18/2012	150	**Yes**
10/19/2012	190	**Yes**
4/25/2013	110	**Yes**
5/22/2014	79.7	**Yes**
7/8/2014	102	***No***
9/12/2014	55.7	***No***
10/23/2014	33.1	***No***
1/15/2015	26.9	***No***
4/16/2015	18.8	***No***
7/23/2015	**178**	***No***
10/8/2015	**44.1**	***No***

North Plume, Well MW-24
Date Range: 2/2/1999 to 5/22/2014 (ISCO Impacts Excluded)



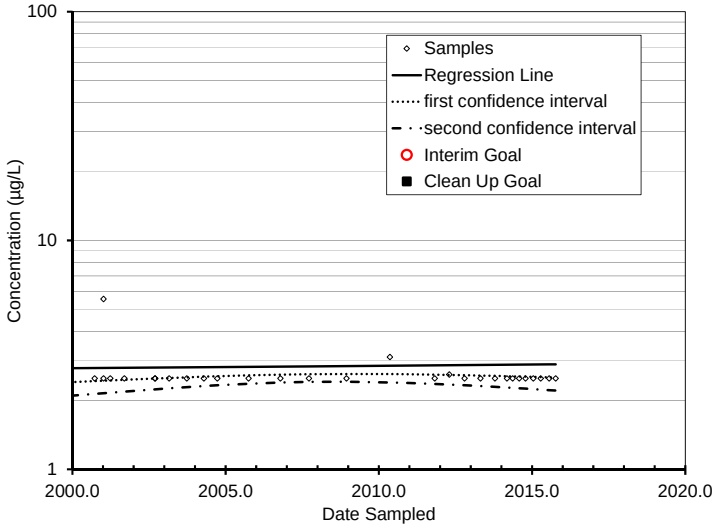


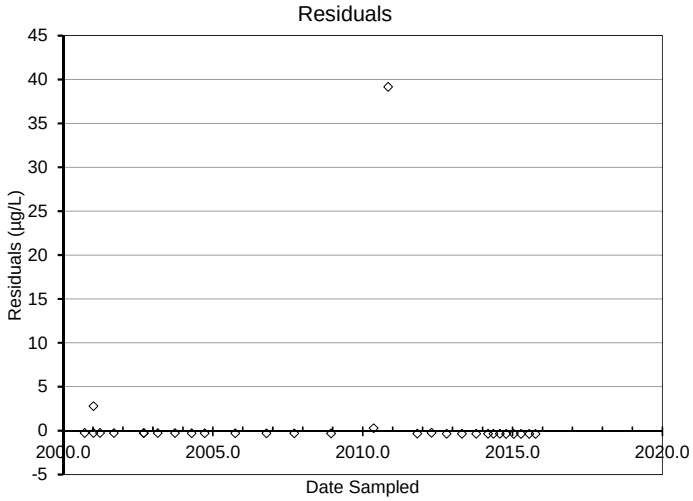
FOD 100%
Slope -0.076
p-value < 0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-27

Date	Value	Included in Regression
12/7/1999	2.5	Yes
12/9/1999	2.5	Yes
9/21/2000	2.5	Yes
1/5/2001	2.5	Yes
1/5/2001	5.55	Yes
3/26/2001	2.5	Yes
9/11/2001	2.5	Yes
9/11/2002	2.5	Yes
9/11/2002	2.5	Yes
2/27/2003	2.5	Yes
9/25/2003	2.5	Yes
4/15/2004	2.5	Yes
9/22/2004	2.5	Yes
9/29/2005	2.5	Yes
10/14/2006	2.5	Yes
9/19/2007	2.5	Yes
12/10/2008	2.5	Yes
5/12/2010	3.1	Yes
11/5/2010	42	Yes
10/27/2011	2.5	Yes
4/18/2012	2.6	Yes
10/18/2012	2.5	Yes
4/24/2013	2.5	Yes
10/15/2013	2.5	Yes
3/7/2014	2.5	Yes
5/13/2014	2.5	Yes
7/30/2014	2.5	Yes
10/14/2014	2.5	Yes
1/14/2015	2.5	Yes
4/13/2015	2.5	Yes
7/22/2015	**2.5**	Yes
10/7/2015	**2.5**	Yes

North Plume, Well MW-27
Date Range: 12/7/1999 to 10/7/2015



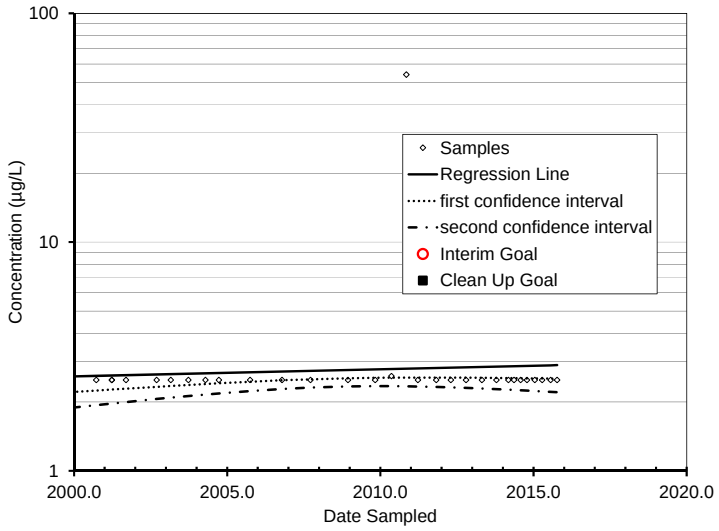


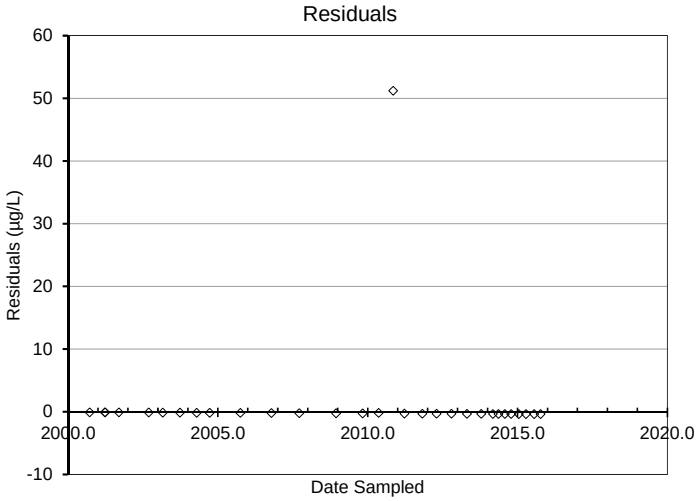
FOD 30%
Slope not calculated
p-value not calculated
Regression not calculated due to low FOD (< 50%)

North Plume, Well MW-28

Date	Value	Included in Regression
12/9/1999	2.5	Yes
12/9/1999	2.5	Yes
9/21/2000	2.5	Yes
3/27/2001	2.5	Yes
3/27/2001	2.5	Yes
9/11/2001	2.5	Yes
9/11/2002	2.5	Yes
2/27/2003	2.5	Yes
9/25/2003	2.5	Yes
4/15/2004	2.5	Yes
9/22/2004	2.5	Yes
9/30/2005	2.5	Yes
10/14/2006	2.5	Yes
9/19/2007	2.5	Yes
12/10/2008	2.5	Yes
10/29/2009	2.5	Yes
5/12/2010	2.6	Yes
11/5/2010	54	Yes
3/23/2011	2.5	Yes
10/27/2011	2.5	Yes
4/19/2012	2.5	Yes
10/17/2012	2.5	Yes
4/24/2013	2.5	Yes
10/15/2013	2.5	Yes
3/6/2014	2.5	Yes
5/13/2014	2.5	Yes
7/30/2014	2.5	Yes
10/14/2014	2.5	Yes
1/14/2015	2.5	Yes
4/13/2015	2.5	Yes
7/22/2015	2.5	Yes
10/7/2015	2.5	Yes

North Plume, Well MW-28
Date Range: 12/9/1999 to 10/7/2015



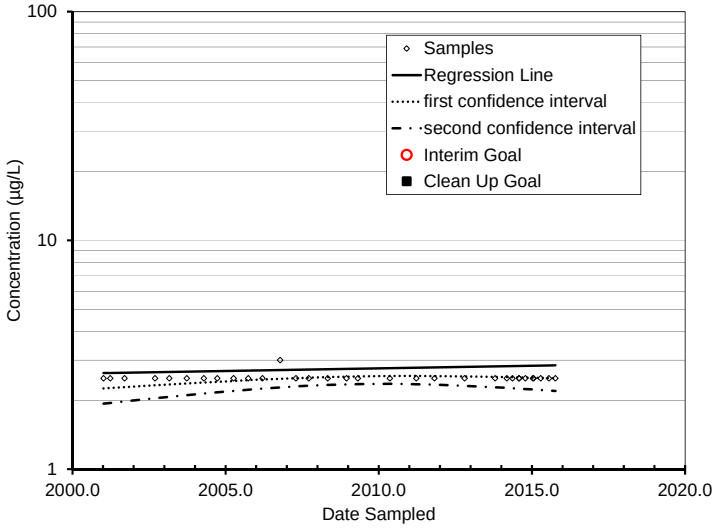


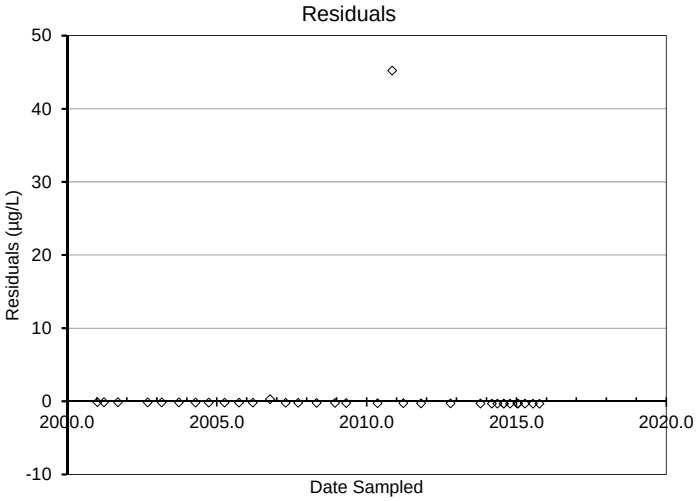
FOD=13%
Slope not calculated due to low FOD
p-value = Not calculated
Regression not calculated due to low FOD (< 50%)

North Plume, Well MW-31

Date	Value	Included in Regression
1/5/2001	2.5	Yes
3/26/2001	2.5	Yes
9/13/2001	2.5	Yes
9/11/2002	2.5	Yes
2/28/2003	2.5	Yes
9/25/2003	2.5	Yes
4/15/2004	2.5	Yes
9/23/2004	2.5	Yes
4/5/2005	2.5	Yes
9/27/2005	2.5	Yes
3/15/2006	2.5	Yes
10/11/2006	3	Yes
4/19/2007	2.5	Yes
9/18/2007	2.5	Yes
4/30/2008	2.5	Yes
12/11/2008	2.5	Yes
4/25/2009	2.5	Yes
5/12/2010	2.5	Yes
11/7/2010	48	Yes
3/23/2011	2.5	Yes
10/26/2011	2.5	Yes
10/19/2012	2.5	Yes
10/18/2013	2.5	Yes
3/6/2014	2.5	Yes
5/13/2014	2.5	Yes
7/30/2014	2.5	Yes
7/30/2014	2.5	Yes
10/14/2014	2.5	Yes
1/12/2015	2.5	Yes
1/19/2015	2.5	Yes
4/14/2015	2.5	Yes
7/21/2015	2.5	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-31
Date Range: 1/5/2001 to 10/6/2015



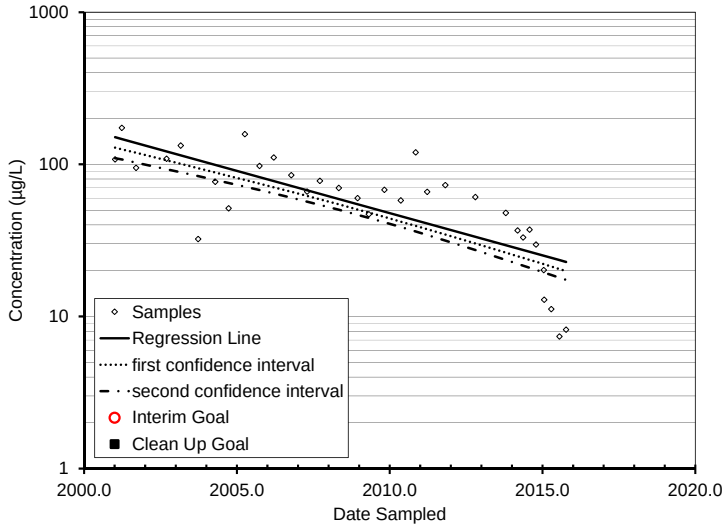


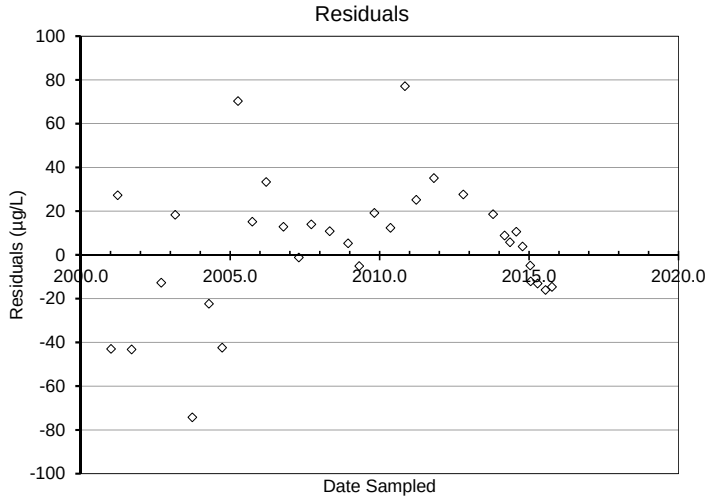
FOD= 9%
Slope not calculated
p-value not calculated
Regression not calculated due to low FOD (< 50%)

North Plume, Well MW-32

Date	Value	Included in Regression
1/5/2001	108	Yes
3/27/2001	174	Yes
9/13/2001	95	Yes
9/11/2002	109	Yes
2/28/2003	133	Yes
9/25/2003	32.3	Yes
4/15/2004	76.9	Yes
9/23/2004	51.4	Yes
4/5/2005	158	Yes
9/27/2005	97.6	Yes
3/15/2006	111	Yes
10/12/2006	85	Yes
4/19/2007	66.3	Yes
9/18/2007	78	Yes
4/30/2008	70	Yes
12/11/2008	60	Yes
4/25/2009	47	Yes
10/28/2009	68	Yes
5/12/2010	58	Yes
11/6/2010	120	Yes
3/24/2011	66	Yes
10/26/2011	73	Yes
10/19/2012	61	Yes
10/18/2013	48	Yes
3/8/2014	36.8	Yes
5/13/2014	33.1	Yes
7/29/2014	37.2	Yes
10/14/2014	29.7	Yes
1/14/2015	20.2	Yes
1/19/2015	12.9	Yes
4/15/2015	11.2	Yes
7/11/2015	7.4	Yes
10/7/2015	8.2	Yes

North Plume, Well MW-32
Date Range: 1/5/2001 to 10/7/2015



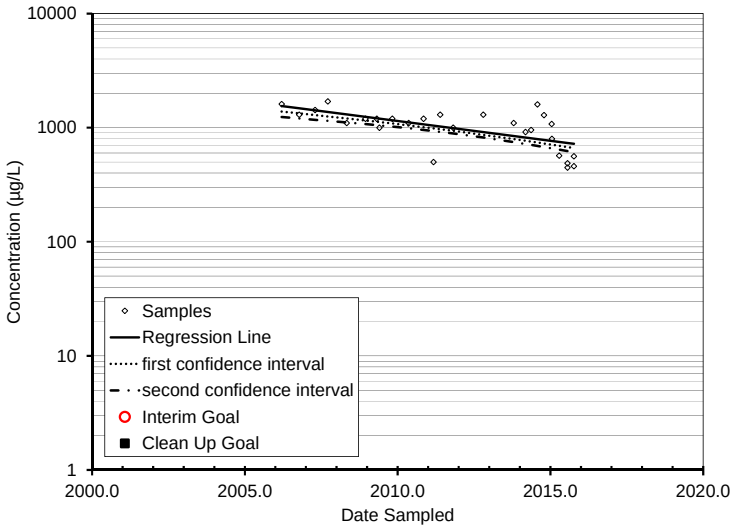


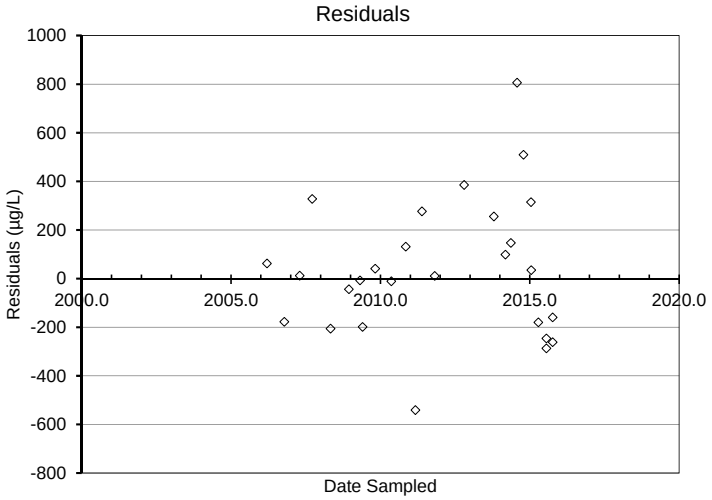
FOD 100%
Slope -0.13
p-value < 0.001
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-33

Date	Value	Included in Regression
1/5/2001	120	No
3/27/2001	260	No
9/13/2001	310	No
9/11/2002	450	No
2/28/2003	274	No
9/25/2003	198	No
4/15/2004	871	No
9/23/2004	798	No
4/5/2005	1430	No
9/27/2005	1030	No
3/15/2006	1610	Yes
10/12/2006	1300	Yes
4/19/2007	1430	Yes
9/18/2007	1700	Yes
4/30/2008	1100	Yes
12/11/2008	1200	Yes
4/25/2009	1200	Yes
5/27/2009	1000	Yes
10/28/2009	1200	Yes
5/12/2010	1100	Yes
11/6/2010	1200	Yes
3/4/2011	500	Yes
5/23/2011	1300	Yes
10/26/2011	1000	Yes
10/19/2012	1300	Yes
10/18/2013	1100	Yes
3/8/2014	918	Yes
5/14/2014	954	Yes
7/29/2014	1600	Yes
10/15/2014	1290	Yes
1/14/2015	1080	Yes
1/18/2015	799	Yes
4/15/2015	570	Yes
7/22/2015	447	Yes
7/22/2015	488	Yes
10/8/2015	562	Yes
10/8/2015	460	Yes

North Plume, Well MW-33
Date Range: 3/15/2006 to 10/8/2015



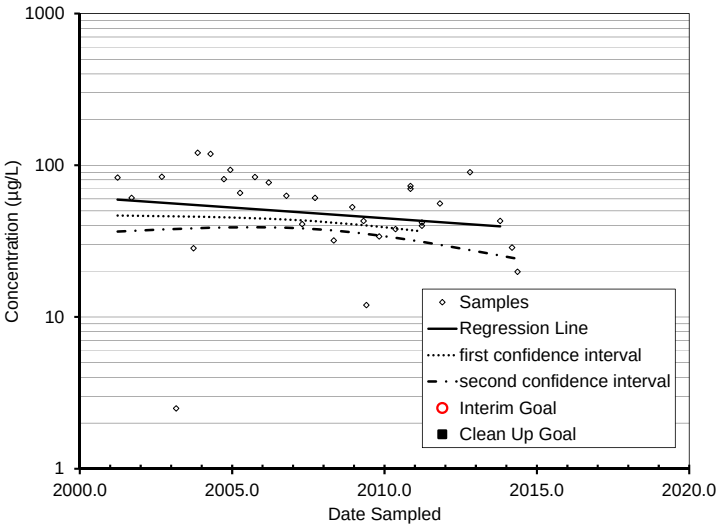


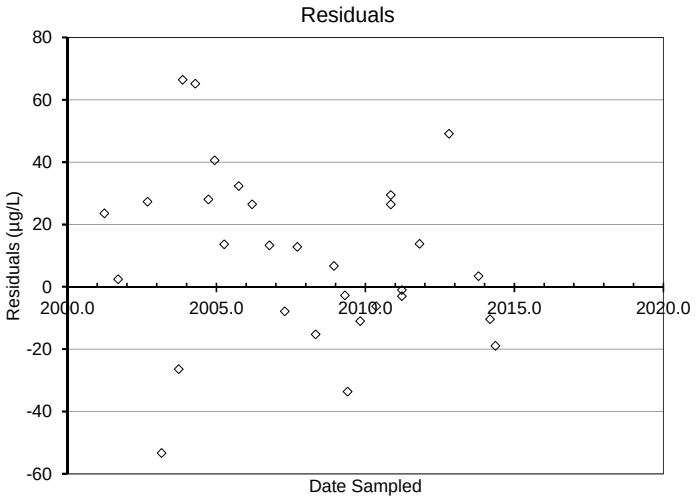
FOD 100%
Slope -0.08
p-value < 0.001
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-34

Date	Value	Included in Regression
3/28/2001	83	Yes
9/13/2001	61	Yes
9/9/2002	84	Yes
2/28/2003	2.5	Yes
9/25/2003	28.4	Yes
11/14/2003	121	Yes
4/15/2004	119	Yes
9/23/2004	81.1	Yes
12/9/2004	93.3	Yes
4/5/2005	65.8	Yes
9/30/2005	83.7	Yes
3/14/2006	77.1	Yes
10/11/2006	63	Yes
4/18/2007	41	Yes
9/19/2007	61	Yes
4/30/2008	32	Yes
12/10/2008	53	Yes
4/24/2009	43	Yes
5/27/2009	12	Yes
10/28/2009	34	Yes
5/12/2010	38	Yes
11/7/2010	70	Yes
11/7/2010	73	Yes
3/24/2011	40	Yes
3/24/2011	42	Yes
10/26/2011	56	Yes
10/20/2012	90	Yes
10/17/2013	43	Yes
3/8/2014	28.7	Yes
5/13/2014	19.9	Yes
7/29/2014	78.2	No
10/15/2014	47.7	No
1/13/2015	22	No
4/14/2015	13.8	No
7/21/2015	3.5	No
10/8/2015	4.5	No

North Plume, Well MW-34
Date Range: 3/28/2001 to 5/13/2014



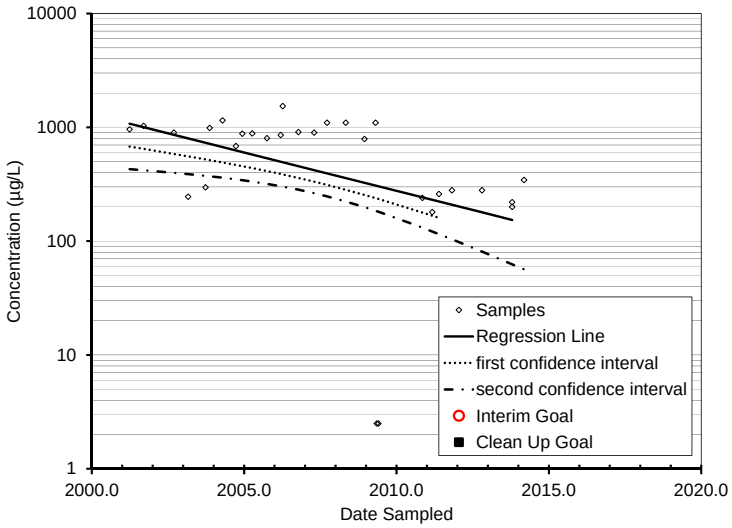


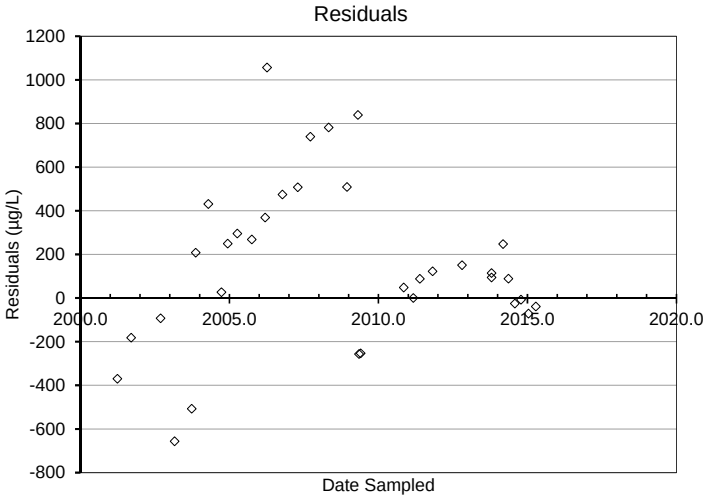
FOD 97%
Slope -0.032
p-value > 0.05
Slope is not significant
Residuals are acceptable
Slope used to estimate degradation rate

North Plume, Well MW-35R

Date	Value	Included in Regression
3/28/2001	960	Yes
9/13/2001	1030	Yes
9/9/2002	900	Yes
2/28/2003	246	Yes
9/25/2003	297	Yes
11/14/2003	990	Yes
4/15/2004	1150	Yes
9/23/2004	685	Yes
12/9/2004	880	Yes
4/6/2005	886	Yes
9/30/2005	804	Yes
3/14/2006	858	Yes
4/6/2006	1540	Yes
10/11/2006	910	Yes
4/18/2007	900	Yes
9/19/2007	1100	Yes
4/30/2008	1100	Yes
12/11/2008	790	Yes
4/24/2009	1100	Yes
5/7/2009	2.5	Yes
5/27/2009	2.5	Yes
11/5/2010	240	Yes
3/4/2011	180	Yes
5/23/2011	260	Yes
10/25/2011	280	Yes
10/20/2012	280	Yes
10/17/2013	200	Yes
10/17/2013	220	Yes
3/8/2014	345	Yes
5/13/2014	183	No
7/30/2014	64.7	No
10/14/2014	79.2	No
1/13/2015	10.9	No
4/14/2015	39.5	No
7/21/2015	33.7	No
10/7/2015	15.4	No

North Plume, Well MW-35R
Date Range: 3/28/2001 to 3/8/2014



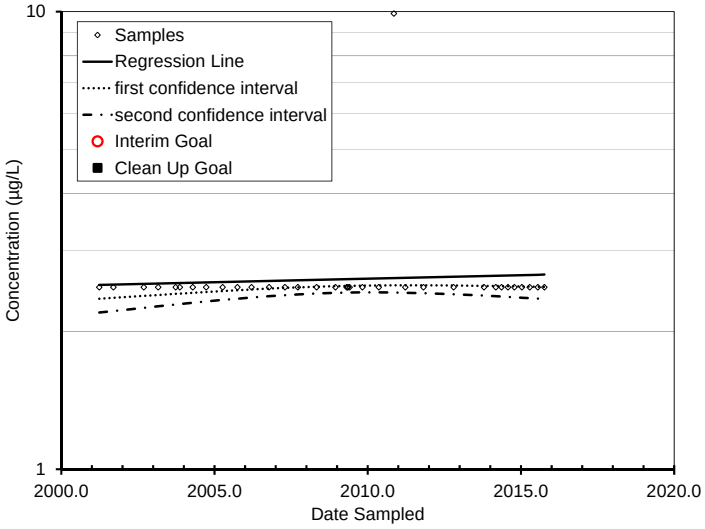


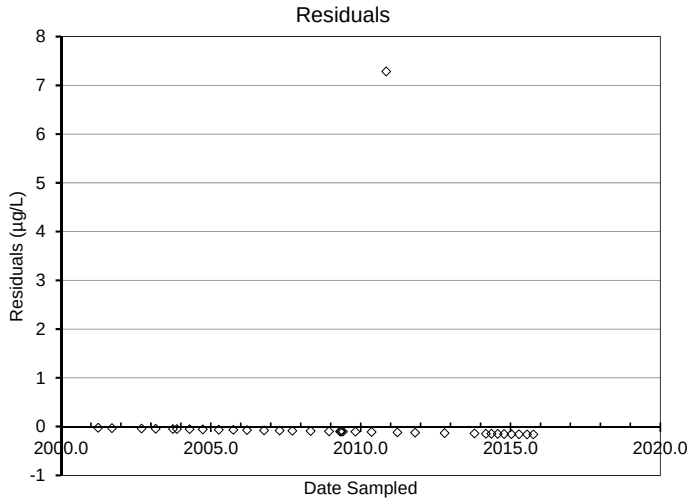
FOD 94%
Slope -0.15
p-value 0.043
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-36

Date	Value	Included in Regression
3/28/2001	2.5	Yes
9/13/2001	2.5	Yes
9/9/2002	2.5	Yes
2/28/2003	2.5	Yes
9/25/2003	2.5	Yes
11/14/2003	2.5	Yes
4/15/2004	2.5	Yes
9/23/2004	2.5	Yes
4/6/2005	2.5	Yes
9/30/2005	2.5	Yes
3/17/2006	2.5	Yes
10/11/2006	2.5	Yes
4/18/2007	2.5	Yes
9/20/2007	2.5	Yes
4/30/2008	2.5	Yes
12/11/2008	2.5	Yes
4/24/2009	2.5	Yes
5/7/2009	2.5	Yes
5/8/2009	2.5	Yes
5/28/2009	2.5	Yes
10/28/2009	2.5	Yes
5/12/2010	2.5	Yes
11/7/2010	9.9	Yes
3/24/2011	2.5	Yes
10/26/2011	2.5	Yes
10/19/2012	2.5	Yes
10/17/2013	2.5	Yes
3/6/2014	2.5	Yes
5/13/2014	2.5	Yes
7/29/2014	2.5	Yes
10/14/2014	2.5	Yes
1/12/2015	2.5	Yes
4/14/2015	2.5	Yes
7/20/2015	2.5	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-36
Date Range: 3/28/2001 to 10/6/2015



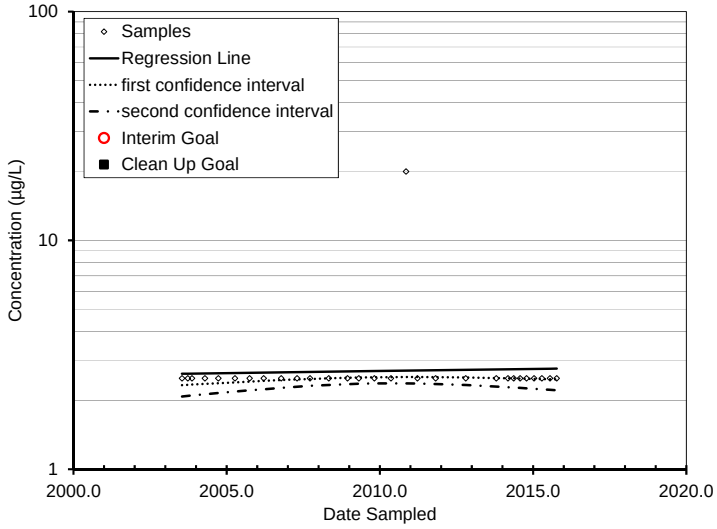


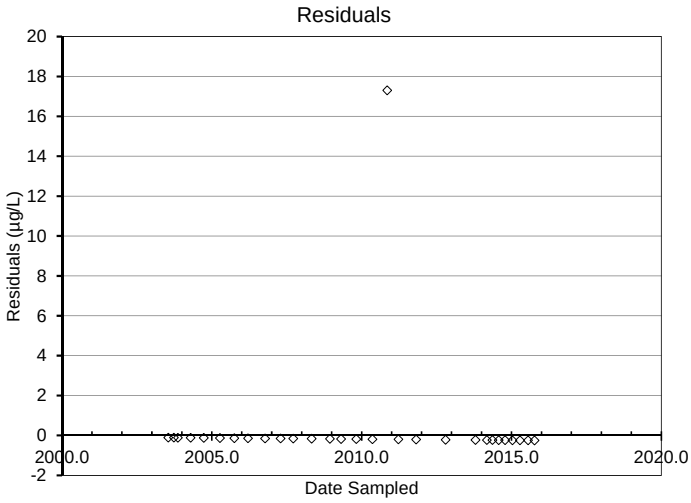
FOD 9%
Slope not calculated
p-value not calculated
Regression not calculated due to low FOD (< 50%)

North Plume, Well MW-39

Date	Value	Included in Regression
7/18/2003	2.5	Yes
9/25/2003	2.5	Yes
11/14/2003	2.5	Yes
4/15/2004	2.5	Yes
9/23/2004	2.5	Yes
4/8/2005	2.5	Yes
9/30/2005	2.5	Yes
3/17/2006	2.5	Yes
10/11/2006	2.5	Yes
4/18/2007	2.5	Yes
9/19/2007	2.5	Yes
4/30/2008	2.5	Yes
12/9/2008	2.5	Yes
4/24/2009	2.5	Yes
10/27/2009	2.5	Yes
5/11/2010	2.5	Yes
11/7/2010	20	Yes
3/24/2011	2.5	Yes
10/26/2011	2.5	Yes
10/19/2012	2.5	Yes
10/18/2013	2.5	Yes
3/6/2014	2.5	Yes
5/13/2014	2.5	Yes
7/29/2014	2.5	Yes
10/13/2014	2.5	Yes
1/12/2015	2.5	Yes
4/14/2015	2.5	Yes
7/20/2015	2.5	Yes
10/7/2015	2.5	Yes

North Plume, Well MW-39
Date Range: 7/18/2003 to 10/7/2015



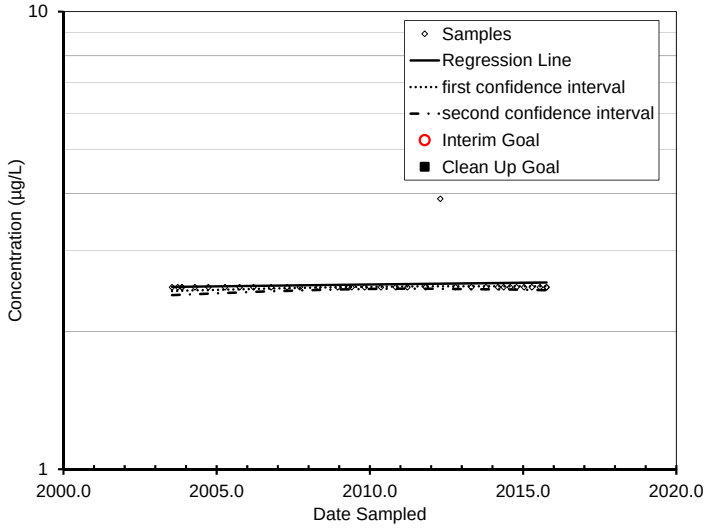


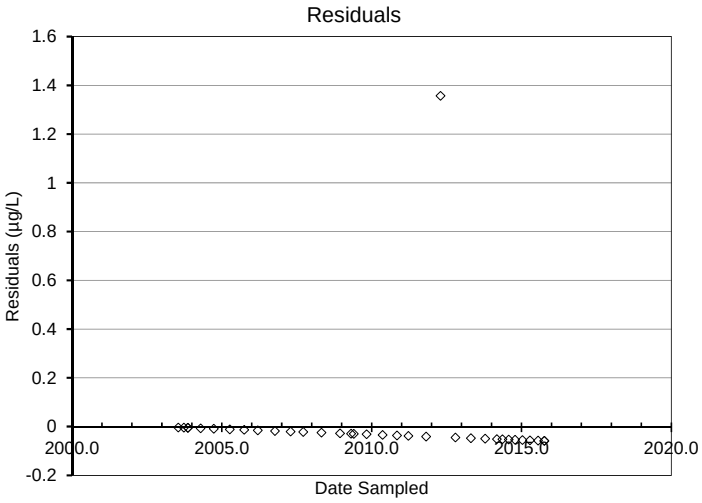
FOD 10%
Slope not calculated
p-value not calculated
Regression not calculated due to low FOD (< 50%)

North Plume, Well MW-40

Date	Value	Included in Regression
7/18/2003	2.5	Yes
9/25/2003	2.5	Yes
11/14/2003	2.5	Yes
11/14/2003	2.5	Yes
4/15/2004	2.5	Yes
9/23/2004	2.5	Yes
4/7/2005	2.5	Yes
9/29/2005	2.5	Yes
3/14/2006	2.5	Yes
10/10/2006	2.5	Yes
4/18/2007	2.5	Yes
9/18/2007	2.5	Yes
4/28/2008	2.5	Yes
12/11/2008	2.5	Yes
4/24/2009	2.5	Yes
5/27/2009	2.5	Yes
10/29/2009	2.5	Yes
5/12/2010	2.5	Yes
11/4/2010	2.5	Yes
3/23/2011	2.5	Yes
10/26/2011	2.5	Yes
4/18/2012	3.9	Yes
10/17/2012	2.5	Yes
4/23/2013	2.5	Yes
10/15/2013	2.5	Yes
3/6/2014	2.5	Yes
5/12/2014	2.5	Yes
7/29/2014	2.5	Yes
10/13/2014	2.5	Yes
1/12/2015	2.5	Yes
4/14/2015	2.5	Yes
7/20/2015	2.5	Yes
10/6/2015	2.5	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-40
Date Range: 7/18/2003 to 4/14/2015



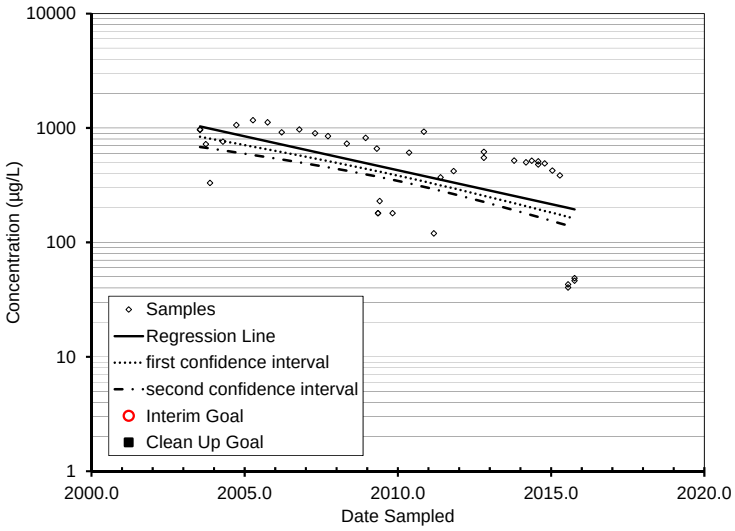


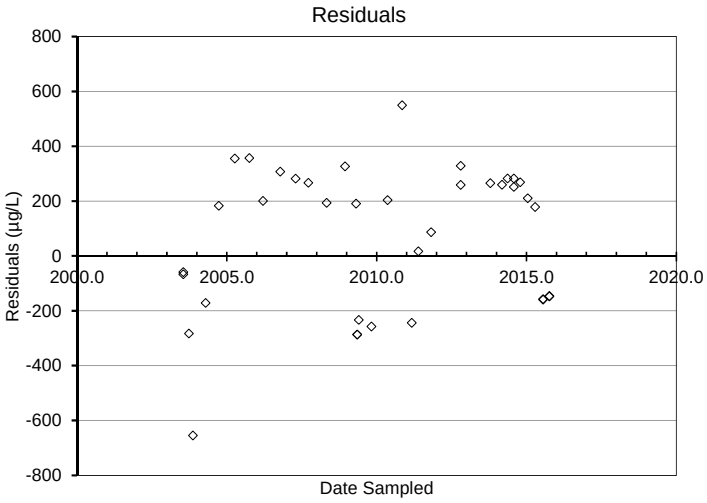
FOD 12%
Slope not calculated
p-value not calculated
No exceedances, regression analysis not performed

North Plume, Well MW-41

Date	Value	Included in Regression
7/18/2003	972	Yes
7/18/2003	964	Yes
9/25/2003	722	Yes
11/14/2003	331	Yes
4/15/2004	760	Yes
9/23/2004	1060	Yes
4/7/2005	1170	Yes
9/30/2005	1120	Yes
3/17/2006	917	Yes
10/13/2006	970	Yes
4/18/2007	900	Yes
9/20/2007	850	Yes
4/30/2008	730	Yes
12/11/2008	820	Yes
4/24/2009	660	Yes
5/7/2009	180	Yes
5/8/2009	180	Yes
5/27/2009	230	Yes
10/28/2009	180	Yes
5/13/2010	610	Yes
11/5/2010	930	Yes
3/4/2011	120	Yes
5/23/2011	370	Yes
10/25/2011	420	Yes
10/20/2012	620	Yes
10/20/2012	550	Yes
10/16/2013	520	Yes
3/7/2014	501	Yes
5/14/2014	518	Yes
7/30/2014	511	Yes
7/30/2014	480	Yes
10/15/2014	491	Yes
1/14/2015	425	Yes
4/15/2015	386	Yes
7/21/2015	43	Yes
7/21/2015	40.4	Yes
10/6/2015	48.7	Yes
10/6/2015	46.4	Yes

North Plume, Well MW-41
Date Range: 7/18/2003 to 10/6/2015



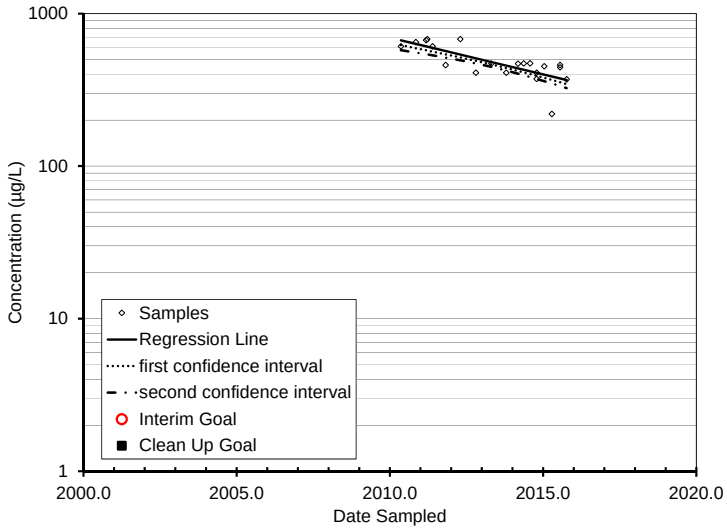


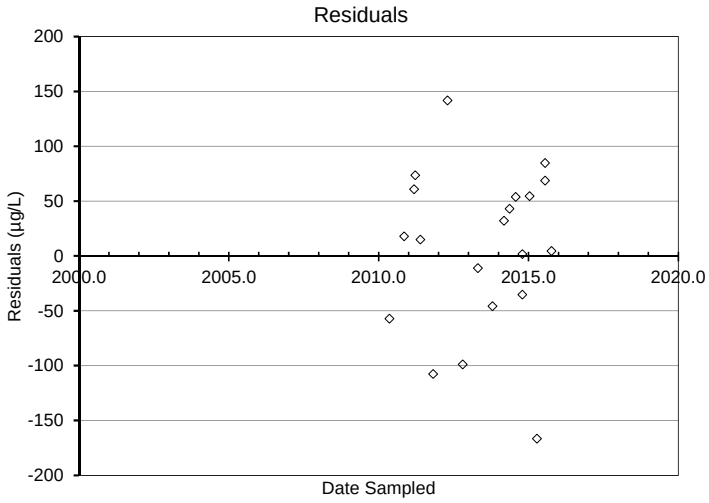
FOD 100%
Slope -0.14
p-value < 0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-46R

Date	Value	Included in Regression
11/14/2003	39.9	No
4/15/2004	77.1	No
9/23/2004	142	No
4/6/2005	210	No
9/28/2005	222	No
3/16/2006	111	No
4/6/2006	300	No
10/11/2006	450	No
4/17/2007	440	No
9/18/2007	420	No
4/29/2008	430	No
12/9/2008	310	No
4/25/2009	460	No
5/27/2009	2.5	No
10/27/2009	390	No
12/21/2009	410	No
5/11/2010	610	Yes
11/5/2010	650	Yes
3/7/2011	670	Yes
3/22/2011	680	Yes
5/23/2011	610	Yes
10/26/2011	460	Yes
4/18/2012	680	Yes
10/20/2012	410	Yes
4/23/2013	470	Yes
10/18/2013	410	Yes
3/7/2014	469	Yes
5/14/2014	471	Yes
7/29/2014	472	Yes
10/16/2014	373	Yes
10/16/2014	410	Yes
1/13/2015	452	Yes
4/14/2015	220	Yes
7/21/2015	444	Yes
7/21/2015	460	Yes
10/7/2015	371	Yes

North Plume, Well MW-46R
Date Range: 5/11/2010 to 10/7/2015 (ISCO Impacts Excluded)



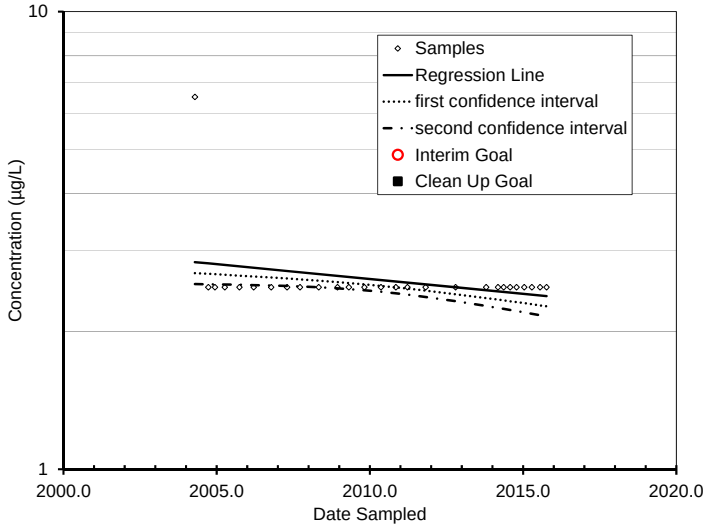


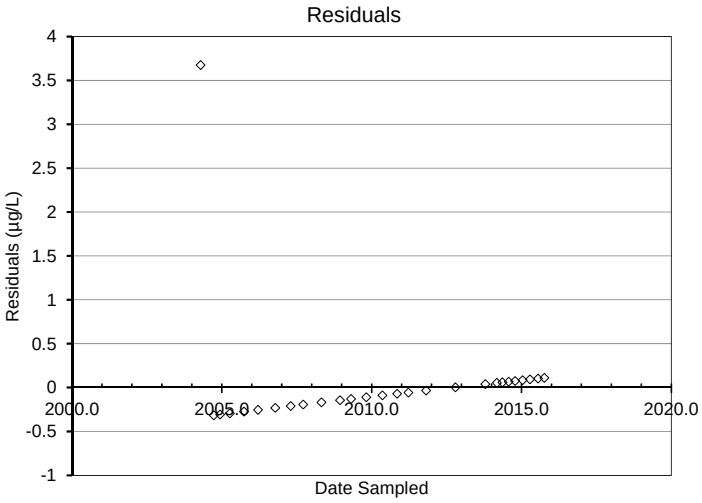
FOD 97%
Slope -0.11
p-value < 0.001
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-50

Date	Value	Included in Regression
4/15/2004	6.51	Yes
9/23/2004	2.5	Yes
12/10/2004	2.5	Yes
4/6/2005	2.5	Yes
9/28/2005	2.5	Yes
3/17/2006	2.5	Yes
10/12/2006	2.5	Yes
4/19/2007	2.5	Yes
9/19/2007	2.5	Yes
4/29/2008	2.5	Yes
12/10/2008	2.5	Yes
4/24/2009	2.5	Yes
10/27/2009	2.5	Yes
5/11/2010	2.5	Yes
11/5/2010	2.5	Yes
3/23/2011	2.5	Yes
10/25/2011	2.5	Yes
10/17/2012	2.5	Yes
10/16/2013	2.5	Yes
3/6/2014	2.5	Yes
5/13/2014	2.5	Yes
7/28/2014	2.5	Yes
10/14/2014	2.5	Yes
1/13/2015	2.5	Yes
4/14/2015	2.5	Yes
7/21/2015	2.5	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-50
Date Range: 4/15/2004 to 10/6/2015



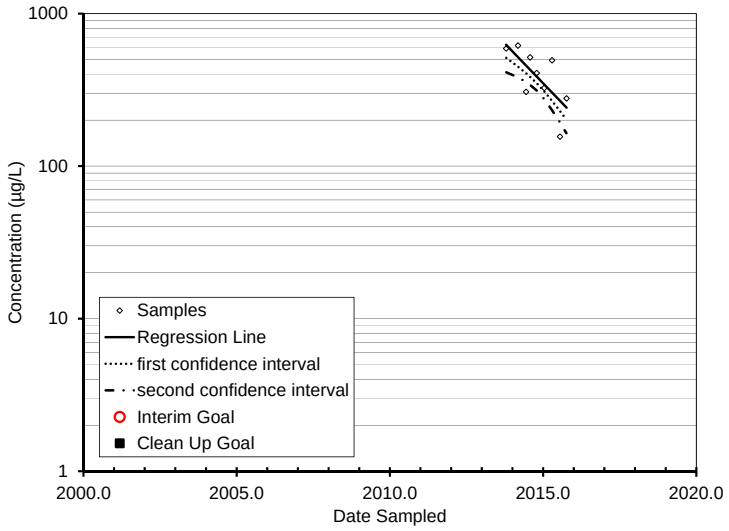


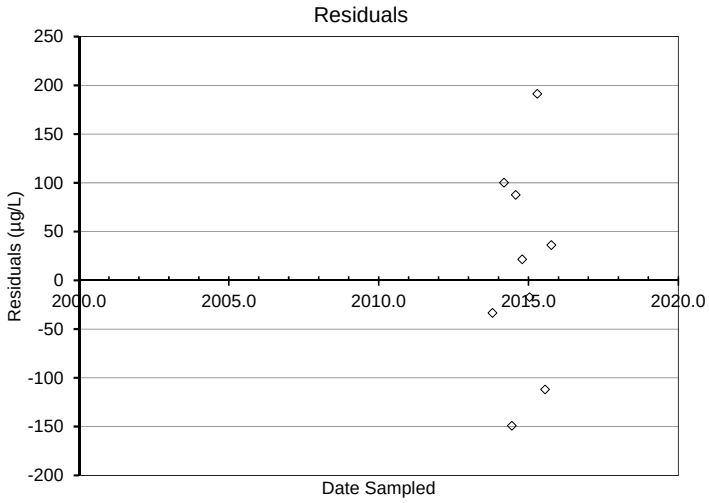
FOD 15%
Slope not calculated
p-value not calculated
Regression not calculated due to low FOD (< 50%)

North Plume, Well MW-56

Date	Value	Included in Regression
12/10/2004	90.2	No
4/8/2005	88.2	No
9/28/2005	207	No
3/16/2006	8.7	No
10/14/2006	110	No
4/19/2007	2.5	No
9/19/2007	38	No
4/29/2008	4	No
12/10/2008	93	No
4/24/2009	14	No
10/27/2009	8.7	No
5/12/2010	230	No
3/23/2011	71	No
10/25/2011	150	No
10/20/2012	470	No
10/17/2013	590	Yes
3/7/2014	618	Yes
6/11/2014	307	Yes
7/29/2014	516	Yes
10/15/2014	408	Yes
1/13/2015	326	Yes
4/16/2015	495	Yes
7/20/2015	156	Yes
10/6/2015	278	Yes

North Plume, Well MW-56
Date Range: 10/17/2013 to 10/6/2015 (ISCO Impacts Excluded)



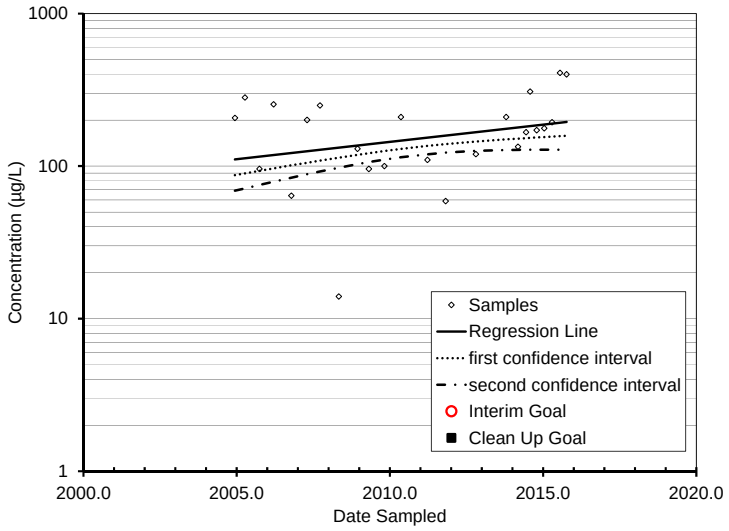


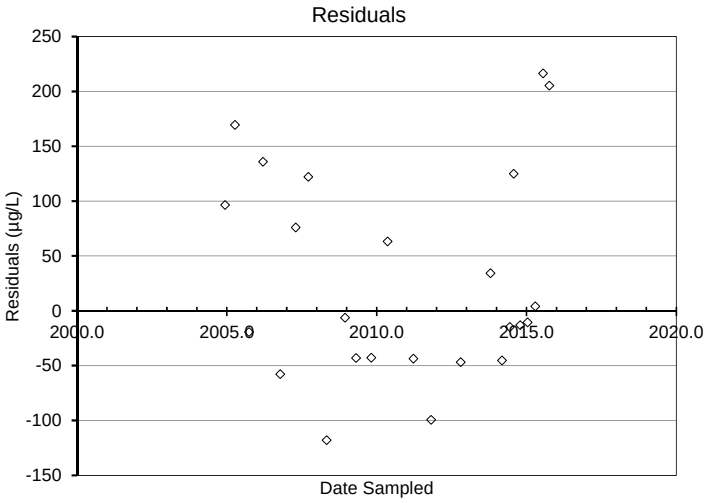
FOD 95%
Slope -0.48
p-value <0.05
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-57

Date	Value	Included in Regression
12/10/2004	207	Yes
4/8/2005	282	Yes
9/28/2005	96	Yes
3/16/2006	254	Yes
10/13/2006	64	Yes
4/19/2007	201	Yes
9/20/2007	250	Yes
4/30/2008	14	Yes
12/10/2008	130	Yes
4/24/2009	96	Yes
10/27/2009	100	Yes
5/12/2010	210	Yes
3/23/2011	110	Yes
10/25/2011	59	Yes
10/20/2012	120	Yes
10/17/2013	210	Yes
3/7/2014	134	Yes
6/11/2014	167	Yes
7/29/2014	308	Yes
10/15/2014	172	Yes
1/13/2015	177	Yes
4/16/2015	194	Yes
7/20/2015	409	Yes
10/6/2015	400	Yes

North Plume, Well MW-57
Date Range: 12/10/2004 to 10/6/2015



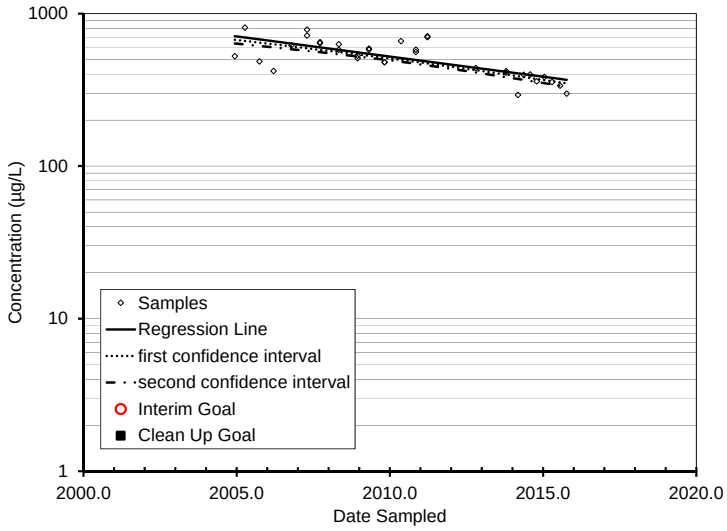


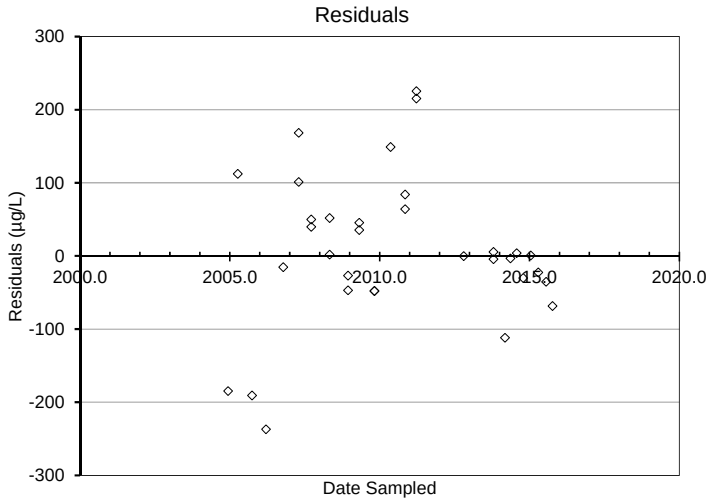
FOD 100%
Slope 0.052
p-value > 0.05
Regression residuals are biased
Slope trend is not significant
Slope not used to estimate degradation rate

North Plume, Well MW-58

Date	Value	Included in Regression
12/9/2004	526	Yes
4/7/2005	809	Yes
9/28/2005	486	Yes
3/16/2006	421	Yes
10/13/2006	620	Yes
4/19/2007	784	Yes
4/19/2007	717	Yes
9/19/2007	650	Yes
9/19/2007	640	Yes
4/30/2008	630	Yes
4/30/2008	580	Yes
12/11/2008	530	Yes
12/11/2008	510	Yes
4/25/2009	590	Yes
4/25/2009	580	Yes
10/28/2009	480	Yes
10/28/2009	480	Yes
5/12/2010	660	Yes
11/6/2010	560	Yes
11/6/2010	580	Yes
3/24/2011	710	Yes
3/24/2011	700	Yes
10/20/2012	440	Yes
10/17/2013	410	Yes
10/17/2013	420	Yes
3/7/2014	293	Yes
5/12/2014	397	Yes
7/29/2014	399	Yes
10/15/2014	360	Yes
1/14/2015	385	Yes
4/16/2015	356	Yes
7/21/2015	337	Yes
10/8/2015	299	Yes

North Plume, Well MW-58
Date Range: 12/9/2004 to 10/8/2015



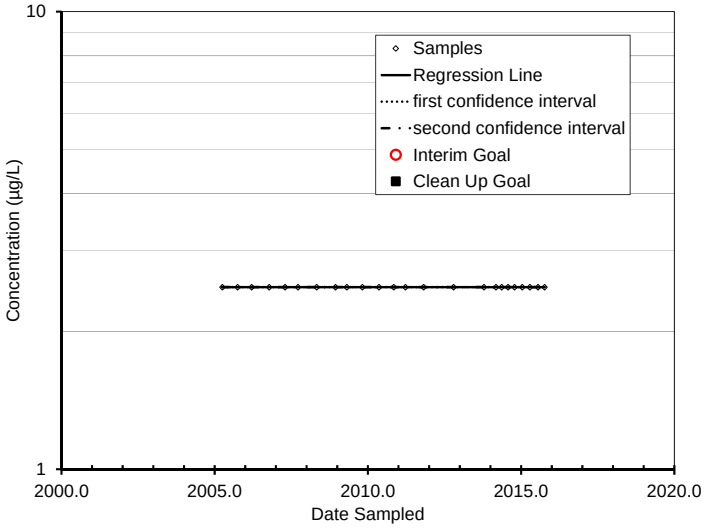


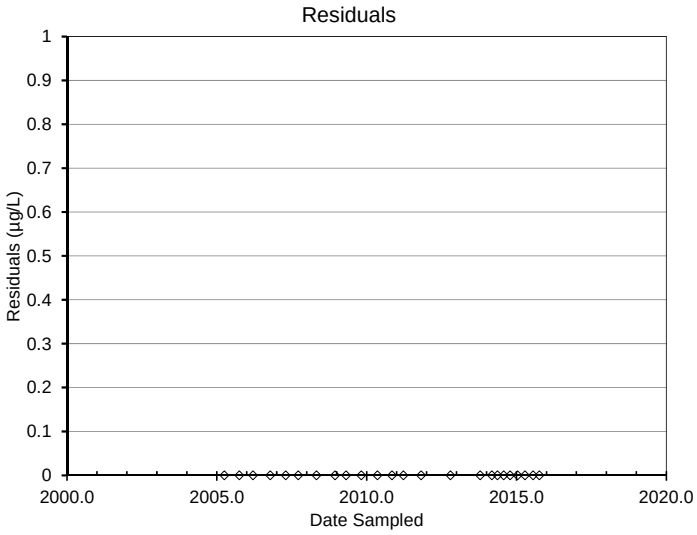
FOD 100%
Slope -0.061
p-value < 0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-60

Date	Value	Included in Regression
4/1/2005	2.5	Yes
9/30/2005	2.5	Yes
3/17/2006	2.5	Yes
10/12/2006	2.5	Yes
4/19/2007	2.5	Yes
9/19/2007	2.5	Yes
4/29/2008	2.5	Yes
12/10/2008	2.5	Yes
4/24/2009	2.5	Yes
10/27/2009	2.5	Yes
5/11/2010	2.5	Yes
11/4/2010	2.5	Yes
3/23/2011	2.5	Yes
10/25/2011	2.5	Yes
10/17/2012	2.5	Yes
10/15/2013	2.5	Yes
3/6/2014	2.5	Yes
5/13/2014	2.5	Yes
7/28/2014	2.5	Yes
10/14/2014	2.5	Yes
1/13/2015	2.5	Yes
4/14/2015	2.5	Yes
7/21/2015	2.5	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-60
Date Range: 4/1/2005 to 10/6/2015



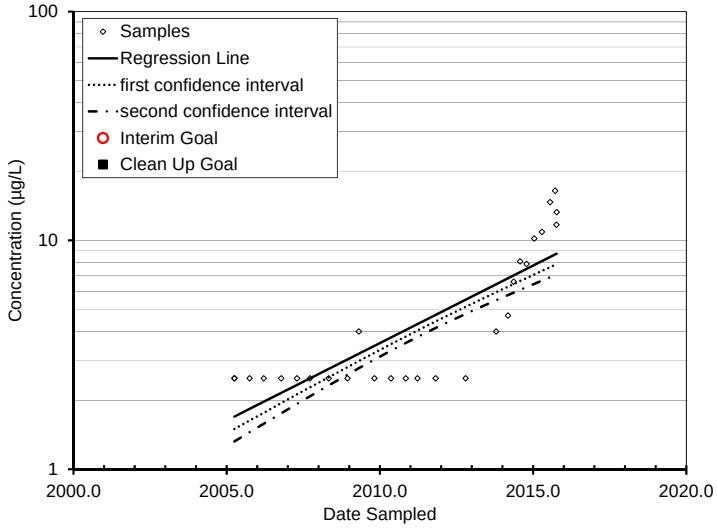


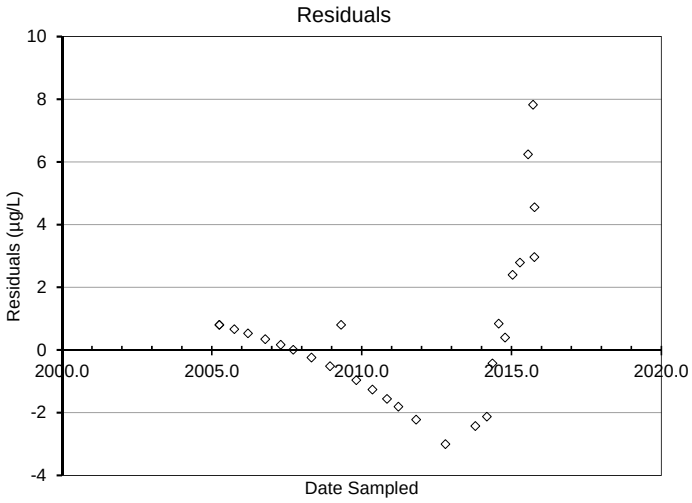
FOD 8%
Slope not calculated
p-value not calculated
No exceedances, regression analysis not performed

North Plume, Well MW-61

Date	Value	Included in Regression
4/1/2005	2.5	Yes
4/1/2005	2.5	Yes
9/30/2005	2.5	Yes
3/17/2006	2.5	Yes
10/12/2006	2.5	Yes
4/19/2007	2.5	Yes
9/19/2007	2.5	Yes
4/29/2008	2.5	Yes
12/10/2008	2.5	Yes
4/24/2009	4	Yes
10/27/2009	2.5	Yes
5/11/2010	2.5	Yes
11/4/2010	2.5	Yes
3/23/2011	2.5	Yes
10/25/2011	2.5	Yes
10/17/2012	2.5	Yes
10/16/2013	4	Yes
3/6/2014	4.7	Yes
5/13/2014	6.6	Yes
7/28/2014	8.1	Yes
10/14/2014	7.9	Yes
1/13/2015	10.2	Yes
4/14/2015	10.9	Yes
7/21/2015	14.7	Yes
9/19/2015	16.5	Yes
10/5/2015	11.7	Yes
10/8/2015	13.3	Yes

North Plume, Well MW-61
Date Range: 4/1/2005 to 10/8/2015



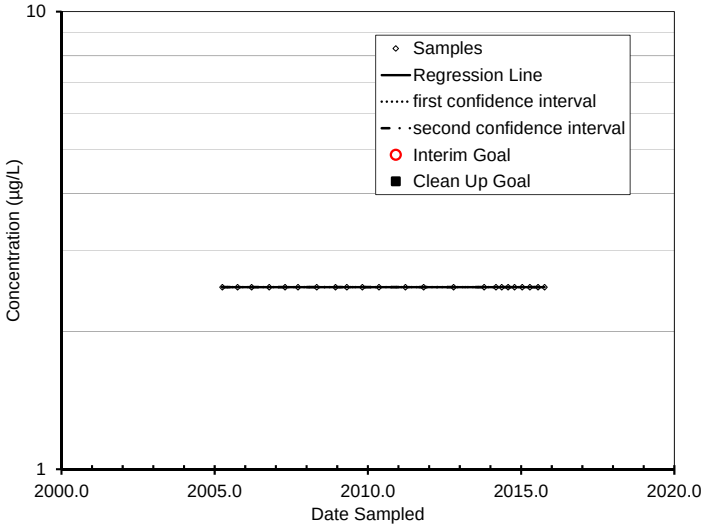


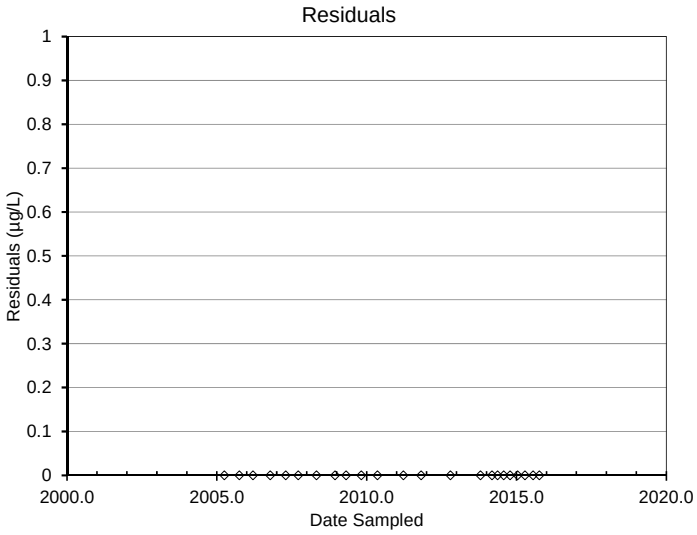
FOD 61%
Slope 0.16
p-value < 0.001
Slope is positive
Regression residuals are not appropriately distributed
Slope not used to estimate degradation rate

North Plume, Well MW-62

Date	Value	Included in Regression
4/1/2005	2.5	Yes
9/30/2005	2.5	Yes
3/16/2006	2.5	Yes
10/12/2006	2.5	Yes
4/19/2007	2.5	Yes
9/19/2007	2.5	Yes
4/29/2008	2.5	Yes
12/10/2008	2.5	Yes
4/24/2009	2.5	Yes
10/27/2009	2.5	Yes
5/11/2010	2.5	Yes
3/23/2011	2.5	Yes
10/25/2011	2.5	Yes
10/17/2012	2.5	Yes
10/17/2013	2.5	Yes
3/7/2014	2.5	Yes
5/14/2014	2.5	Yes
7/29/2014	2.5	Yes
10/14/2014	2.5	Yes
1/13/2015	2.5	Yes
4/14/2015	2.5	Yes
7/21/2015	2.5	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-62
Date Range: 4/1/2005 to 10/6/2015



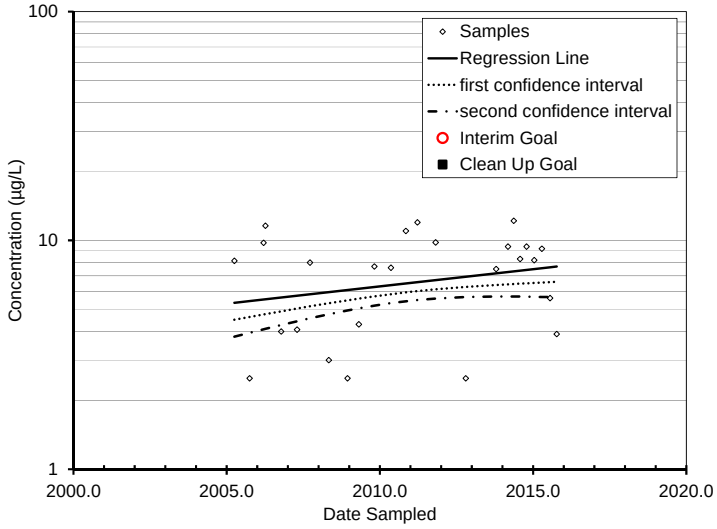


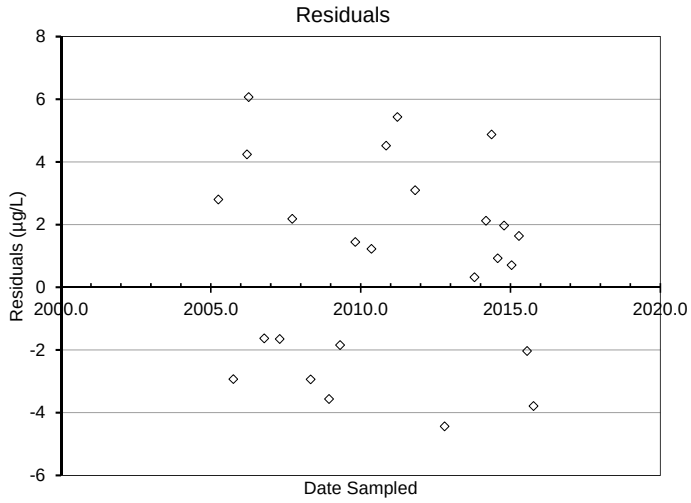
FOD 13%
Slope not calculated
p-value not calculated
No exceedances, regression analysis not performed

North Plume, Well MW-63

Date	Value	Included in Regression
4/1/2005	8.14	Yes
9/30/2005	2.5	Yes
3/16/2006	9.76	Yes
4/6/2006	11.6	Yes
10/12/2006	4	Yes
4/19/2007	4.08	Yes
9/19/2007	8	Yes
4/30/2008	3	Yes
12/10/2008	2.5	Yes
4/24/2009	4.3	Yes
10/27/2009	7.7	Yes
5/11/2010	7.6	Yes
11/6/2010	11	Yes
3/23/2011	12	Yes
10/25/2011	9.8	Yes
10/19/2012	2.5	Yes
10/17/2013	7.5	Yes
3/7/2014	9.4	Yes
5/14/2014	12.2	Yes
7/28/2014	8.3	Yes
10/14/2014	9.4	Yes
1/13/2015	8.2	Yes
4/14/2015	9.2	Yes
7/21/2015	5.6	Yes
10/8/2015	3.9	Yes

North Plume, Well MW-63
Date Range: 4/1/2005 to 10/8/2015



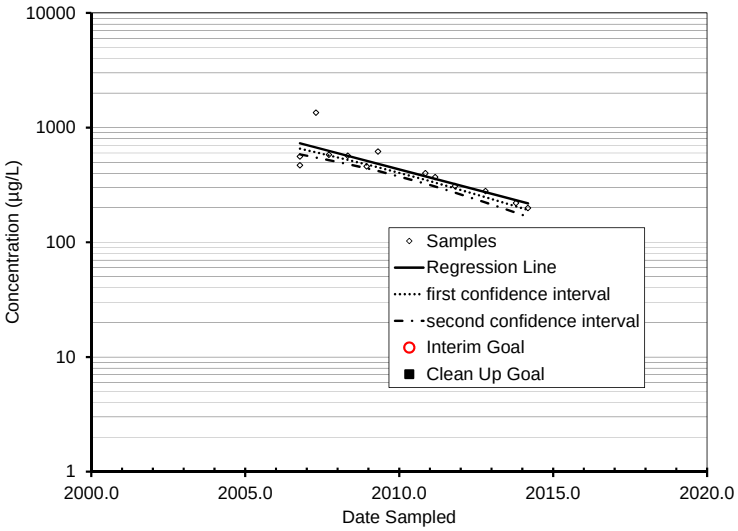


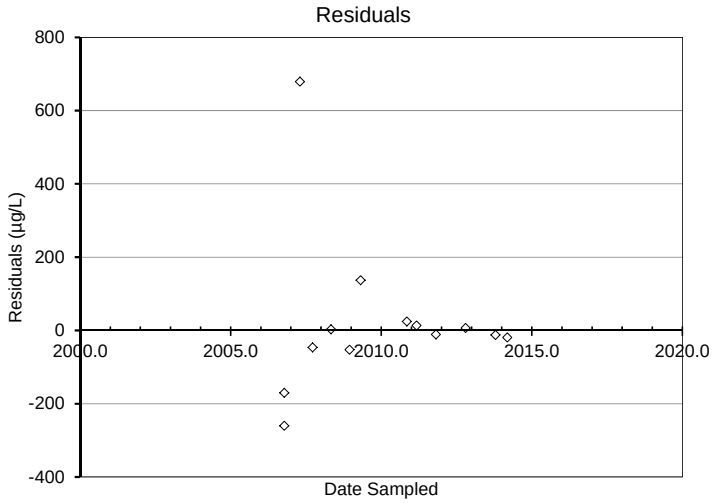
FOD 88%
Slope 0.035
p-value 0.26
Regression residuals are appropriately distributed
Slope is positive
Slope not used to estimate degradation rate

North Plume, Well MW-65

Date	Value	Included in Regression
10/11/2006	470	Yes
10/11/2006	560	Yes
4/19/2007	1350	Yes
9/20/2007	580	Yes
4/30/2008	570	Yes
12/11/2008	460	Yes
4/24/2009	620	Yes
11/7/2010	400	Yes
3/4/2011	370	Yes
10/25/2011	310	Yes
10/20/2012	280	Yes
10/17/2013	220	Yes
3/8/2014	199	Yes
5/14/2014	195	No
7/30/2014	17.1	No
10/14/2014	30.8	No
1/13/2015	19.2	No
4/15/2015	16	No
7/20/2015	26.3	No
10/7/2015	0.28	No

North Plume, Well MW-65
Date Range: 10/11/2006 to 3/8/2014 (ISCO Impacts Excluded)



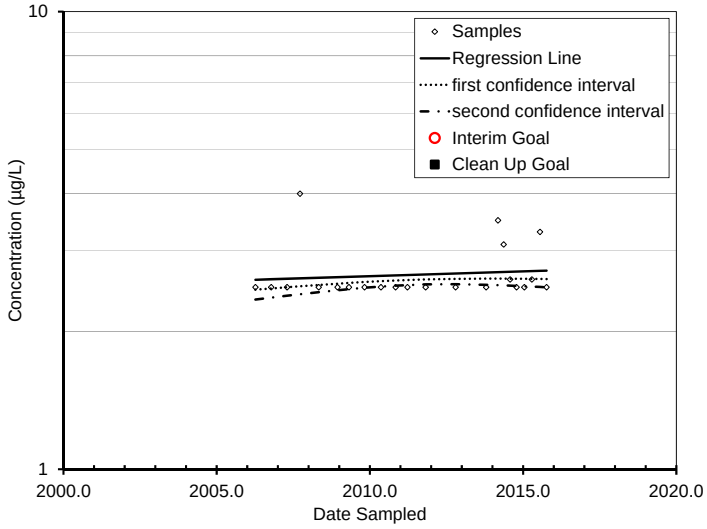


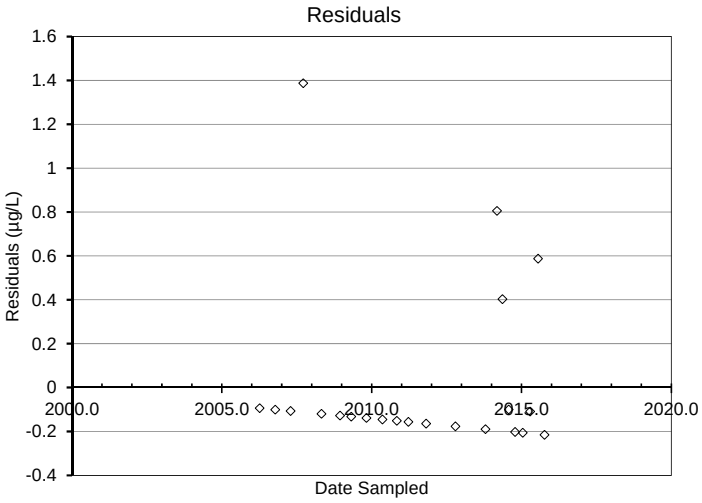
FOD100%
Slope -0.16
p-value < 0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-66

Date	Value	Included in Regression
4/6/2006	2.5	Yes
10/12/2006	2.5	Yes
4/18/2007	2.5	Yes
9/19/2007	4	Yes
4/29/2008	2.5	Yes
12/10/2008	2.5	Yes
4/25/2009	2.5	Yes
10/28/2009	2.5	Yes
5/11/2010	2.5	Yes
11/3/2010	2.5	Yes
3/24/2011	2.5	Yes
10/26/2011	2.5	Yes
10/17/2012	2.5	Yes
10/17/2013	2.5	Yes
3/7/2014	3.5	Yes
5/13/2014	3.1	Yes
7/28/2014	2.6	Yes
10/13/2014	2.5	Yes
1/14/2015	2.5	Yes
4/15/2015	2.6	Yes
7/20/2015	3.3	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-66
Date Range: 4/6/2006 to 10/6/2015



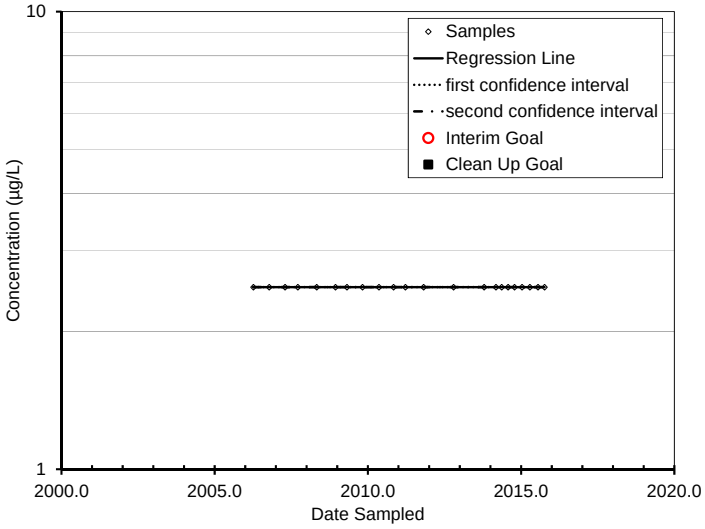


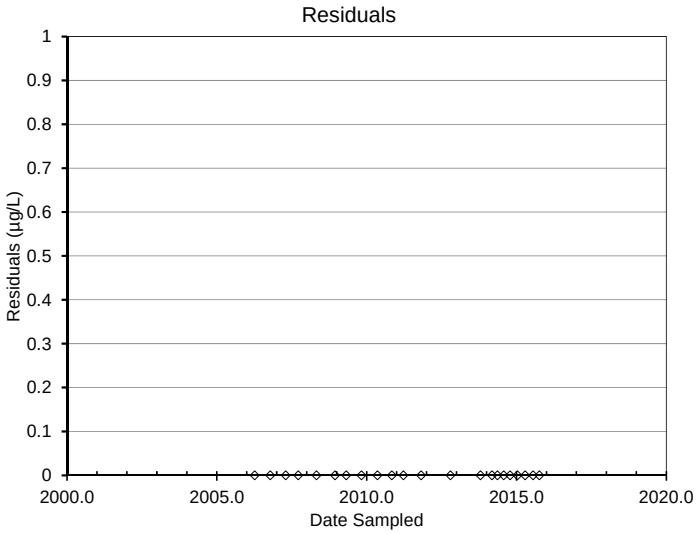
FOD 59%
Slope not calculated
p-value not calculated
No exceedances, regression analysis not performed

North Plume, Well MW-67

Date	Value	Included in Regression
4/6/2006	2.5	Yes
10/12/2006	2.5	Yes
4/19/2007	2.5	Yes
9/18/2007	2.5	Yes
4/29/2008	2.5	Yes
12/10/2008	2.5	Yes
4/25/2009	2.5	Yes
10/28/2009	2.5	Yes
5/11/2010	2.5	Yes
11/3/2010	2.5	Yes
3/24/2011	2.5	Yes
10/26/2011	2.5	Yes
10/17/2012	2.5	Yes
10/17/2013	2.5	Yes
3/7/2014	2.5	Yes
5/13/2014	2.5	Yes
7/28/2014	2.5	Yes
10/13/2014	2.5	Yes
1/12/2015	2.5	Yes
4/15/2015	2.5	Yes
7/20/2015	2.5	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-67
Date Range: 4/6/2006 to 10/6/2015



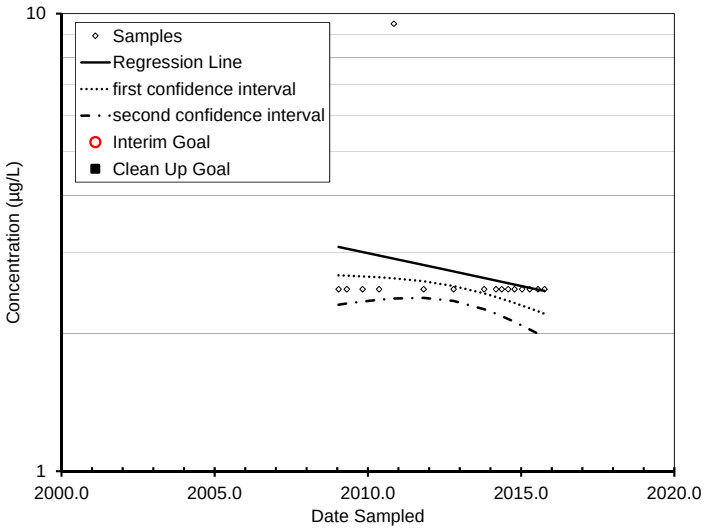


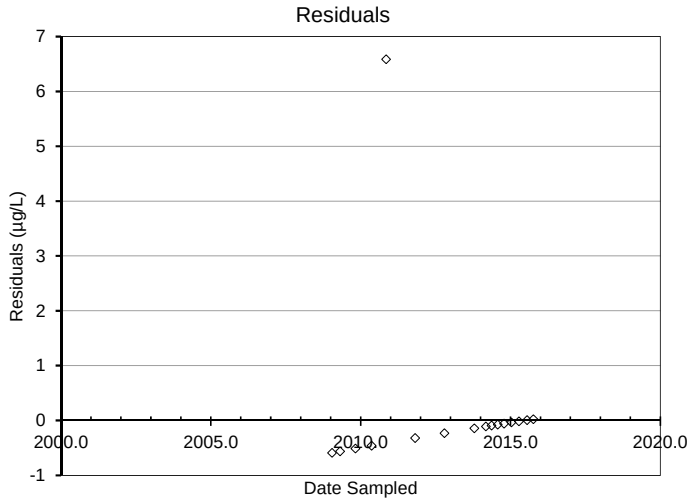
FOD 14%
Slope not calculated
p-value not calculated
No exceedances, regression analysis not performed

North Plume, Well MW-68

Date	Value	Included in Regression
1/15/2009	2.5	Yes
4/24/2009	2.5	Yes
10/28/2009	2.5	Yes
5/13/2010	2.5	Yes
11/6/2010	9.5	Yes
10/26/2011	2.5	Yes
10/17/2012	2.5	Yes
10/16/2013	2.5	Yes
3/6/2014	2.5	Yes
5/14/2014	2.5	Yes
7/29/2014	2.5	Yes
10/14/2014	2.5	Yes
1/12/2015	2.5	Yes
4/13/2015	2.5	Yes
7/20/2015	2.5	Yes
10/6/2015	2.5	Yes

North Plume, Well MW-68
Date Range: 1/15/2009 to 10/6/2015



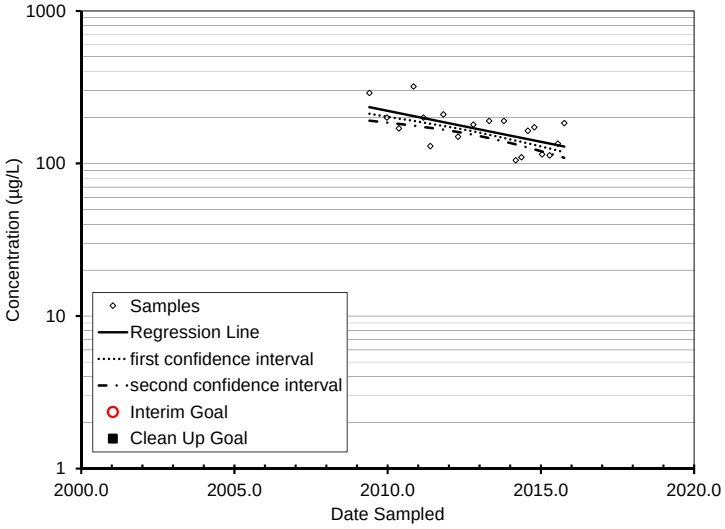


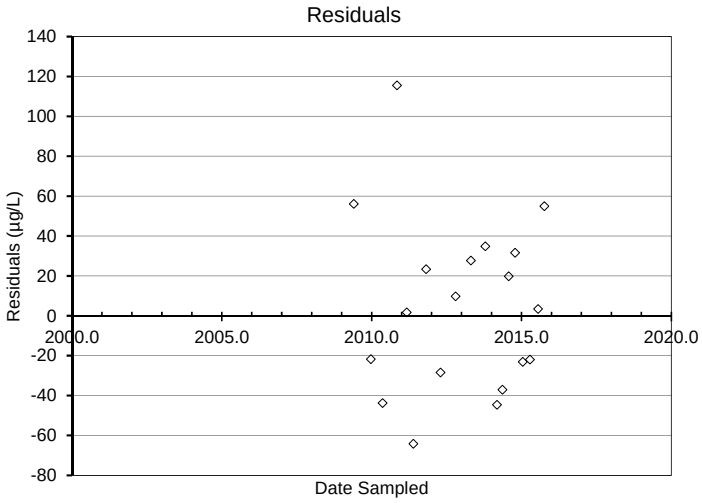
FOD 13%
Slope not calculated
p-value not calculated
Regression not calculated due to low FOD

North Plume, Well RW-69

Date	Value	Included in Regression
1/15/2009	170	No
4/24/2009	62	No
5/27/2009	290	Yes
12/21/2009	200	Yes
5/13/2010	170	Yes
11/4/2010	320	Yes
3/3/2011	200	Yes
5/23/2011	130	Yes
10/26/2011	210	Yes
4/18/2012	150	Yes
10/18/2012	180	Yes
4/23/2013	190	Yes
10/16/2013	190	Yes
3/7/2014	105	Yes
5/13/2014	110	Yes
7/29/2014	164	Yes
10/14/2014	173	Yes
1/14/2015	115	Yes
4/14/2015	113	Yes
7/21/2015	135	Yes
10/6/2015	184	Yes

North Plume, Well RW-69
Date Range: 5/27/2009 to 10/6/2015 (ISCO Impacts Excluded)



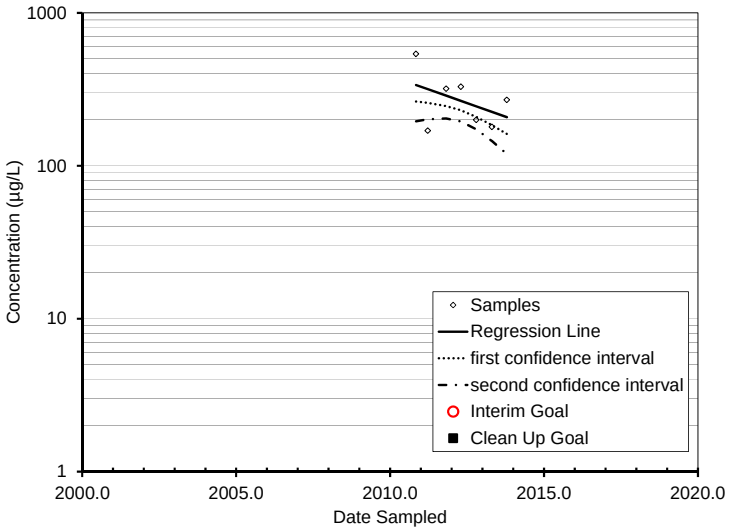


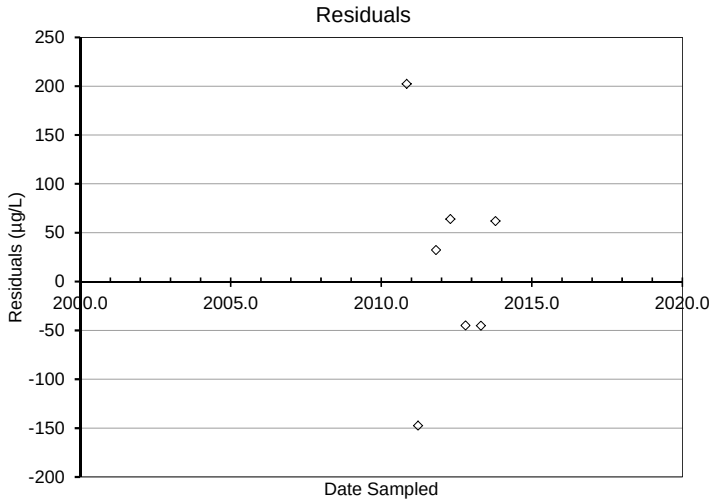
FOD 100%
Slope -0.093
p-value <0.01
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-70

Date	Value	Included in Regression
11/4/2010	540	Yes
3/22/2011	170	Yes
10/26/2011	320	Yes
4/18/2012	330	Yes
10/18/2012	200	Yes
4/23/2013	180	Yes
10/16/2013	270	Yes

North Plume, Well MW-70
Date Range: 11/4/2010 to 10/16/2013 (ISCO Impacts Excluded)



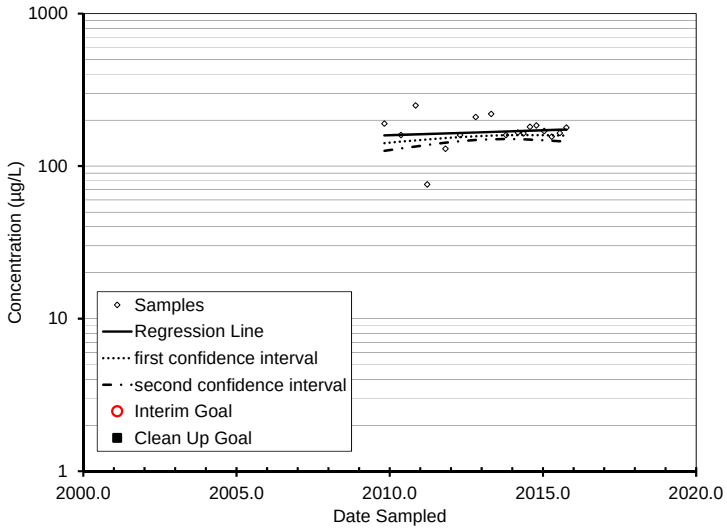


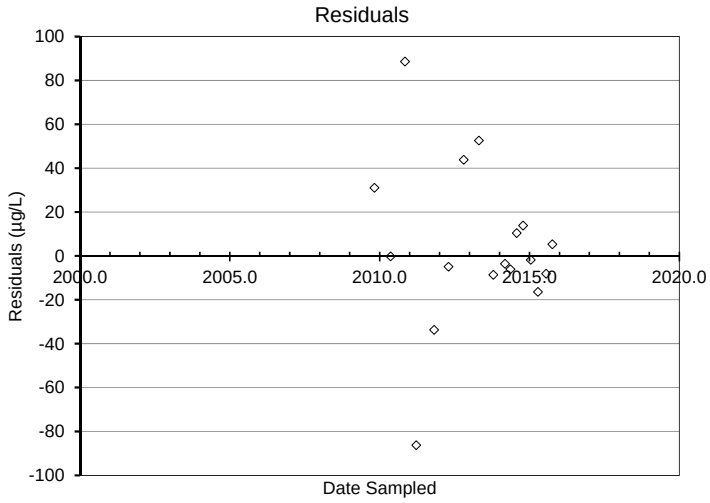
FOD 100%
Slope -0.16
p-value < 0.05
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well MW-71

Date	Value	Included in Regression
10/28/2009	190	Yes
5/13/2010	160	Yes
11/4/2010	250	Yes
3/22/2011	76	Yes
10/26/2011	130	Yes
4/18/2012	160	Yes
10/20/2012	210	Yes
4/23/2013	220	Yes
10/16/2013	160	Yes
3/7/2014	166	Yes
5/13/2014	164	Yes
7/29/2014	181	Yes
10/14/2014	185	Yes
1/14/2015	170	Yes
4/14/2015	156	Yes
7/20/2015	165	Yes
10/6/2015	179	Yes

North Plume, Well MW-71
Date Range: 10/28/2009 to 10/6/2015



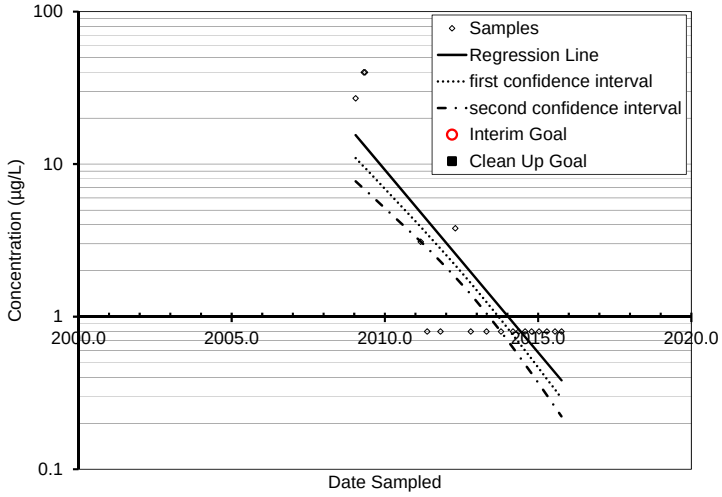


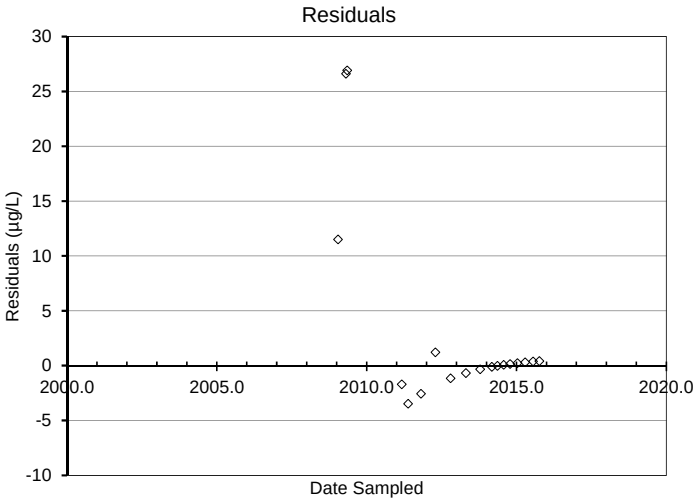
FOD100%
Slope 0.015
p-value >0.05
Regression residuals are potentially biased
Slope trend is not significant
Slope not used to estimate degradation rate

North Plume, Well IW-72

Date	Value	Included in Regression
1/16/2009	27	Yes
4/23/2009	40	Yes
5/8/2009	40	Yes
3/3/2011	3.1	Yes
5/19/2011	0.8	Yes
10/24/2011	0.8	Yes
4/17/2012	3.8	Yes
10/19/2012	0.8	Yes
4/24/2013	0.8	Yes
10/15/2013	0.8	Yes
3/6/2014	0.8	Yes
5/12/2014	0.8	Yes
7/29/2014	0.8	Yes
10/13/2014	0.8	Yes
1/12/2015	0.8	Yes
4/15/2015	0.8	Yes
7/20/2015	0.8	Yes
10/6/2015	0.8	Yes

North Plume, Well IW-72
Date Range: 1/16/2009 to 10/6/2015



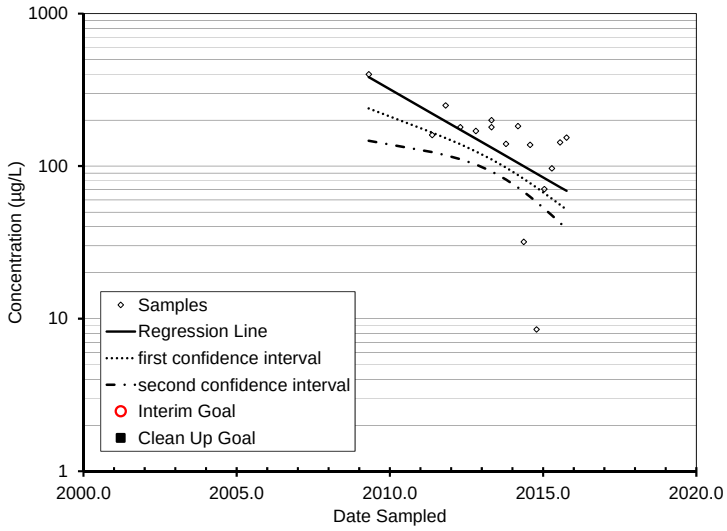


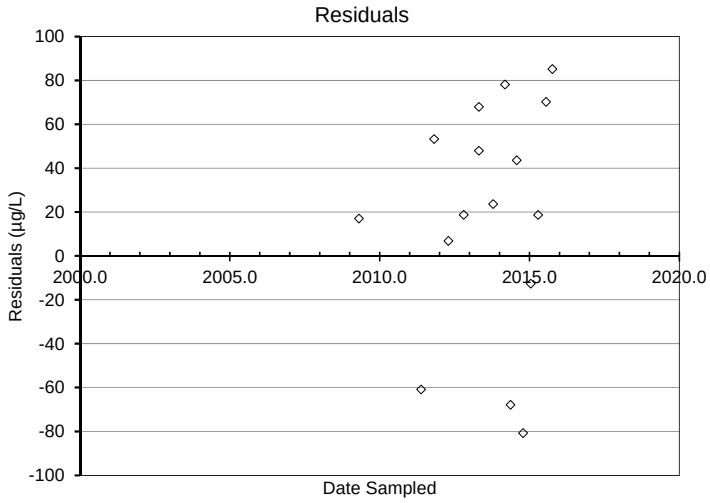
FOD 39%
Slope not calculated
p-value not calculated
Regression not calculated due to low FOD (< 50%)

North Plume, Well IW-73

Date	Value	Included in Regression
4/23/2009	400	Yes
5/19/2011	160	Yes
10/25/2011	250	Yes
4/17/2012	180	Yes
10/20/2012	170	Yes
4/24/2013	200	Yes
4/24/2013	180	Yes
10/15/2013	140	Yes
3/7/2014	183	Yes
5/14/2014	31.9	Yes
7/29/2014	138	Yes
10/14/2014	8.5	Yes
1/14/2015	70.8	Yes
4/15/2015	96.8	Yes
7/21/2015	143	Yes
10/6/2015	154	Yes

North Plume, Well IW-73
Date Range: 4/23/2009 to 10/6/2015



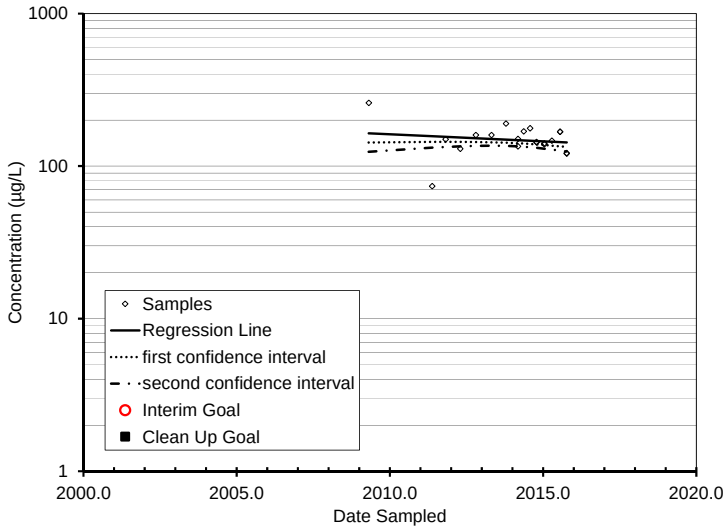


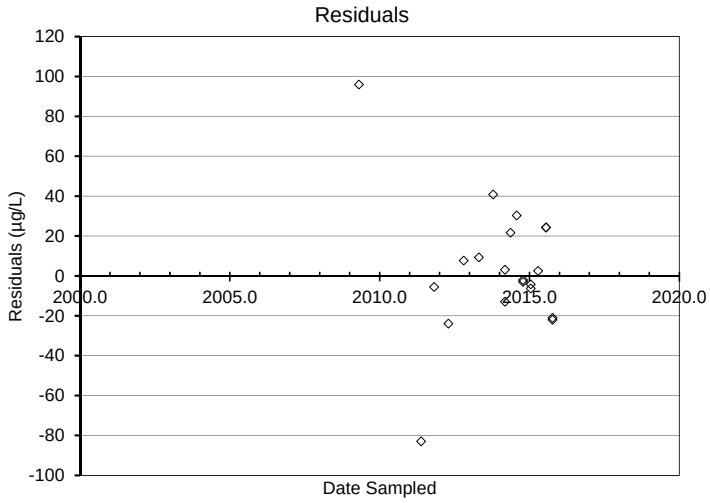
FOD 100%
Slope -0.27
p-value 0.041
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

North Plume, Well IW-74

Date	Value	Included in Regression
4/23/2009	260	Yes
5/19/2011	74	Yes
10/25/2011	150	Yes
4/17/2012	130	Yes
10/20/2012	160	Yes
4/24/2013	160	Yes
10/15/2013	190	Yes
3/7/2014	135	Yes
3/7/2014	151	Yes
5/14/2014	169	Yes
7/29/2014	177	Yes
10/14/2014	143	Yes
10/14/2014	144	Yes
1/14/2015	139	Yes
1/14/2015	141	Yes
4/15/2015	147	Yes
7/21/2015	168	Yes
7/21/2015	168	Yes
10/7/2015	121	Yes
10/7/2015	122	Yes

North Plume, Well IW-74
Date Range: 4/23/2009 to 10/7/2015



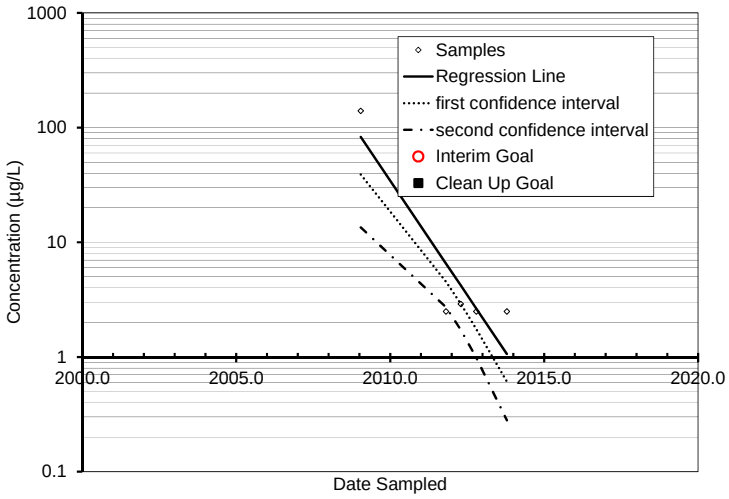


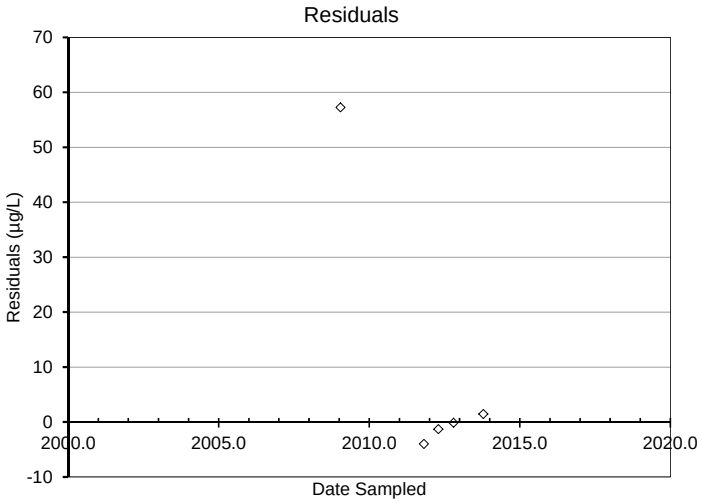
FOD 100%
Slope -0.021
p-value 0.521
Regression residuals are appropriately distributed
Slope is not significant
Slope used to estimate degradation rate

North Plume, Well IW-75

Date	Value	Included in Regression
1/16/2009	140	Yes
10/25/2011	2.5	Yes
4/17/2012	2.9	Yes
10/18/2012	2.5	Yes
10/15/2013	2.5	Yes

North Plume, Well IW-75
Date Range: 1/16/2009 to 10/15/2013



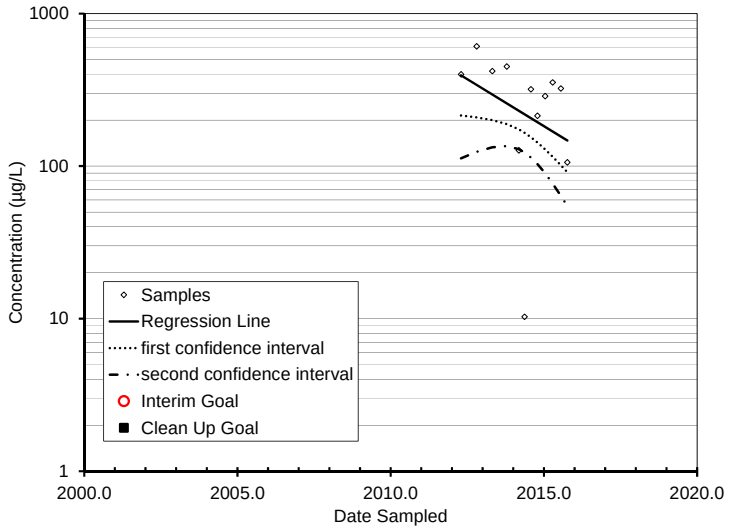


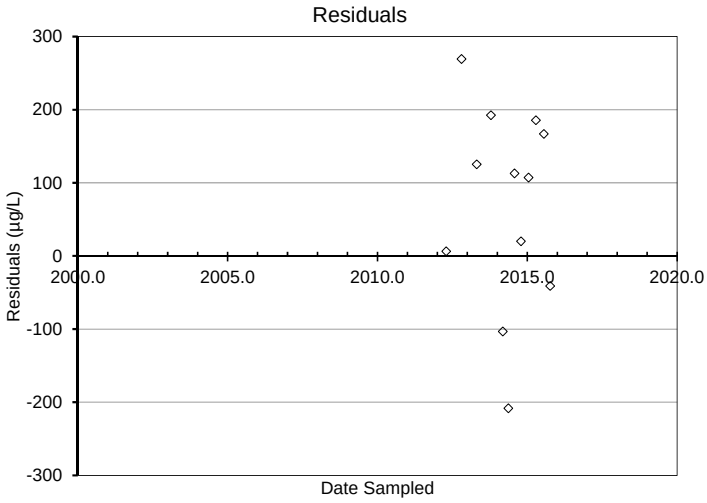
FOD 40%
Slope not calculated
p-value not calculated
Regression not calculated due to low FOD (< 50%)

North Plume, Well IW-76

Date	Value	Included in Regression
4/23/2009	730	No
5/7/2009	460	No
3/4/2011	380	No
5/23/2011	460	No
10/25/2011	130	No
4/17/2012	400	Yes
10/20/2012	610	Yes
4/24/2013	420	Yes
10/15/2013	450	Yes
3/8/2014	127	Yes
5/14/2014	10.3	Yes
7/29/2014	319	Yes
10/15/2014	214	Yes
1/14/2015	288	Yes
4/15/2015	354	Yes
7/21/2015	323	Yes
10/6/2015	106	Yes

North Plume, Well IW-76
Date Range: 4/17/2012 to 10/6/2015



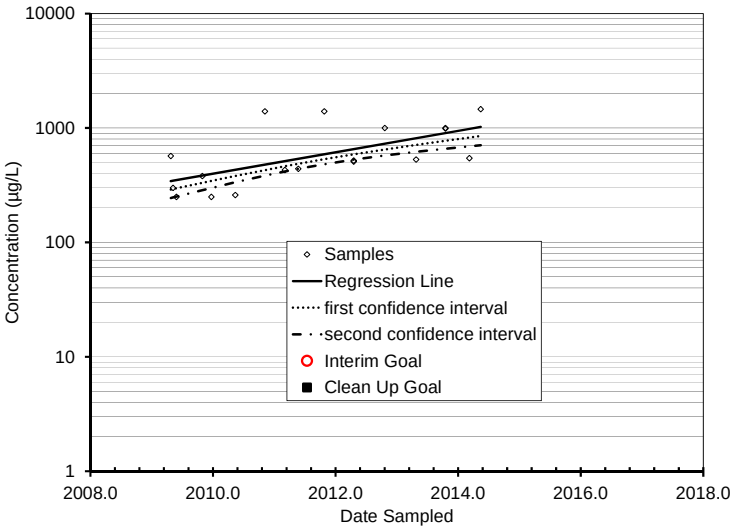


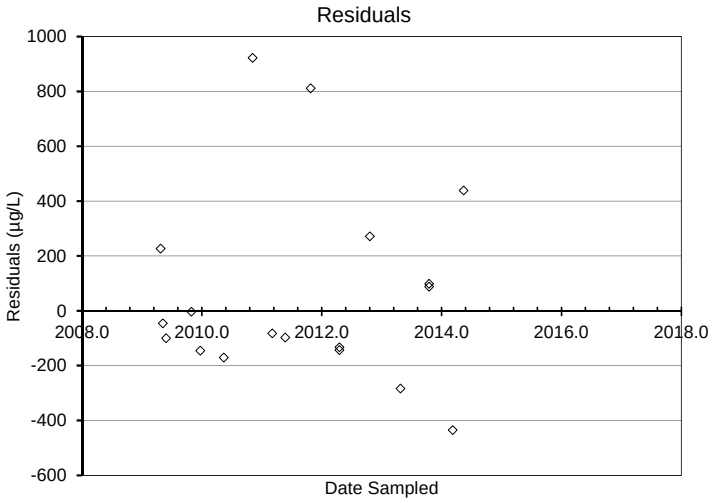
FOD 100%
Slope -0.28
p-value >0.05
Regression residuals are appropriately distributed
Slope is not significant
Slope used to estimate degradation rate

North Plume, Well IW-77

Date	Value	Included in Regression
4/23/2009	570	Yes
5/7/2009	300	Yes
5/27/2009	250	Yes
10/28/2009	380	Yes
12/21/2009	250	Yes
5/13/2010	260	Yes
11/5/2010	1400	Yes
3/4/2011	430	Yes
5/23/2011	440	Yes
10/25/2011	1400	Yes
4/17/2012	520	Yes
4/17/2012	510	Yes
10/19/2012	1000	Yes
4/24/2013	530	Yes
10/16/2013	1000	Yes
10/16/2013	990	Yes
3/8/2014	546	Yes
5/14/2014	1460	Yes
7/9/2014	1200	No
7/29/2014	1540	No
10/15/2014	741	No
10/23/2014	554	No
1/14/2015	201	No
4/14/2015	153	No
7/21/2015	130	No
10/8/2015	24.3	No

North Plume, Well IW-77
Date Range: 4/23/2009 to 5/14/2014 (ISCO Impacts Excluded)



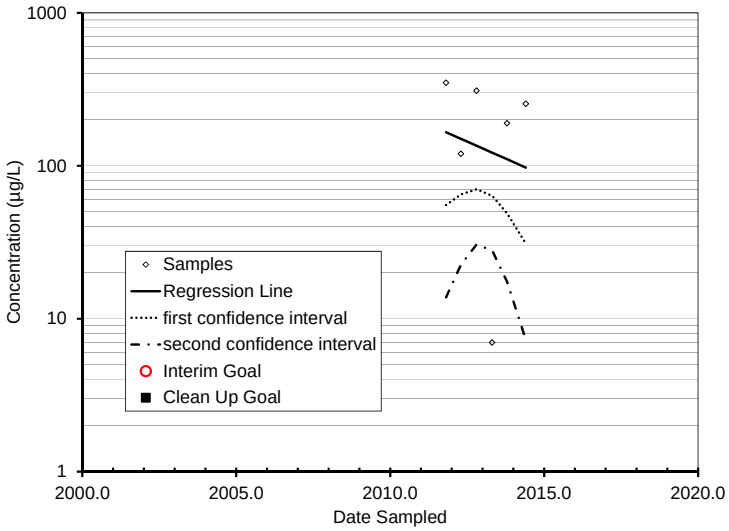


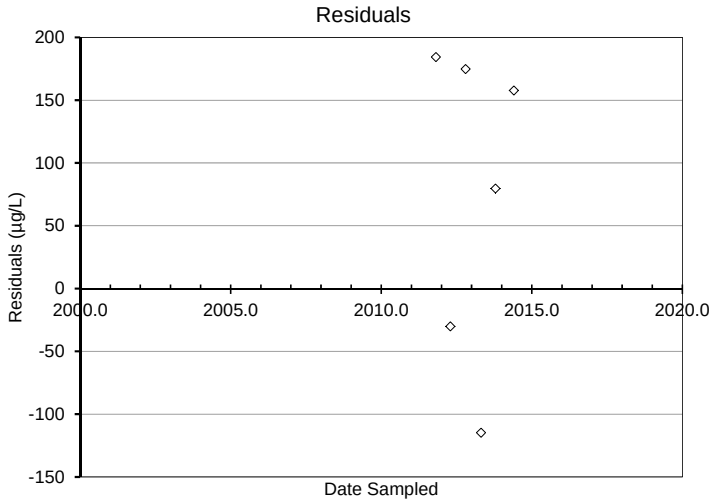
FOD 100%
Slope 0.22
p-value <0.01
Regression residuals are potentially biased
Slope is not significant
Slope not used to estimate degradation rate

North Plume, Well IW-78

Date	Value	Included in Regression
10/25/2011	350	Yes
4/18/2012	120	Yes
10/20/2012	310	Yes
4/24/2013	7	Yes
10/17/2013	190	Yes
5/28/2014	255	Yes
9/11/2014	39.6	No

North Plume, Well IW-78
Date Range: 10/25/2011 to 5/28/2014 (ISCO Impacts Excluded)



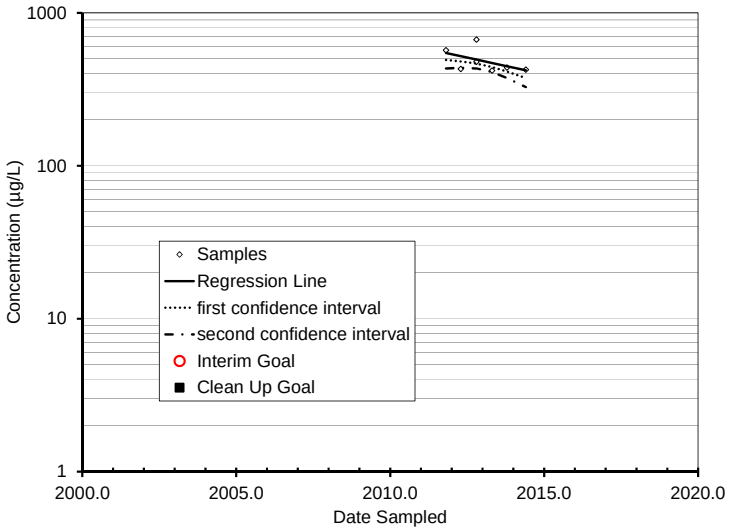


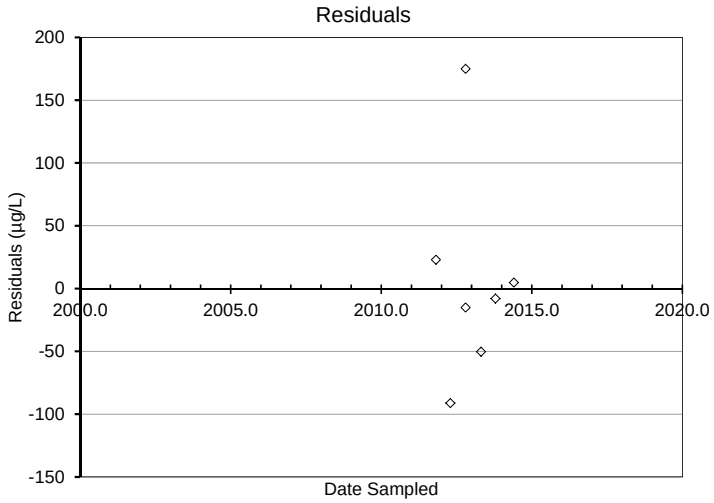
FOD 100%
Slope -0.21
p-value >0.05
Regression residuals are potentially biased
Slope is trend is not significant
Slope not used to estimate degradation rate

North Plume, Well IW-79

Date	Value	Included in Regression
10/25/2011	570	Yes
4/17/2012	430	Yes
10/20/2012	670	Yes
10/20/2012	480	Yes
4/24/2013	420	Yes
10/17/2013	440	Yes
5/28/2014	426	Yes
9/11/2014	105	No

North Plume, Well IW-79
Date Range: 10/25/2011 to 5/28/2014 (ISCO Impacts Excluded)



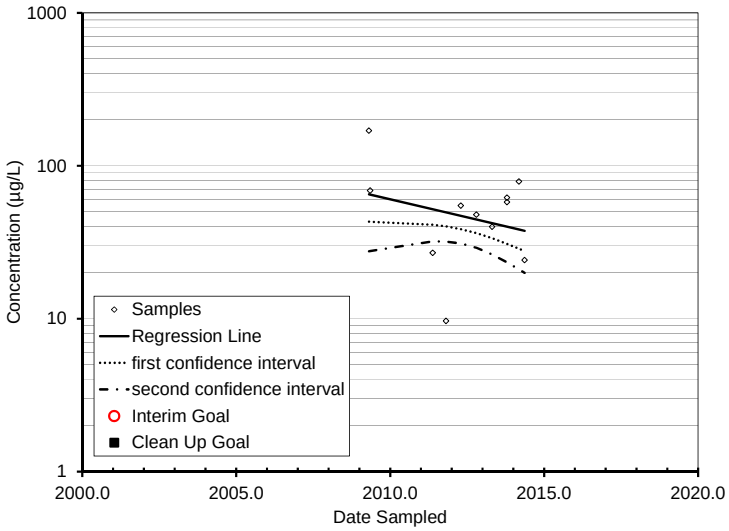


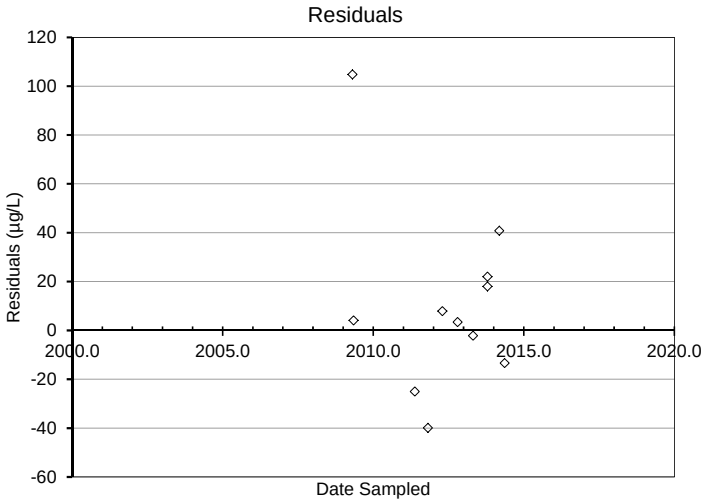
FOD 100%
Slope -0.10
p-value >0.05
Regression residuals are appropriately distributed
Slope is not significant
Slope used to estimate degradation rate

North Plume, Well IW-80

Date	Value	Included in Regression
4/23/2009	170	Yes
5/7/2009	69	Yes
5/19/2011	27	Yes
10/25/2011	9.7	Yes
4/17/2012	55	Yes
10/19/2012	48	Yes
4/24/2013	40	Yes
10/17/2013	58	Yes
10/17/2013	62	Yes
3/8/2014	79.1	Yes
5/13/2014	24.2	Yes
7/30/2014	25.6	No
10/14/2014	11.8	No
1/13/2015	7.1	No
4/14/2015	9.2	No
7/21/2015	12.5	No
10/6/2015	10.6	No

North Plume, Well IW-80
Date Range: 4/23/2009 to 5/13/2014 (ISCO Impacts Excluded)



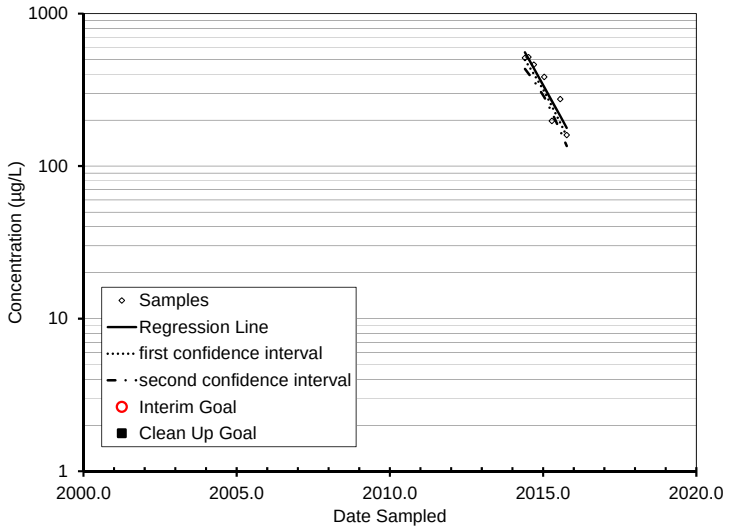


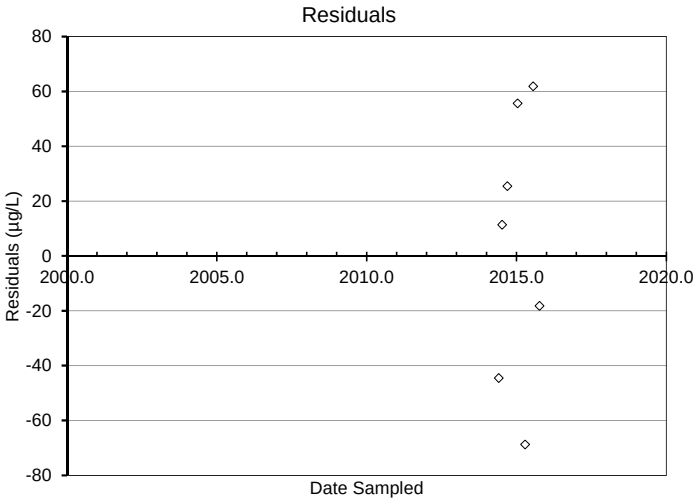
FOD 100%
Slope -0.11
p-value >0.05
Regression residuals are appropriately distributed
Slope is not significant
Slope used to estimate degradation rate

North Plume, Well MW-81

Date	Value	Included in Regression
5/29/2014	512	Yes
7/9/2014	518	Yes
9/11/2014	463	Yes
1/13/2015	385	Yes
4/15/2015	198	Yes
7/22/2015	275	Yes
10/8/2015	160	Yes

North Plume, Well MW-81
Date Range: 5/29/2014 to 10/8/2015



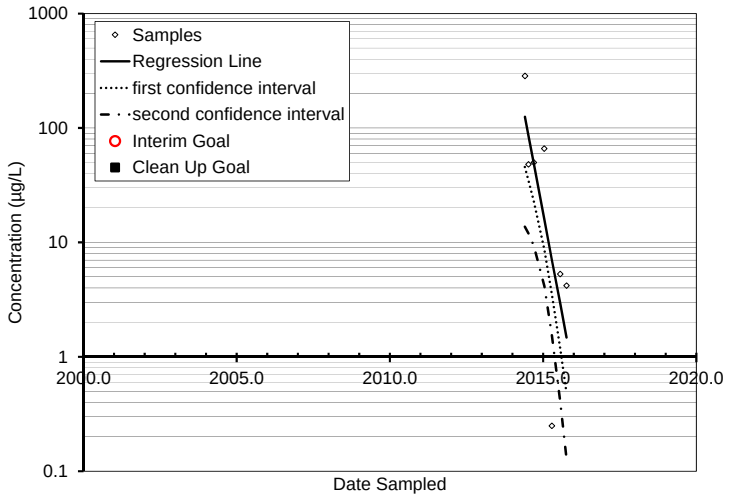


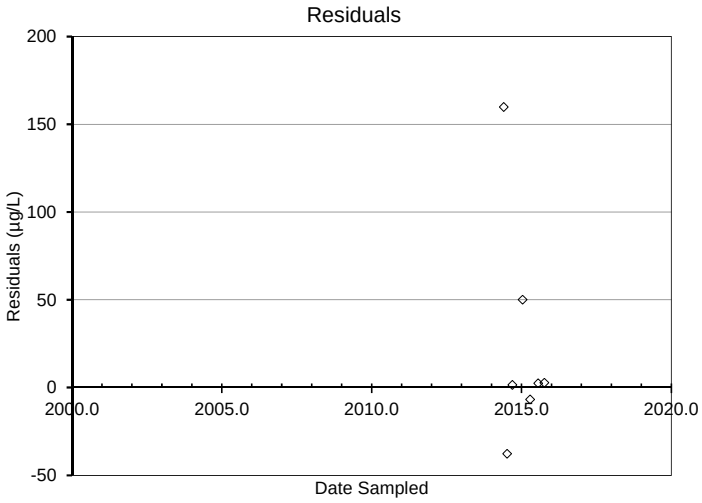
FOD 100%
Slope -0.84
p-value <0.01
Regression residuals are appropriately distributed
Slope is negative
Regression fit not used to estimate degradation due to low sample size

North Plume, Well MW-82

Date	Value	Included in Regression
5/28/2014	285	Yes
7/9/2014	48.2	Yes
9/11/2014	50	Yes
1/13/2015	66	Yes
4/15/2015	0.25	Yes
7/22/2015	5.3	Yes
10/6/2015	4.2	Yes

North Plume, Well MW-82
Date Range: 5/28/2014 to 10/6/2015



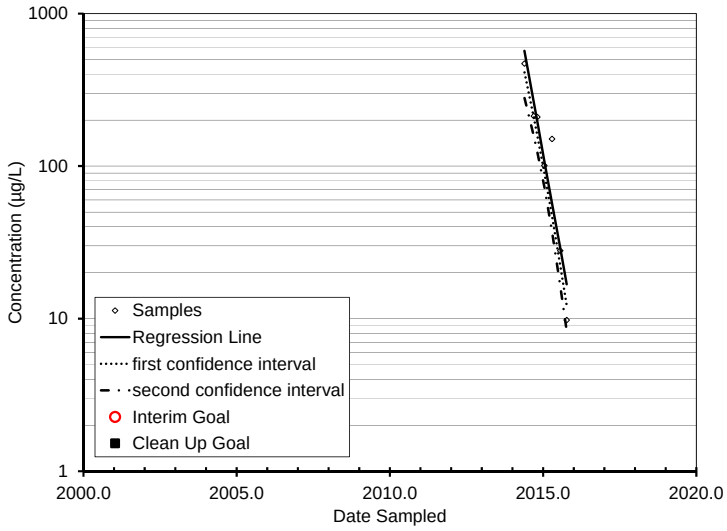


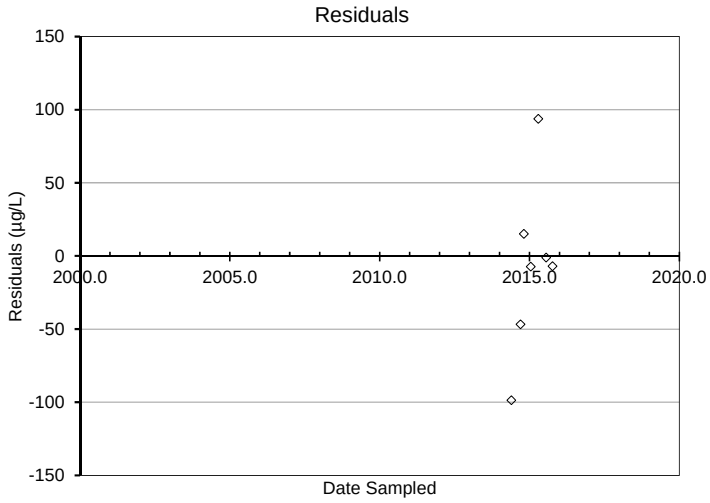
FOD 86%
Slope -3.27
p-value >0.05
Regression residuals are appropriately distributed
Slope is not significant
Regression fit not used to estimate degradation rate due to low sample size

North Plume, Well MW-83

Date	Value	Included in Regression
5/23/2014	470	Yes
9/12/2014	213	Yes
10/23/2014	210	Yes
1/15/2015	101	Yes
4/16/2015	151	Yes
7/22/2015	27.9	Yes
10/8/2015	9.8	Yes

North Plume, Well MW-83
Date Range: 5/23/2014 to 10/8/2015



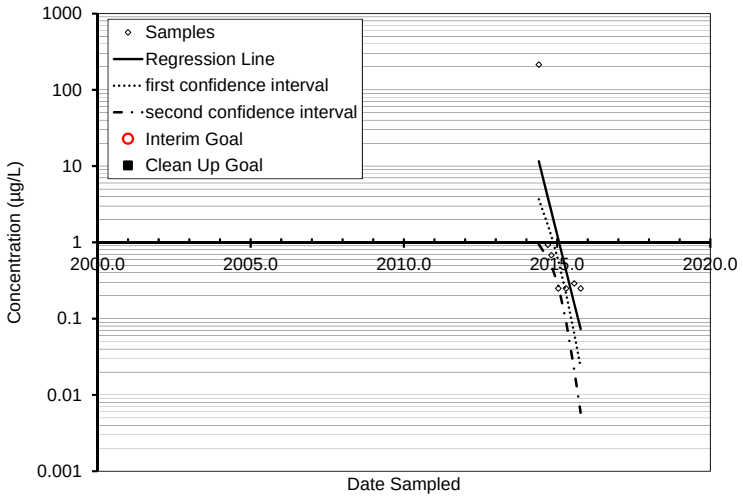


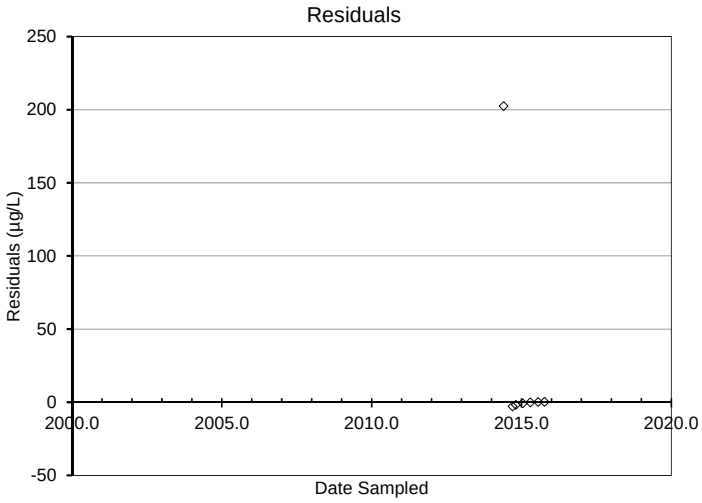
FOD 100%
Slope -2.6
p-value <0.01
Regression residuals are appropriately distributed
Slope is negative
Regression not used to estimate degradation rate due to low sample size

North Plume, Well MW-84

Date	Value	Included in Regression
5/27/2014	214	Yes
9/12/2014	0.93	Yes
10/23/2014	0.68	Yes
1/14/2015	0.25	Yes
4/16/2015	0.25	Yes
7/23/2015	0.29	Yes
10/7/2015	0.25	Yes

North Plume, Well MW-84
Date Range: 5/27/2014 to 10/7/2015



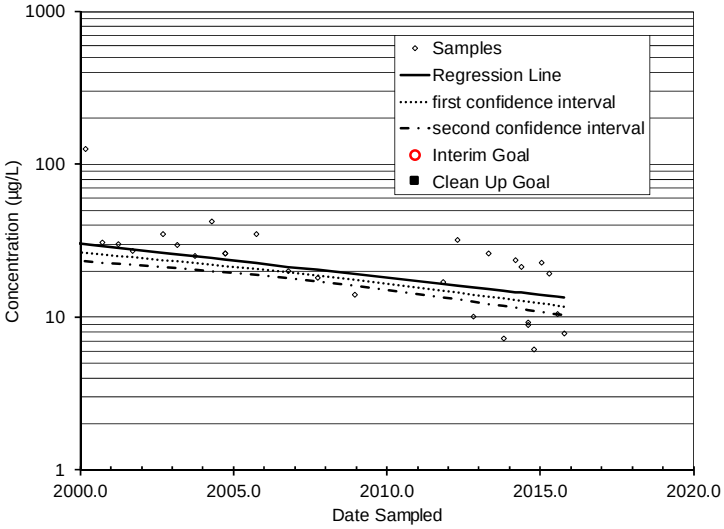


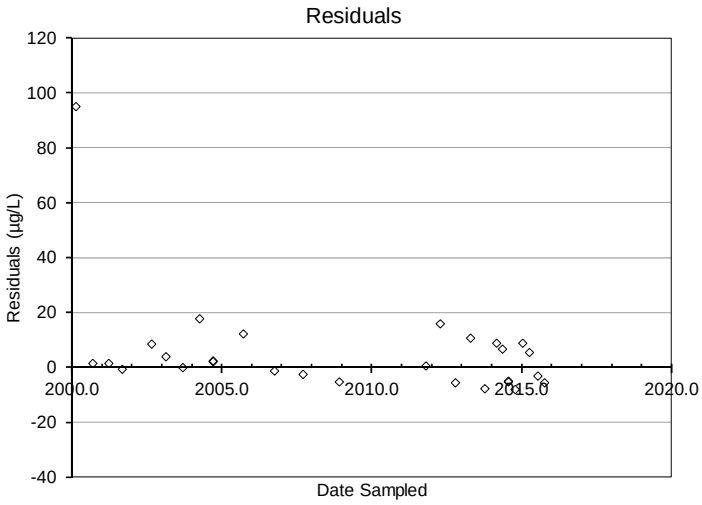
FOD 57%
Slope -3.7
p-value >0.05
Regression residuals are appropriately distributed
Slope is not significant
Regression fit not used to estimate degradation rate due to low sample size

South Plume, Well ITMW-1

Date	Value	Included in Regression
11/1/1993	10	Yes
12/1/1996	21	Yes
2/1/1999	37	Yes
3/1/2000	125	Yes
9/19/2000	30.7	Yes
3/27/2001	30	Yes
9/11/2001	27	Yes
9/10/2002	35	Yes
2/27/2003	29.6	Yes
9/23/2003	25	Yes
4/13/2004	42.2	Yes
9/21/2004	26	Yes
9/21/2004	26.1	Yes
9/28/2005	34.7	Yes
10/14/2006	20	Yes
9/20/2007	18	Yes
12/9/2008	14	Yes
10/27/2011	17	Yes
4/18/2012	32	Yes
10/19/2012	10	Yes
4/24/2013	26	Yes
10/15/2013	7.2	Yes
3/8/2014	23.4	Yes
5/13/2014	21.3	Yes
7/30/2014	9.2	Yes
7/30/2014	8.9	Yes
10/15/2014	6.1	Yes
1/14/2015	22.7	Yes
4/15/2015	19.2	Yes
7/22/2015	10.5	Yes
10/7/2015	7.8	Yes

South Plume, Well ITMW-1
Date Range: 11/1/1993 to 10/7/2015



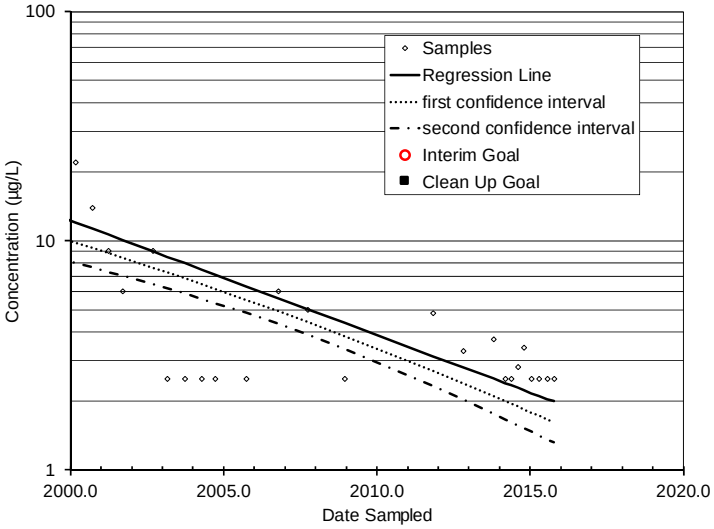


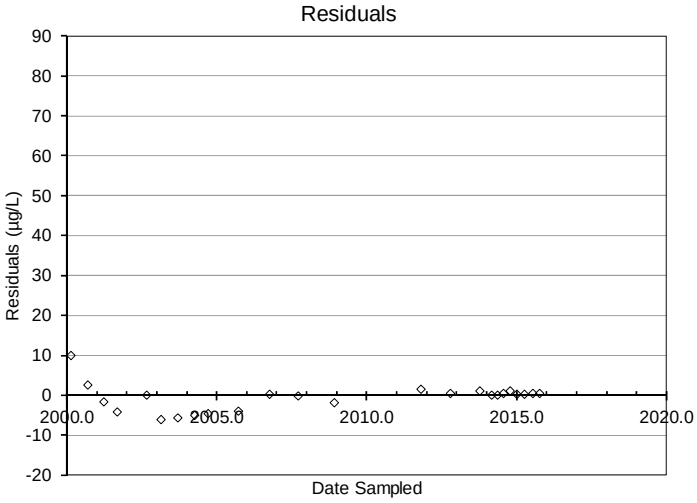
FOD 100%
Slope -0.052
p-value <0.01
Regression residuals are potentially biased
Slope is negative
Slope not used to estimate degradation rate

South Plume, Well ITMW-4

Date	Value	Included in Regression
12/1/1996	75	Yes
2/1/1999	93	Yes
3/1/2000	22	Yes
9/20/2000	13.9	Yes
3/28/2001	9	Yes
9/13/2001	6	Yes
9/10/2002	9	Yes
2/28/2003	2.5	Yes
9/23/2003	2.5	Yes
4/14/2004	2.5	Yes
9/22/2004	2.5	Yes
9/27/2005	2.5	Yes
10/11/2006	6	Yes
9/20/2007	5	Yes
12/9/2008	2.5	Yes
10/25/2011	4.8	Yes
10/17/2012	3.3	Yes
10/14/2013	3.7	Yes
3/6/2014	2.5	Yes
5/13/2014	2.5	Yes
7/30/2014	2.8	Yes
10/16/2014	3.4	Yes
1/13/2015	2.5	Yes
7/22/2015	2.5	Yes
10/6/2015	2.5	Yes

South Plume, Well ITMW-4
Date Range: 12/1/1996 to 10/6/2015



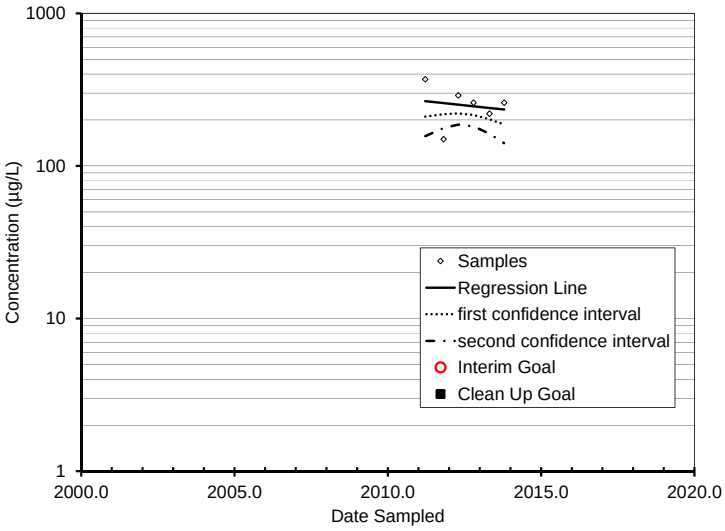


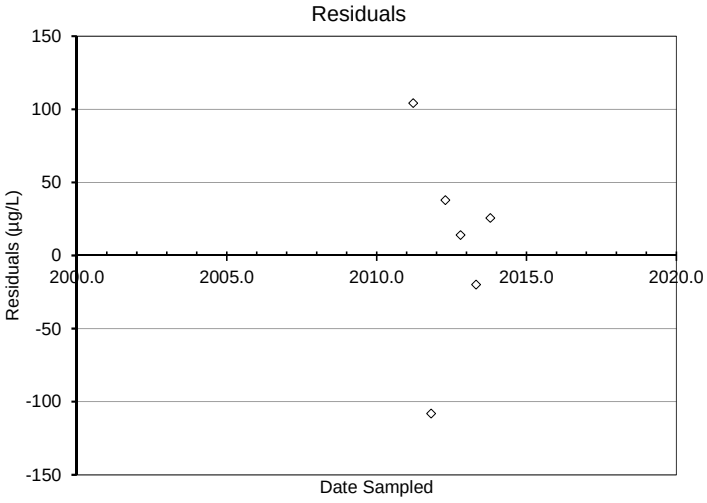
FOD 77%
Slope -0.12
p-value <0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

South Plume, Well ITMW-5

Date	Value	Included in Regression
2/1/1999	86	No
3/1/2000	73	No
9/20/2000	85	No
3/28/2001	100	No
9/13/2001	72	No
9/10/2002	108	No
2/28/2003	90.4	No
9/24/2003	97.3	No
4/14/2004	83.9	No
9/22/2004	105	No
4/6/2005	93.2	No
4/6/2005	87	No
9/28/2005	79	No
9/28/2005	82.1	No
3/14/2006	92	No
3/14/2006	98.4	No
10/10/2006	110	No
4/18/2007	115	No
9/20/2007	120	No
4/29/2008	120	No
12/9/2008	200	No
4/27/2009	160	No
5/11/2010	190	No
11/6/2010	350	No
3/22/2011	370	Yes
10/25/2011	150	Yes
4/17/2012	290	Yes
10/18/2012	260	Yes
4/25/2013	220	Yes
10/16/2013	260	Yes

South Plume, Well ITMW-5
Date Range: 3/22/2011 to 10/16/2013 (Refined Analysis)



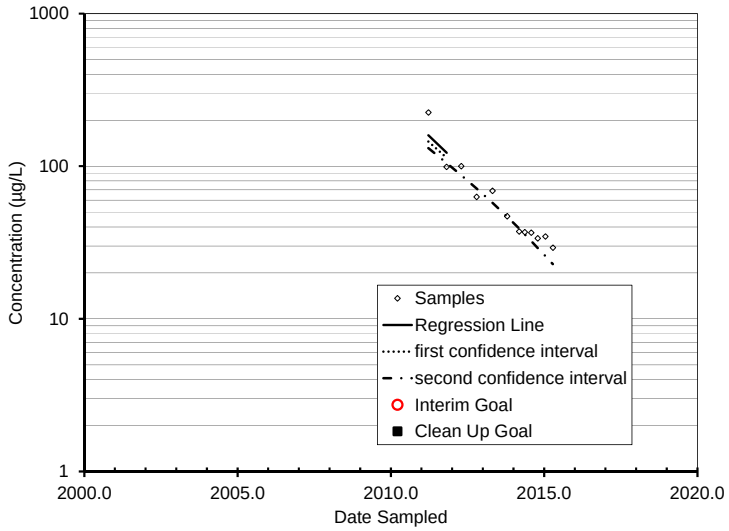


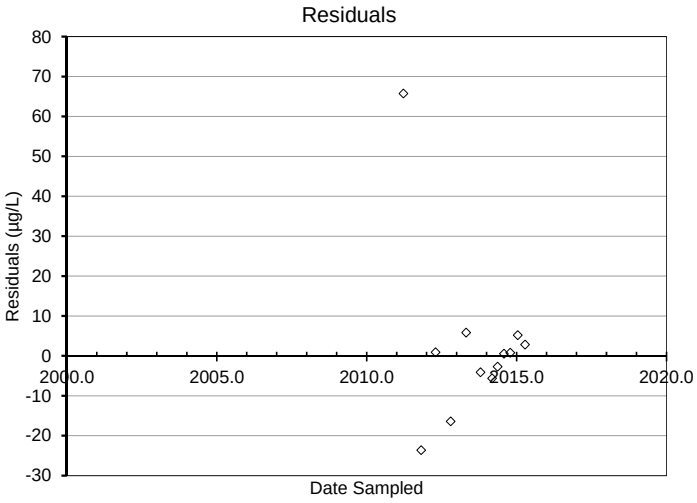
FOD 100%
Slope -0.049
p-value >0.05
Residuals are appropriated distributed
Slope is not significant
Slope used to estimate degradation rate

South Plume, Well ITMW-7

Date	Value	Included in Regression
12/1/1996	290	No
5/1/1997	380	No
6/1/1999	320	No
6/1/1999	300	No
3/1/2000	262	No
3/1/2000	207	No
9/19/2000	207	No
9/21/2000	109	No
3/28/2001	161	No
9/13/2001	139	No
9/10/2002	137	No
9/10/2002	128	No
2/27/2003	172	No
9/24/2003	125	No
4/14/2004	201	No
9/22/2004	132	No
4/7/2005	122	No
9/28/2005	100	No
3/14/2006	153	No
10/10/2006	140	No
4/17/2007	83	No
9/21/2007	72	No
4/30/2008	70	No
12/11/2008	66	No
4/27/2009	87	No
10/28/2009	60	No
5/10/2010	73	No
3/23/2011	225	Yes
10/25/2011	99	Yes
4/18/2012	100	Yes
10/18/2012	63	Yes
4/25/2013	69	Yes
10/17/2013	47	Yes
3/8/2014	37.4	Yes
5/14/2014	37	Yes
7/30/2014	36.7	*No*
10/15/2014	33.7	*No*
1/14/2015	34.7	*No*
4/14/2015	29.3	*No*
7/22/2015	26.4	*No*
10/8/2015	27.6	*No*

South Plume, Well ITMW-7
Date Range: 3/23/2011 to 5/14/2014 (ISCO Impacts Excluded, Refined)



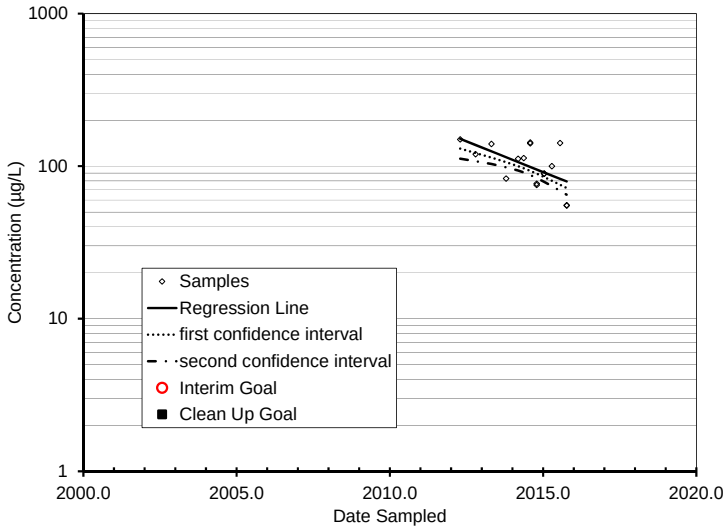


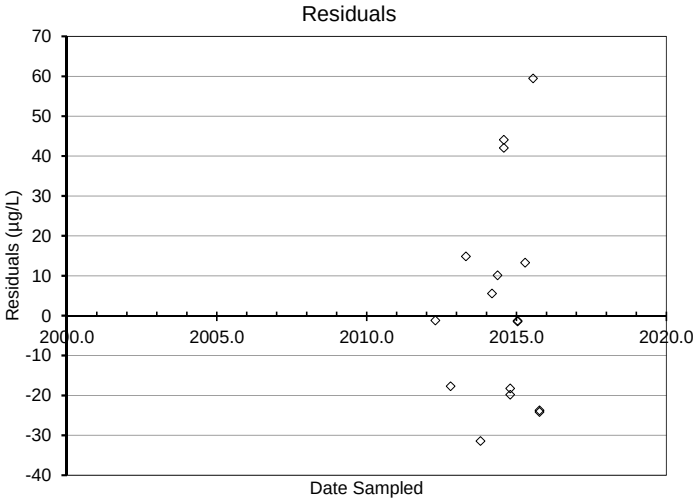
FOD 100%
Slope -0.40
p-value < 0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

South Plume, Well ITMW-9

Date	Value	Included in Regression
12/1/1996	230	No
5/1/1997	7	No
2/1/1999	40	No
3/1/2000	69	No
9/20/2000	57.3	No
9/20/2000	54.8	No
3/28/2001	40	No
9/13/2001	40	No
9/10/2002	61	No
2/28/2003	54.2	No
9/23/2003	91	No
9/23/2003	97.6	No
4/14/2004	71.8	No
9/22/2004	80.7	No
4/6/2005	79	No
9/27/2005	98.8	No
3/14/2006	101	No
10/11/2006	110	No
4/17/2007	79	No
9/20/2007	76	No
4/28/2008	82	No
12/9/2008	90	No
4/27/2009	110	No
10/27/2009	120	No
10/27/2009	120	No
5/11/2010	130	No
3/22/2011	120	No
10/25/2011	90	No
4/17/2012	150	Yes
10/18/2012	120	Yes
4/24/2013	140	Yes
10/17/2013	83	Yes
3/8/2014	112	Yes
5/14/2014	113	Yes
7/30/2014	143	Yes
7/30/2014	141	Yes
10/15/2014	75.3	Yes
10/15/2014	76.9	Yes
1/13/2015	89.4	Yes
1/13/2015	89.6	Yes
4/15/2015	100	Yes
7/21/2015	142	Yes
10/7/2015	55.6	Yes
10/7/2015	55.2	Yes

South Plume, Well ITMW-9
Date Range: 4/17/2012 to 10/7/2015 (Refined Analysis)



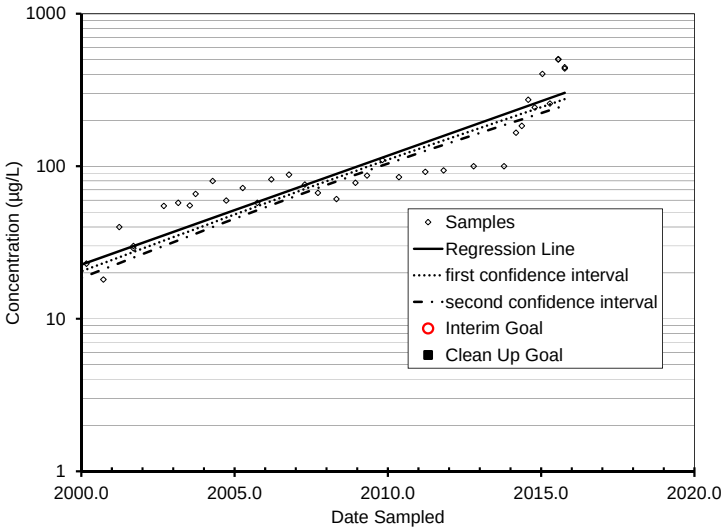


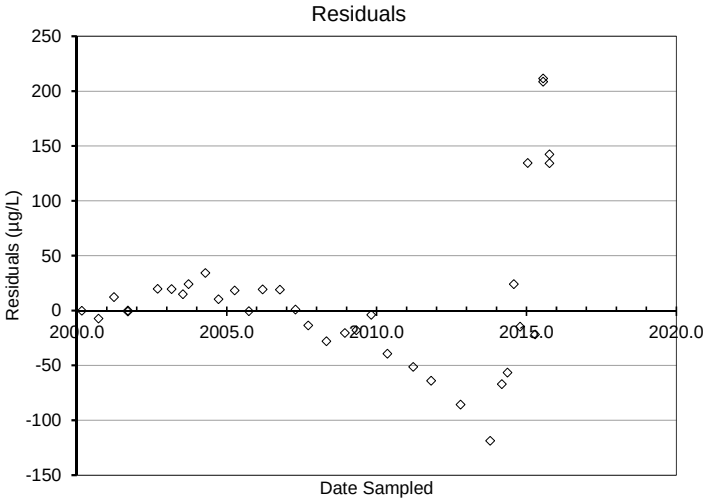
FOD 100%
Slope -0.19
p-value 0.02
Slope is negative
Regression is acceptable
Slope used to estimate degradation rate

South Plume, Well ITMW-10

Date	Value	Included in Regression
12/1/1996	4	Yes
2/1/1999	25	Yes
3/1/2000	23	Yes
9/20/2000	18.1	Yes
3/28/2001	40	Yes
9/13/2001	29	Yes
9/13/2001	30	Yes
9/10/2002	55	Yes
2/28/2003	57.6	Yes
7/16/2003	55.3	Yes
9/23/2003	65.9	Yes
4/14/2004	80	Yes
9/22/2004	59.6	Yes
4/6/2005	72.1	Yes
9/28/2005	57.6	Yes
3/14/2006	82	Yes
10/10/2006	88	Yes
4/17/2007	76	Yes
9/20/2007	67	Yes
4/28/2008	61	Yes
12/9/2008	78	Yes
4/27/2009	87	Yes
10/27/2009	110	Yes
5/11/2010	85	Yes
3/22/2011	92	Yes
10/25/2011	94	Yes
10/18/2012	100	Yes
10/15/2013	100	Yes
3/6/2014	166	Yes
5/14/2014	184	Yes
7/30/2014	273	Yes
10/15/2014	243	Yes
1/14/2015	403	Yes
4/15/2015	258	Yes
7/22/2015	501	Yes
7/22/2015	504	Yes
10/7/2015	437	Yes
10/7/2015	445	Yes

South Plume, Well ITMW-10
Date Range: 12/1/1996 to 10/7/2015



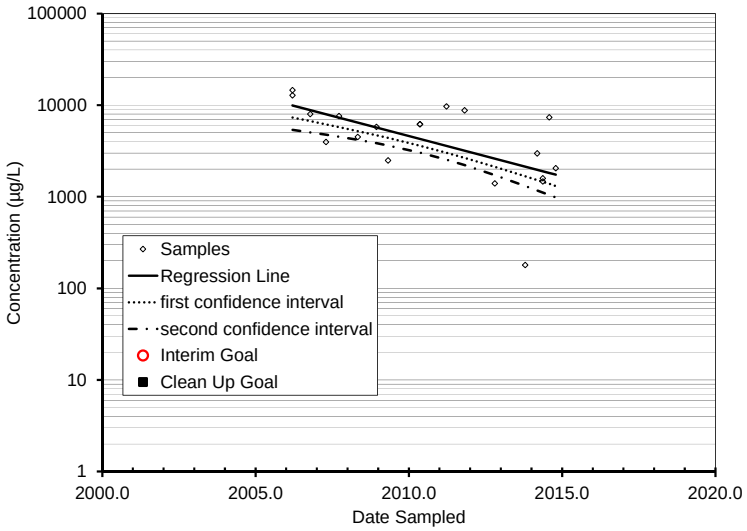


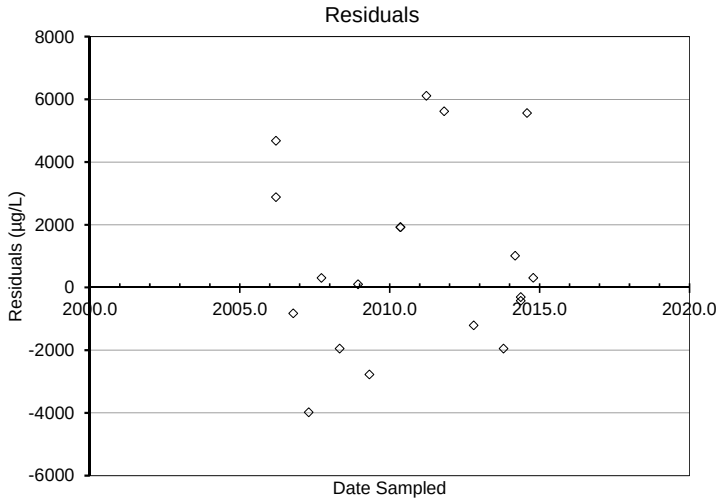
FOD 100%
Slope 0.16
p-value < 0.001
Slope is positive
Regression residuals are not appropriately distributed
Slope not used to estimate degradation rate

South Plume, Well ITMW-11

Date	Value	Included in Regression
1/1/1990	19000	*No*
11/1/1990	4700	*No*
2/1/1991	3400	*No*
11/1/1993	2300	*No*
12/1/1996	510	*No*
2/1/1999	650	*No*
3/1/2000	3370	*No*
9/19/2000	8030	*No*
3/27/2001	7000	*No*
9/13/2001	6000	*No*
11/20/2001	2.5	*No*
9/9/2002	7100	*No*
9/9/2002	800	*No*
2/26/2003	4110	*No*
2/26/2003	3630	*No*
9/24/2003	3990	*No*
4/13/2004	3160	*No*
9/21/2004	3450	*No*
4/7/2005	4210	*No*
9/29/2005	3910	No
3/16/2006	14600	Yes
3/16/2006	12800	Yes
10/13/2006	8000	Yes
4/19/2007	3970	Yes
9/21/2007	7600	Yes
4/30/2008	4500	Yes
12/10/2008	5800	Yes
4/27/2009	2500	Yes
5/11/2010	6200	Yes
5/11/2010	6200	Yes
3/23/2011	9700	Yes
10/26/2011	8800	Yes
10/19/2012	1400	Yes
10/17/2013	180	Yes
3/8/2014	2980	Yes
5/15/2014	1470	Yes
5/15/2014	1590	Yes
7/31/2014	7380	Yes
10/15/2014	2050	Yes
12/4/2014	1530	*No*
1/15/2015	68.3	*No*
4/15/2015	2.5	*No*
7/22/2015	33.2	*No*
10/7/2015	721	*No*

South Plume, Well ITMW-11
Date Range: 3/16/2006 to 10/15/2014 (ISCO Impacts Excluded, Refined)



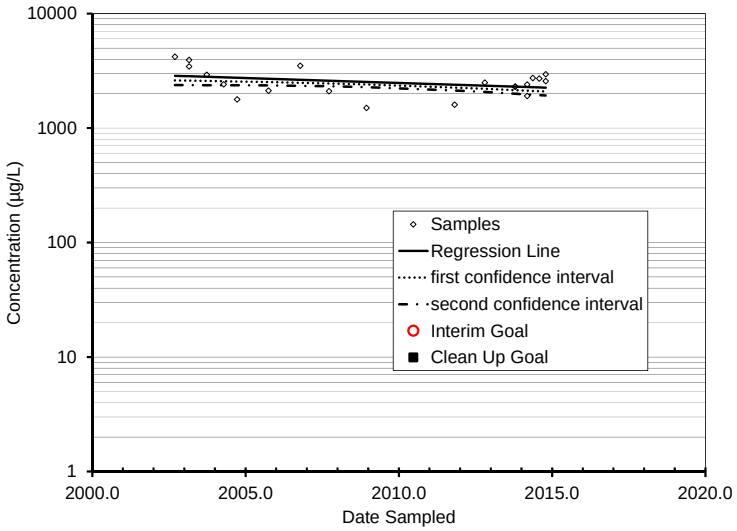


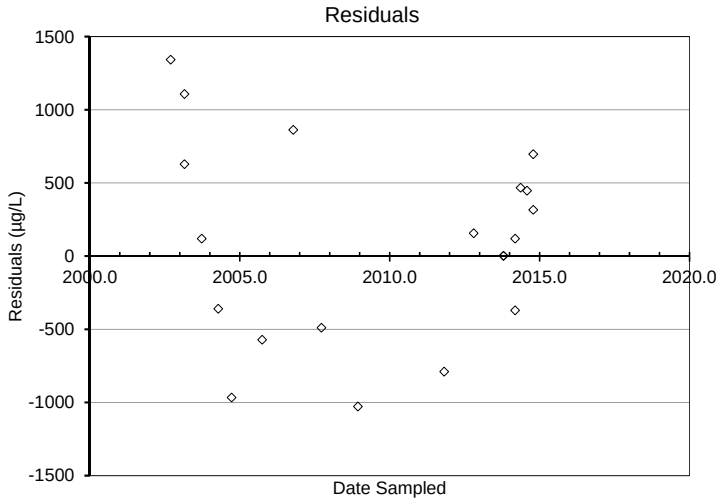
FOD 100%
Slope -0.20
p-value <0.01
Slope is negative
Regression residuals are biased
Slope not used to estimate degradation rate

South Plume, Well ITMW-12

Date	Value	Included in Regression
11/1/1990	2400	No
2/1/1991	2100	No
11/1/1993	2500	No
12/1/1996	1200	No
2/1/1999	3100	No
3/1/2000	3110	No
9/19/2000	3350	No
3/27/2001	3900	No
9/13/2001	3100	No
11/20/2001	2400	No
9/11/2002	4200	Yes
2/26/2003	3460	Yes
2/26/2003	3940	Yes
9/24/2003	2920	Yes
4/13/2004	2410	Yes
9/21/2004	1780	Yes
9/29/2005	2120	Yes
10/13/2006	3500	Yes
9/21/2007	2100	Yes
12/9/2008	1500	Yes
10/26/2011	1600	Yes
10/19/2012	2500	Yes
10/17/2013	2300	Yes
10/17/2013	2300	Yes
3/8/2014	1910	Yes
3/8/2014	2400	Yes
5/14/2014	2740	Yes
7/31/2014	2710	Yes
10/15/2014	2950	Yes
10/15/2014	2570	Yes
7/23/2015	652	No
10/7/2015	314	No

South Plume, Well ITMW-12
Date Range: 9/11/2002 to 10/15/2014 (ISCO Impacts Excluded, Refined)



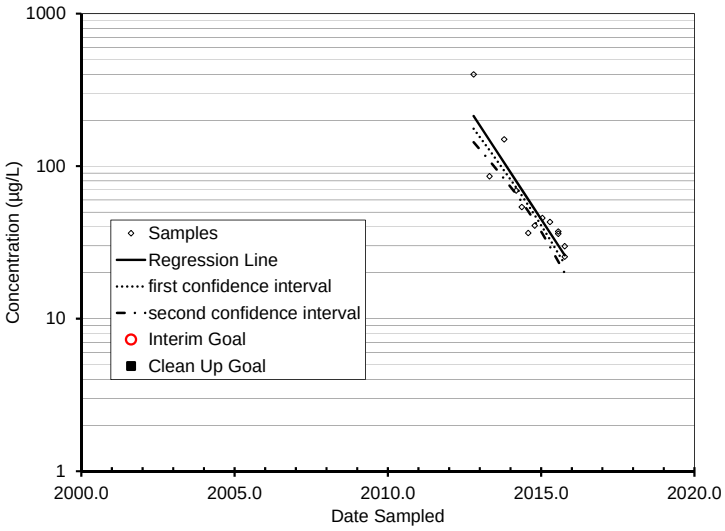


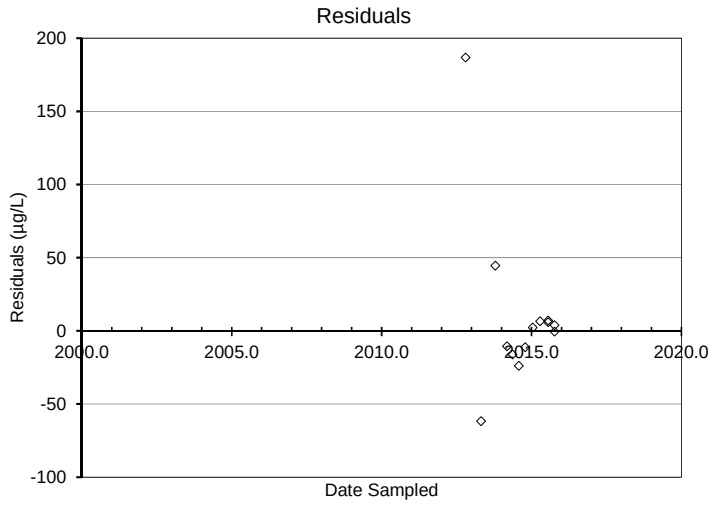
FOD 100%
Slope -0.020
p-value >0.05
Slope is not significant
Regression residuals are not appropriately distributed
Slope not used to estimate degradation rate

South Plume, Well ITMW-13

Date	Value	Included in Regression
11/1/1990	34	No
2/1/1991	32	No
12/1/1996	36	No
2/1/1999	36	No
3/1/2000	37	No
9/19/2000	22.4	No
3/28/2001	44	No
9/13/2001	35	No
9/9/2002	99	No
9/9/2002	81	No
2/26/2003	70.2	No
9/24/2003	159	No
4/13/2004	48.4	No
9/21/2004	25.5	No
4/7/2005	71.8	No
9/30/2005	72.7	No
3/16/2006	141	No
10/14/2006	100	No
4/18/2007	83.1	No
9/20/2007	28	No
4/29/2008	69	No
12/10/2008	26	No
4/27/2009	79	No
10/27/2009	18	No
5/12/2010	97	No
3/23/2011	130	No
10/27/2011	64	No
10/27/2011	65	No
4/19/2012	97	No
10/18/2012	400	Yes
4/25/2013	86	Yes
10/16/2013	150	Yes
3/8/2014	69.3	Yes
5/14/2014	54	Yes
7/30/2014	36.5	Yes
10/15/2014	40.8	Yes
1/14/2015	45.8	Yes
4/15/2015	43.1	Yes
7/22/2015	36.1	Yes
7/22/2015	37.3	Yes
10/7/2015	29.9	Yes
10/7/2015	25.5	Yes

South Plume, Well ITMW-13
Date Range: 10/18/2012 to 10/7/2015 (Refined)



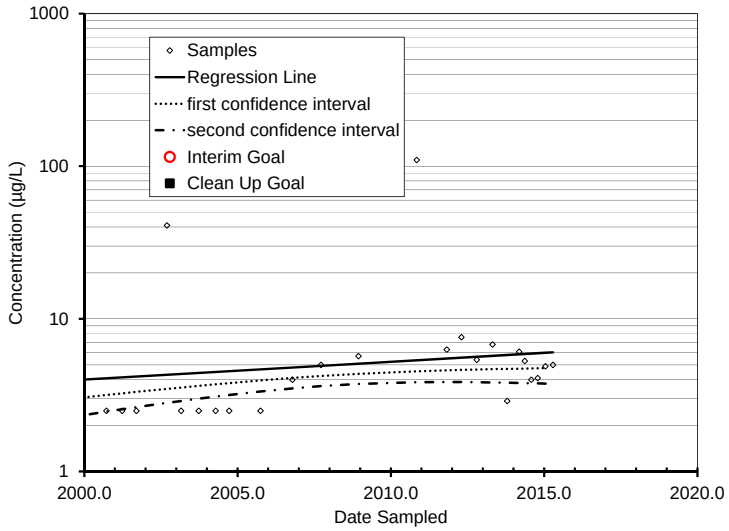


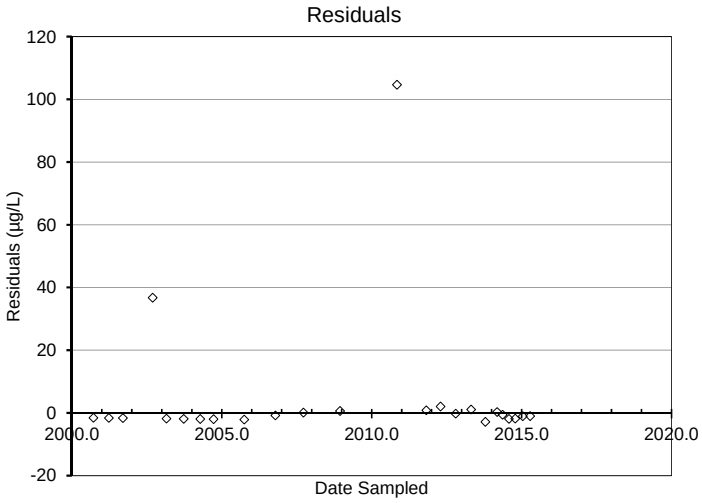
FOD= 100%
Slope -0.71
p-value <0.001
Slope is negative
Regression residuals are biased
Slope not used to estimate degradation rate

South Plume, Well ITMW-14

Date	Value	Included in Regression
11/1/1993	6	Yes
9/19/2000	2.5	Yes
3/27/2001	2.5	Yes
9/13/2001	2.5	Yes
9/11/2002	41	Yes
2/26/2003	2.5	Yes
9/24/2003	2.5	Yes
4/13/2004	2.5	Yes
9/21/2004	2.5	Yes
9/30/2005	2.5	Yes
10/14/2006	4	Yes
9/21/2007	5	Yes
12/10/2008	5.7	Yes
11/4/2010	110	Yes
10/27/2011	6.3	Yes
4/19/2012	7.6	Yes
10/19/2012	5.4	Yes
4/25/2013	6.8	Yes
10/16/2013	2.9	Yes
3/8/2014	6.1	Yes
5/14/2014	5.3	Yes
7/30/2014	4	Yes
10/15/2014	4.1	Yes
1/14/2015	4.9	Yes
4/15/2015	5	Yes
7/22/2015	4.3	Yes
10/7/2015	4.6	Yes

South Plume, Well ITMW-14
Date Range: 11/1/1993 to 10/7/2015



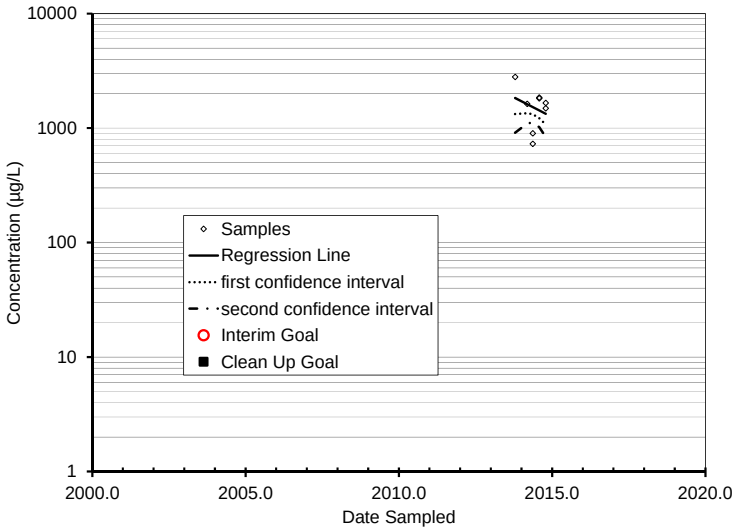


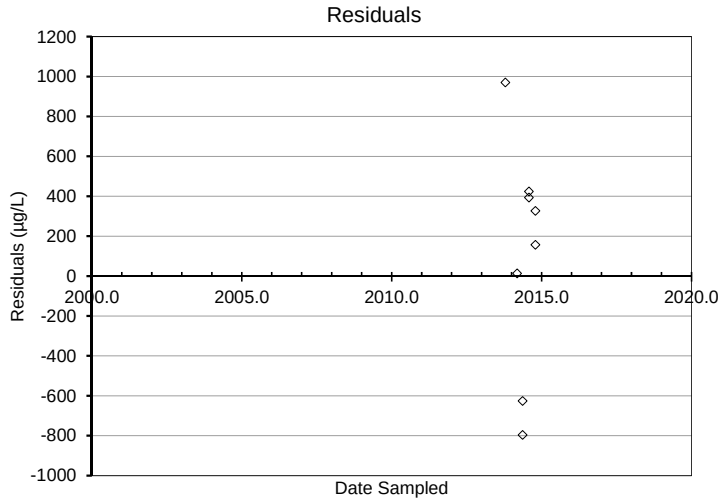
FOD 70%
Slope 0.022
p-value >0.05
Regression residuals are potentially biased
Slope trend is not significant
Slope not used to estimate degradation rate

South Plume, Well ITMW-15

Date	Value	Included in Regression
11/1/1990	2500	No
2/1/1991	1700	No
4/15/1991	2000	No
4/19/1991	2100	No
4/20/1991	2400	No
11/1/1993	4300	No
12/1/1996	240	No
2/1/1999	400	No
3/1/2000	339	No
9/19/2000	362	No
9/19/2000	376	No
3/28/2001	290	No
9/13/2001	380	No
9/13/2001	370	No
11/20/2001	157	No
9/11/2002	320	No
2/26/2003	301	No
9/25/2003	490	No
4/14/2004	334	No
9/21/2004	774	No
4/7/2005	685	No
9/29/2005	862	No
3/16/2006	908	No
10/13/2006	680	No
4/19/2007	591	No
9/21/2007	1000	No
4/29/2008	100	No
12/10/2008	1100	No
4/27/2009	2800	No
5/11/2010	2800	No
10/26/2011	1100	No
10/19/2012	240	No
10/16/2013	2800	Yes
3/8/2014	1630	Yes
5/14/2014	899	Yes
5/14/2014	729	Yes
7/30/2014	1850	Yes
7/30/2014	1820	Yes
10/16/2014	1660	Yes
10/16/2014	1490	Yes
12/5/2014	63	*No*
1/15/2015	61.7	*No*
1/15/2015	56.5	*No*
4/15/2015	101	*No*
7/22/2015	110	*No*
10/7/2015	38.9	*No*

South Plume, Well ITMW-15
Date Range: 10/16/2013 to 10/16/2014 (ISCO Impacts Excluded)



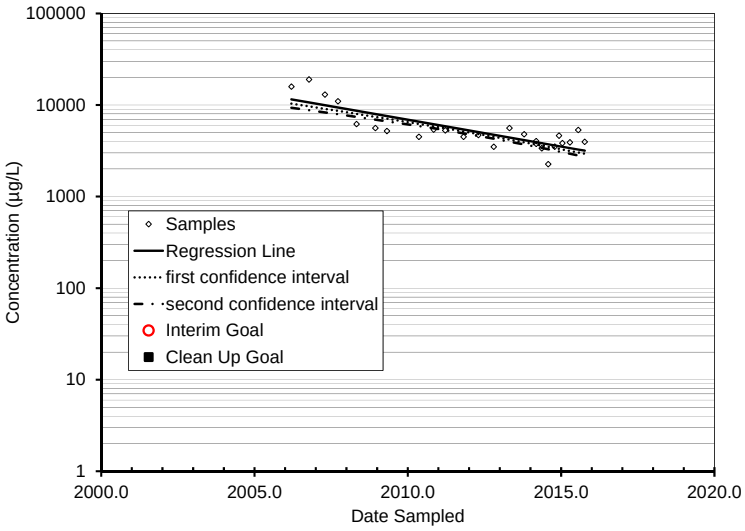


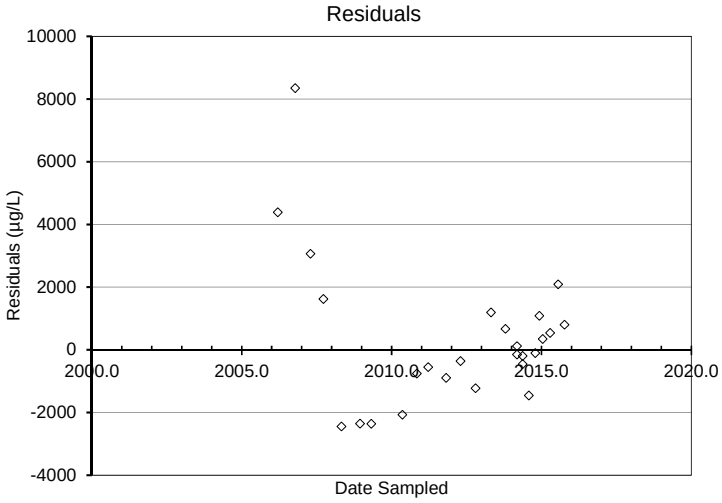
FOD 100%
Slope -0.32
p-value >0.05
Slope is not significant
Regression residuals are not appropriately distributed
Slope not used to estimate degradation rate

South Plume, Well ITMW-17

Date	Value	Included in Regression
2/1/1991	21000	No
4/15/1991	21000	No
4/24/1991	21000	No
11/1/1993	18000	No
12/1/1996	9300	No
2/1/1999	11000	No
3/1/2000	6780	No
9/19/2000	5500	No
1/5/2001	8310	No
3/28/2001	6700	No
9/13/2001	6300	No
9/11/2002	6500	No
2/26/2003	4380	No
9/25/2003	6090	No
4/14/2004	5050	No
4/14/2004	4920	No
9/21/2004	5760	No
4/7/2005	5750	No
9/29/2005	5460	No
3/15/2006	15900	Yes
10/12/2006	19000	Yes
4/18/2007	13000	Yes
9/21/2007	11000	Yes
4/29/2008	6200	Yes
12/10/2008	5600	Yes
4/27/2009	5200	Yes
5/11/2010	4500	Yes
11/4/2010	5400	Yes
3/22/2011	5300	Yes
10/26/2011	4500	Yes
4/19/2012	4700	Yes
10/19/2012	3500	Yes
4/25/2013	5600	Yes
10/17/2013	4800	Yes
3/8/2014	3770	Yes
3/8/2014	4040	Yes
5/15/2014	3370	Yes
5/15/2014	3630	Yes
7/30/2014	2260	Yes
10/16/2014	3510	Yes
12/5/2014	4630	Yes
1/15/2015	3840	Yes
4/15/2015	3920	Yes
7/22/2015	5350	Yes
10/7/2015	3970	Yes

South Plume, Well ITMW-17
Date Range: 3/15/2006 to 10/7/2015 (ISCO Impacts Excluded)



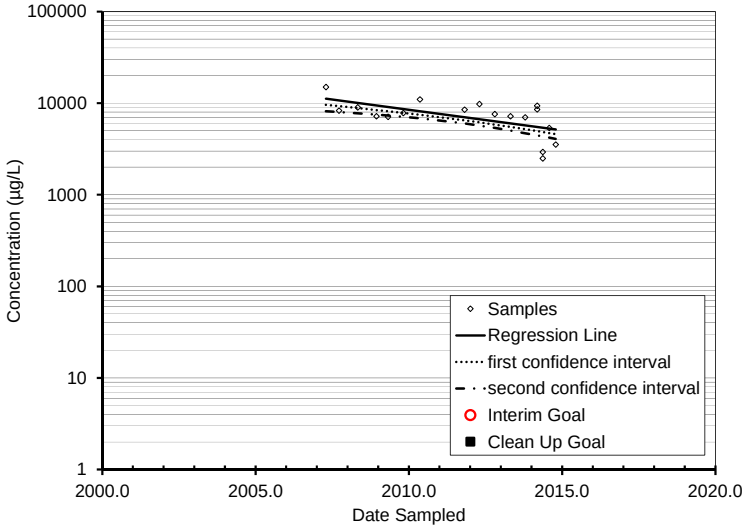


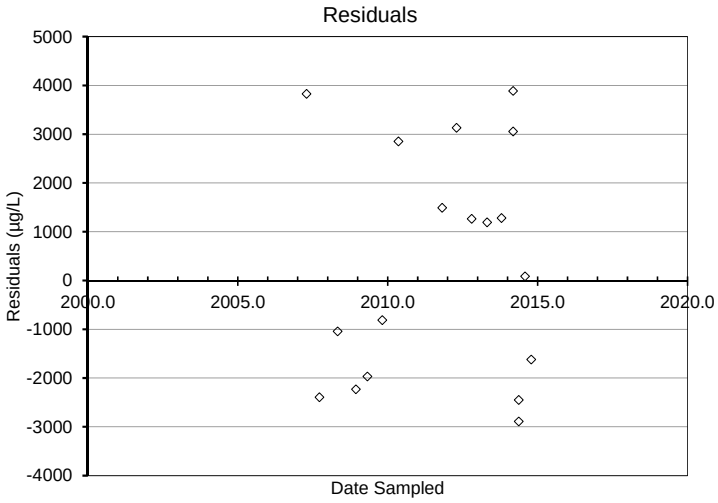
FOD 100%
Slope -0.14
p-value < 0.001
Regression residuals are biased
Slope is negative
Slope not used to estimate degradation rate

South Plume, Well ITMW-18

Date	Value	Included in Regression
2/1/1991	3700	No
11/1/1993	4500	No
12/1/1996	1600	No
2/1/1999	6300	No
3/1/2000	3560	No
9/19/2000	4080	No
3/27/2001	4000	No
3/27/2001	4200	No
9/11/2001	4100	No
9/11/2002	6700	No
2/26/2003	5110	No
9/24/2003	7700	No
4/13/2004	7740	No
9/21/2004	7050	No
4/8/2005	7080	No
9/29/2005	4660	No
3/15/2006	5750	No
10/13/2006	6600	No
4/18/2007	15000	Yes
9/21/2007	8300	Yes
4/30/2008	9000	Yes
12/9/2008	7200	Yes
4/27/2009	7100	Yes
10/27/2009	7800	Yes
5/11/2010	11000	Yes
10/26/2011	8500	Yes
4/19/2012	9800	Yes
10/19/2012	7600	Yes
4/25/2013	7200	Yes
10/17/2013	7000	Yes
3/8/2014	9380	Yes
3/8/2014	8550	Yes
5/15/2014	2500	Yes
5/15/2014	2940	Yes
7/31/2014	5360	Yes
10/15/2014	3540	Yes
12/4/2014	3690	No
1/15/2015	488	No
4/16/2015	43.5	No
7/23/2015	22.9	No
10/8/2015	12.9	No
10/8/2015	12.4	No

South Plume, Well ITMW-18
Date Range: 4/18/2007 to 10/15/2014 (ISCO Impacts Excluded)



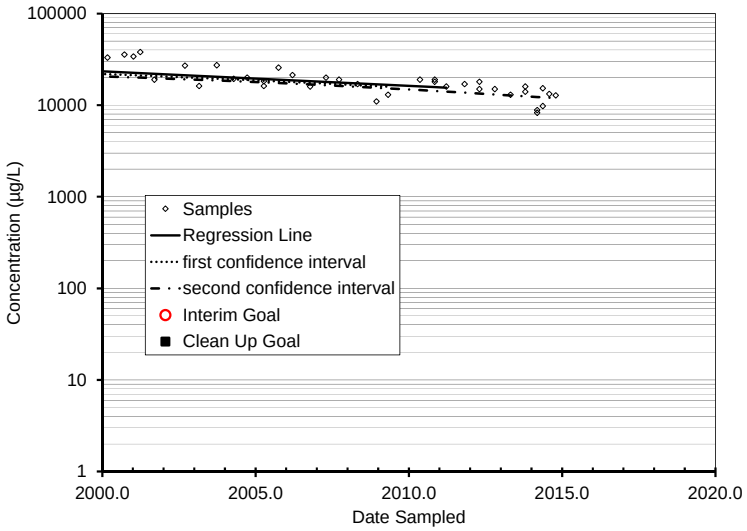


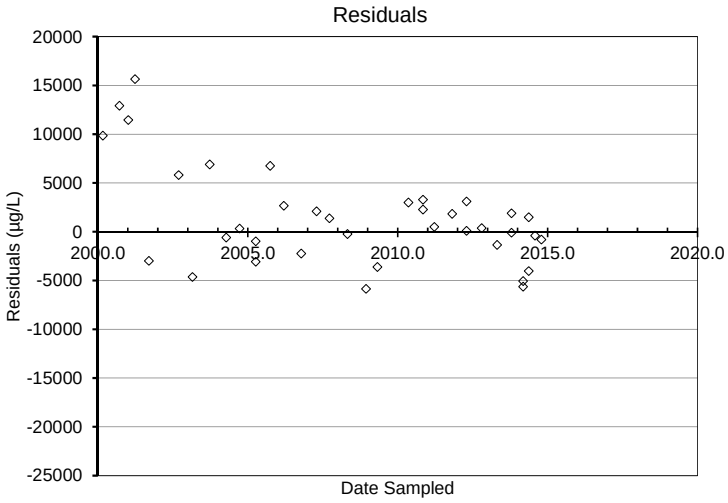
FOD 100%
Slope -0.10
p-value <0.01
Slope is negative
Regression residuals are not appropriately distributed
Slope not used to estimate degradation rate

South Plume, Well ITMW-19

Date	Value	Included in Regression
2/1/1991	9900	Yes
11/1/1993	27000	Yes
12/1/1996	25000	Yes
2/1/1999	33000	Yes
3/1/2000	33100	Yes
9/19/2000	35700	Yes
1/5/2001	34000	Yes
3/28/2001	38000	Yes
9/13/2001	19000	Yes
9/11/2002	27000	Yes
2/26/2003	16200	Yes
9/24/2003	27300	Yes
4/13/2004	19400	Yes
9/21/2004	20000	Yes
4/7/2005	18300	Yes
4/7/2005	16200	Yes
9/29/2005	25700	Yes
3/15/2006	21300	Yes
10/12/2006	16000	Yes
4/18/2007	20000	Yes
9/21/2007	19000	Yes
4/29/2008	17000	Yes
12/10/2008	11000	Yes
4/27/2009	13000	Yes
5/11/2010	19000	Yes
11/4/2010	19000	Yes
11/4/2010	18000	Yes
3/22/2011	16000	Yes
10/26/2011	17000	Yes
4/19/2012	15000	Yes
4/19/2012	18000	Yes
10/19/2012	15000	Yes
4/25/2013	13000	Yes
10/18/2013	16000	Yes
10/18/2013	14000	Yes
3/8/2014	8850	Yes
3/8/2014	8270	Yes
5/15/2014	15300	Yes
5/15/2014	9780	Yes
7/31/2014	13300	Yes
10/16/2014	12800	Yes
12/5/2014	33.5	No
1/15/2015	17.4	No
4/15/2015	594	No
7/23/2015	15.2	No
10/8/2015	87.1	No

South Plume, Well ITMW-19
Date Range: 2/1/1991 to 10/16/2014 (ISCO Impacts Excluded)



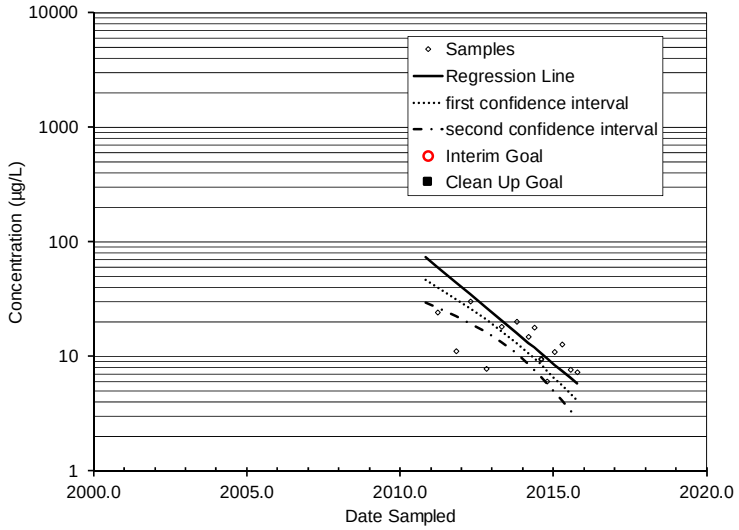


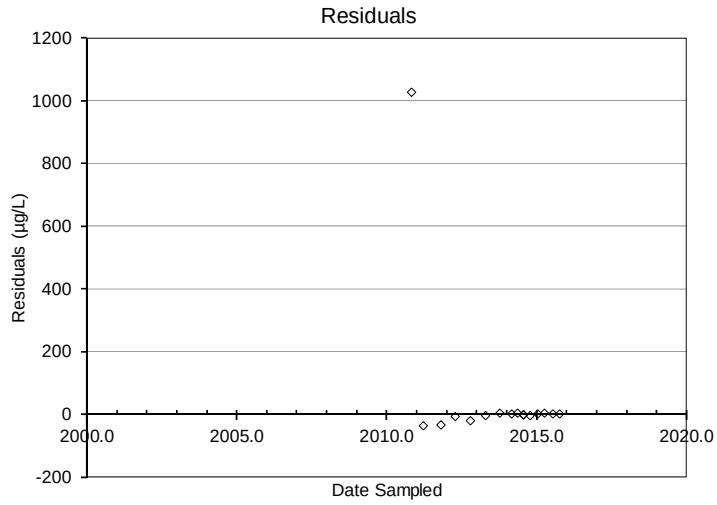
FOD 100%
Slope -0.037
p-value < 0.001
Regression residuals are potentially biased
Slope is negative
Slope not used to estimate degradation rate

South Plume, Well ITMW-21

Date	Value	Included in Regression
3/1/1991	21	No
11/1/1993	37	No
12/1/1996	150	No
2/1/1999	190	No
3/1/2000	196	No
9/19/2000	192	No
3/28/2001	123	No
9/13/2001	116	No
9/10/2002	13	No
2/26/2003	39.5	No
9/23/2003	9.09	No
4/14/2004	52.9	No
9/22/2004	7.8	No
9/28/2005	6.45	No
10/12/2006	9	No
9/21/2007	10	No
12/9/2008	15	No
10/27/2009	14	No
11/4/2010	1100	Yes
3/22/2011	24	Yes
10/25/2011	11	Yes
4/17/2012	30	Yes
10/19/2012	7.7	Yes
4/24/2013	18	Yes
10/15/2013	20	Yes
3/6/2014	14.8	Yes
5/14/2014	17.6	Yes
7/30/2014	9.3	Yes
7/30/2014	9.4	Yes
10/15/2014	6	Yes
1/14/2015	10.8	Yes
4/14/2015	12.7	Yes
7/22/2015	7.6	Yes
10/8/2015	7.2	Yes

South Plume, Well ITMW-21
Date Range: 11/4/2010 to 10/8/2015 (ISCO Impacts Excluded)



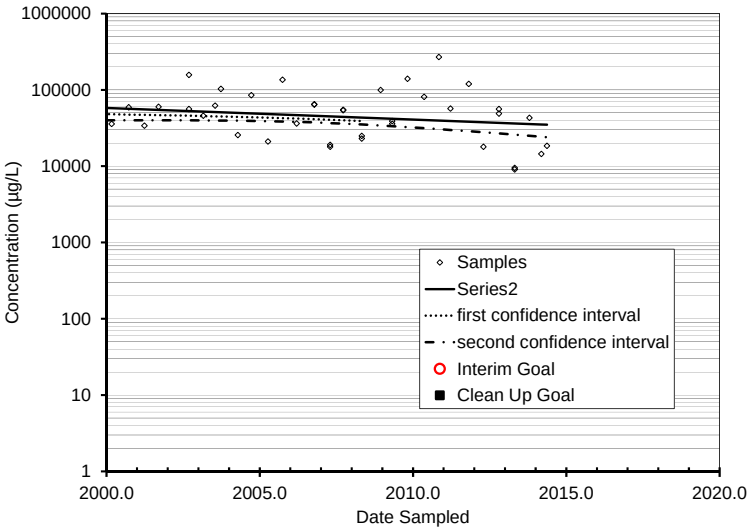


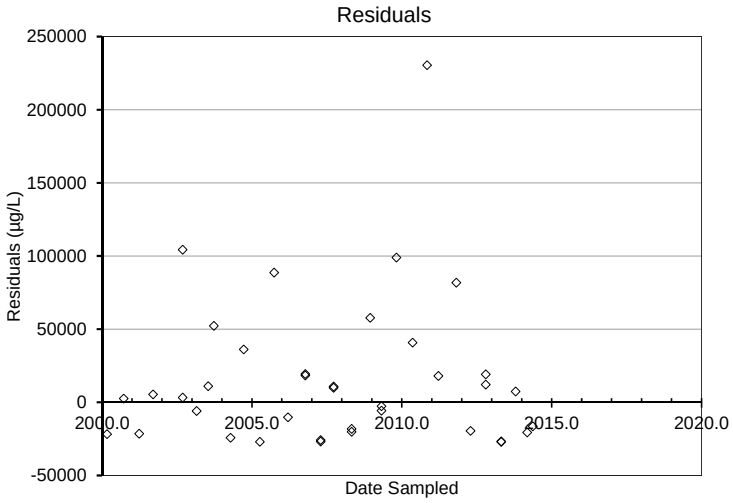
FOD 100%
Slope -0.51
p-value < 0.01
Regression residuals are potentially biased
Slope is negative
Slope not used to estimate degradation rate

South Plume, Well MW-25

Date	Value	Included in Regression
2/1/1999	29000	Yes
2/1/1999	27000	Yes
12/1/1999	94500	Yes
3/1/2000	35900	Yes
9/21/2000	59000	Yes
3/28/2001	34000	Yes
9/13/2001	60000	Yes
9/9/2002	157000	Yes
9/9/2002	56000	Yes
2/26/2003	45900	Yes
7/17/2003	62200	Yes
9/24/2003	103000	Yes
4/14/2004	25600	Yes
9/21/2004	85200	Yes
4/7/2005	21100	Yes
9/28/2005	136000	Yes
3/15/2006	36300	Yes
10/12/2006	64000	Yes
10/12/2006	65000	Yes
4/18/2007	19000	Yes
4/18/2007	18000	Yes
9/21/2007	54000	Yes
9/21/2007	55000	Yes
4/29/2008	23000	Yes
4/29/2008	25000	Yes
12/10/2008	100000	Yes
4/27/2009	36000	Yes
4/27/2009	39000	Yes
10/27/2009	140000	Yes
5/11/2010	81000	Yes
11/4/2010	270000	Yes
3/22/2011	57000	Yes
10/26/2011	120000	Yes
4/17/2012	18000	Yes
10/19/2012	56000	Yes
10/19/2012	49000	Yes
4/25/2013	9100	Yes
4/25/2013	9500	Yes
10/18/2013	43000	Yes
3/8/2014	14500	Yes
5/15/2014	18500	Yes
7/9/2014	49900	*No*
7/31/2014	71700	*No*
10/16/2014	42500	*No*
10/24/2014	59800	*No*
12/5/2014	2620	*No*
1/15/2015	2510	*No*
4/16/2015	4650	*No*
7/23/2015	39800	*No*
10/8/2015	68700	*No*

South Plume, Well MW-25
Date Range: 2/1/1999 to 5/15/2014 (ISCO Impacts Excluded)



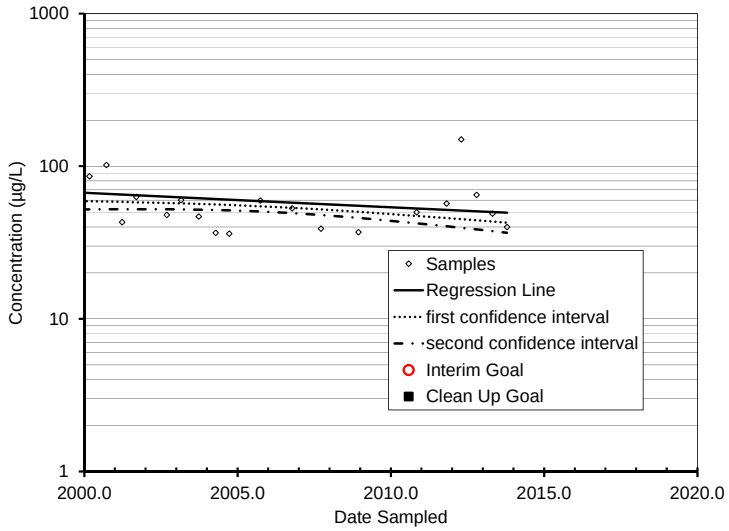


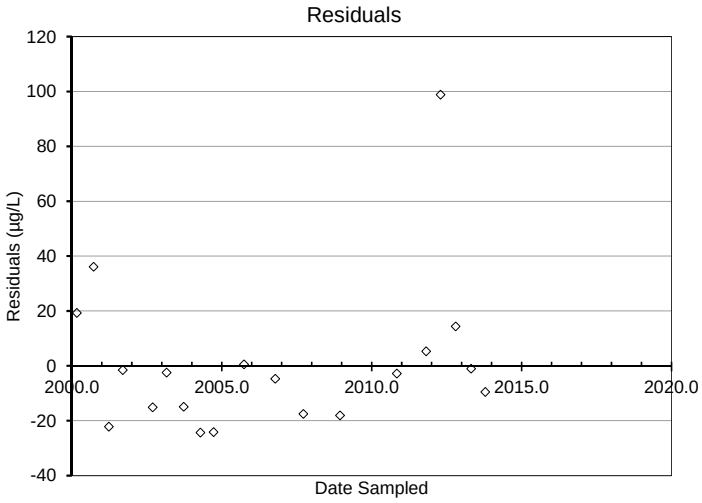
FOD 100%
Slope -0.04
p-value > 0.05
Regression residuals are appropriately distributed
Slope trend is not significant
Slope used to estimate degradation rate

South Plume, Well MW-30

Date	Value	Included in Regression
12/1/1999	115	Yes
12/9/1999	115	Yes
3/1/2000	86	Yes
9/20/2000	102	Yes
3/27/2001	43	Yes
9/11/2001	63	Yes
9/10/2002	48	Yes
2/27/2003	60	Yes
9/24/2003	46.8	Yes
4/14/2004	36.6	Yes
9/22/2004	36.2	Yes
9/28/2005	59.6	Yes
10/12/2006	53	Yes
9/20/2007	39	Yes
12/10/2008	37	Yes
11/3/2010	50	Yes
10/26/2011	57	Yes
4/18/2012	150	Yes
10/18/2012	65	Yes
4/25/2013	49	Yes
10/14/2013	40	Yes

South Plume, Well MW-30
Date Range: 12/1/1999 to 10/14/2013



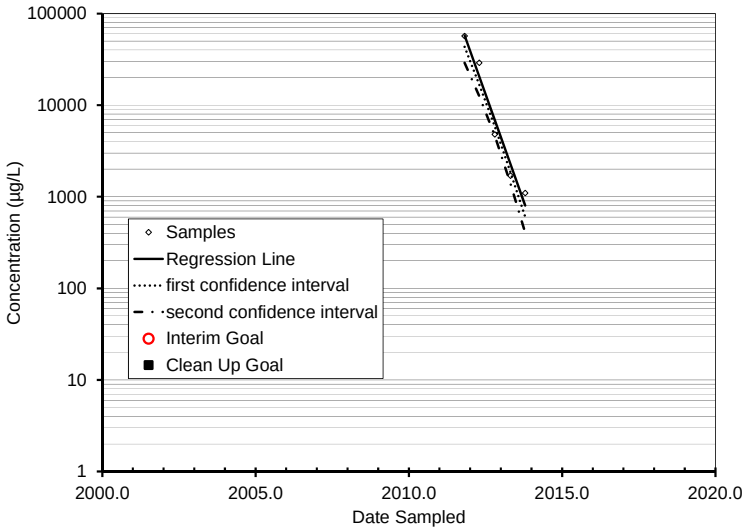


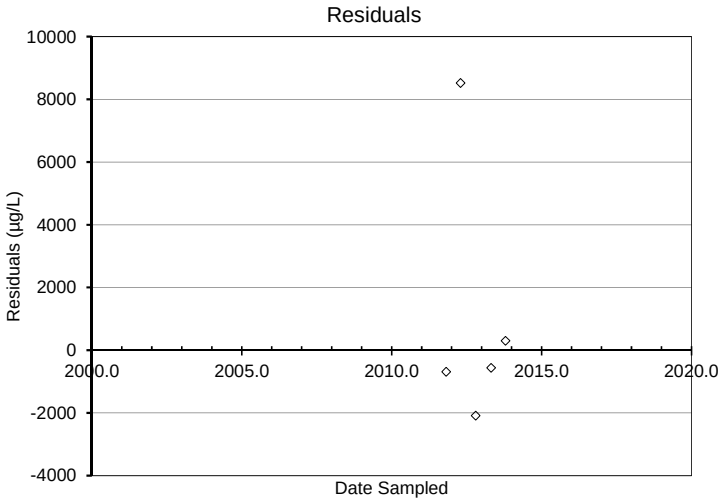
FOD 100%
Slope -0.022
p-value >0.05
Regression residuals are appropriately distributed
Slope trend is not significant
Slope used to estimate degradation rate

South Plume, Well MW-37

Date	Value	Included in Regression
9/14/2001	5000	No
11/20/2001	2.5	No
9/11/2002	1400	No
2/27/2003	4050	No
7/17/2003	2560	No
9/24/2003	3700	No
4/13/2004	5190	No
9/21/2004	5030	No
4/5/2005	5310	No
9/29/2005	6780	No
3/16/2006	11200	No
10/13/2006	13000	No
10/13/2006	13000	No
4/19/2007	9490	No
9/21/2007	22000	No
4/30/2008	16000	No
12/10/2008	24000	No
4/27/2009	11000	No
10/27/2009	37000	No
5/11/2010	33000	No
11/4/2010	54000	No
3/22/2011	36000	No
10/26/2011	57000	Yes
4/18/2012	29000	Yes
10/19/2012	4800	Yes
4/25/2013	1700	Yes
10/17/2013	1100	Yes

South Plume, Well MW-37
Date Range: 10/26/2011 to 10/17/2013 (ISCO Impacts Excluded)



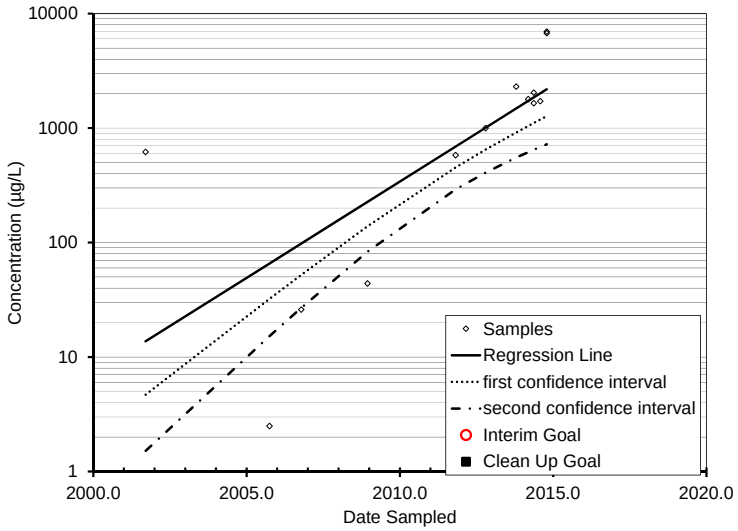


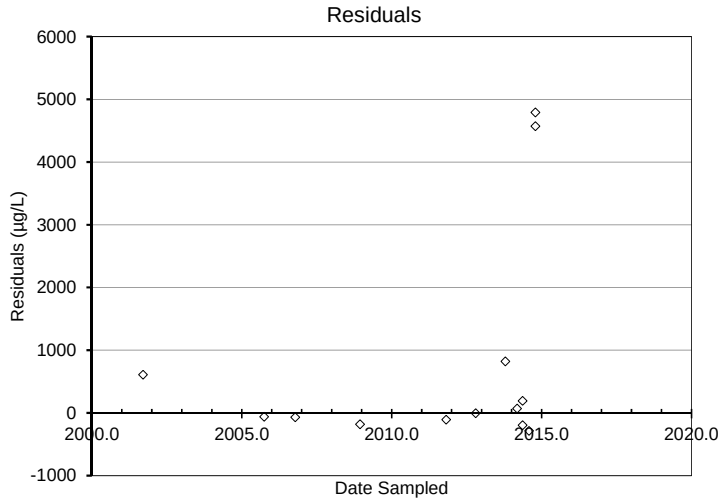
FOD 96%
Slope -2.2
p-value <0.001
Slope is negative
Regression residuals are not appropriately distributed
Slope not used to estimate degradation rate

South Plume, Well MW-38

Date	Value	Included in Regression
9/14/2001	620	Yes
9/29/2005	2.5	Yes
10/13/2006	26	Yes
12/10/2008	44	Yes
10/26/2011	580	Yes
10/18/2012	1000	Yes
10/16/2013	2300	Yes
3/8/2014	1790	Yes
5/14/2014	2040	Yes
5/14/2014	1650	Yes
7/31/2014	1720	Yes
10/16/2014	6970	Yes
10/16/2014	6750	Yes
12/4/2014	3190	No
1/15/2015	3910	No
1/15/2015	5440	No
4/16/2015	3060	No
7/23/2015	3420	No
12/4/2014	3190	No

South Plume, Well MW-38
Date Range: 9/14/2001 to 10/16/2014 (ISCO Impacts Excluded)





FOD 92%
Slope 0.38
p-value <0.01
Slope is positive
Regression residuals are not appropriately distributed
Slope not used to estimate degradation rate

APPENDIX D

Plume Regression for cis-1,2-Dichloroethene and Vinyl Chloride

As discussed in Section 4.4 of the text, the use of monitored natural attenuation (MNA) carries with it an expectation of achieving site specific remedial action objectives within a certain timeframe. To examine the time to reach remedial action objectives, trends of contaminant concentrations were reviewed, regression analysis was performed, and this information was used to simulate site specific degradation of the main contaminant [trichloroethylene (TCE)] over time.

The breakdown of TCE daughter products [(cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC)] is another line of evidence for the occurrence of natural attenuation. However, it is important to evaluate the rate of cis-1,2-DCE and VC creation and degradation over time, especially as the build-up of these constituents can occur if breakdown does not keep pace with the creation of daughter products as TCE degrades.

A discussion of the regression analysis for TCE is included in Section 4.4.1 of the text (See Appendix E). Regression analysis was also performed at site specific individual monitoring wells for cis-1,2-DCE and VC. Data used for this analysis included historic sampling events beginning in 2000 and ending with the fourth quarter of 2015. Each individual well data set was reviewed and chemical concentrations that were recorded as non-detect or were detected at lower than one-half of the method detection limit were set to one-half the method detection limit value. The frequency of detection (FOD) in lab data was used to initially determine the quality of the data during the MNA evaluations. The regression model for each constituent was considered to be invalid if the FOD for an analyte was below 50%. Estimated concentrations were considered as detected values, which in each instance resulted in a higher or more conservative assumed concentration. The regression of log transformed concentration data was then used to calculate the slopes for each specific well.

The output of this evaluation includes a regression curve, a slope and a graph of the regression residuals for the daughter products present at each well (cis-1,2-DCE and VC). The regression trend line documents whether the trend at the well being evaluated for a particular chemical of interest is increasing, not significant, or decreasing. The residuals graphs from the regression were evaluated to verify if the model fits the measured values at each well and meets the statistical assumptions of linear regression. Valid models produced residuals graphs with random deviations from the measured values, homogenous variances and no temporal trends, while poor models presented systematic or structured regression residuals. The goal of this regression analysis was to estimate slopes that characterize the ‘average or representative’ rate of reduction in the concentrations. These slopes can then be used to determine the degradation rate constants or half-lives.

The historical contaminant concentration trends at a given location are a function of various factors: groundwater velocity, flow direction, retardation, concentration distribution, reaction rates, etc. For the MNA analysis, the regression lines were fit to measured Site data and the slopes reflect the combined influence of all these Site-specific factors. Additional conservatism was applied to the analysis since wells that show impacts from the ISCO or ISCR injections were analyzed by excluding sampling events that occurred after the injection to address and

normalize statistical biases (excluding data which typically indicated significant TCE reductions) and some wells were refined by determining the maximum historic concentration of a respective analyte and only including data from that specific sampling event forward.

To represent the overall TCE degradation rate for the both the North Plume and the South Plume, the regression slope values for wells in the North Plume with declining concentration trends were averaged, resulting in an average value of -0.15 (Appendix E). The regression slope values for wells in the South Plume with declining concentration trends were also averaged, resulting in a value of -0.15 (Appendix E).

The same averaging process for the regression slope values was completed for cis-1,2-DCE and VC in the North Plume and the South Plume. The data from wells that may have been excluded based upon TCE regression analysis are considered for cis-1,2-DCE and VC since the data set for each constituents is assessed independently. The wells and corresponding slope values are listed in the tables below .The data tables and regression results for each of these individual wells are provided at the end of this appendix. The

CIS-1,2-DCE

North Plume		South Plume	
Location	**Slope [a]**	**Location**	**Slope [a]**
IW-76	-0.24	ITMW-1	-0.02
MW-81	-0.73	ITMW-13	-0.10
RW-69	-0.10	ITMW-17	-0.05
		ITMW-7	-0.12
Average	-0.36	Average	-0.07

VINYL CHLORIDE

North Plume		South Plume	
Location	**Slope [a]**	**Location**	**Slope [a]**
NA	---	MW-38	-0.33
Average	---	Average	-0.33

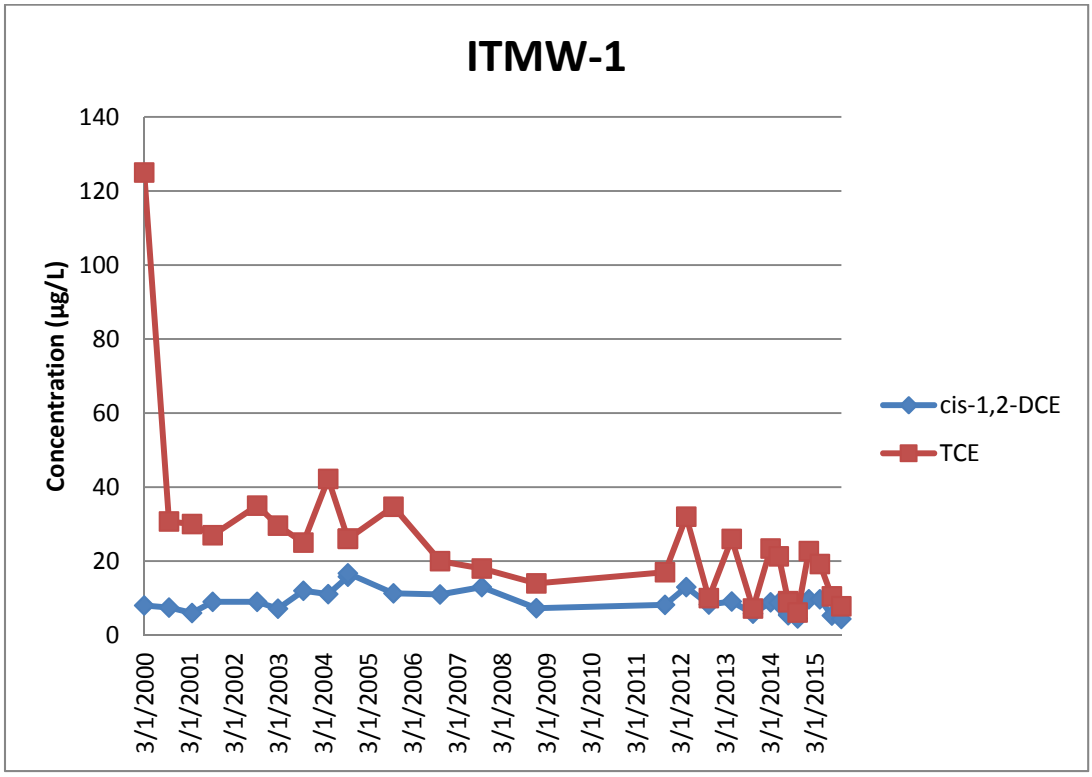
[a] Slopes in units of ln(µg/L)/year

The average cis-1,2-DCE slopes are -0.36 for the northern plume and -0.07 for the southern plume. No wells with valid regression were identified for VC in the northern plume and a value of -0.33 was identified for the southern plume (as shown on the tables above).

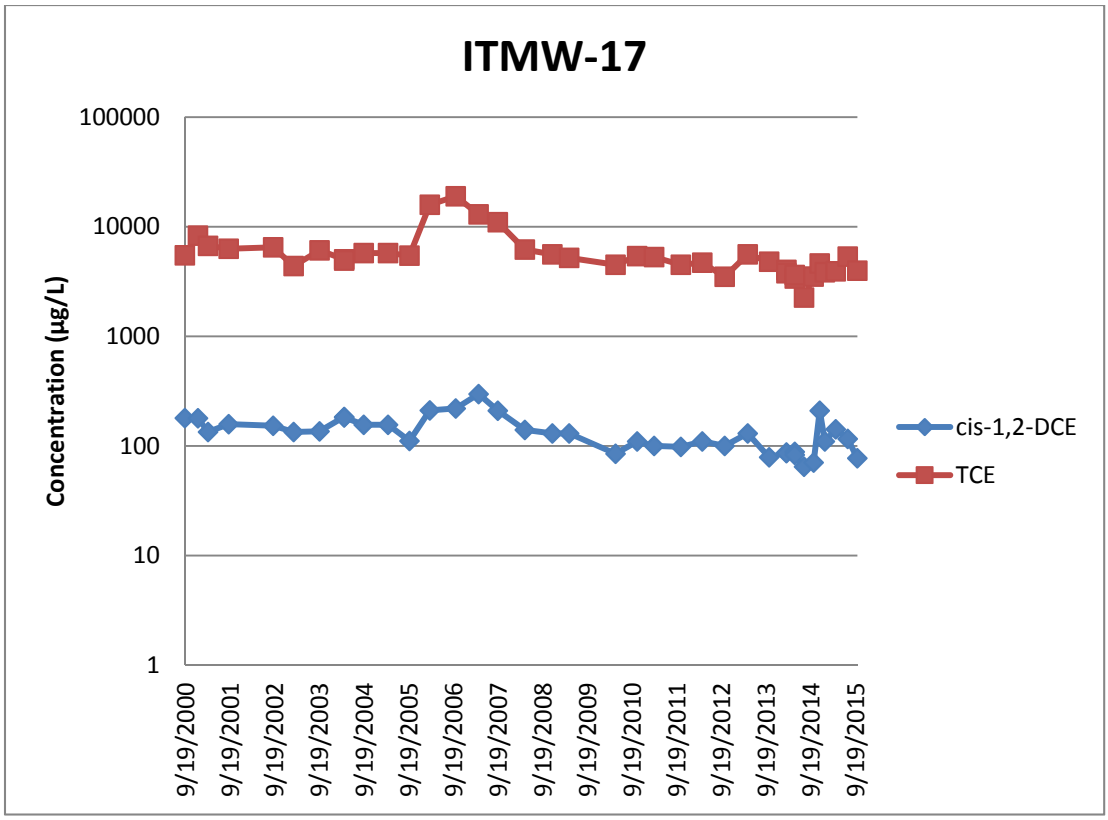
The northern plume cis-1,2-DCE and southern plume VC degradation rates are much more rapid than the TCE degradation rates for both the north and south plume of 0.15 ln(µg/L)/year. Therefore, the daughter products(when the daughter products are detected) are degrading

faster than the degradation/bioremediation cycle can create them and therefore a “stall” or potential high level of these breakdown products is not likely.

The degradation rate of cis-1,2-DCE in the southern plume is 0.07 ln(µg/L)/year is less than the TCE rate of 0.15 ln(µg/L)/year. However a review of the cis-1,2-DCE concentrations at the locations in the southern plume with the shallowest slopes [ITMW-1 (slope of -0.02) and ITMW-17 (slope of -0.05)], shows an increasing cis-1,2-DCE trend at ITMW-1 until September 2004, at which point the slope (or decreasing trend) steepens. Also fluctuations of cis-1,2-DCE after September 2004 appear to trend fluctuations in TCE, although to a lesser amplitude as shown below.



ITMW-17 also had a fairly shallow regression slope (-0.05) for cis-1,2-DCE. A review of the TCE and cis-1,2-DCE data from this location shows that the cis-1,2-DCE is matching the pattern of TCE concentration fairly well as shown in the chart below. Therefore cis-1,2-DCE is not increasing as a result of a MNA stall.



The northern plume degradation rate for VC could not be calculated as only one well (IW-73) contained a sufficient amount of VC data necessary for statistical evaluation via regression analysis. However, the concentration of VC at IW-73 as of October 2015 was 0.59 µg/L (J flagged), therefore VC is not being generated at this location in sufficient quantities to affect remedial action levels.

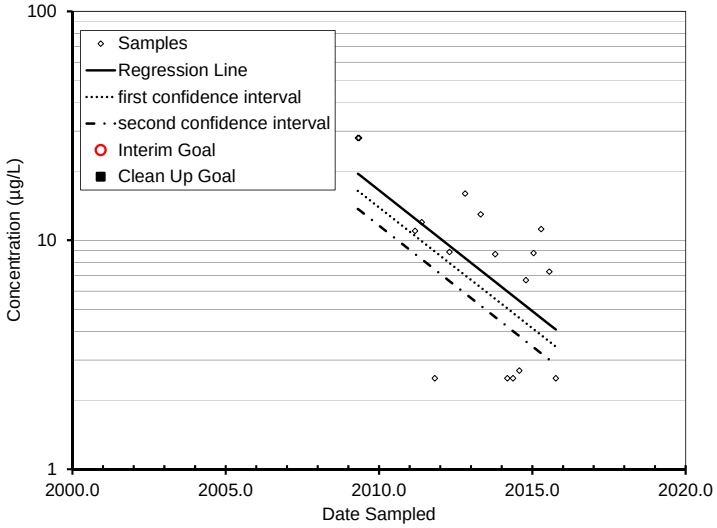
VC is not detected in the north plume at sufficient quantities to be of concern during future degradation of the north plume; however, monitoring will continue to assess VC conditions in the north plume. Cis-1,2-DCE concentration trends appear to be mimicking the TCE concentrations trends; therefore, cis-1,2-DCE concentrations are not expected to increase as a result of future degradation of the south plume.

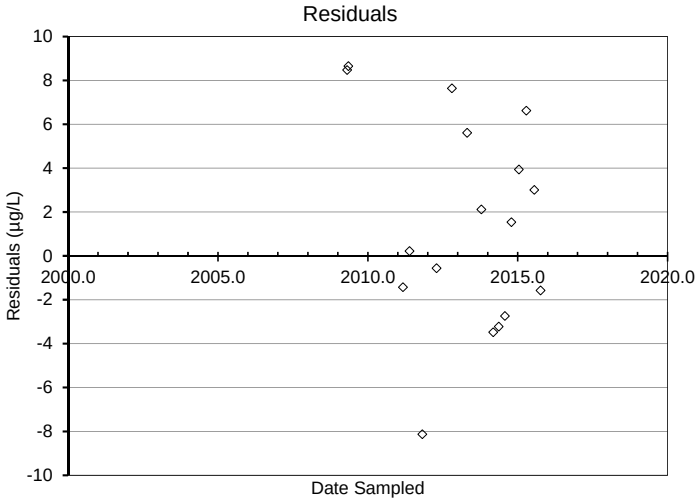
Individual Well Analyses

North Plume, Well IW-76
Cis-1,2-dichloroethene

Date	Value	Included in Regression
4/23/2009	28	Yes
5/7/2009	28	Yes
3/4/2011	11	Yes
5/23/2011	12	Yes
10/25/2011	2.5	Yes
4/17/2012	8.9	Yes
10/20/2012	16	Yes
4/24/2013	13	Yes
10/15/2013	8.7	Yes
3/8/2014	2.5	Yes
5/14/2014	2.5	Yes
7/29/2014	2.7	Yes
10/15/2014	6.7	Yes
1/14/2015	8.8	Yes
4/15/2015	11.2	Yes
7/21/2015	7.3	Yes
10/6/2015	2.5	Yes

North Plume, Well IW-76
Cis-1,2-dichloroethene
Date Range: 4/23/2009 to 10/6/2015





FOD 94%
Slope -0.24
p-value < 0.01
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

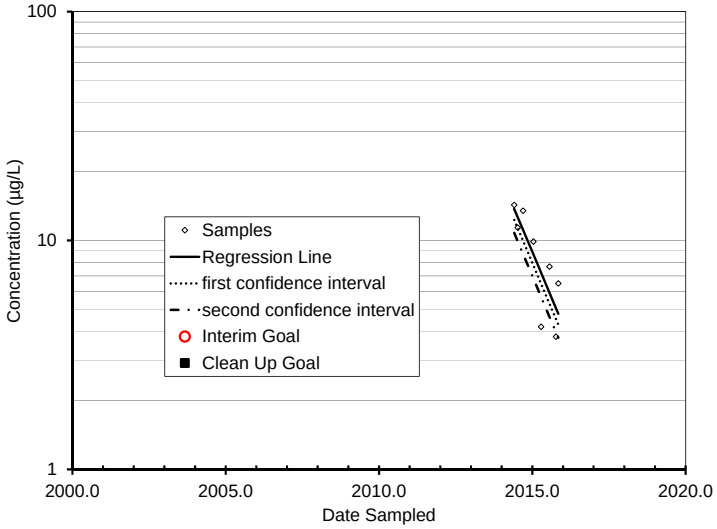
North Plume, Well MW-81
Cis-1,2-dichloroethene

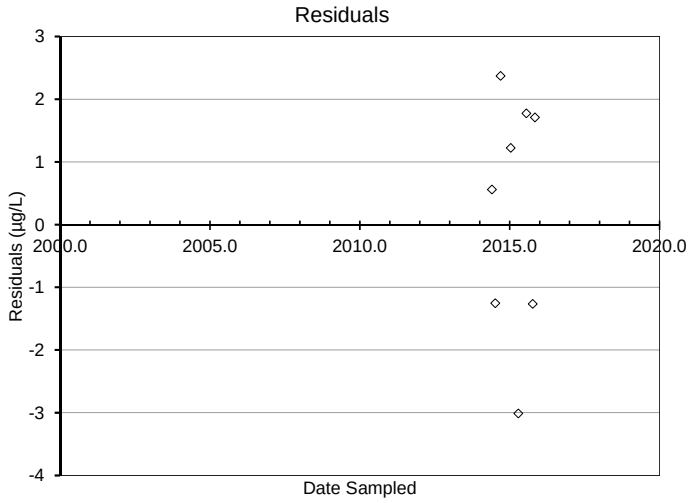
Date	Value	Included in Regression
5/29/2014	14.3	**Yes**
7/9/2014	11.4	**Yes**
9/11/2014	13.5	**Yes**
1/13/2015	9.9	**Yes**
4/15/2015	4.2	**Yes**
7/22/2015	7.7	**Yes**
10/8/2015	3.8	**Yes**
11/5/2015	6.5	**Yes**

North Plume, Well MW-81

Cis-1,2-dichloroethene

Date Range: 5/29/2014 to 11/5/2015





FOD 100%
Slope -0.73
p-value < 0.05
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

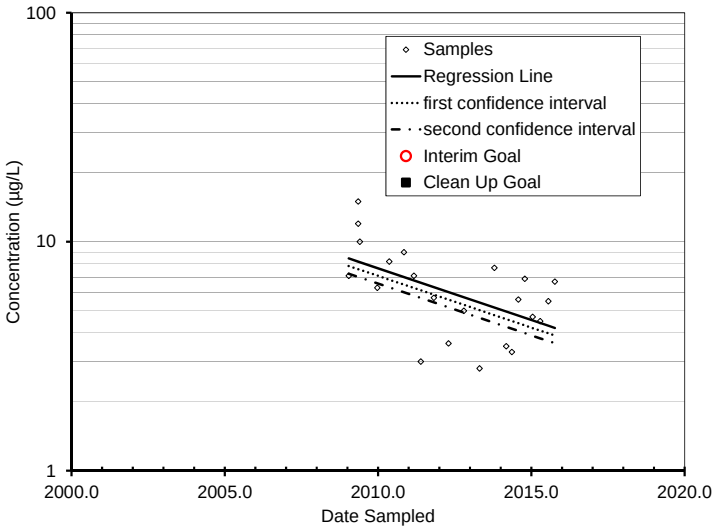
North Plume, Well RW-69
Cis-1,2-dichloroethene

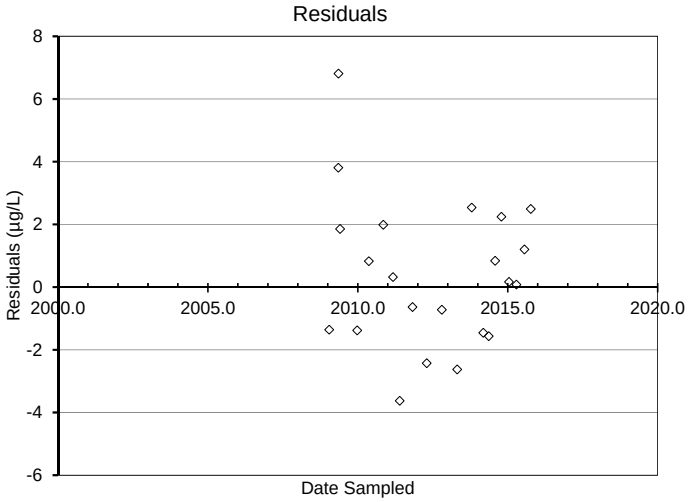
Date	Value	Included in Regression
1/15/2009	7.1	Yes
4/24/2009	5	Yes
5/7/2009	12	Yes
5/8/2009	15	Yes
5/27/2009	10	Yes
12/21/2009	6.3	Yes
5/13/2010	8.2	Yes
11/4/2010	9	Yes
3/3/2011	7.1	Yes
5/23/2011	3	Yes
10/26/2011	5.7	Yes
4/18/2012	3.6	Yes
10/18/2012	5	Yes
4/23/2013	2.8	Yes
10/16/2013	7.7	Yes
3/7/2014	3.5	Yes
5/13/2014	3.3	Yes
7/29/2014	5.6	Yes
10/14/2014	6.9	Yes
1/14/2015	4.7	Yes
4/14/2015	4.5	Yes
7/21/2015	5.5	Yes
10/6/2015	6.7	Yes

North Plume, Well RW-69

Cis-1,2-dichloroethene

Date Range: 1/15/2009 to 10/6/2015





FOD 100%
Slope -0.10
p-value < 0.01
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

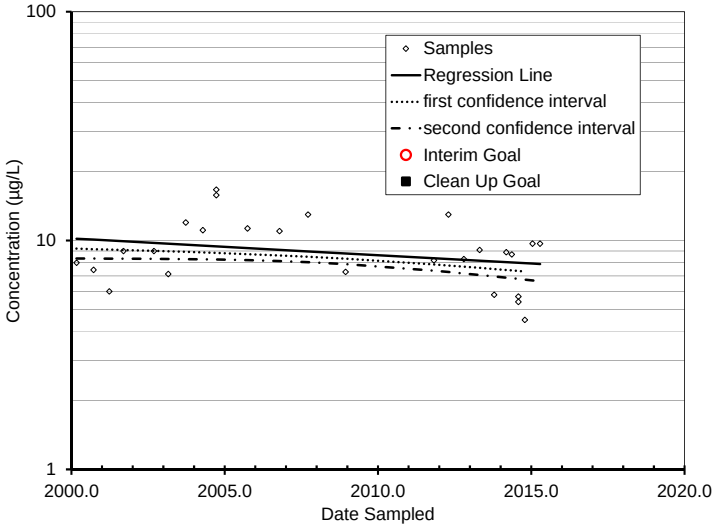
South Plume, Well ITMW-1
Cis-1,2-dichloroethene

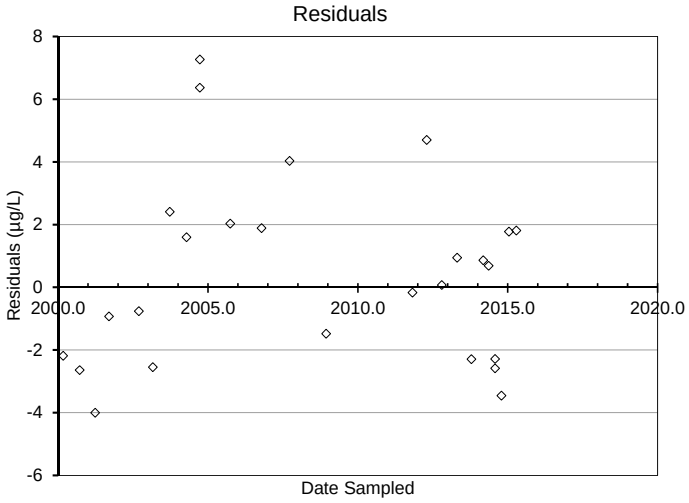
Date	Value	Included in Regression
3/1/2000	8	Yes
9/19/2000	7.45	Yes
3/27/2001	6	Yes
9/11/2001	9	Yes
9/10/2002	9	Yes
2/27/2003	7.14	Yes
9/23/2003	12	Yes
4/13/2004	11.1	Yes
9/21/2004	16.7	Yes
9/21/2004	15.8	Yes
9/28/2005	11.3	Yes
10/14/2006	11	Yes
9/20/2007	13	Yes
12/9/2008	7.3	Yes
10/27/2011	8.2	Yes
4/18/2012	13	Yes
10/19/2012	8.3	Yes
4/24/2013	9.1	Yes
10/15/2013	5.8	Yes
3/8/2014	8.9	Yes
5/13/2014	8.7	Yes
7/30/2014	5.7	Yes
7/30/2014	5.4	Yes
10/15/2014	4.5	Yes
1/14/2015	9.7	Yes
4/15/2015	9.7	Yes
7/22/2015	5.3	Yes
10/7/2015	4.4	Yes

South Plume, Well ITMW-1

Cis-1,2-dichloroethene

Date Range: 3/1/2000 to 10/7/2015





FOD 100%
Slope -0.02
p-value > 0.05
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

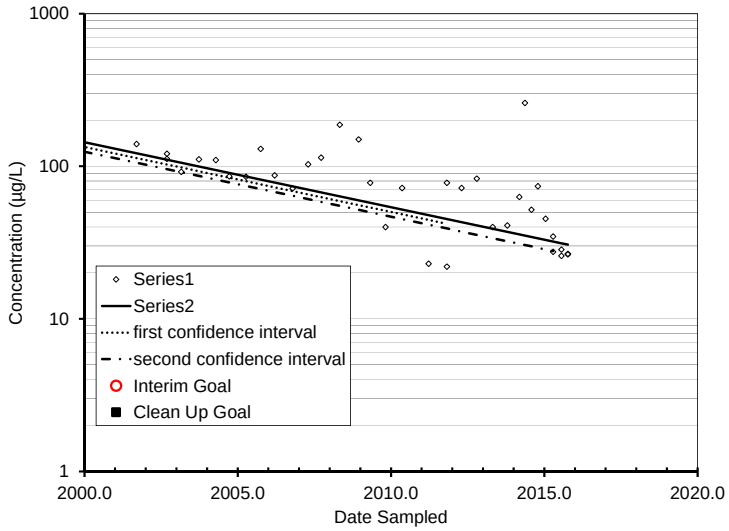
South Plume, Well ITMW-13
Cis-1,2-dichloroethene

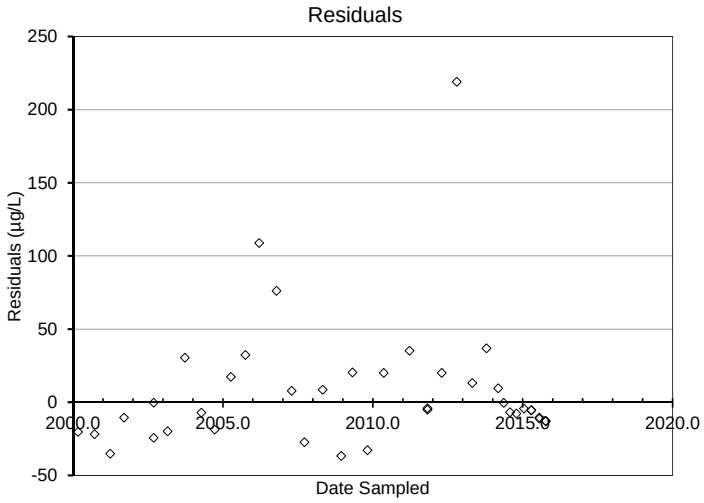
Date	Value	Included in Regression
2/1/1999	140	Yes
3/1/2000	121	Yes
9/19/2000	112	Yes
3/28/2001	92	Yes
9/13/2001	111	Yes
9/9/2002	110	Yes
9/9/2002	86	Yes
2/26/2003	85.5	Yes
9/24/2003	130	Yes
4/13/2004	87.2	Yes
9/21/2004	71.6	Yes
4/7/2005	103	Yes
9/30/2005	114	Yes
3/16/2006	187	Yes
10/14/2006	150	Yes
4/18/2007	78	Yes
9/20/2007	40	Yes
4/29/2008	72	Yes
12/10/2008	23	Yes
4/27/2009	78	Yes
10/27/2009	22	Yes
5/12/2010	72	Yes
3/23/2011	83	Yes
10/27/2011	40	Yes
10/27/2011	41	Yes
4/19/2012	63	Yes
10/18/2012	260	Yes
4/25/2013	52	Yes
10/16/2013	74	Yes
3/8/2014	45.3	Yes
5/14/2014	34.7	Yes
7/30/2014	27.5	Yes
10/15/2014	25.9	Yes
1/14/2015	28.5	Yes
4/15/2015	26.5	Yes
4/15/2015	26.7	Yes
7/22/2015	20.1	Yes
7/22/2015	20.8	Yes
10/7/2015	17.6	Yes
10/7/2015	17.8	Yes

South Plume, Well ITMW-13

Cis-1,2-dichloroethene

Date Range: 2/1/1999 to 10/7/2015





FOD 100%
Slope -0.10
p-value <0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

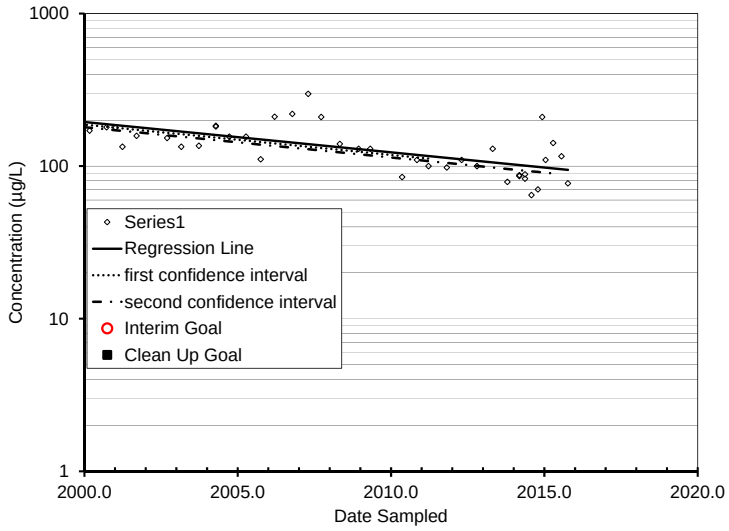
South Plume, Well ITMW-17
Cis-1,2-dichloroethene

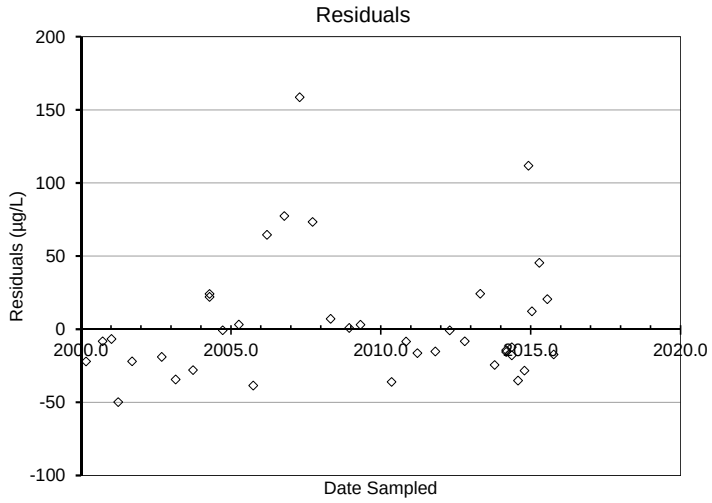
Date	Value	Included in Regression
2/1/1999	240	Yes
3/1/2000	171	Yes
9/19/2000	180	Yes
1/5/2001	179	Yes
3/28/2001	134	Yes
9/13/2001	158	Yes
9/11/2002	153	Yes
2/26/2003	134	Yes
9/25/2003	136	Yes
4/14/2004	184	Yes
4/14/2004	182	Yes
9/21/2004	156	Yes
4/7/2005	156	Yes
9/29/2005	111	Yes
3/15/2006	211	Yes
10/12/2006	220	Yes
4/18/2007	298	Yes
9/21/2007	210	Yes
4/29/2008	140	Yes
12/10/2008	130	Yes
4/27/2009	130	Yes
5/11/2010	85	Yes
11/4/2010	110	Yes
3/22/2011	100	Yes
10/26/2011	98	Yes
4/19/2012	110	Yes
10/19/2012	100	Yes
4/25/2013	130	Yes
10/17/2013	79	Yes
3/8/2014	86.1	Yes
3/8/2014	87.3	Yes
5/15/2014	88.5	Yes
5/15/2014	82.9	Yes
7/30/2014	64.7	Yes
10/16/2014	70.5	Yes
12/5/2014	210	Yes
1/15/2015	110	Yes
4/15/2015	142	Yes
7/22/2015	116	Yes
10/8/2015	77.2	Yes

South Plume, Well ITMW-17

Cis-1,2-dichloroethene

Date Range: 2/1/1999 to 10/8/2015





FOD 100%
Slope -0.05
p-value <0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

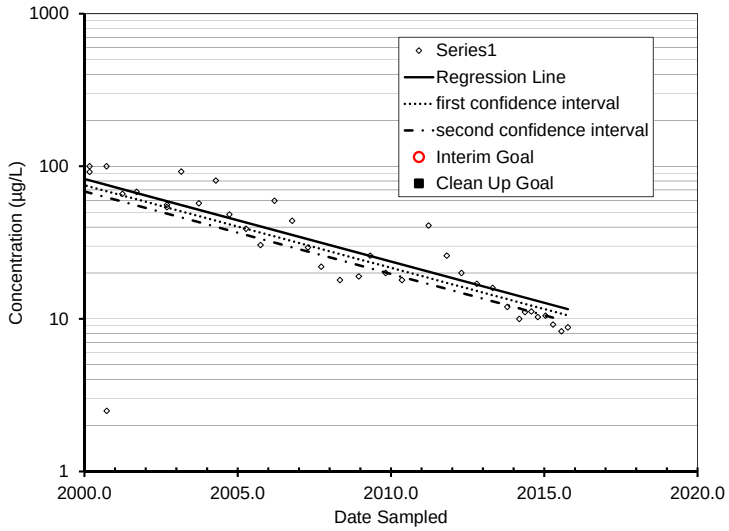
South Plume, Well ITMW-7
Cis-1,2-dichloroethene

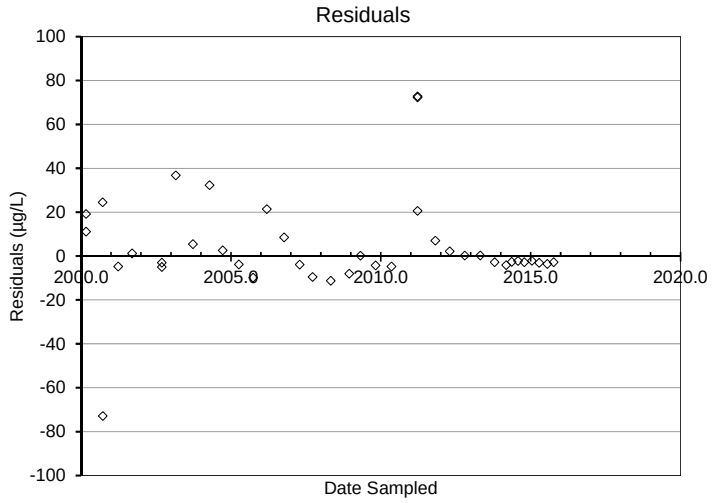
Date	Value	Included in Regression
5/1/1997	180	Yes
6/1/1999	144	Yes
6/1/1999	140	Yes
3/1/2000	100	Yes
3/1/2000	92	Yes
9/19/2000	100	Yes
9/21/2000	2.5	Yes
3/28/2001	66	Yes
9/13/2001	68	Yes
9/10/2002	56	Yes
9/10/2002	54	Yes
2/27/2003	92.5	Yes
9/24/2003	57.3	Yes
4/14/2004	80.7	Yes
9/22/2004	48.4	Yes
4/7/2005	39	Yes
9/28/2005	30.5	Yes
3/14/2006	59.5	Yes
10/10/2006	44	Yes
4/17/2007	29.4	Yes
9/21/2007	22	Yes
4/30/2008	18	Yes
12/11/2008	19	Yes
4/27/2009	26	Yes
10/28/2009	20	Yes
5/10/2010	18	Yes
3/23/2011	41	Yes
3/23/2011	92.7	Yes
3/23/2011	93.2	Yes
10/25/2011	26	Yes
4/18/2012	20	Yes
10/18/2012	17	Yes
4/25/2013	16	Yes
10/17/2013	12	Yes
3/8/2014	10	Yes
5/14/2014	11.1	Yes
7/30/2014	11.2	Yes
10/15/2014	10.3	Yes
1/14/2015	10.5	Yes
4/14/2015	9.2	Yes
7/22/2015	8.3	Yes
10/8/2015	8.8	Yes

South Plume, Well ITMW-7

Cis-1,2-dichloroethene

Date Range: 5/1/1997 to 10/8/2015





FOD 100%
Slope -0.12
p-value <0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate

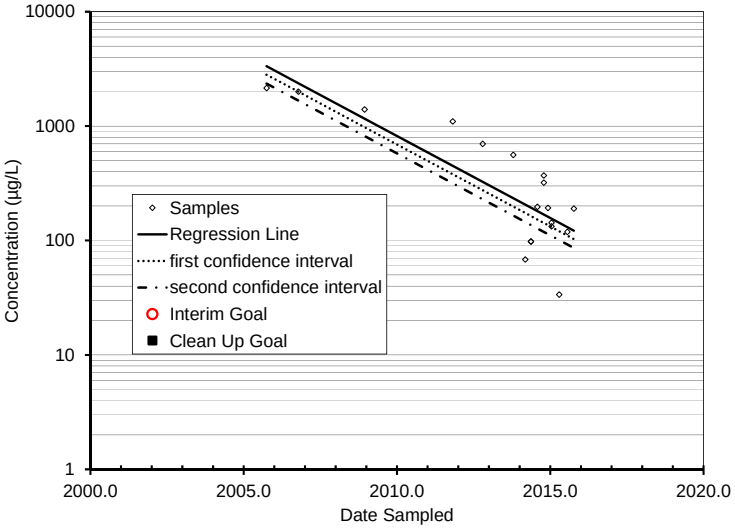
South Plume, Well MW-38
Vinyl chloride

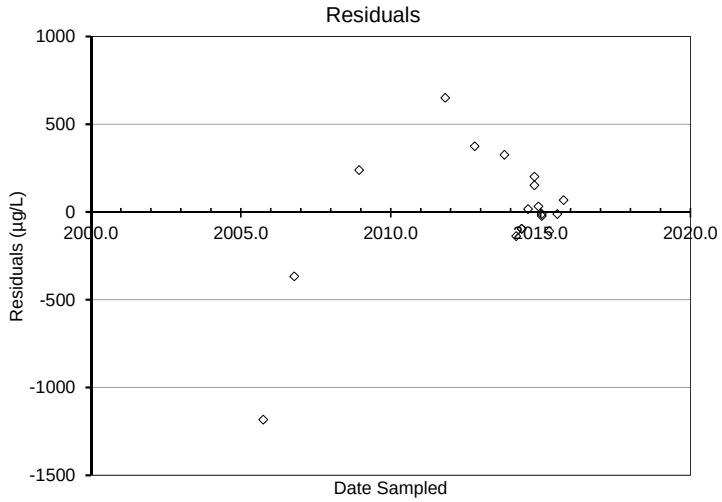
Date	Value	Included in Regression
9/29/2005	2150	Yes
10/13/2006	2000	Yes
12/10/2008	1400	Yes
10/26/2011	1100	Yes
10/18/2012	700	Yes
10/16/2013	560	Yes
3/8/2014	68.4	Yes
5/14/2014	98.2	Yes
5/14/2014	97.9	Yes
7/31/2014	197	Yes
10/16/2014	370	Yes
10/16/2014	321	Yes
12/4/2014	193	Yes
1/15/2015	133	Yes
1/15/2015	143	Yes
4/16/2015	33.7	Yes
7/23/2015	119	Yes
10/8/2015	190	Yes

South Plume, Well MW-38

Vinyl chloride

Date Range: 9/14/2001 to 10/8/2015





FOD 100%
Slope -0.33
p-value <0.001
Regression residuals are appropriately distributed
Slope is negative
Regression fit is acceptable
Slope used to estimate degradation rate